

Short dissemination document to inform the public about E-PRTR Maps on Releases from Diffuse Sources into Air

Maps of emission releases to air for the pollutants NO_x, SO₂, NH₃, PM10, CO and CO₂ from diffuse sources related to **industrial, non-industrial combustion, road transport, domestic and international navigation, domestic aviation and agricultural activities**. Two different emission data bases, based on officially reported data from the Member States, are combined in order to derive diffuse emissions to air:

- submissions from the countries to the UNECE under the Convention on Long-range Transboundary Air Pollution (CLRTAP)¹ for the pollutants NO_x, PM10, SO₂, CO and NH₃, and
- CO₂ emission data from the respective national submissions to the UNFCCC².

The area covered within the maps comprises all EU27 Member states and the 4 EFTA countries (Switzerland, Liechtenstein, Norway and Iceland), including the 12 nautic mile zones. The reference year selected for the diffuse emission to derive E-PRTR maps is 2008. The gridded emissions presented here have been processed using a consistent methodology developed at EU level on the basis of the latest scientific knowledge for the compilation of the maps of diffuse emissions released into air. Sector specific shares of NO_x-, PM10-, SO₂-, CO-, NH₃- and CO₂- emissions have been derived for distinguishing into E-PRTR related sources, diffuse sources which have been spatially resolved and other diffuse sources which have not been taken into account.

The subtraction approach used to derive diffuse emissions from industrial sources

The emission data officially reported to CLRTAP and UNFCCC by the Member States include E-PRTR related emissions as well as non-E-PRTR related emissions, which are defined as diffuse, here.

- The CLRTAP data set is applied for CO, NO_x, SO₂, PM10 and NH₃ emissions
- The UNFCCC data set is applied for CO₂ emissions

For spatial resolving of diffuse sources have been applied a subtraction methodology. The main step of this subtraction procedure was the identification of CLRTAP and UNFCCC related subsectors which are covered by E-PRTR related activities. The CLRTAP and UNFCCC sector reporting structure have been categorized as follows:

- A – Industrial related sectors covered completely by the E-PRTR reporting system,
- B – Industrial sectors partly covered by the E-PRTR reporting system
- C – Agricultural sectors partly covered by the E-PRTR reporting system
- D – Sectors not covered by the E-PRTR reporting system.

Residential and commercial combustion, road transport, domestic and international navigation and

¹ <http://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-convention-on-long-range-transboundary-air-pollution-lrtap-convention-4> (downloaded at 12th July 2010)

² <http://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-4> (downloaded at 12th July 2010, Version 11)

domestic aviation activities are not covered by the E-PRTR reporting system and have been allocated to category D.

The applied subtraction methodology aggregated emissions from industrial related activities officially reported to CLRTAP and UNFCCC by the Member States to the categories A and B, defined above. The agricultural sector related emissions have been aggregated to country specific sums for the category C. The aggregated country specific emissions reported to E-PRTR are subtracted in a second step from the aggregated country specific emissions reported to CLRTAP/UNFCCC. The results of the applied subtraction methodology represent the diffuse shares of national total emissions. The resulted differences are reallocated to the CLRTAP and UNFCCC sector structure, but only to category B related sectors. For countries where the E-PRTR emissions higher than the CLRTAP/UNFCCC industrial activities related emissions a methodology for compiling diffuse emissions has been developed. This methodology has been applied if Country specific differences after the subtraction procedure below the following defined pollutant specific thresholds:

- For SO₂, CO and CO₂ no threshold,
- For NO_x 5% and
- For NH₃ and PM10 10%.

The calculation of the diffuse emissions for countries where inconsistencies identified are conducted using data inputs from similar countries or group of countries where no inconsistencies exists after the subtraction process. The selection of similar countries is applied on the basis of the gross added value (GVA) by comparing the country specific contributing economic branches.

It has been also taken into account the country specific reporting practice of biomass related activities for correct subtracting of CO₂ emissions reported in both systems. Some countries (respectively facilities) include the biomass related activities into the national totals reported to E-PRTR and other countries exclude the biomass CO₂ in the submissions to the E-PRTR. For 2008 only few countries delivered data for CO₂ excluding biomass sources on facility level. Thus for 2008 have been assumed that the CO₂ emissions reported to the E-PRTR system include biomass related CO₂ emissions. The subtraction of CO₂ emission data from the UNFCCC datasets was conducted on base of this assumption.

In the following figures are shown pollutant specific shares for different sectors after applying the subtraction process for industrial related subsectors. In these figures are distinguished emissions covered by the E-PRTR regulation, emissions which are considered as diffuse, that means not covered by the E-PRTR regulation and emissions which are assumed as diffuse but have not been spatial resolved.

Figure 1: CO emissions distinguished by different source sectors for EU27 + EFTA4 countries

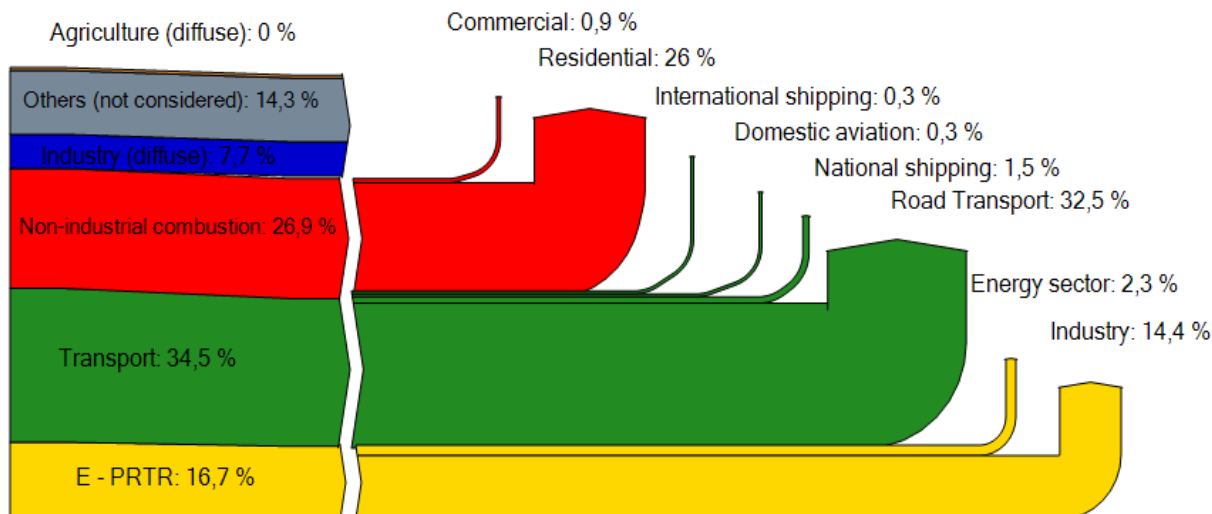


Table 1: CO emissions distinguished by different source sectors for EU27 + EFTA4 countries

Sector	CO [t]	Split_subsector	CO [t]	[%]
Agriculture	0	Animal	0	0.0
		Other agriculture	0	0.0
Industry	2,263,882	Industry	2,263,882	7.7
Others (not considered)	4,191,930	Other (not considered + not included in national total)	1,437,433	4.9
		Others (not considered)	2,754,497	9.4
Non-industrial Combustion	7,900,070	Commercial	265,710	0.9
		Residential	7,634,360	26.0
Transport	10,128,726	Domestic Aviation	73,687	0.3
		International shipping	77,908	0.3
		National shipping	429,294	1.5
		Road transport	9,547,837	32.5
		Energy sector	686,809	2.3
E-PRTR	4,915,176	Industry	4,218,295	14.3
		Other	10,072	0.0
Total	29,399,783		29,399,783	100

Figure 2: NO_x emissions distinguished by different source sectors for EU27 + EFTA4 countries

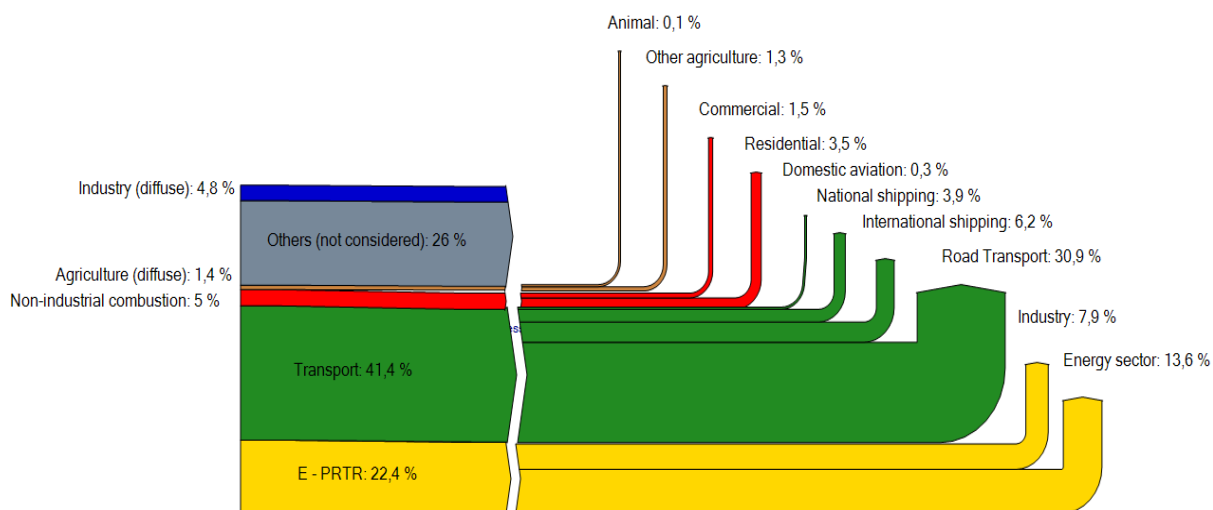


Table 2: NO_x emissions distinguished by different source sectors for EU27 + EFTA4 countries

Sector	NO _x [t]	Split_subsector	NO _x [t]	[%]
Agriculture	191,739	Animal	8,999	0.1
		Other agriculture	182,740	1.3
Industry	658,163	Industry	658,163	4.8
		Others (not considered + not included in national total)	2,336,065	16.9
Others (not considered)	3,605,472	Others (not considered)	1,269,408	9.2
		Commercial	202,388	1.5
Non-industrial Combustion	692,506	Residential	490,118	3.5
		Domestic Aviation	35,533	0.3
Transport	5,727,181	International shipping	864,459	6.2
		National shipping	545,088	3.9
		Road transport	4,282,100	30.9
		Industry	1,086,803	7.8
E-PRTR	2,969,757	Energy sector	1,880,027	13.6
		Other	2,927	0.0
		Total	13,844,818	13,844,818

Figure 3: PM10 emissions distinguished by different source sectors for EU27 + EFTA4 countries

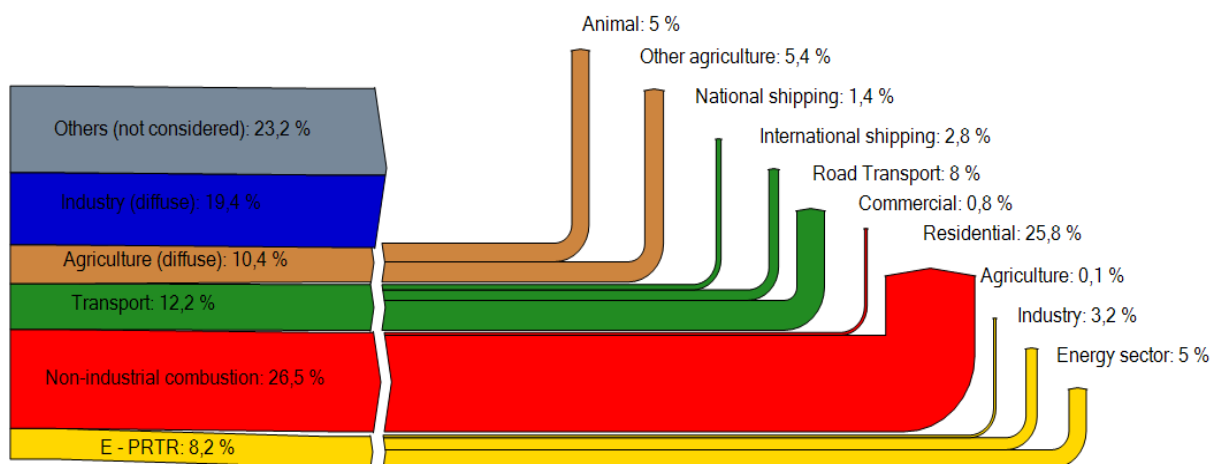


Table 3: PM10 emissions distinguished by different source sectors for EU27 + EFTA4 countries

Sector	PM10 [t]	Split_subsector	PM10 [t]	[%]
Agriculture	252,367	Animal	120,794	5.0
		Other agriculture	131,573	5.4
Industry	469,497	Industry	469,497	19.3
Others (not considered)	562,469	Other (not considered + not included in national total)	166,366	6.9
		Others (not considered)	396,103	16.3
Non-industrial Combustion	644,217	Commercial	18,266	0.8
		Residential	625,951	25.8
Transport	296,577	Domestic Aviation	655	0.0
		International shipping	67,229	2.8
		National shipping	34,541	1.4
		Road transport	194,152	8.0
E-PRTR	201,775	Agriculture	1,447	0.1
		Industry	78,260	3.2
		Energy sector	121,152	5.0
		Other	915	0.0
Total	2,426,902		2,426,902	100

Figure 4: SO₂ emissions distinguished by different source sectors for EU27 + EFTA4 countries

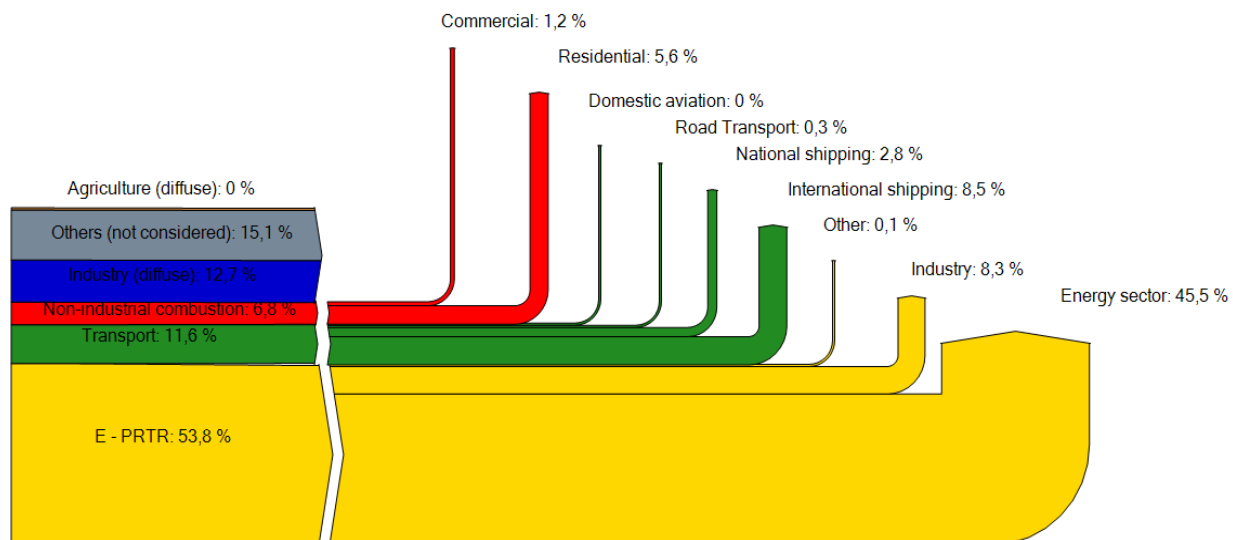


Table 4: SO₂ emissions distinguished by different source sectors for EU27 + EFTA4 countries

