



OSPAR
COMMISSION

Atmospheric Deposition of Nitrogen to the OSPAR Maritime Area in the period 1995-2014

OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. The Contracting Parties are Belgium, Denmark, the European Union, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. Les Parties contractantes sont l'Allemagne, la Belgique, le Danemark, l'Espagne, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède, la Suisse et l'Union européenne.

Acknowledgements

This report was prepared by Jerzy Bartnicki and Anna Benedictow of the Meteorological Synthesizing Centre-West (MSC-W) of EMEP, Oslo. The report was published by EMEP in January 2017 as EMEP/MSC-W TECHNICAL REPORT 1/2017, ISSN 0332-9879. EMEP retains all rights on the data, measured under the EMEP Programme and modelled for this report, and the related data products (tables and figures).

This work has been supported and financed by OSPAR. The authors are indebted to the scientific team at MSC-W for their help in providing the results included in this report. The work related to EMEP/MSC-W modelling has been supported by the Research Council of Norway through the NOTUR project “CPU time for EMEP - European Monitoring and Evaluation Programme” (NN2890K) and NorStore project “Storage for EMEP - European Monitoring and Evaluation Programme” (ns9005k).

Atmospheric Deposition of Nitrogen to the OSPAR Maritime Area in the period 1995-2014

1. Introduction.....	3
2. Time series of atmospheric nitrogen deposition to OSPAR Regions.....	7
2.1 Annual deposition to OSPAR Region I.....	7
2.2 Annual deposition to OSPAR Region II.....	9
2.3 Annual deposition to OSPAR Region III.....	11
2.4 Annual deposition to OSPAR Region IV.....	13
2.5 Annual deposition to OSPAR Region V.....	15
2.6 Annual deposition to the OSPAR Maritime Area	17
3. Weather-normalised nitrogen deposition to each OSPAR Region	22
3.1 Normalised deposition to OSPAR Region I.....	22
3.2 Normalised deposition to OSPAR Region II.....	24
3.3 Normalised deposition to OSPAR Region III.....	26
3.4 Normalised deposition to OSPAR Region IV	28
3.5 Normalised deposition to OSPAR Region V	30
3.6 Normalised deposition to all the OSPAR Maritime Area	32
4. Source apportionment of the atmospheric deposition to each OSPAR region.....	34
4.1 Apportionment for OSPAR Region I.....	34
4.2 Apportionment for OSPAR Region II	38
4.3 Apportionment for OSPAR Region III.....	43
4.4 Apportionment for OSPAR Region IV.....	46
4.5 Apportionment for OSPAR Region V.....	49
4.6 Apportionment for the OSPAR Maritime Area	52
5. Summary and conclusions.....	55
5.1 Annual depositions	55
5.2 Normalised depositions	56
5.3 Source apportionment.....	57
6. References.....	59
7. Appendix A: Time series of nitrogen emissions.....	60

1. Introduction

One of the important tasks of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) is to protect the OSPAR Maritime Area from eutrophication. This requires analysis of the role of nutrient emissions, discharges losses and inputs into the OSPAR area. In addition to riverine and direct inputs, atmospheric nitrogen input plays an important role for some regions of the OSPAR Maritime Area. Therefore, actions and measures to reduce nitrogen input may need to be formulated.

Nitrogen deposition to the OSPAR Maritime Area has been a subject of a cooperation between Meteorological Synthesizing Centre – West (MSC-W) of EMEP and OSPAR since 2003, starting with the first EMEP report for OSPAR (Bartnicki and Fagerli, 2003). This cooperation has continued and been documented (Bartnicki and Fagerli, 2004a, 2004b; Bartnicki and Fagerli, 2006).

The goal of the present EMEP report for OSPAR is an evaluation of nutrient inputs to the OSPAR Maritime Area from land-based sources (via atmospheric transport and deposition) and directly from the atmosphere. This evaluation has been performed for the entire OSPAR Maritime Area and for individual OSPAR Regions. The five OSPAR Regions are shown in Figure 1.1.

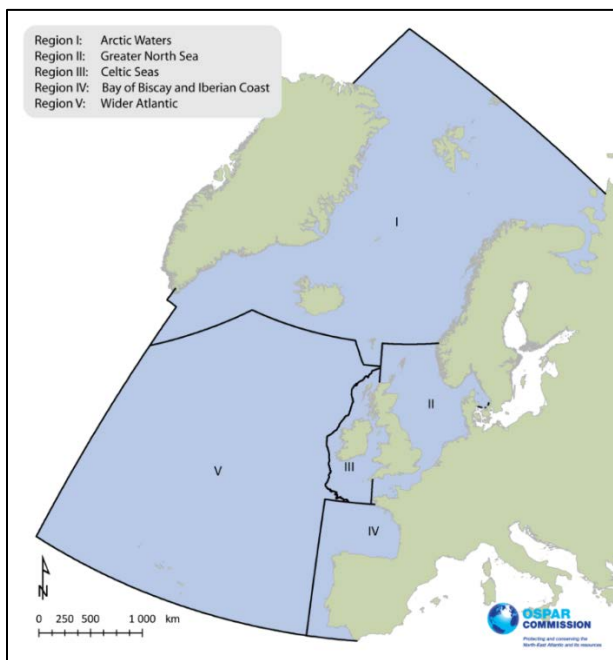


Figure 1.1: Location of five OSPAR Regions for which all computations with the EMEP/MSC-W air pollution model were performed

EMEP was requested to prepare data and a report for the following tasks and products at the OSPAR Region level:

- Task 1: Time series of atmospheric deposition to OSPAR Regions (with the understanding that the EMEP grid does not fully cover the whole of Region V, I and IV). Data for 1995–2014 presented as stacked bar charts, with the stacks representing NH_x and NO_x. Data included as tables as well as figures.
- Task 2: Weather-normalised total (sum of NO_x and NH_x) nitrogen deposition to each OSPAR Region for 1995–2014 (the same time period as in 2.1.1). Use the same method as for HELCOM each year, based on the source-receptor matrices for oxidised and reduced nitrogen, including calculation of new source-receptor matrices for selected OSPAR Regions 1995–2014. The new source-receptor matrices to be used for Task 3.
- Task 3: Following completion of Task 2, conduct source apportionment by country (and shipping, non-OSPAR sources etc.) of the atmospheric deposition (total nitrogen) to each OSPAR region for the period 1995–2014. Use the source-receptor matrices calculated in Task 2.
- Task 4: A synthesis of the results from Tasks 1-3, discussing major sources. Changes, influence of EU and international agreements, likely developments. A relatively short text report with data presented as tables and figures. Provide all the data in Excel files.
- Task 5: Time series of emissions (NO_x and NH_x) from each Contracting Party divided by SNAP sector. This could be shown as a stacked bar chart and table per Contracting Party with each sector represented by one colour in the bar chart. A time series from 1985–2014 would be ideal.