Sector	SO ₂ [t]	Split_subsector	SO ₂ [t]	[%]
Agriculture	0	Animal	0	0.0
		Other agriculture	0	0.0
Industry	969,269	Industry	969,269	12.7
Others (not considered)	1,149,234	Other (not considered + not included in national total)	1,012,630	13.3
		Others (not considered)	136,604	1.8
Non-industrial Combustion	519,237	Commercial	92,676	1.2
		Residential	426,562	5.6
Transport	889,199	Domestic Aviation	2,560	0.0
		International shipping	652,096	8.5
		National shipping	212,661	2.8
		Road transport	21,883	0.3
		Other	3,797	0.0
E-PRTR	4,111,529	Industry	632,868	8.3
		Energy sector	3,474,864	45.5
Total	7,638,468		7,638,468	100

Figure 5: CO₂ emissions distinguished by different source sectors for EU27 + EFTA4 countries

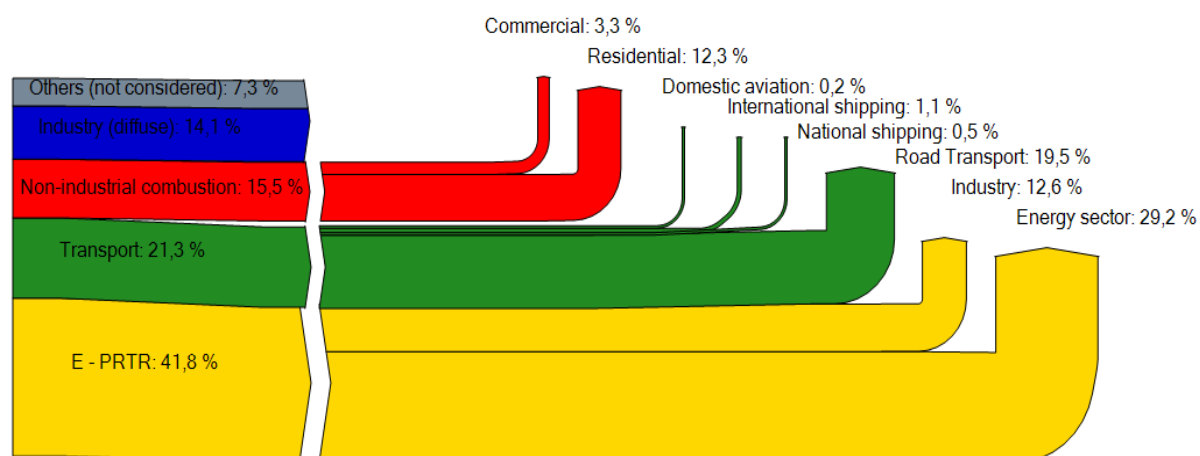


Table 5: CO₂ emissions distinguished by different source sectors for EU27 + EFTA4 countries

Sector	CO ₂ [kt]	Split_subsector	CO ₂ [kt]	[%]
Agriculture	0	Animal	0	0.0
		Other agriculture	0	0.0
Industry	667,764	Industry	667,764	14.1
Others (not considered)	347,036	Other (not considered + not included in national total)	224,078	4.7
		Others (not considered)	122,959	2.6
Non-industrial Combustion	737,124	Commercial	155,044	3.3
		Residential	582,080	12.3
Transport	1,008,559	Domestic Aviation	7,771	0.2
		International shipping	53,745	1.1
		National shipping	24,420	0.5
		Road transport	922,623	19.5
E-PRTR	1,983,508	Industry	596,145	12.6
		Energy sector	1,386,746	29.2
		Other	617	0.0
Total	4,743,992		4,743,992	100

Figure 6: NH₃ emissions distinguished by different source sectors for EU27 + EFTA4 countries

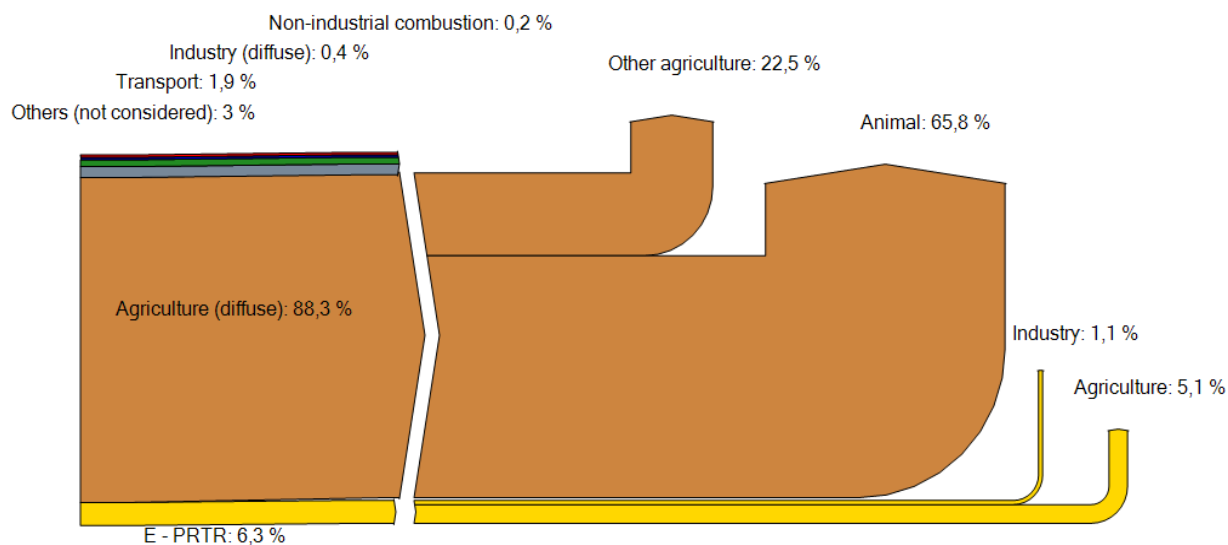


Table 6: NH₃ emissions distinguished by different source sectors for EU27 + EFTA4 countries

Sector	NH3 [t]	Split_subsector	NH3 [t]	[%]
Agriculture	3,442,278	Animal	2,564,795	65.8
		Other agriculture	877,483	22.5
Industry	16,881	Industry	16,881	0.4
Others (not considered)	115,102	Other (not considered + not included in national total)	11,084	0.3
		Others (not considered)	104,018	2.7
Non-industrial Combustion	7,094	Commercial	929	0.0
		Residential	6,165	0.2
Transport	72,240	Domestic Aviation	0	0.0
		International shipping	259	0.0
		National shipping	37	0.0
		Road transport	71,945	1.8
E-PRTR	244,406	Industry	44,149	1.1
		Agriculture	198,654	5.1
		Energy sector	1,582	0.0
		Other	20	0.0
Total	3,898,001		3,898,001	100

For each emission sector and pollutant considered appropriate statistical data, so called proxy data, used. These data are either calculated from available GIS based data sets (areas and acreage, distance gradients etc.) or allocated to respective regions and areas of their occurrence (population, employees, animal life stock, traffic volume or traffic density data, etc.). These proxy data are used as weighting factors in order to distribute the diffuse emission data to the spatial patterns of the grid. Best available and most recent data over the whole mapping extent have been selected for modelling the maps of E-PRTR diffuse emissions to air for the reporting year 2008. The spatial resolution of the diffuse emission maps is a 5 km x 5 km grid cell size. The results are shown in the following figures (Figure 7 to Figure 38).

Maps of diffuse NH₃ and PM10 emissions from the agricultural sector

Table 7 shows the European emissions from agricultural activities (NFR 4B and NFR 4BD) officially reported by the countries to CLRTAP (all EU27 + EFTA4 countries).

Table 7: Emissions from the agricultural sector officially reported by the EU27 + EFTA4 countries

Sector	Sector_Code	Sector_Name	Emissions (2008)	
	[NFR]	[NFR]	NH ₃ [t]	PM10 [t]
Manure Management and animal husbandry	4B1a	Cattle Dairy	780,849	7,737
	4B1b	Cattle Non-Dairy	746,776	9,644
	4B2	Buffalo	71,227	116
	4B3	Sheep	9,687	592
	4B4	Goats	62,675	85
	4B6	Horses	10,983	667
	4B7	Mules and Asses	52,809	36
	4B8	Swine	462,578	46,290
	4B9a	Laying Hens	104,708	13,367
	4B9b	Broilers	77,071	22,855
	4B9c	Turkeys	11,650	371
	4B9d	Other Poultry	102,553	19,032
	4B13	Other	71,227	2
Crop production and agricultural soils	4D1a	Synthetic N-fertilizers	844,740	102,445
	4D2a	Farm-level agricultural operations incl. storage, handling and transport of agricultural products	4,240	29,042
	4D2b	Off-farm storage. handling and transport of bulk and agricultural products	0	86
	4D2c	N-excretion on pasture range and paddock Unspecified	28,503	0
	Sum		3,442,276	252,367
All reported emissions from EU27 + EFTA4 countries			3,898,001	2,426,902

The allocation of emissions releases from animal husbandry and manure management (NFR 4B) activities is based on animal census from EUROSTAT, gridded animal data from FAO and CORINE Land Cover data containing information on the land use.

EUROSTAT statistical data on animal census contains the annual total population of buffalos, cattle, sheep, pigs, goats and dairy cows on NUTS 2 level, however with some gaps. Therefore the FAO animal density data with a resolution of 3 arc minutes (approximately 3.5 km at 50° N latitude) are used for gap filling of the missing animal numbers and for allocation the EUROSTAT animal data to NUTS3 level.

FAO data on gridded animal data concern the livestock distributions for the entire globe of the following animal species: cattle, buffalos, goats, sheep, pigs and poultry.

Emissions released by **horses** (NFR 4B6), **mules and asses** (NFR 4B7) and other (NFR 4B13) are distributed directly to the 5km x 5km grid cell using the CORINE land cover classes since they are not available in the EUROSTAT dataset on NUTS2 level nor in the gridded FAO data.

The emissions of NH₃ and of PM10 from crop production and agricultural soils (NFR 4D) are considered proportional to the amount of applied N-fertilizers (determined by the type of agricultural activities e. g. arable land, permanent crops, pastures or heterogeneous agricultural areas) and allocated directly into 5km x 5km grids according to the agricultural areas in each grid cell. Table 8 lists the main proxy variables used for spatial distribution of diffuse emissions from the agricultural sector.

Table 8: Proxy data sets applied for spatial distribution of agriculture emissions

NFR_Code	Sector_Name	Proxy Data for Regionalisation	Proxy Data for Gridding
4B1a	Cattle Dairy	Animal data (EUROSTAT, 2008) & Animal density (FAO, 2005)	<i>Corine land cover</i>
4B1b	Cattle Non-Dairy		(CLC90) Switzerland (CLC 2000) Europe (CLC 2006) Europe
4B2	Buffalo		class 2: Agricultural areas
4B3	Sheep		
4B4	Goats		
4B8	Swine		
4B6	Horses		
4B7	Mules and Asses	---	2.1. Arable land 2.2. Permanent crops 2.3. Pastures 2.4. Heterogeneous agricultural areas
4B9a	Laying Hens	Animal density (FAO, 2005)	2.1. Arable land 2.2. Permanent crops 2.3. Pastures 2.4. Heterogeneous agricultural areas
4B9b	Broilers		
4B9c	Turkeys		
4B9d	Other Poultry		
4B13	Other	---	
4D1a	Synthetic N-fertilizers	---	<i>Corine land cover</i>
4D2a	Farm-level agr. operations incl. storage, handling and transport of agr. products		(CLC90) Switzerland (CLC 2000) Europe (CLC 2006) Europe
4D2b	Off-farm storage, handling and transport of bulk agricultural products		class 2: Agricultural areas except the sub-classes 2.1.3. (rice fields)
4D2c	N-excretion on pasture range and paddock Unspecified		

Figure 7 shows the NH₃ emissions from agricultural activities for Europe distributed on a 5km x 5km grid. The main source for NH₃ emissions is the agricultural sector, contributing about 95% of the whole amount of NH₃ emissions in Europe. Figure 8 shows the PM10 emissions from agricultural activities in Europe distributed on a 5km x 5km grid.

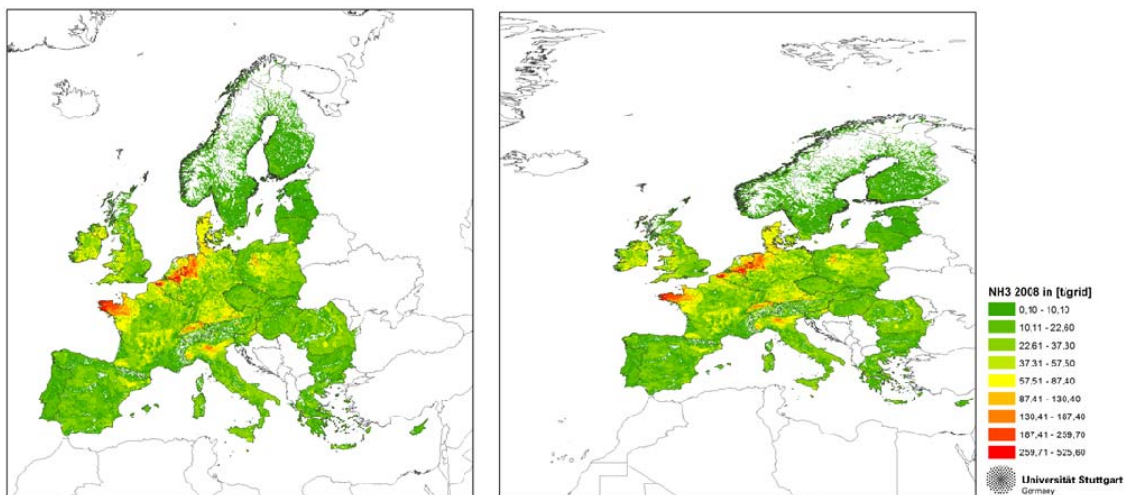


Figure 7: Diffuse NH₃ emissions from agricultural sector for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

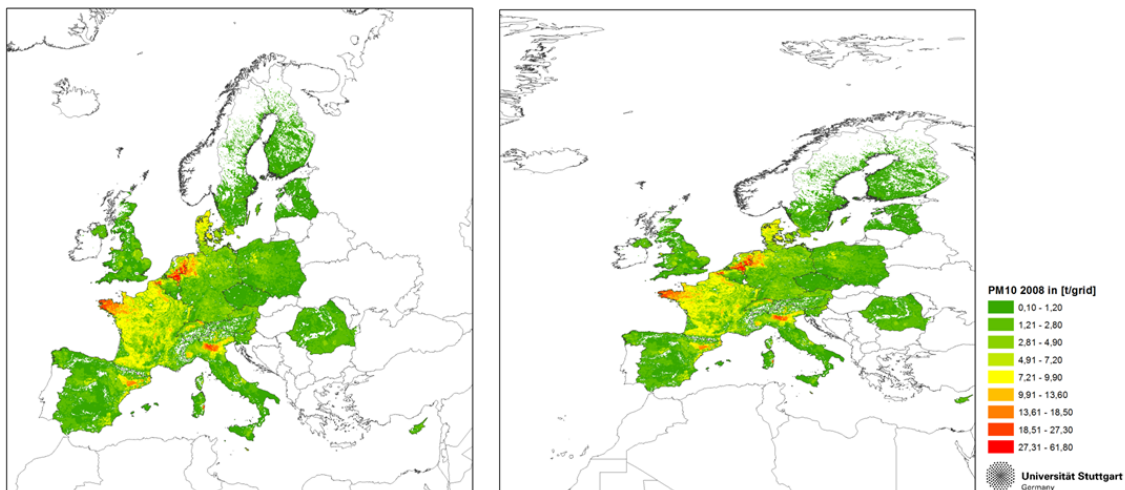


Figure 8: Diffuse PM10 emissions from agricultural sector for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

Table 21 in Annex I gives an overview of the country specific missing emissions not reported to CLRTAP and UNFCCC on sector level. For Iceland emissions of NH₃ and PM10 from agricultural activities have not been reported. For Bulgaria, Greece, Hungary, Liechtenstein, Lithuania, Luxembourg, Norway, Portugal and Slovakia have not been reported PM10 emissions from agricultural activities.

Maps of diffuse CO₂, CO, PM₁₀, NO_x and SO₂ emissions from the road transport sector

The reported emissions from road transport activities divided by considered pollutants are listed in Table 9. The national total emissions are aggregated for the EU27 and EFTA4 countries using 2008 UNFCCC data sets for CO₂ and 2008 CLRTAP data sets for NO_x, SO₂, PM₁₀ and CO.

Table 9: Emissions from road transport activities in the EU27 and EFTA4 countries in relation to pollutant specific national totals

Sector	Sector Code	Sector_Name	Emissions in 2008				
	[NFR]	[NFR]	CO ₂ [kt]	NO _x [t]	SO ₂ [t]	PM ₁₀ [t]	CO [t]
			UNFCCC	CLRTAP			
Road transport	1A3bi	Road Transport: Passenger cars	519,869	1,991,915	12,786	81,149	7,805,255
	1A3bii	Road Transport: Light duty vehicles	75,638	370,183	2,652	39,114	518,750
	1A3biii	Road Transport: Heavy duty vehicles	316,741	1,905,042	6,341	69,651	605,974
	1A3biv	Road Transport: Mopeds & Motorcycles	10,374	14,960	103	4,239	617,858
	Sum		922,623	4,282,100	21,883	194,152	9,547,837
All reported emissions from EU27 + EFTA4 countries			4,743,992	13,844,818	7,638,468	2,426,902	29,399,783

The spatial distribution of emissions caused by the road transport sector is based on vehicle and road class specific emission data sets. The first calculation step is applied to allocate the country specific CO₂ emissions reported to UNFCCC, on base of the TREMOVE³ model to different vehicle types. The second calculation step is the allocation of the emissions from CLRTAP and UNFCCC per vehicle class into different road classes. This allocation is applied to compile country specific shares for each pollutant. The next step is to harmonize the road and vehicle classes with the road network from the TRANS-TOOLS⁴ model. The road classes are allocated to roads which are covered by the TRANS-TOOLS model and not covered by TRANS-TOOLS. In an additional step has been divided the emissions from rural roads into shares covered and not covered by TRANSTOOLS. The last calculation step was the distinction of the rural and urban road traffic into line and area sources.

Based on the national total emissions divided by road and vehicle classes, the emissions are allocated to roads covered by TRANSTOOLS and not covered by TRANSTOOLS. The regionalization of the emissions from road transport activities considers the traffic volume data for each road segment from TRANS-TOOLS and the population density as weighting factor for roads not covered by TRANS-TOOLS. The area sources not covered by TRANS-TOOLS are distributed to the grid using the gridded population density from Gallego (2010)⁵. The following proxy data sets are applied for spatial resolving the emissions from the road transport sector to a 5x5 km² grid (Table 10). Figure 9 to Figure 13 show the spatial resolved emissions of NO_x, SO₂, PM₁₀, CO and CO₂ from road transport activities in Europe.

³ TREMOVE, 2010: <http://www.tremove.org/documentation/index.htm>

⁴ TRANS-TOOLS, 2010: (URL: <http://energy.jrc.ec.europa.eu/transtools/index.html>)

⁵ Gallego F. J., 2010, A population density grid of the European Union, Population and Environment. 31: 460-473

Table 10: Proxy data sets applied for spatial distribution of road transport emissions

Sector	Proxy Dataset	Data Source	Year	Extend
Road transport	Population density disaggregated with CORINE Land Cover 2000 and 2006	JRC	2000 and 2006	EU 27 + EFTA
	Split factors for vehicle and road class	TREMOVE	1995-2030	EU 27 + EFTA
	Emission factors for vehicle and road class	TREMOVE	1995-2030	EU 27 + EFTA
	Traffic volume for all road types on national level	TREMOVE	1995-2030	EU 27 + EFTA
	Traffic volume for road segments of highways and rural roads	TRANS-TOOLS	Scenario for 2008	EU 27 + EFTA
	Road network for highways and rural roads	TRANS-TOOLS	Updated 2010	EU 27 + EFTA
	Road network for all street categories	GISCO (ROAD)	2010	EU 27 + EFTA

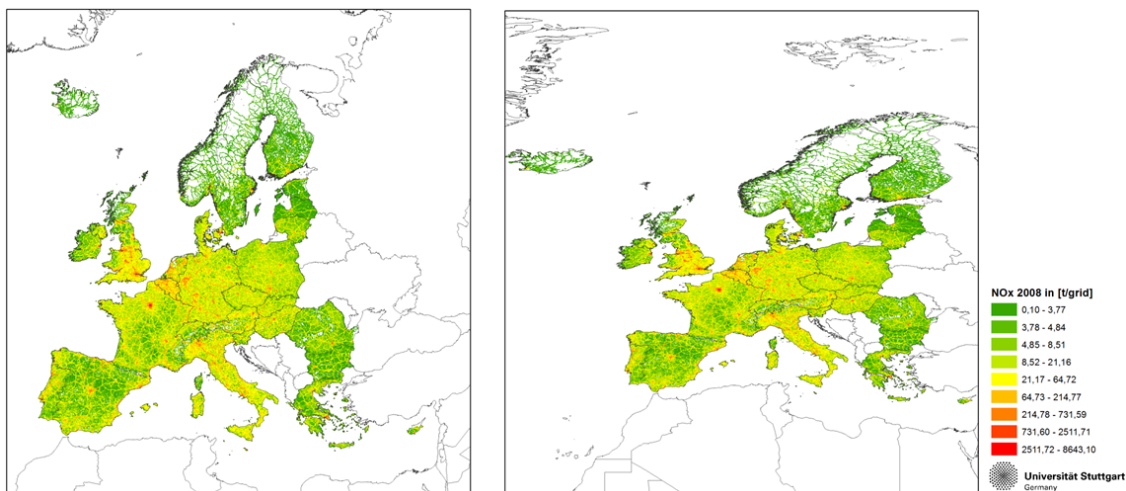


Figure 9: NO_x emissions from road transport for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

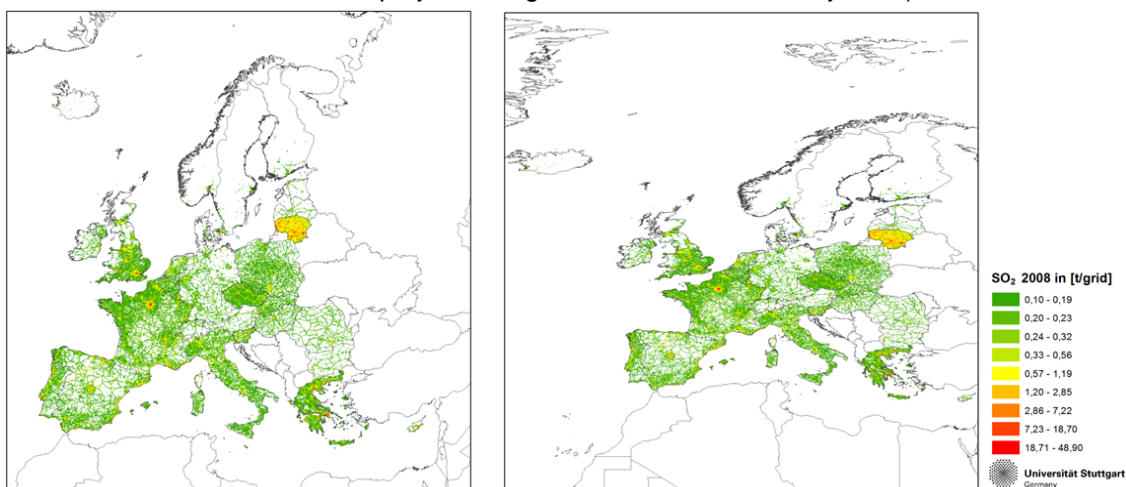


Figure 10: SO₂ emissions from road transport for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

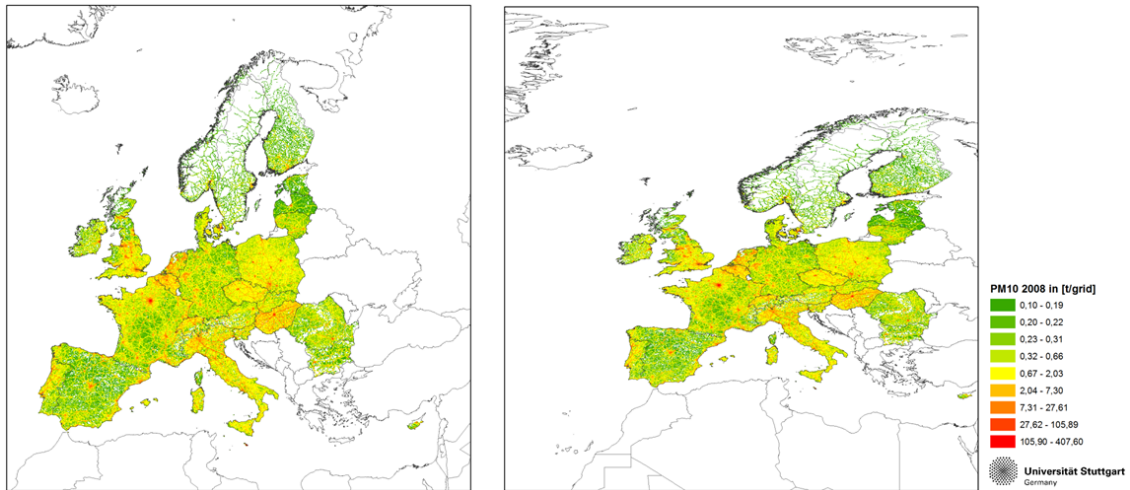


Figure 11: PM10 emissions from road transport for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

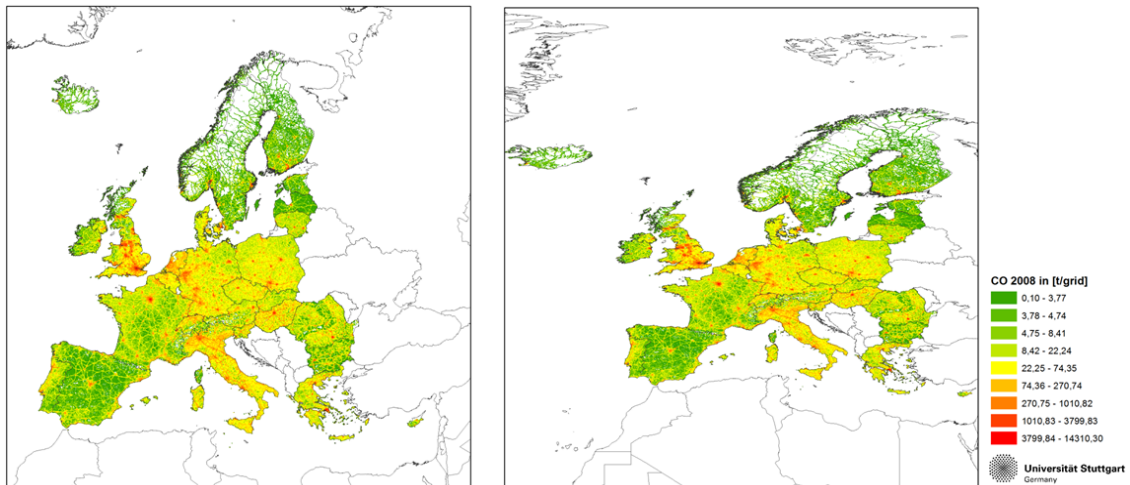


Figure 12: CO emissions from road transport for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

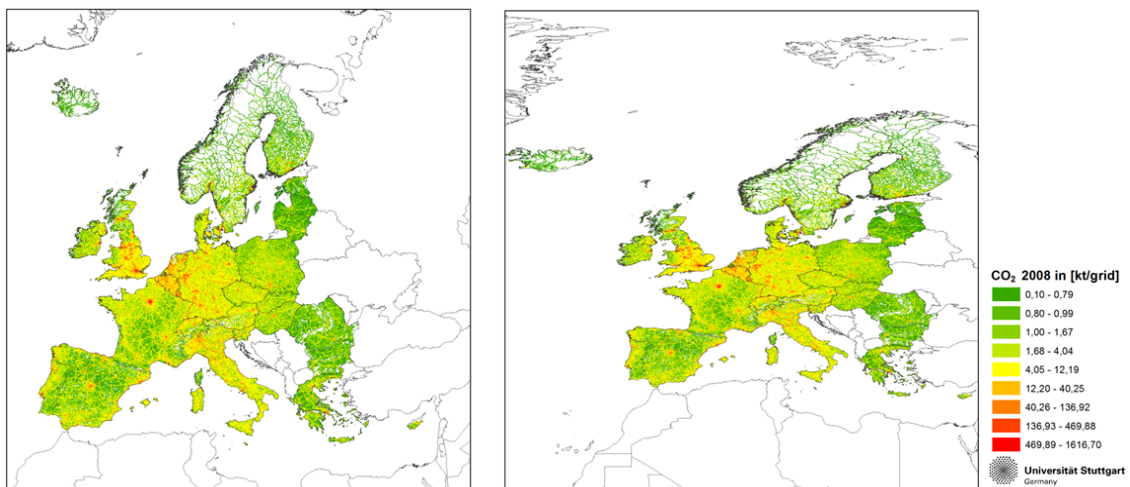


Figure 13: CO₂ emissions from road transport for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

Table 21 in Annex I gives an overview of the country specific missing emissions not reported to CLRTAP and UNFCCC on sector level. For Greece and Iceland have not been reported emissions of PM10 from road transport activities. For Luxembourg have not been reported CO and PM10 emissions from road transport activities and for Malta are missing the CO emissions from road transport.