In the above tasks, the source apportionment (Task 3) was calculated using the source-receptor matrices and was performed on actual data (not weather-normalised). Emission sources from all countries (OSPAR Contracting Parties and non-Contracting Parties) were included directly in the calculations performed with the EMEP/MSC-W model. The emissions sources located outside the EMEP domain (e.g. nitrogen emission sources in the United States and Canada) were not included directly in the calculations, but taken into account indirectly, in the lateral boundary conditions to the EMEP/MSC-W model.

Nitrogen emissions for 2014 have been derived from the 2016 official data submissions to UNECE CLRTAP as of May 2016. The gridded distributions of the 2014 emissions were provided by the EMEP Centre on Emission Inventories and Projections (CEIP). The emissions for the period of 2000–2013 were derived from the data submissions to UNECE CLRTAP as of May 2015. Re-submissions of emission data in 2016 were not included since the gridded data set for 2000–2013 had not been updated by CEIP in 2016. This is the reason for differences in nitrogen

emissions officially submitted by some countries (e.g. Germany) to UNECE and emissions used for the EMEP/MSC-W model calculations presented here.

The EMEP/MSC-W (Simpson et al. 2012) model was used for all nitrogen computations presented here. The latest available model version rv4.9 was used for the deposition calculations. This version is described in the EMEP Status Report 1/2016 and the results of model verification for 2014 can be found in the Supplementary material to the EMEP Status Report 1/2016. The model was run on 50×50 km in the EMEP domain. Meteorology, emissions, boundary conditions and forest fires for 2014 have been used as input. In addition, the SO_2 emissions from the Holuhraun eruption in 2014 were included in the emission inventories. For the first time, DMS emissions are created 'on-the-fly' e.g. they are meteorology dependent. Analysis of this model version performance and comparison of the model results with measurements can be found in Supplementary material to EMEP Status Report 1/2016.

In 2008, the Steering Body of EMEP adopted an extension of the official EMEP domain to facilitate the inclusion of countries in Eastern Europe, Caucasus and Central Asia (EECCA) in the EMEP calculations (ref. ECE/EB.AIR/GE.1/2007/9). Thus from 2008, the official 50×50 km² polar stereographic EMEP grid has been extended from 132×111 to 132×159 grid cells following Stage 1 in ECE/EB.AIR/GE.1/2007/9. In geographical projection, it leads to an extension eastward as well as northward. This domain is shown in Figure 1.2.

All nitrogen depositions presented in the present report were computed in the domain shown in Figure 1.2. This domain covers most of the OSPAR Maritime Area, but unfortunately not all of them. Therefore, some underestimation of the computed depositions can be expected mainly in Region V, but also to a less extent in the Regions I and III. The maxima of these underestimations were evaluated based on the boundary depositions as 10% for Region V, 5% for Regions I and 3% for Region III.

The main subject of the present report is atmospheric nitrogen deposition to the OSPAR Maritime Area. However, one of the most important inputs to EMEP/MSC-W model for calculating deposition is nitrogen emissions. Therefore, annual nitrogen emissions from all OSPAR Contracting Parties in the period 1995-2014 are presented in Appendix A.