Maps of diffuse CO₂, CO, PM₁₀, NO_x and SO₂ emissions from diffuse industrial releases

Table 11 shows the emission values of the different pollutants for each industrial sector. The amount of all emissions from releases to air in the EU27 + EFTA4 countries is also presented.

Table 11: Diffuse industrial releases in relation to the total emissions for the considered pollutants

Sector	Sector_Code	Sector_Name	Emissions in 2008				
	[NFR/CRF]	[NFR/CRF]	CO ₂ [kt]	NO _x [t]	SO ₂ [t]	PM ₁₀ [t]	CO [t]
			UNFCCC	CLRTAP			
Energy	1 A	Combustion	472,009	545,612	632,894	145,456	1,216,750
	1 B	Fugitive Emissions from Fuels	13,567	8,426	146,113	25,611	20,807
Industrial processes	2 A	Mineral industry	89,764	28,219	39,502	142,868	46,847
	2 B	Chemical industry	24,625	38,957	59,787	10,627	44,233
	2 C	Metal industry	66,307	27,087	75,068	80,081	927,432
	2 D	Other production industry	116	9,676	12,126	30,535	6,374
	2 G	Other	1,376	187	3,779	34,320	1,438
	Sum		667,764	658,163	969,269	469,497	2,263,882
All reported emissions from EU27 + EFTA countries			4,743,992	13,844,818	7,638,468	2,426,902	29,399,783

The gridding methodology for diffuse releases from industrial activities based on the proxy data sets "employees by activity source" from EUROSTAT and the "densities of E-PRTR related facilities".

As main proxy data for spatial distribution of diffuse industrial releases have been used employment numbers by activity branches. Care has been taken to ensure that the emissions are located where they occur. The use of employment data often locate emissions at registered places or regions of work and may tend to focus emissions inappropriately to urban areas. But employment statistics on regional level are relevant indicators for diffuse industrial releases. As additional proxy data for the regionalization of the diffuse industrial emissions have been used the densities of E-PRTR related facilities on regional level. Table 12 lists the main proxy variables used for spatial distribution of the diffuse part of industrial releases. The results are shown in Figure 14 to Figure 18 for the different pollutants.

Table 12: Proxy data sets used for the spatial distribution of industrial emissions

Sector	Proxy Dataset	Data Source	Release Year	Extend
Industry	Employment data	EUROSTAT	2008	EU 27 + EFTA4
	Land use data	CORINE Land Cover (CLC90) Switzerland, CLC2000, CLC2006	1990, 2000, 2006	EU 27 + EFTA4
	Point source data	E-PRTR data set	2010	EU 27+ EFTA4

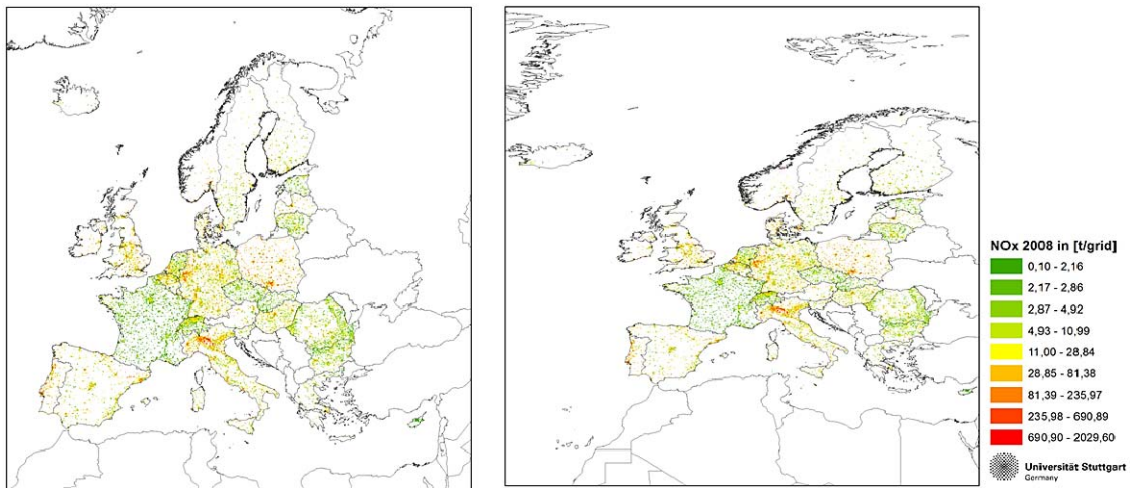


Figure 14: NO_x emissions from diffuse industrial releases for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

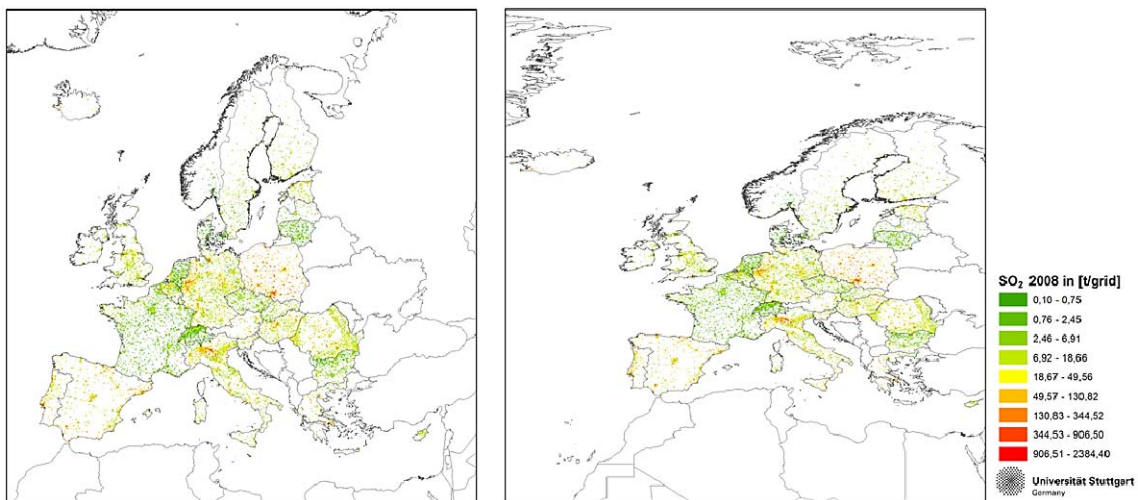


Figure 15: SO₂ emissions from diffuse industrial releases for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

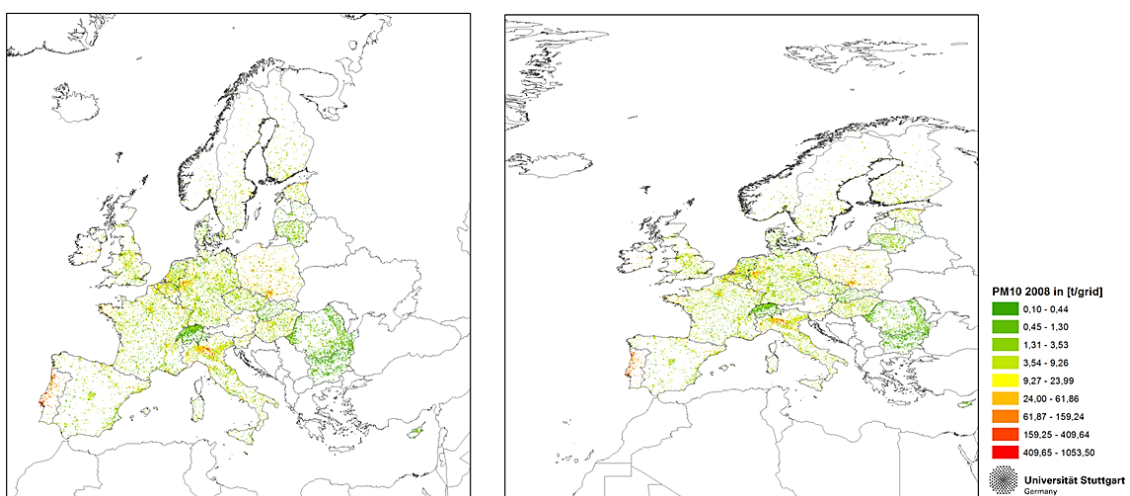


Figure 16: PM10 emissions from diffuse industrial releases for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

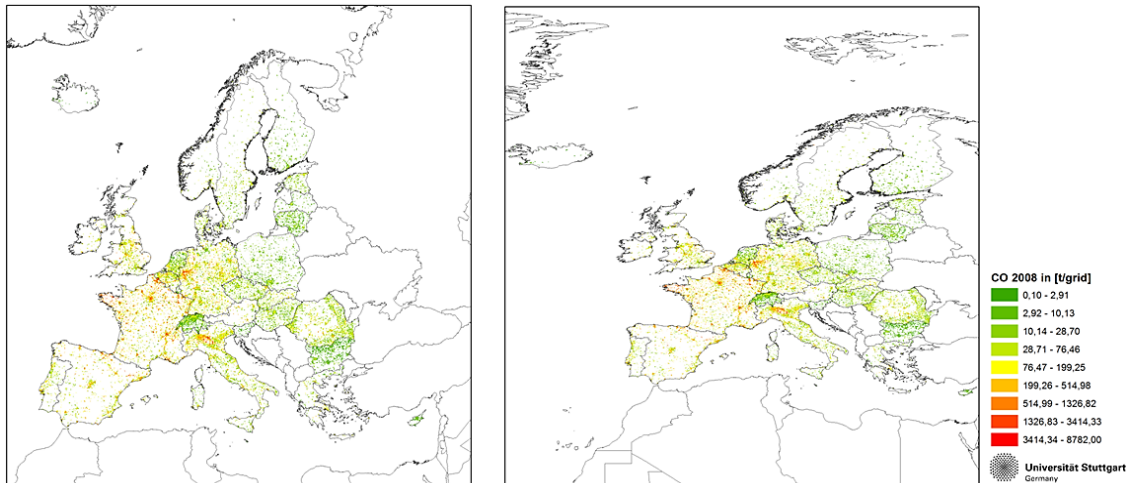


Figure 17: CO emissions from diffuse industrial releases for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

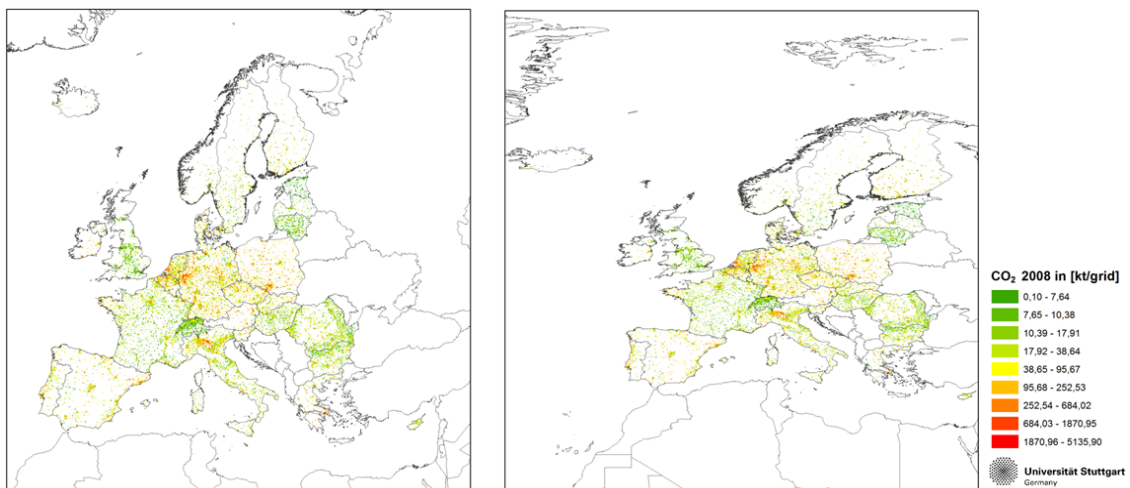


Figure 18: CO₂ emissions from diffuse industrial releases for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

Table 21 in Annex I gives an overview of the country specific missing emissions not reported CLRTAP and UNFCCC on sector level. For Greece, Iceland and Luxembourg no PM10 emissions from industrial activities have been reported.

Maps of diffuse CO₂, CO, PM₁₀, NO_x and SO₂ emissions from non-industrial combustion activities

Table 13 shows the emissions of the different pollutants distinguished by fuel for the non-industrial combustion sector.

Table 13: Emissions from non-industrial combustion activities distinguished by different pollutants

Sector	Sector_Code	Sector_Name	Fuel type	Emissions in 2008				
	[NFR([1])/CRF[2]]	[NFR/CRF]		CO ₂ [kt]	NO _x [t]	SO ₂ [t]	PM ₁₀ [t]	CO [t]
				UNFCCC	CLRTAP			
Residential combustion	1A4ai	Commercial Institutional: Stationary	Not applied	155,044	202,388	92,676	18,266	265,710
	1A4bi	Residential: Stationary plants	Wood	138,791	7,269	149,380	468,426	5,993,854
			Gas	262,070	265,592	8,054	808	131,822
			Oil & Coal	181,219	217,256	269,127	156,717	1,508,683
	Sum			737,124	692,506	519,237	644,217	7,900,070
All reported emissions from EU27 + EFTA4 countries				4,743,992	13,844,818	7,638,468	2,426,902	29,399,783

For spatial resolution of emission caused by residential stationary plants the pollutant specific fuel splits have been compiled on base of the amount of different fuel types used. These are estimated by multiplying fuel use statistics from UNFCCC⁶ with country specific emission factors from the GAINS⁷ model. The allocation into administrative unit and grid cells has been conducted on base of population data and furthermore on fuel specific assumptions for different population categories. Natural gas is rapidly expanding in urban areas and it is assumed that it accounts for at least three times of household energy consumption in relation to rural regions, where wood is the preferred fuel type. For wood is assumed that it is consumed in rural two times more than in urban areas. Coal and oil consumption are assumed as equal in relation to rural and urban areas. For commercial and institutional stationary plants institutions, the emissions are allocated directly into administrative units and grids using the number of employees from EUROSTAT⁸ and the population density on base of Gallego (2010)⁹. The spatial allocation is carried out without considering a pollutant specific fuel split. Information about the number of households as proxy data would be more correlated to the number of combustion installations, than the population density. But these data sets are not available for all

⁶ United Nations Framework Convention on Climate Change (URL: http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5270.php, 16.07.2010)

⁷ <http://gains.iiasa.ac.at/gains/EUR/index.login?logout=1>

⁸ Eurostat: Regional labour market statistics (reg_lmk) (URL: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database, 16.07.2010)

⁹ Gallego F.J., 2010, A population density grid of the European Union, Population and Environment. 31: 460-473

European countries on national and regional level and therefore not usable for the applied European wide approach. The results are shown in Figure 19 to Figure 23 for the different pollutants.