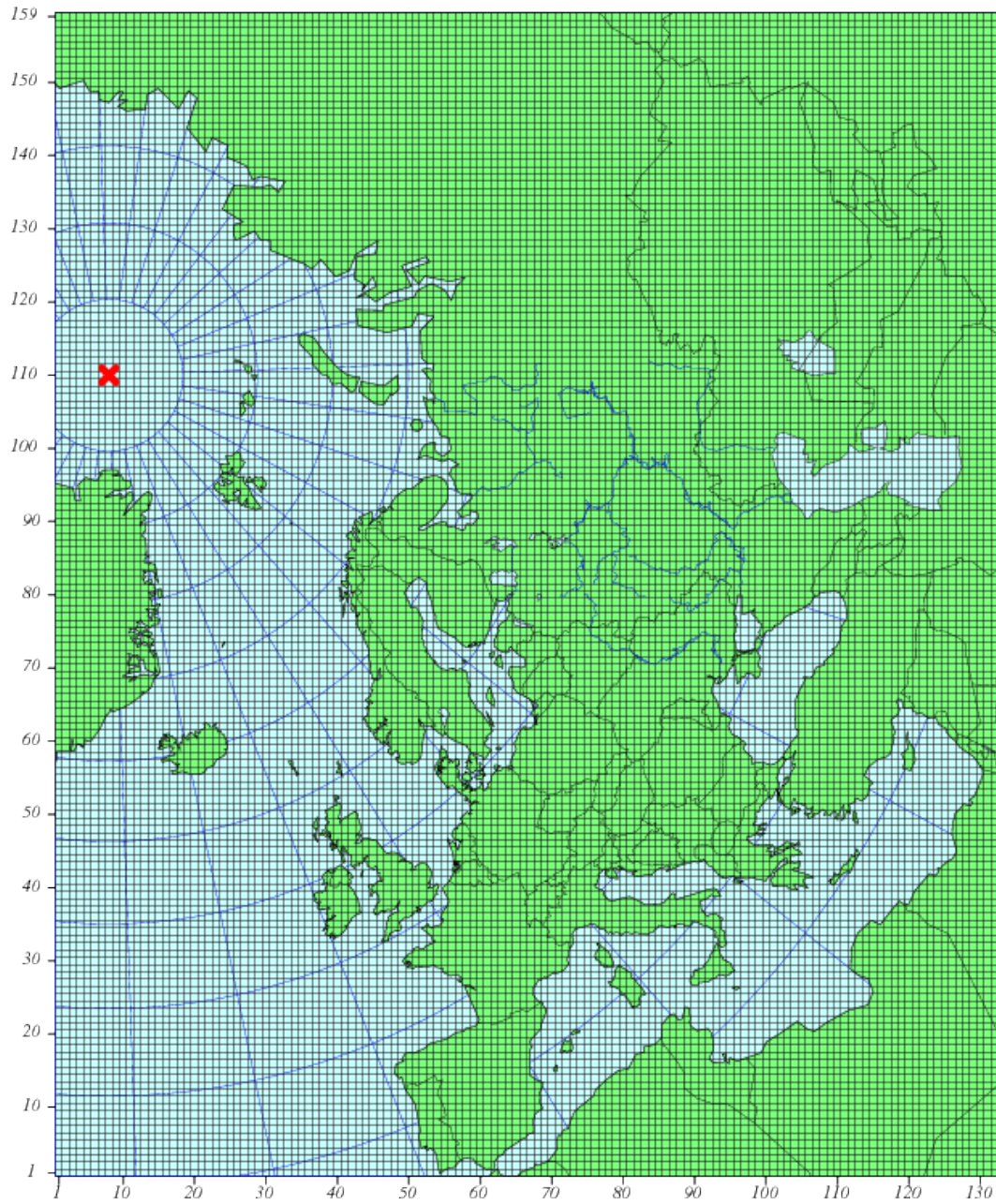


Figure 1.2: The official EMEP domain used for all EMEP/MSC-W model calculations presented and discussed in the present report

2. Time series of atmospheric nitrogen deposition to OSPAR Regions

Time series of annual atmospheric deposition to OSPAR Regions calculated with the EMEP/MSC-W model are presented in this Chapter for the period 1995–2014. The results are presented as stacked bar charts, with the stacks representing oxidised and reduced nitrogen deposition. In addition, tables with calculated deposition are also included here.

2.1 Annual deposition to OSPAR Region I

Annual deposition of nitrogen oxides and ammonia to OSPAR Region I is presented in Figure 2.1 for the period 1995–2014. The values of the deposition (including total nitrogen) are listed in Table 2.1.

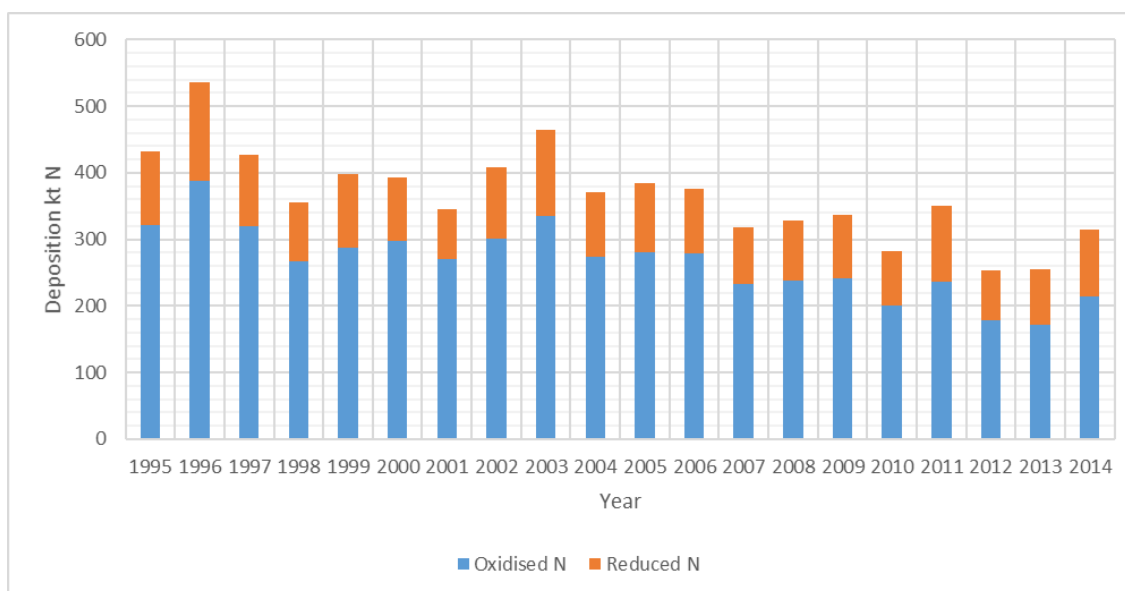


Figure 2.1: Annual deposition of oxidised and reduced nitrogen to OSPAR Region I in the period 1995–2014. Units: kt N per year

As mentioned in the Introduction, depositions calculated for Region I are slightly underestimated, because the domain of the EMEP model does not cover the entire area of the Region I. This underestimation is less than 5%. There is quite a lot of inter-annual variation in calculated annual deposition, mainly because of different meteorological conditions for each year. Minima of the deposition can be noticed at the end of the period in 2013 for oxidised deposition and in 2012 for reduced and total nitrogen deposition. Maxima of deposition occur at the beginning of the period in 1996 for all kinds of depositions. Annual deposition is lower in 2014 than in 1995: 33%, 10% and 27% for oxidised, reduced and total nitrogen, respectively.

Relative contribution of annual oxidised and reduced nitrogen deposition to annual total nitrogen deposition for each year of the period 1995–2014 is shown in Figure 2.2. The

Atmospheric Deposition of Nitrogen to the OSPAR Maritime Area in the period 1995-2014

contribution of oxidised nitrogen is definitely higher, slightly above 70% in 1995-2010 and slightly below 70% in the last four years of the considered period.

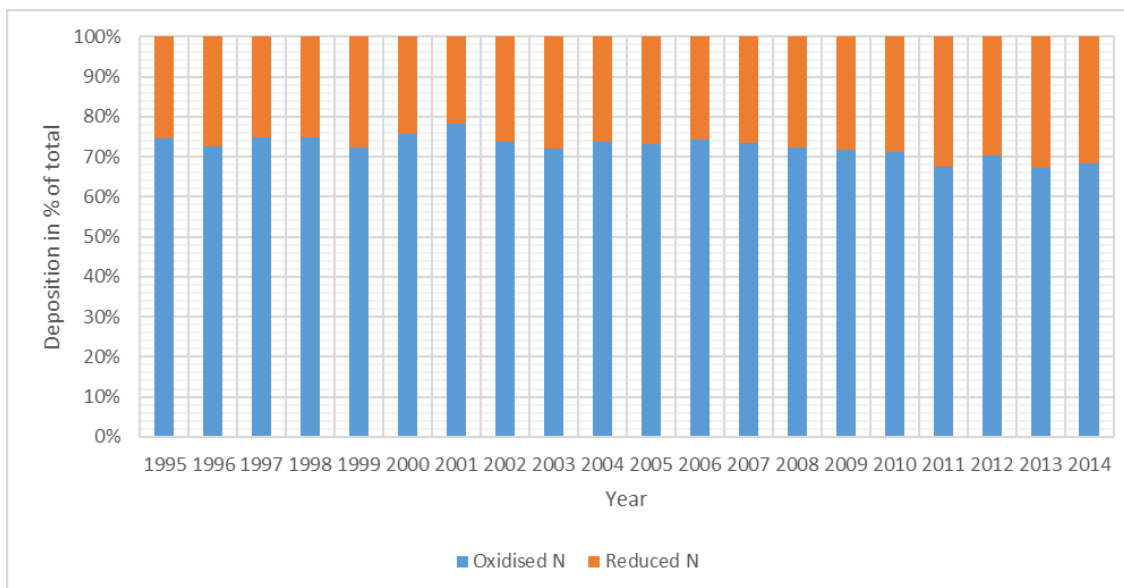


Figure 2.2: Relative annual deposition of oxidised and reduced nitrogen (in % of total deposition) to OSPAR Region I in the period 1995-2014

Table 2.1: Annual deposition of oxidised, reduced and total nitrogen to OSPAR Region I in the period 1995-2014. Units: kt N per year. Deposition maxima marked in cyan, minima in green

Year	Deposition		
	Ox-N	Rd-N	Tot-N
1995	321	110	432
1996	388	148	536
1997	319	108	427
1998	267	89	356
1999	288	110	398
2000	298	95	393
2001	270	75	345
2002	300	107	407
2003	334	131	465
2004	273	97	370
2005	281	103	384
2006	279	97	376
2007	233	85	318
2008	237	91	329

2009	242	95	337
2010	201	82	283
2011	236	114	350
2012	178	75	253
2013	172	84	255
2014	215	99	314

2.2 Annual deposition to OSPAR Region II

Annual deposition of nitrogen oxides and ammonia to OSPAR Region II are presented in Figure 2.3 for the period 1995-2014. The values of the deposition (including total nitrogen) are listed in Table 2.3.

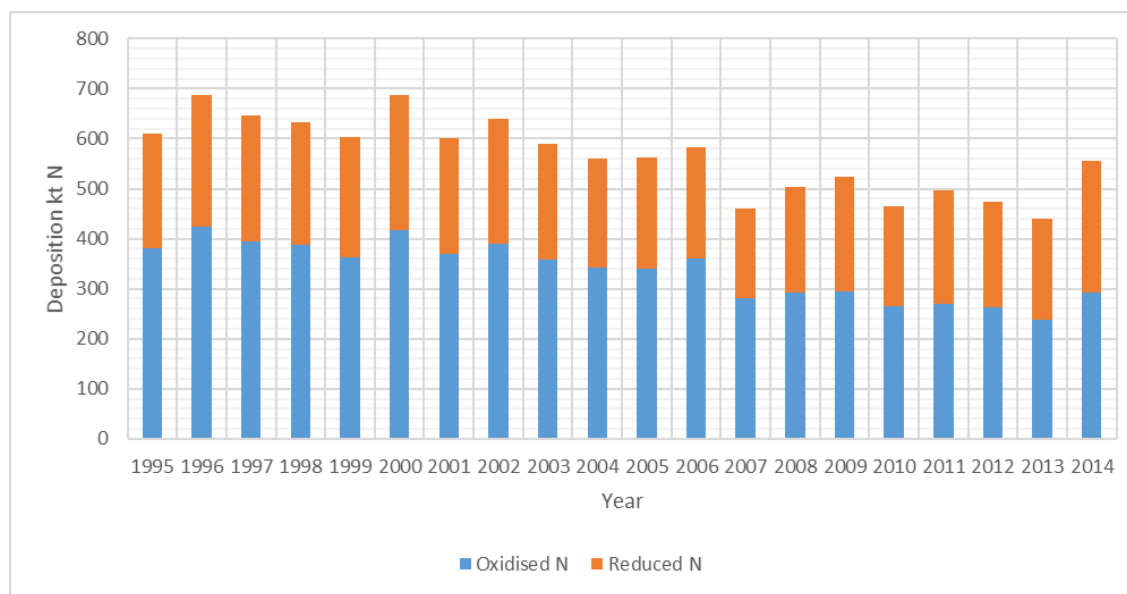


Figure 2.3: Annual deposition of oxidised and reduced nitrogen to OSPAR Region II in the period 1995-2014.

Also for this Region there is visible inter-annual variation in calculated annual deposition, but slightly lower than for Region I. Minima of the deposition can be noticed at the end of the period in 2013 for oxidised and total deposition, but closer to the middle of the period, in 2007, for reduced nitrogen deposition. Maxima of the deposition occur at the beginning of the period, in 1996, for oxidised and total nitrogen deposition, but in 2000 for total deposition. Annual deposition is lower in 2014 than in 1995: 23% and 9% for oxidised and total nitrogen, respectively, it is 14% higher for reduced nitrogen.

Relative contributions of annual oxidised and reduced nitrogen deposition to annual total nitrogen deposition to OSPAR Region II for each year of the period 1995-2014 is shown in Figure

2.4. The contribution of oxidised nitrogen is slightly above 60% at the beginning of the period 1995-2007 and slightly above 50% at the end period.