Table 14: Proxy data sets applied for the non-industrial combustion sector

Sector	NFR08	NFR08 Name	Fuel type	Proxy Dataset	Data Source	Release Year	Extend
Residential and commercial combustion	1A4ai	Commercial Institutional: Stationary	all	Number of employees allocated to specific land use categories	EUROSTAT JRC	2008	EU 27 + EFTA4
				Land use			
	1A4bi	Residential: Stationary plants	Wood	Population density distinguished into three urbanisation areas: A; densely populated area B; intermediate pop. area C: thinly pop. area Weighting factors for A : B : C 1 : 1.5 : 2	EUROSTAT JRC population EUROSTAT-GISCO CORINE Land Cover (CLC90) Switzerland, CLC 2000, CLC 2006	2008 & 2006 & 2001	
				Land use			
			Gas	Population density distinguished into three urbanisation areas: A; densely populated area B; intermediate pop. area C: thinly pop. area Weighting factors for A : B : C 3 : 2 : 1			
				Land use			
			Oil & Coal	Population density distinguished into three urbanisation areas: A; densely populated area B; intermediate pop. area C: thinly pop. area Weighting factors for A : B : C 1 : 1 : 1			
				Land use			

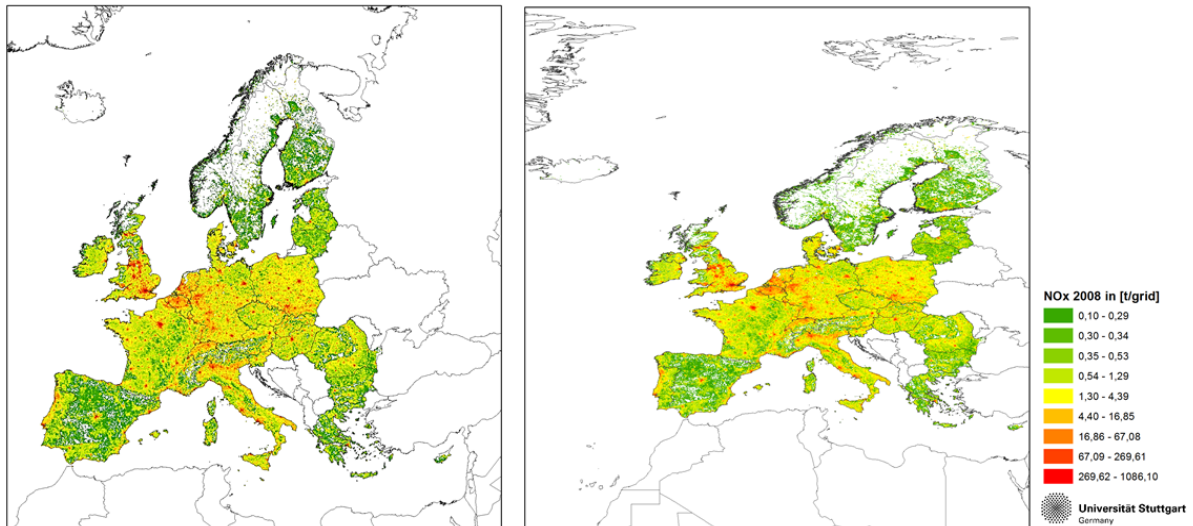


Figure 19: NO_x emissions from non-industrial combustion for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

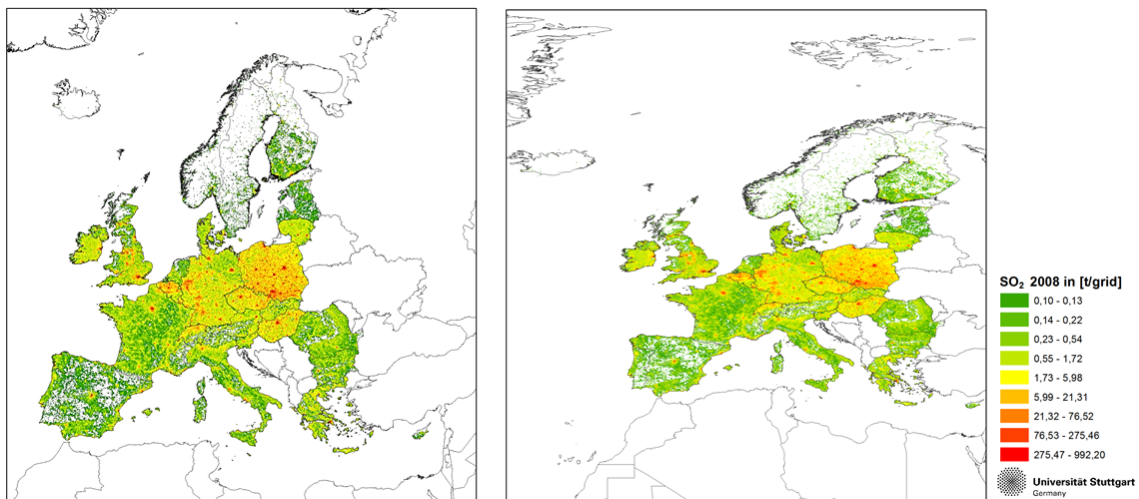


Figure 20: SO₂ emissions from non-industrial combustion for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

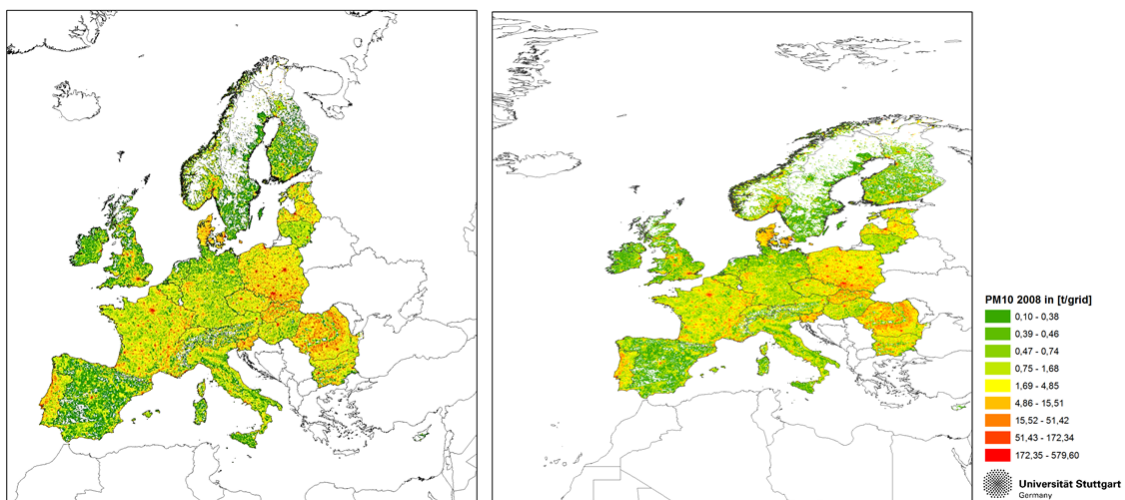


Figure 21: PM₁₀ emissions from non-industrial combustion for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

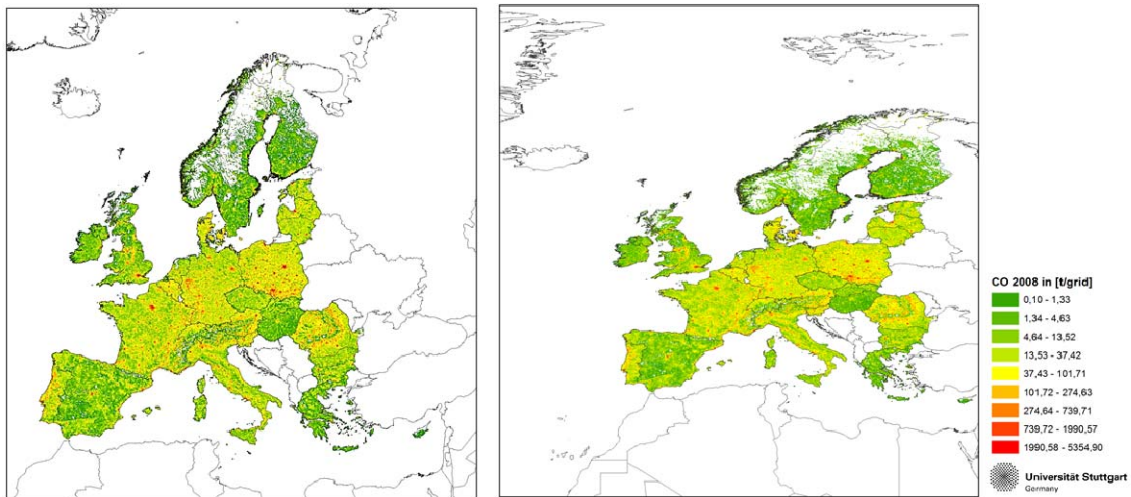


Figure 22: CO emissions from non-industrial combustion for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

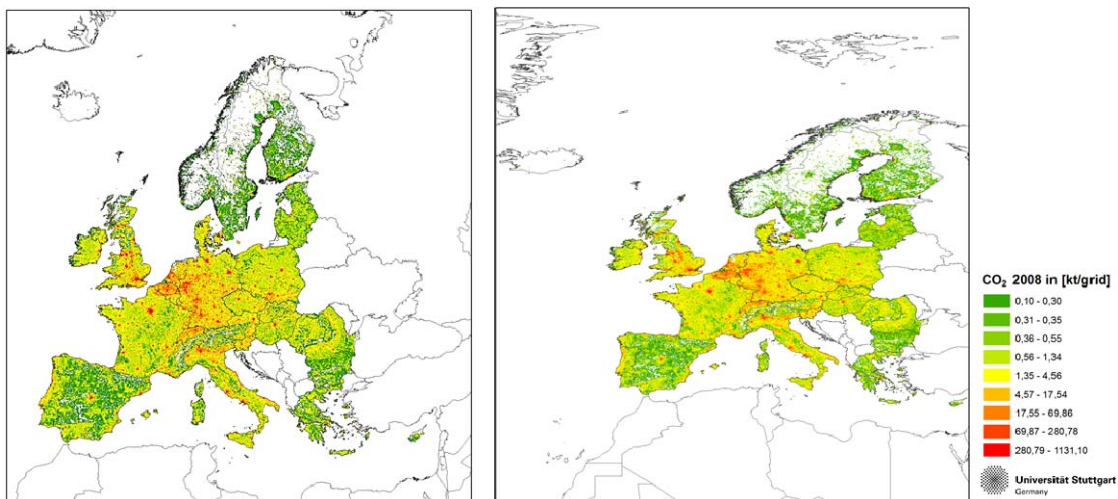


Figure 23: CO₂ emissions from non-industrial combustion for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

Table 21 in Annex I gives an overview of the country specific missing emissions not reported to CLRTAP and UNFCCC on sector level. For Greece, Iceland and Malta PM10 emissions from residential and commercial combustions activities have not been reported. For Luxembourg CO and PM10 emissions from residential and commercial activities have not been reported.

Maps of diffuse CO₂, CO, PM₁₀, NO_x and SO₂ emissions from international shipping activities

Table 15 shows emission values of the different pollutants from the international shipping activities.

Table 15: International shipping releases to air distinguished by source category

Sector	Sector Code	Sector_Name	Emissions in 2008				
	[NFR]	[NFR]	CO ₂ [kt]	NO _x [t]	SO ₂ [t]	PM ₁₀ [t]	CO [t]
			UNFCCC	CLRTAP			
International Shipping	1 A 3 d i (i)	International maritime navigation	53,215	843,553	649,581	66,409	73,225
	1 A 3 d i (ii)	International inland waterways	530	20,906	2,515	820	4,683
	Sum		53,745	864,459	652,096	67,229	77,908
All reported emissions from EU27 + EFTA4 countries			4,743,992	13,844,818	7,638,468	2,426,902	29,399,783

The methodology for the spatial distribution of international shipping activities is based mainly on the identification of emissions from international maritime navigation activities within Europe (model area extent of the project) and the gridding of international navigation activities on inland waterways using traffic volume data from TRANS-TOOLS¹⁰ and traffic data from VNF¹¹ in combination with river geo data from GISCO¹². The emissions from international maritime navigation activities are allocated to the grid cells using global shipping proxies from Wang et al. (2008)¹³. The remaining part (emissions of the international inland waterway shipping activities) is distributed using TRANS-TOOLS and VNF data in combination with the river geo data from GISCO. Table 16 shows emission values of the different pollutants for the international shipping. The results for the spatial distribution of emissions from international shipping activities are shown in figure 24 to figure 28 for the different pollutants.