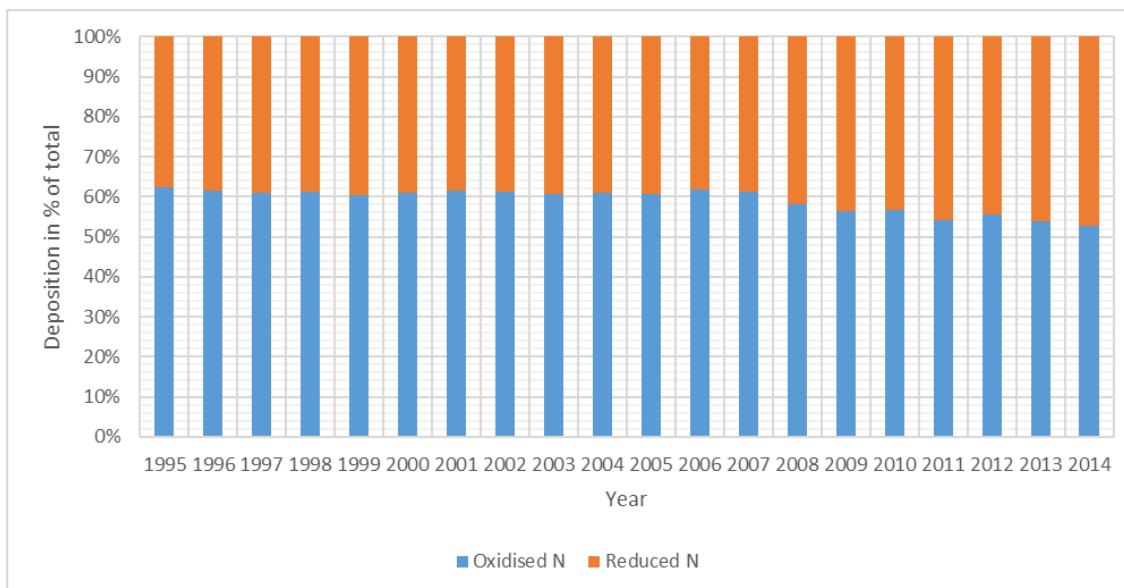


Figure 2.4: Relative annual deposition of oxidised and reduced nitrogen (in % of total deposition) to OSPAR Region II in the period 1995-2014

Table 2.2: Annual deposition of oxidised, reduced and total nitrogen to OSPAR Region II in the period 1995-2014. Units: kt N per year. Deposition maxima marked in cyan, minima in green

Year	Deposition		
	Ox-N	Rd-N	Tot-N
1995	381	230	611
1996	423	265	688
1997	394	253	646
1998	388	245	634
1999	363	239	602
2000	418	269	687
2001	371	231	601
2002	390	249	639
2003	357	233	590
2004	341	218	560
2005	340	221	562
2006	361	223	583
2007	282	179	461
2008	292	210	502

2009	295	228	523
2010	264	202	466
2011	269	227	496
2012	263	210	473
2013	237	203	440
2014	292	263	555

2.3 Annual deposition to OSPAR Region III

Annual deposition of nitrogen oxides and ammonia to OSPAR Region III are presented in Figure 2.5 for the period 1995-2014. The values of the deposition (including total nitrogen) are listed in Table 2.3.

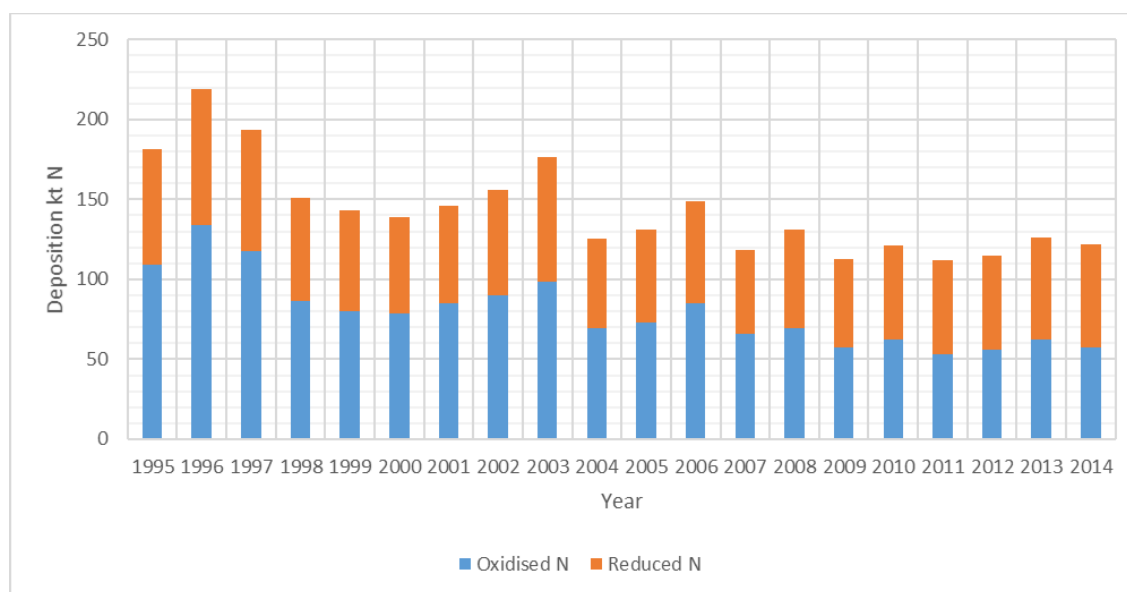


Figure 2.5: Annual deposition of oxidised and reduced nitrogen to OSPAR Region III in the period 1995-2014

Inter-annual variation in calculated annual deposition is relatively large for Region III. Minima of the deposition can be noticed at the end of the period in 2011 for oxidised and total deposition, but closer to the middle of the period, in 2007, for reduced nitrogen deposition. Maxima of the deposition occur at the beginning of the period in 1996 for all kinds of depositions. All annual depositions are lower in 2014 than in 1995: 47%, 11% and 33% for oxidised, reduced and total nitrogen, respectively.

Relative contribution of annual oxidised and reduced nitrogen deposition to annual total nitrogen deposition to OSPAR Region III for each year of the period 1995-2014 is shown in Figure

2.6. The contribution of oxidised nitrogen is close to 60% at the beginning of the period in 1995-1997, but it is slightly below 50% in the last four years of the considered period.