¹⁰ TRANS-TOOLS, 2010: (URL: <http://energy.jrc.ec.europa.eu/transtools/index.html>)

¹¹ Voies Navigables d'Europe (VNE) (URL: <http://www.vne-waterways.eu/>, 05.07.2010)

¹² GISCO (Geographic Information System of the European Commission), 2010: <http://epp.eurostat.ec.europa.eu/portal/page/portal/gisco/introduction>

¹³ Wang, C., Corbett, J. J. and Firestone J., (2008): Improving Spatial Representation of Global Ship Emissions Inventories, Environ. Sci. Technol., 2008, 42 (1), pp 193–199 DOI: 10.1021/es0700799

Table 16: Proxy data sets used for the spatial distribution of international shipping activities

Sector	Sector_Code	Subsector (NFR)	Proxy Dataset	Data Source	Year	Extend
	[NFR]					
International shipping	1A3di(ii)	International emissions on inland waterways	Traffic volume	Trans-tools	2010	Selected countries
			River geo data	Gisco Eurostat	2010	EU 27 + EFTA
			Selected traffic data for selected waterway sectors	Voies Navigables de France (VNF)	2010	Selected countries
	1A3di(i)	International maritime navigation	Georeferenced global data set (activities & emissions)	Wang et al. (2008); EDGAR	Updated 2010	Worldwide

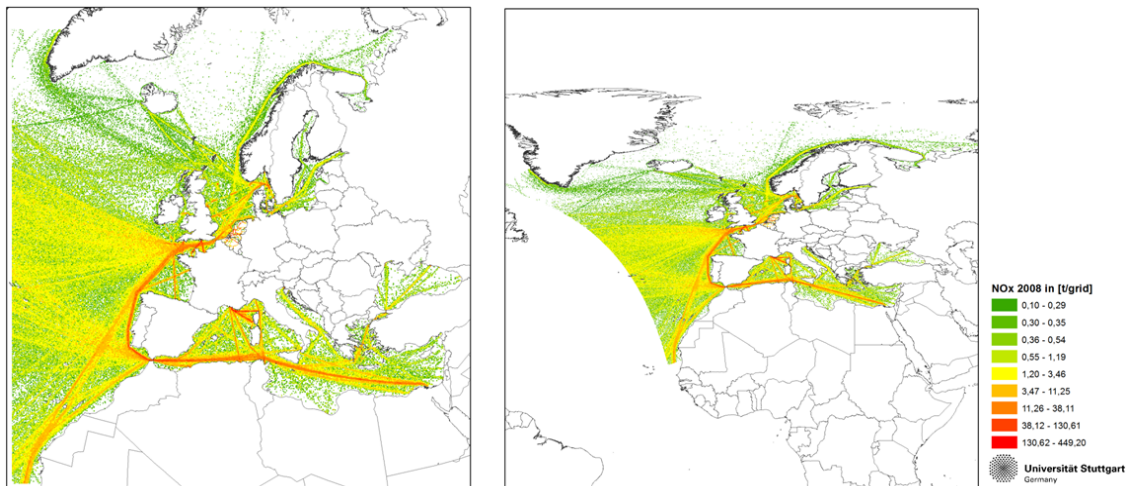


Figure 24: NO_x emissions from international shipping for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

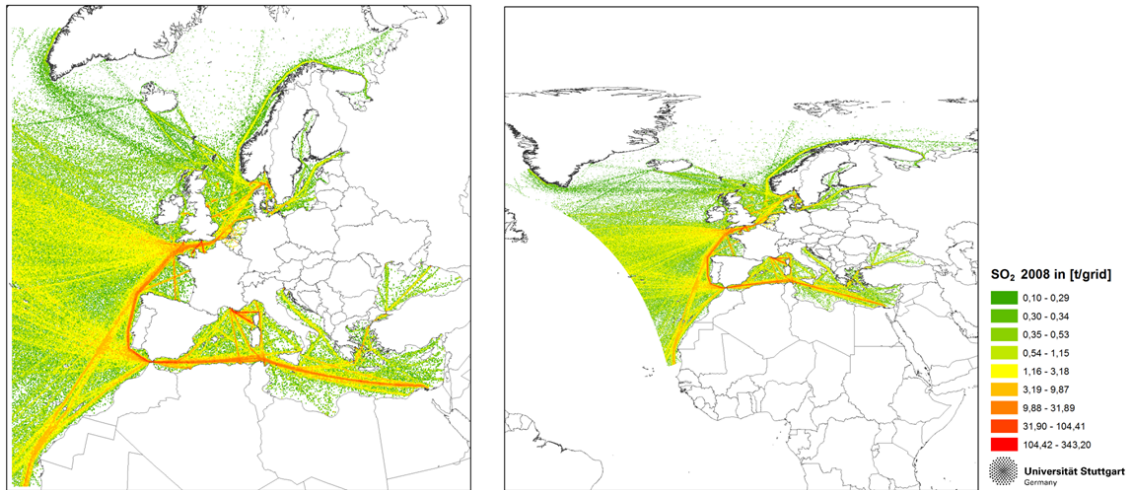


Figure 25: SO₂ emissions from international shipping for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

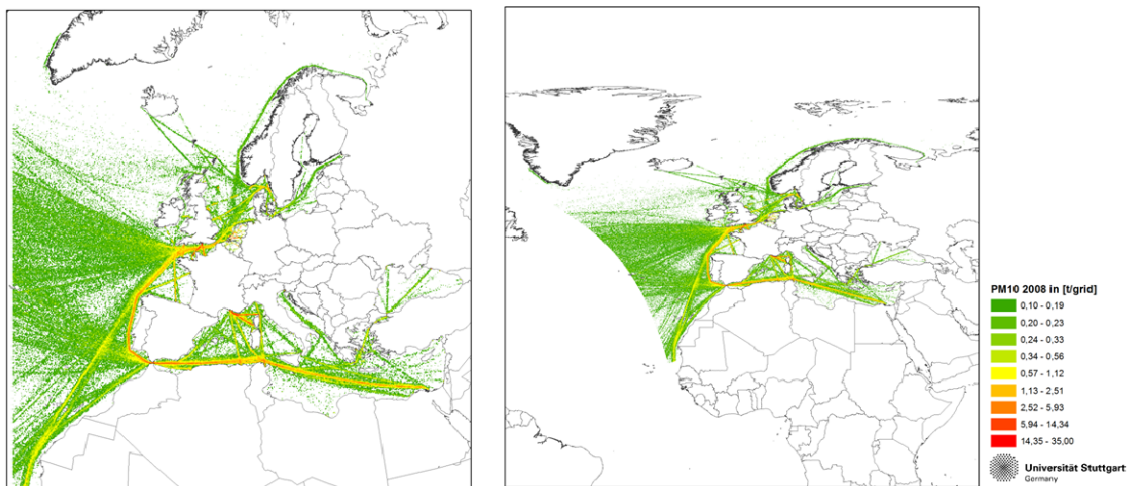


Figure 26: PM10 emissions from international shipping for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

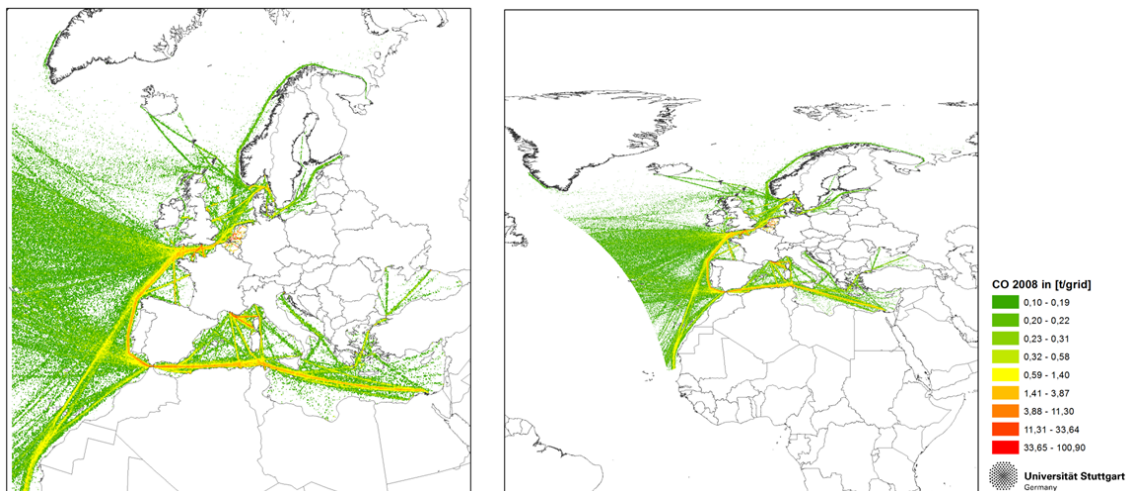


Figure 27: CO emissions from international shipping for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

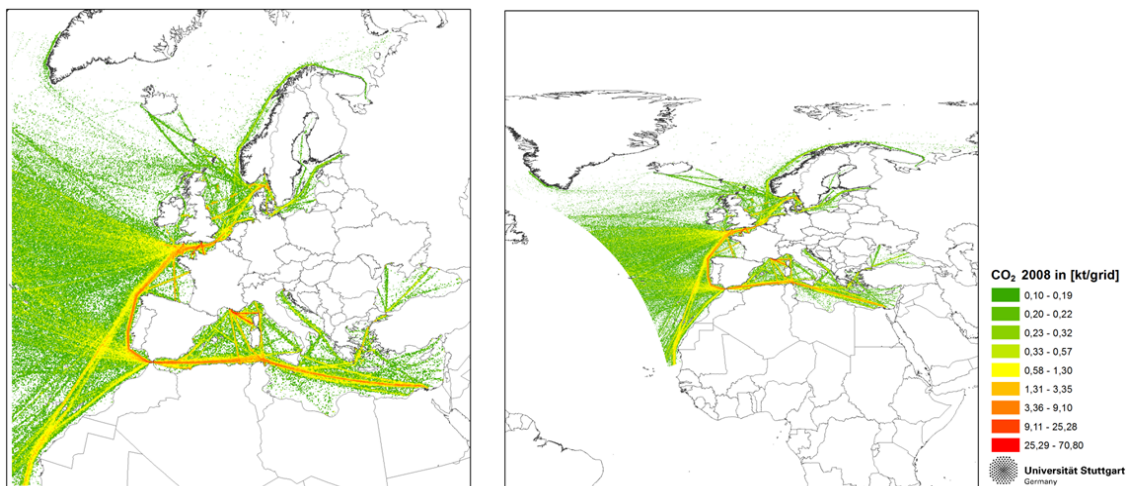


Figure 28: CO₂ emissions from international shipping for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

Table 21 in Annex I gives an overview of the country specific missing emissions not reported to CLRTAP and UNFCCC on sector level. For Austria, Bulgaria, Switzerland, Czech Republic, Hungary, Liechtenstein, Poland, Romania, Slovenia and Slovakia, no emissions from international navigation activities have been reported. For Cyprus, Finland, Iceland, Latvia and Malta only PM10 emissions from international navigation activities have been reported and no emissions for other pollutants taken into account here. For Luxemburg CO and PM10 emissions from international navigation activities have not been reported.

Maps of diffuse CO₂, CO, PM₁₀, NO_x and SO₂ emissions from national navigation activities

Table 17 shows the emissions of the different pollutants from national navigation activities.

Table 17: National shipping releases to air for specific pollutants

Sector	Sector Code	Sector_Name	Emissions in 2008				
	[NFR]	[NFR]	CO ₂ [kt]	NO _x [t]	SO ₂ [t]	PM ₁₀ [t]	CO [t]
			UNFCCC	CLRTAP			
Shipping	1A3dii	National Navigation (Shipping)	682	453,151	202,379	30,688	419,084
	1A4ciii	Agriculture/Forestry /Fishing: National Fishing	23,738	91,937	10,282	3,853	10,209
	Sum		24,420	545,088	212,661	34,541	429,293
All reported emissions from EU27 + EFTA4 countries			4,743,992	13,844,818	7,638,468	2,426,902	29,399,783

The spatial distribution of national navigation activities considers the categories national fishing, domestic shipping on inland waterways, coastal shipping and harbour manoeuvring. The gridding of the inland waterway shipping is performed using traffic volume data from TRANS-TOOLS¹⁴ and traffic data from VNF¹⁵ in combination with river geo data from GISCO¹⁶. The emissions at the coastline are distributed using harbour statistics from EUROSTAT^{17,18} and territorial waters (12 nautical miles coastal zones)¹⁹. The emissions for the harbours are distributed to the harbours using coordinates and harbour statistics from EUROSTAT. The national fishing is distributed equally to water bodies. Table 18 shows the applied proxy data sets used for the spatial distribution of the emissions from national navigation activities. The results for the spatial distribution of emissions from national navigation activities are shown in figure 29 to figure 33.

¹⁴ TRANS-TOOLS, 2010: (URL: <http://energy.jrc.ec.europa.eu/transtools/index.html>)

¹⁵ Voies Navigables d'Europe (VNE) (URL: <http://www.vne-waterways.eu/>, 05.07.2010)

¹⁶ Eurostat, GISCO: Watercourses from EuroRegional Map v30: Hydrography (HYDRO)

¹⁷ GISCO – Files to download for airports and ports: (URL: http://epp.eurostat.ec.europa.eu/portal/page/portal/gisco/popups/references/transport_networks)

¹⁸ EUROSTAT statistical information on harbour movements

¹⁹ <http://www.eea.europa.eu/data-and-maps/data/maritime-boundaries>,

Table 18: Proxy data sets used for the spatial distribution of national shipping activities

Sector	Sector_Code	Subsector (NFR)	Proxy Dataset	Data Source	Year	Extend
	[NFR]					
Shipping	1A3dii	Navigable inland waterways	Traffic data on the sections of the waterways	Voies Navigables de France (VNF)	2010	Selected countries
		and	Traffic volume	Trans-tools	2010	Selected countries
		coastal shipping	River geo data/geospatial inland waterways	Open Street Maps (OSM)	2010	EU 27 + EFTA
			Statistical data on harbor movements	Eurostat	2009	Ports in Europe
			Georeferenced ports	AtoBviaC (BP, 2010); Gisco Eurostat	2010	World
			World EEZ, VLIZ Maritime Boundaries Geodatabase v5	Flanders Marine Institute (VLIZ)	2009	World
			EEA Maritime Boundaries Datasets	EEA	2009	EU 27
			Georeferenced global data set (activities & emissions)	Wang et al. (2008); EDGAR	Updated 2010	Worldwide
	1A4ciii	National fishing	Water bodies	Corine Land cover data set 2000 (CLC, 2000); 2006 (CLC, 2006)	Updated 2010	EU 27 + EFTA

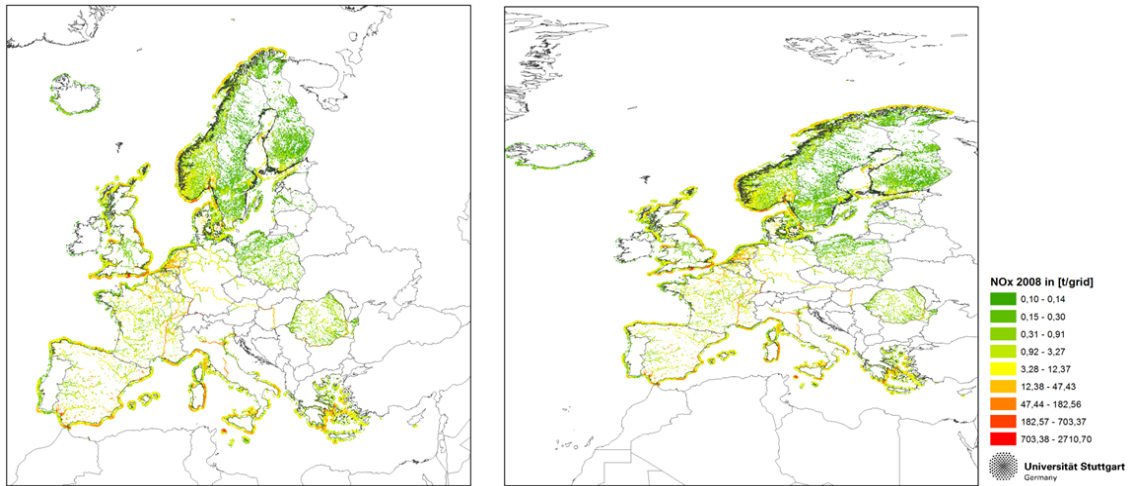


Figure 29: NO_x emissions from national shipping for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

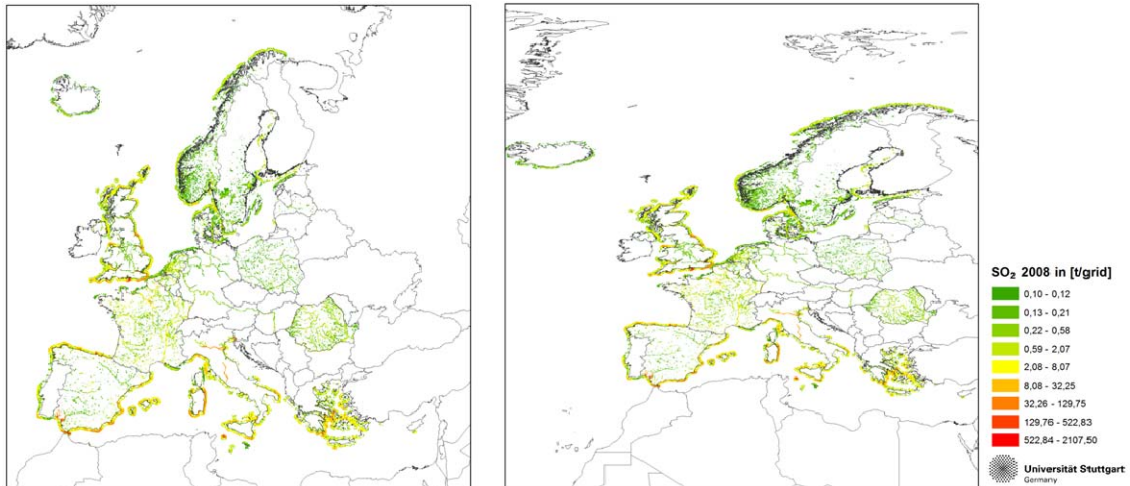


Figure 30: SO₂ emissions from national shipping for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

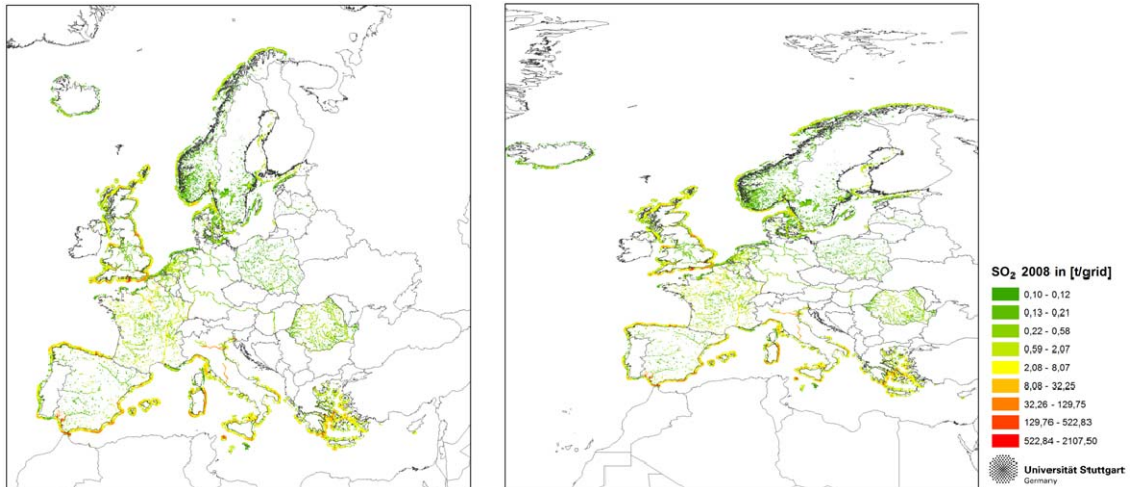


Figure 31: PM₁₀ emissions from national shipping for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

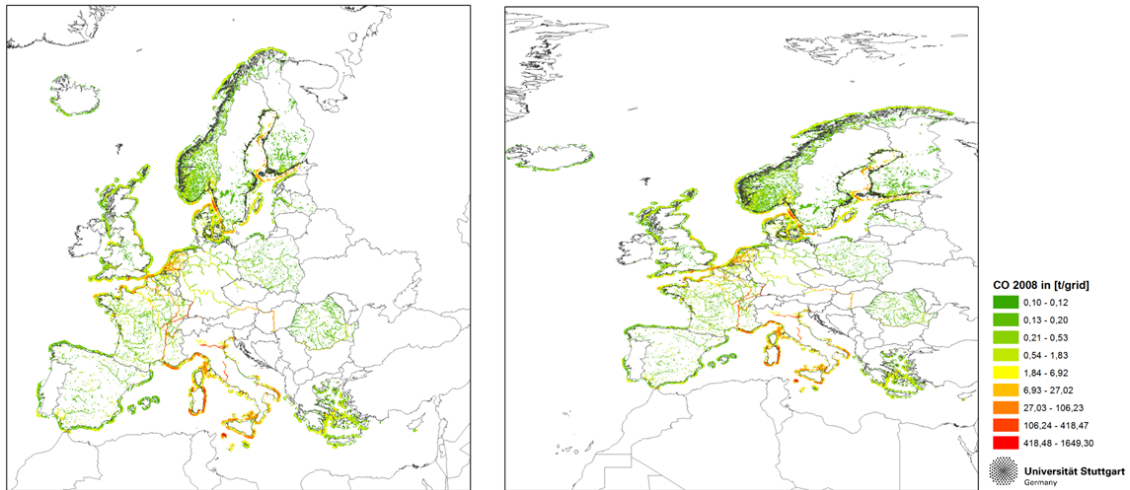


Figure 32: CO emissions from national shipping for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

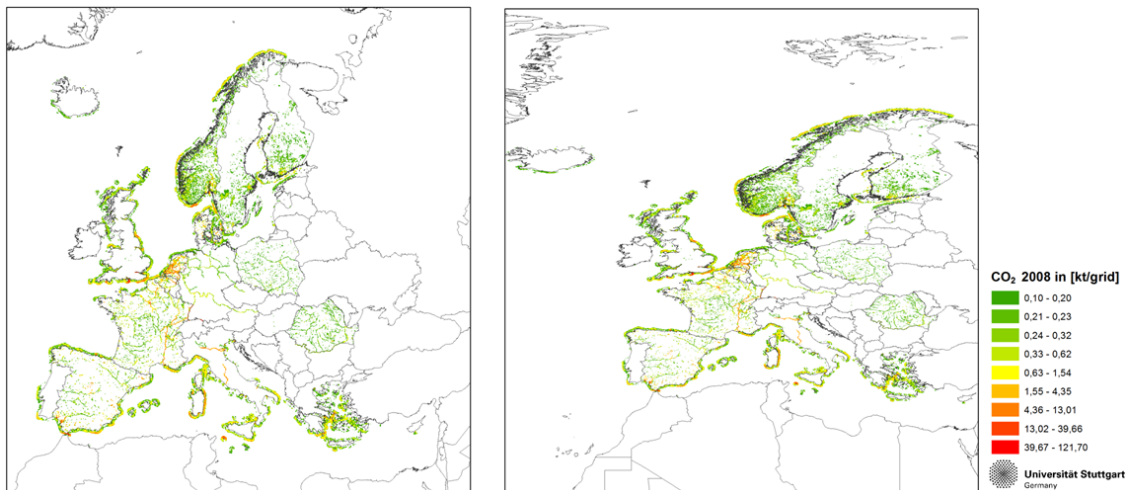


Figure 33: CO₂ emissions from national shipping for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

Table 21 in Annex I gives an overview of the country specific missing emissions not reported to CLRTAP and UNFCCC on sector level. For Bulgaria, Cyprus, Liechtenstein, and Slovenia no emissions from national navigation activities have been reported. For Greece, Iceland, Luxembourg and Malta PM10 emissions from national navigation activities have not been reported. For Luxembourg are missing also CO emissions from national navigation activities.

Maps of diffuse CO₂, CO, PM₁₀, NO_x and SO₂ emissions from domestic aviation activities

In Table 19 emissions from domestic aviation activities (only LTO cycles) for each pollutant considered are shown. The national total emission is aggregated for the EU27 and EFTA4 countries, using 2008 CO₂ emission data reported to UNFCCC, and 2008 data of NO_x, SO_x, PM₁₀ and CO reported to CLRTAP.

Table 19: Emissions from domestic aviation activities in EU27 and EFTA4 countries

Sector	Sector Code	Sector_Name	Emissions in 2008				
	[NFR]	[NFR/CRF]	CO ₂ [kt]	NO _x [t]	SO ₂ [t]	PM ₁₀ [t]	CO [t]
			UNFCCC	CLRTAP			
Domestic aviation	1A3a(ii) /1A3a	Civil Aviation (Domestic. LTO) /a. Civil Aviation	7,771	35,533	2,560	655	73,687
	Sum		7,771	35,533	2,560	655	73,687
All reported emissions from EU27 + EFTA4 countries			4,743,992	13,844,818	7,638,468	2,426,902	29,399,783
Countries for which no data are available from official reporting			<i>2 countries: CY, HU</i>	<i>5 countries: CY, HU, LI, LT, RO</i>	<i>7 countries: CY, EE, HU, LI, LT, PL, RO</i>	<i>13 countries: BE, BG, CY, CZ, EE, GR, HU, LI, LT, LU, MT, RO, SI</i>	<i>7 countries: CY, HU, LI, LT, LU, MT, RO</i>

Spatial disaggregation of officially reported national total emissions of the domestic aviation (only Landing and Take Off - LTO cycles) sector to high resolution gridded GIS data layers over EU27 and EFTA4 countries is carried out. Information on land, sea, and country extent within the mapping domain is attributed to the target grid cells on a sub-grid scale. Information on source distribution is approximated by airport location coordinates from GISCO²⁰, and spatial extent of airports is defined using high resolution CORINE Land Cover class²¹ 1.2.4 data and the 2009 EUROSTAT GISCO airport area data set²² below 1km x 1km. Source intensity is derived using available EUROSTAT LTO cycle²³ information of each airport within the mapping extent as activity data substitution. Table 20 shows the used proxy data sets for the spatial distribution of the domestic aviation.

²⁰ GISCO – Files to download for airports and ports (URL: http://epp.eurostat.ec.europa.eu/portal/page/portal/gisco/popups/references/transport_networks, 16.05.2011)

²¹ EMEP/EEA: Corine Land Cover 2006 Version 02/2010 (CLC2006) (URL: <http://www.eea.europa.eu/data-and-maps/data/corine-land-cover-2000-2006>, 02.07.2010)

²² GISCO – Files to download for airports and ports (URL: http://epp.eurostat.ec.europa.eu/portal/page/portal/gisco/popups/references/transport_networks, 16.05.2011)

²³ LTO (Landing and Take-off)

Table 20: Proxy data sets used for the spatial distribution of domestic aviation

Sector	Proxy Dataset	Data Source	Year	Extend
Domestic aviation	CORINE Land Cover 2000 and 2006 (air ports)	EEA	2000 and 2006	EU 27 + EFTA
	LTO cycles (Aircraft traffic data by main airport)	Eurostat	2010	EU 27 + EFTA
	Airport coordinates	GISCO	2006	EU 27 + EFTA

The results for the spatial distribution of emissions from national navigation activities are shown in figure 34 to figure 38.

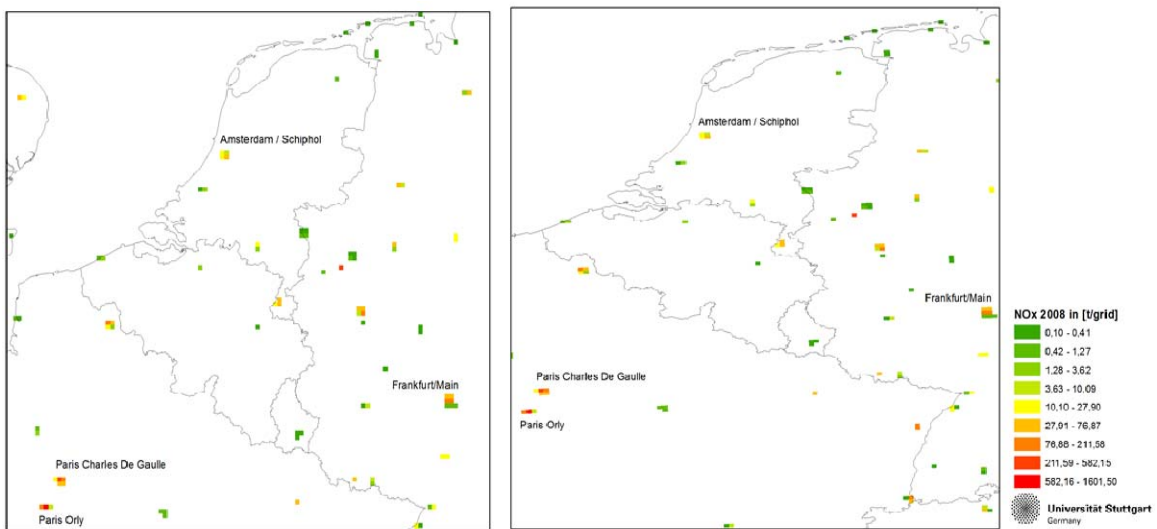


Figure 34: NO_x emissions from domestic aviation for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

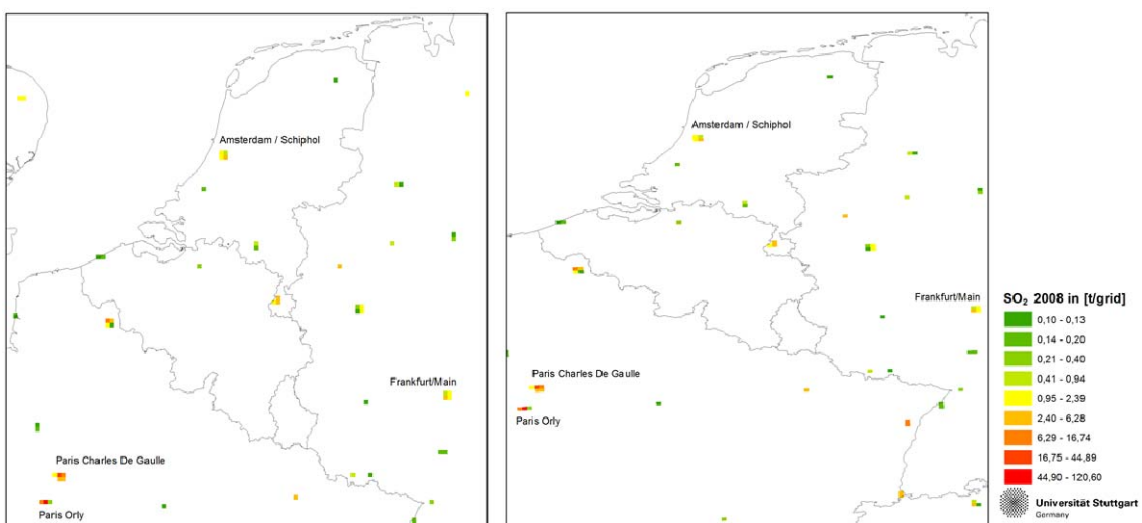


Figure 35: SO₂ emissions from domestic aviation for some airports within EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