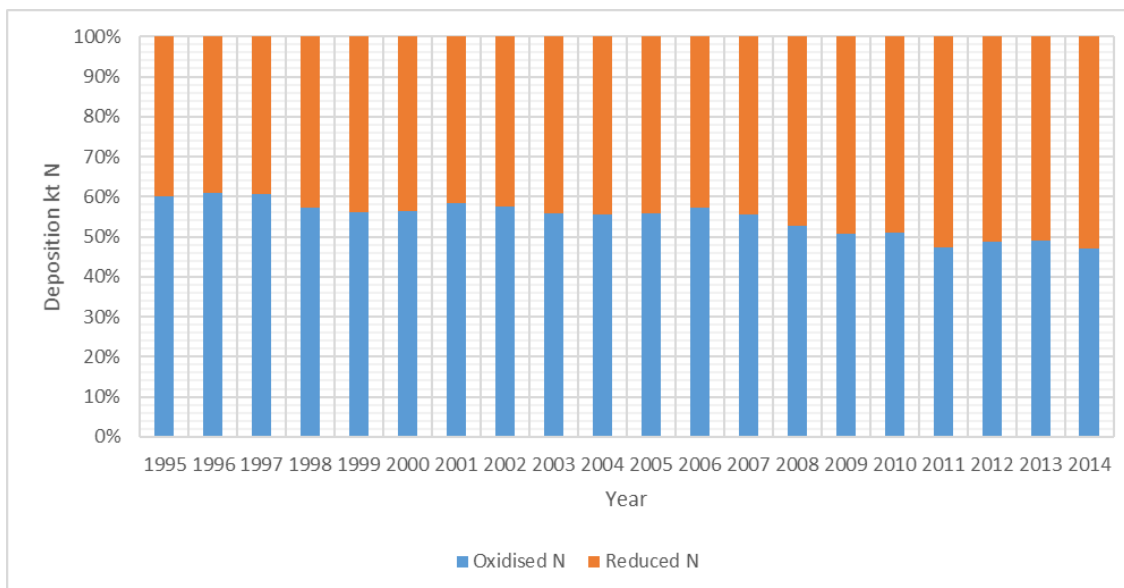


Figure 2.6: Relative annual deposition of oxidised and reduced nitrogen (in % of total deposition) to OSPAR Region III in the period 1995-2014

Table 2.3: Annual deposition of oxidised, reduced and total nitrogen to OSPAR Region III in the period 1995-2014. Units: kt N per year. Deposition maxima marked in cyan, minima in green

Year	Deposition		
	Ox-N	Rd-N	Tot-N
1995	109	72	181
1996	134	86	219
1997	117	76	194
1998	86	65	151
1999	80	63	143
2000	79	60	139
2001	85	61	146
2002	90	66	156
2003	99	78	177
2004	70	56	125
2005	73	58	131
2006	85	64	149
2007	66	53	119
2008	69	62	131

2009	57	56	113
2010	62	59	121
2011	53	59	112
2012	56	59	115
2013	62	64	126
2014	57	64	122

2.4 Annual deposition to OSPAR Region IV

Annual deposition of nitrogen oxides and ammonia to OSPAR Region IV are presented in Figure 2.7 for the period 1995-2014. The values of the deposition (including total nitrogen) are listed in Table 2.4.

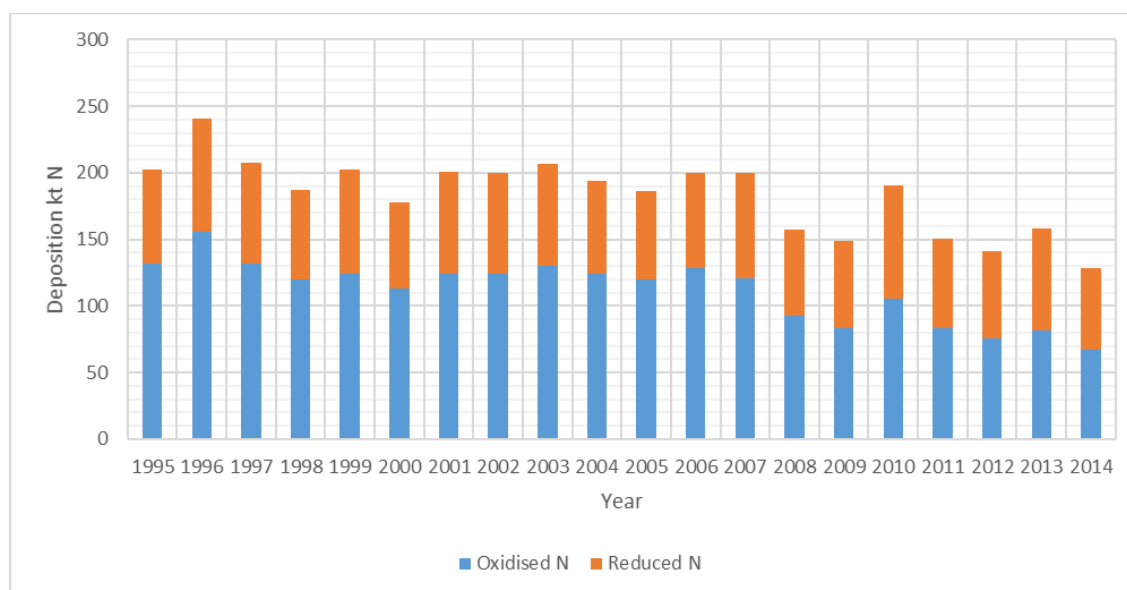


Figure 2.7: Annual deposition of oxidised and reduced nitrogen to OSPAR Region IV in the period 1995-2014

Inter-annual variation in calculated annual deposition is relatively large for Region IV. Minima of the deposition can be noticed at the very end of the period in 2014 for all depositions. All maxima of the deposition occur at the beginning of the period, in 1996. All annual depositions are clearly lower in 2014 than in 1995: 49%, 13% and 36% for oxidised, reduced and total nitrogen, respectively.

Relative contribution of annual oxidised and reduced nitrogen deposition to annual total nitrogen deposition to OSPAR Region IV for each year of the period 1995-2014 is shown in Figure 2.8. The contribution of oxidised nitrogen is slightly above 60% at the beginning of the period and slightly above 50% at the end of considered period.