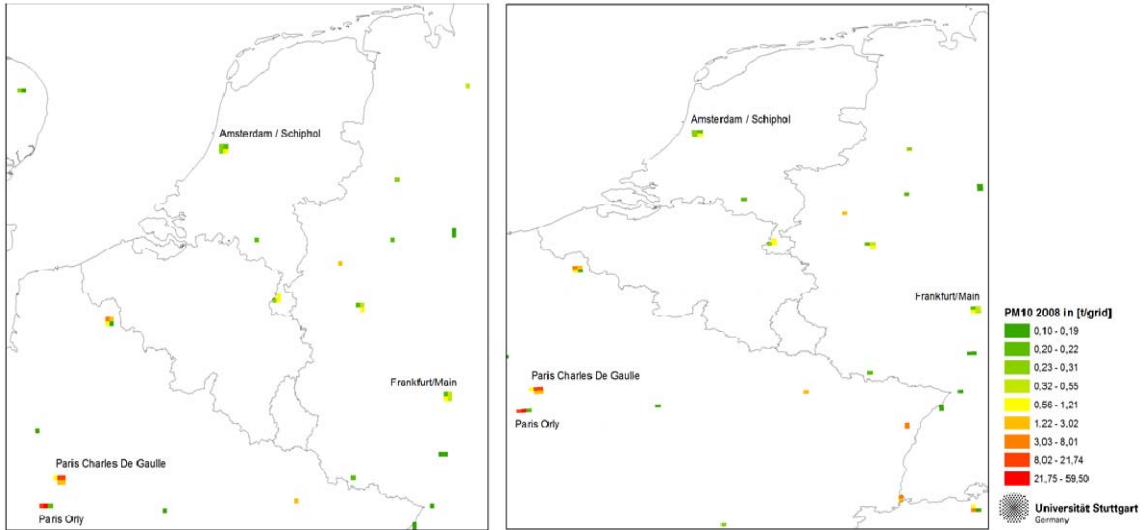


Figure 36: PM10 emissions from domestic aviation for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

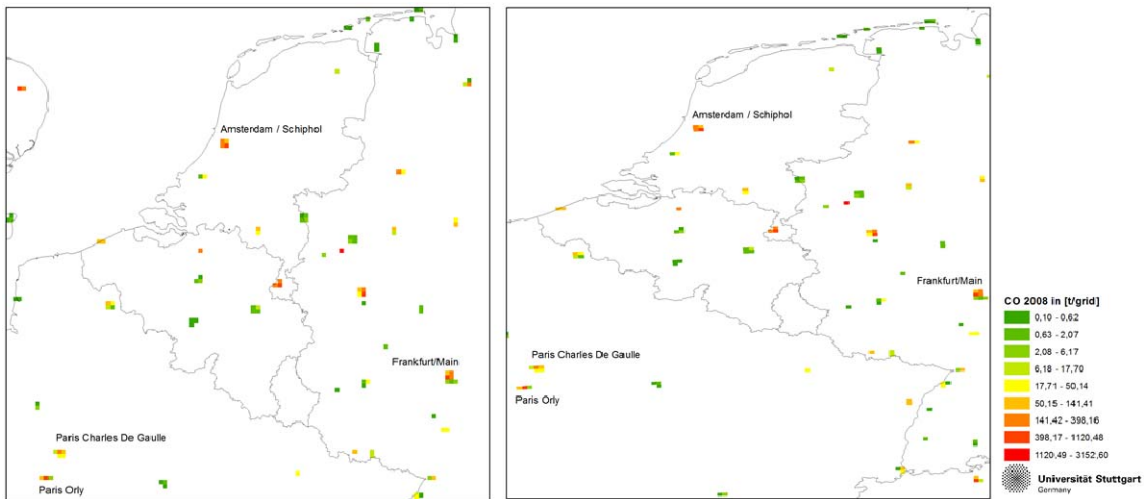


Figure 37: CO emissions from domestic aviation for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

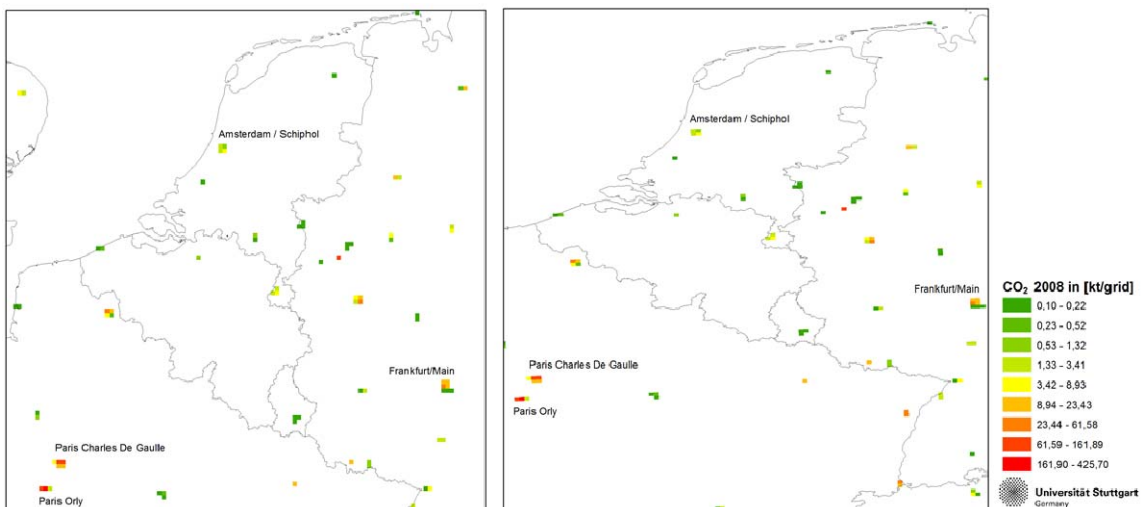


Figure 38: CO₂ emissions from domestic aviation for EU27 + EFTA4 in a spatial resolution of 5x5 km² (left in ETRS_1989_LAEA projection; right GCS_WGS_1984 Projection)

Table 21 in Annex I gives an overview of the country specific missing emissions not reported to CLRTAP and UNFCCC on sector level. For Cyprus and Hungary no emissions from domestic aviation activities have been reported. For Liechtenstein, Lithuania and Romania only CO₂ emissions from domestic aviation activities have been reported. For Belgium, Bulgaria, Czech Republic, Estonia, Greece, Iceland, Luxemburg and Malta no PM₁₀ emissions from Domestic aviation have been reported. For Estonia and Poland were no SO_x emissions from domestic aviation reported.

Which are the limitations?

(1) Emissions are Not the Same as Exposure

Emissions alone do not represent the extent of exposure to air pollution or possibly health risks may occur. Different meteorological conditions can result in exposures that occur in different locations where the emissions actually occurred or have been localized using a gridding methodology. In addition secondary pollutants due to chemical reactions are created in the atmosphere. Also, a larger amount of emissions of a particular pollutant may not be as important as smaller amounts of less reactive pollutants. While information about air pollutant emissions can serve as an indicator of local air pollution levels, it is the exposure to concentrations what influences health effects. Exposure is the amount of pollutants that someone actually breathes or otherwise ingests at different locations.

(2) Not all sources and pollutants are represented

The E-PRTR maps of diffuse emissions do not have information on all sources of air pollution and pollutants. The following main sectors/activities have not been taken into account:

- International aviation
- Domestic aviation (cruise)
- Road vehicle tyre and brake wear, road surface wear
- Railways
- Construction & building machineries
- Agricultural machineries
- Housing & Gardening machineries
- Fireworks and tobacco smoke
- Field burning of agricultural wastes
- Solid waste disposal on land
- Waste incineration
- No emissions from the agricultural sector (soils and fertilizers)
- Natural sources

The main barriers for not taken into these sources were the data availability on European scale, the uncertainties of the reported data on country level and the availability of resources. For international aviation, emission data are available but relevant proxy data have to be prepared.

(3) Spatial allocation parameters versus real location of the emissions

Diffuse industrial emissions from Energy industries, Manufacturing industries, Mineral industries,

Chemical industry, Metal industry and other production industry are typical spatial allocated using proxy data based on employees statistic. However this information often reflects only the location of the administrative headquarter of the industrial facility and sometimes not the location of the real work places and the location of the related air pollutant emissions. Thus on base of the assumption that industrial emissions are more likely located in areas with higher industrial activity in-dependent if they are covered by the E-PRTR regulation or not, the density of E-PRTR related facilities have been applied as an additional proxy data for the spatial resolution of diffuse industrial releases.

(4) Differences between gridding methodology at EU level and National specific methodologies

On national level much more country detailed information are available than at European level. Thus the results on country level can show large deviations in comparison to the applied European approach. These is for example the case for releases of CO from domestic and commercial heating that are mainly distributed to areas in proximity of forestry and not densely populated areas. However open fire places are in some countries nowadays mainly use for recreational purpose, especially in urban areas.

(5) Improving the Performance of the maps in the E-PRTR system by reducing file sizes

The size of map files was reduced by deleting no data values from the map files in process called rationalisation. Additionally, the decimal place was set to one in order to reduce the loading time of the map on the web-tool.

Frequently asked questions

How is mapped emission data derived?

The report 'Methodology development for the spatial distribution of the diffuse emissions in Europe' provides details on how mapped data are generated. This can be downloaded [here](#)

Are cities with district heating being excluded from allocating emission for domestic combustion?

Urban areas with district heating have not been taken into account by the applied methodology for spatial allocation of the specific pollutants because no European wide information exists about district heating installations. On national level this information is available for some countries.

What units is mapped emission data provided in?

The mapped emissions data are provided in terms of tonnes per 5x5 km² grid cell per year for the pollutants NH₃, PM₁₀, NO_x, CO and SO₂. For CO₂ mapped emissions data are provided in terms of kilotonnes per 5x5 km² grid cell per year.

Why are some major airports and harbours in Europe not represented?

This is due to the fact that emissions from domestic activities of mobile sources covers only releases from activities within a country. Small countries have less domestic traffic (e.g Belgium). This is the reason why the Brussels airport is not shown in the maps.

Annex I

Table 21 gives an overview of the emissions not reported to CLRTAP and UNFCCC on sector level. An “x” means that no emissions reported for the whole main sector. Here are not indicated gaps if countries have reported only partly to the concerning sectors.

Table 21: Emissions not reported to CLRTAP and UNFCCC on main sector level ([Yellow cross= not reported]²⁴

Aggregated E-PRTR sectors	Code	Country	CO	NH ₃	NO _x	PM10	SO _x	CO ₂
Industry	GR	Greece				x		
Industry	IS	Iceland				x		
Industry	LU	Luxembourg				x		
Residential and Commercial	GR	Greece				x		
Residential and Commercial	IS	Iceland				x		
Residential and Commercial	LU	Luxembourg	x			x		
Residential and Commercial	MT	Malta				x		
Road transport	GR	Greece				x		
Road transport	IS	Iceland				x		
Road transport	LU	Luxembourg	x			x		
Road transport	MT	Malta	x					
National shipping	BG	Bulgaria	x		x	x	x	x
National shipping	CY	Cyprus	x		x	x	x	x
National shipping	GR	Greece				x		
National shipping	IS	Iceland				x		
National shipping	LI	Liechtenstein	x		x	x	x	x
National shipping	LU	Luxembourg	x			x		
National shipping	MT	Malta				x		
National shipping	SK	Slovakia						x
National shipping	SI	Slovenia	x		x	x	x	x
International shipping	AT	Austria	x		x	x	x	
International shipping	BG	Bulgaria	x		x	x	x	
International shipping	CH	Switzerland	x		x	x	x	x
International shipping	CY	Cyprus	x			x		
International shipping	CZ	Czech Republic	x		x	x	x	x
International shipping	FI	Finland				x		
International shipping	GR	Greece				x		
International shipping	HU	Hungary	x		x	x	x	x
International shipping	IS	Iceland				x		
International shipping	LI	Liechtenstein	x		x	x	x	x
International shipping	LU	Luxembourg	x			x		
International shipping	LV	Latvia				x		
International shipping	MT	Malta				x		

²⁴ Here are not indicated gaps if countries have reported only partly to the concerning sectors.

Aggregated E-PRTR sectors	Code	Country	CO	NH ₃	NO _x	PM10	SO _x	CO ₂
International shipping	PL	Poland	x		x	x	x	
International shipping	RO	Romania	x		x	x	x	
International shipping	SI	Slovenia	x		x	x	x	
International shipping	SK	Slovakia	x		x	x	x	
Domestic aviation (Domestic, LTO)	BE	Belgium				x		
Domestic aviation (Domestic, LTO)	BG	Bulgaria				x		
Domestic aviation (Domestic, LTO)	CY	Cyprus	x		x	x	x	x
Domestic aviation (Domestic, LTO)	CZ	Czech Republic				x		
Domestic aviation (Domestic, LTO)	EE	Estonia				x	x	
Domestic aviation (Domestic, LTO)	GR	Greece				x		
Domestic aviation (Domestic, LTO)	HU	Hungary	x		x	x	x	x
Domestic aviation (Domestic, LTO)	IS	Iceland				x		
Domestic aviation (Domestic, LTO)	LI	Liechtenstein	x		x	x	x	
Domestic aviation (Domestic, LTO)	LT	Lithuania	x		x	x	x	
Domestic aviation (Domestic, LTO)	LU	Luxembourg	x			x		
Domestic aviation (Domestic, LTO)	MT	Malta	x			x		
Domestic aviation (Domestic, LTO)	PL	Poland					x	
Domestic aviation (Domestic, LTO)	RO	Romania	x		x	x	x	
Domestic aviation (Domestic, LTO)	SI	Slovenia				x		
Agriculture	BG	Bulgaria				x		
Agriculture	GR	Greece				x		
Agriculture	HU	Hungary				x		
Agriculture	IS	Iceland		x		x		
Agriculture	LI	Liechtenstein				x		
Agriculture	LT	Lithuania				x		
Agriculture	LU	Luxembourg				x		
Agriculture	NO	Norway				x		
Agriculture	PT	Portugal				x		
Agriculture	SK	Slovakia				x		