Atmospheric Deposition of Nitrogen to the OSPAR Maritime Area in the period 1995-2014

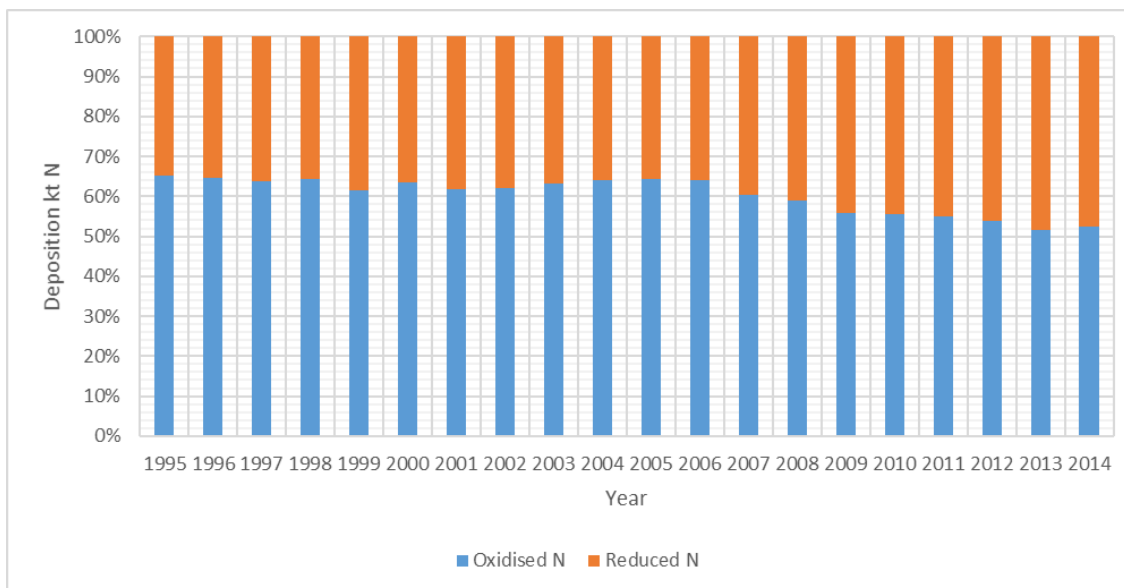


Figure 2.8: Relative annual deposition of oxidised and reduced nitrogen (in % of total deposition) to OSPAR Region IV in the period 1995-2014

Table 2.4: Annual deposition of oxidised, reduced and total nitrogen to OSPAR Region IV in the period 1995-2014. Units: kt N per year. Deposition maxima marked in cyan, minima in green

Year	Deposition		
	Ox-N	Rd-N	Tot-N
1995	132	70	202
1996	156	85	241
1997	132	76	208
1998	120	67	187
1999	124	78	202
2000	113	65	178
2001	124	77	200
2002	124	76	200
2003	130	76	206
2004	124	70	194
2005	120	66	186
2006	128	72	200
2007	121	79	200
2008	93	65	157
2009	83	66	149

2010	105	85	190
2011	83	68	151
2012	76	65	141
2013	82	77	158
2014	67	61	129

2.5 Annual deposition to OSPAR Region V

Annual deposition of nitrogen oxides and ammonia to OSPAR Region V are presented in Figure 2.9 for the period 1995-2014. The values of the deposition (including total nitrogen) are listed in Table 2.5.

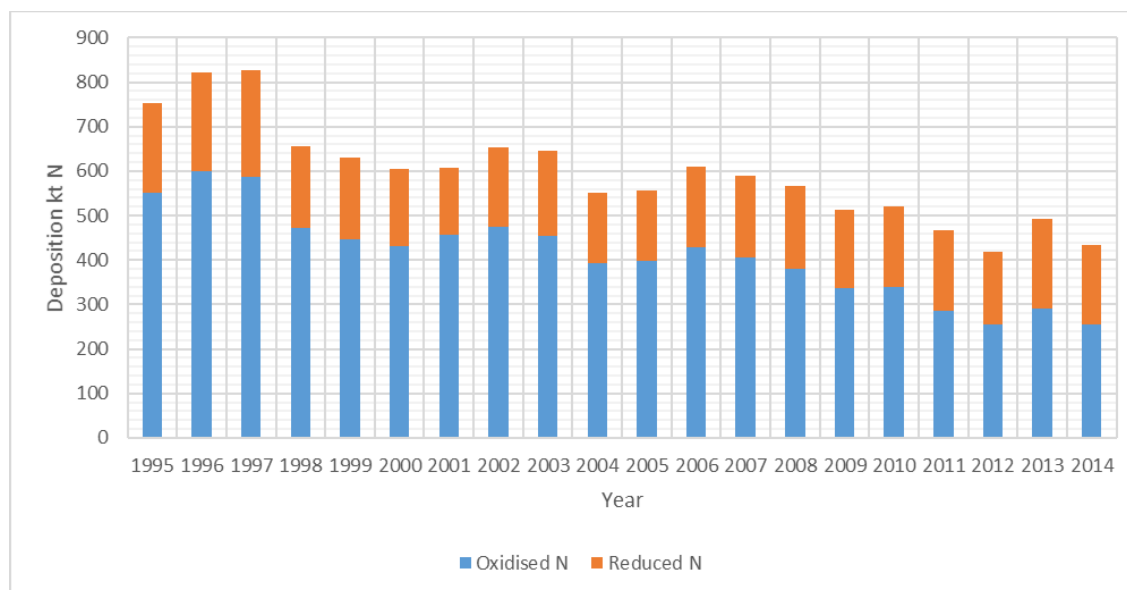


Figure 2.9: Annual deposition of oxidised and reduced nitrogen to OSPAR Region V in the period 1995-2014

Inter-annual variation in calculated annual deposition is relatively large also for Region V. Minima of the deposition are scattered over the period: in 2014, 2001 and 2012 for oxidised, reduced and total nitrogen, respectively. Maxima of the deposition occur at the beginning of the period, in 1996 for oxidised nitrogen and in 1997 for reduced and total nitrogen. All annual depositions are significantly lower in 2014 than in 1995: 54%, 11% and 42% for oxidised, reduced and total nitrogen, respectively.

Relative contribution of annual oxidised and reduced nitrogen deposition to annual total nitrogen deposition to Region V, for each year of the period 1995-2014 is shown in Figure 2.10. The contribution of oxidised nitrogen is relatively high for this Region, above 70% at the beginning of the period and to 60% at the end of the period.

Atmospheric Deposition of Nitrogen to the OSPAR Maritime Area in the period 1995-2014

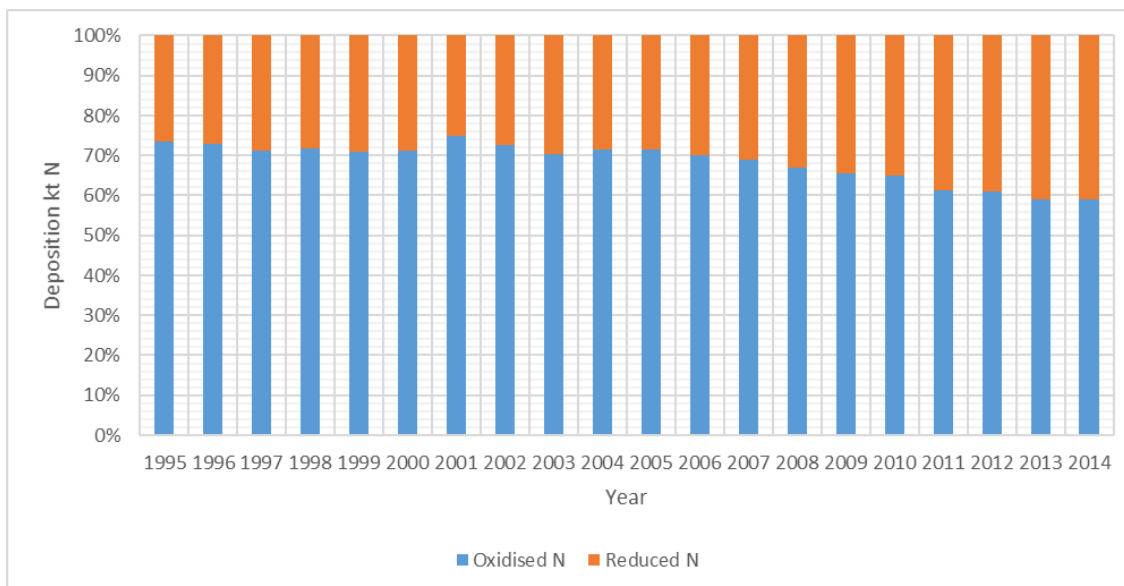


Figure 2.10: Relative annual deposition of oxidised and reduced nitrogen (in % of total deposition) to OSPAR Region V in the period 1995-2014

Table 2.5: Annual deposition of oxidised, reduced and total nitrogen to OSPAR Region V in the period 1995-2014. Units: kt N per year. Deposition maxima marked in cyan, minima in green

Year	Deposition		
	Ox-N	Rd-N	Tot-N
1995	552	200	752
1996	600	221	821
1997	587	239	826
1998	471	185	656
1999	447	184	631
2000	432	174	606
2001	456	152	607
2002	474	180	654
2003	454	191	645
2004	393	158	551
2005	398	159	556
2006	428	183	611
2007	406	184	590
2008	379	186	566
2009	336	177	513
2010	339	182	521

2011	286	180	466
2012	256	163	420
2013	291	202	493
2014	256	179	435

2.6 Annual deposition to the OSPAR Maritime Area

Annual deposition of nitrogen oxides and ammonia to all the OSPAR Maritime Area are presented in Figure 2.11 for the period 1995-2014. The values of the deposition (including total nitrogen) are listed in Table 2.6.

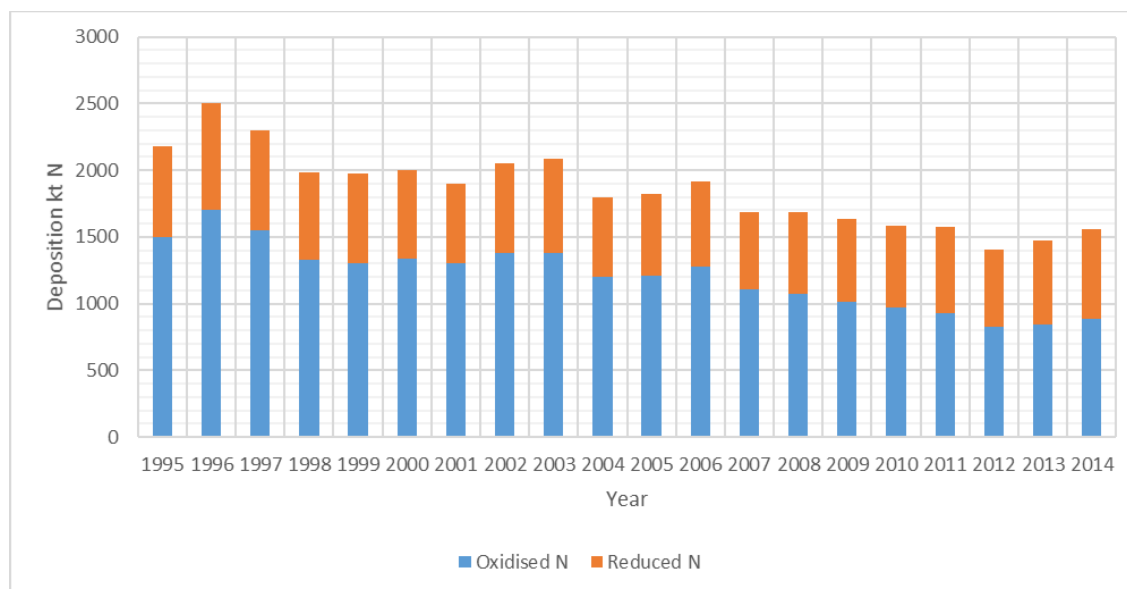


Figure 2.11: Annual deposition of oxidised and reduced nitrogen to all the OSPAR Maritime Area in the period 1995-2014

For all the OSPAR Maritime Area inter-annual variation in calculated annual deposition is lower than for individual Regions because of the much larger area for the deposition. Minima of the deposition occur in 2012 for oxidised, reduced and total nitrogen. Maxima of the deposition occur at the beginning of the period, in 1996 for all the kinds of deposition. Also for the OSPAR Maritime Area, all annual depositions are lower in 2014 than in 1995: 41%, 2% and 29% for oxidised, reduced and total nitrogen, respectively.

Relative contribution of annual oxidised and reduced nitrogen deposition to annual total nitrogen deposition to all the OSPAR Maritime Area, for each year of the period 1995-2014 is shown in Figure 2.12. The contribution of oxidised nitrogen is also relatively high in this case, close to 70% at the beginning of the period and close to 60% at the end of the period.

Atmospheric Deposition of Nitrogen to the OSPAR Maritime Area in the period 1995-2014

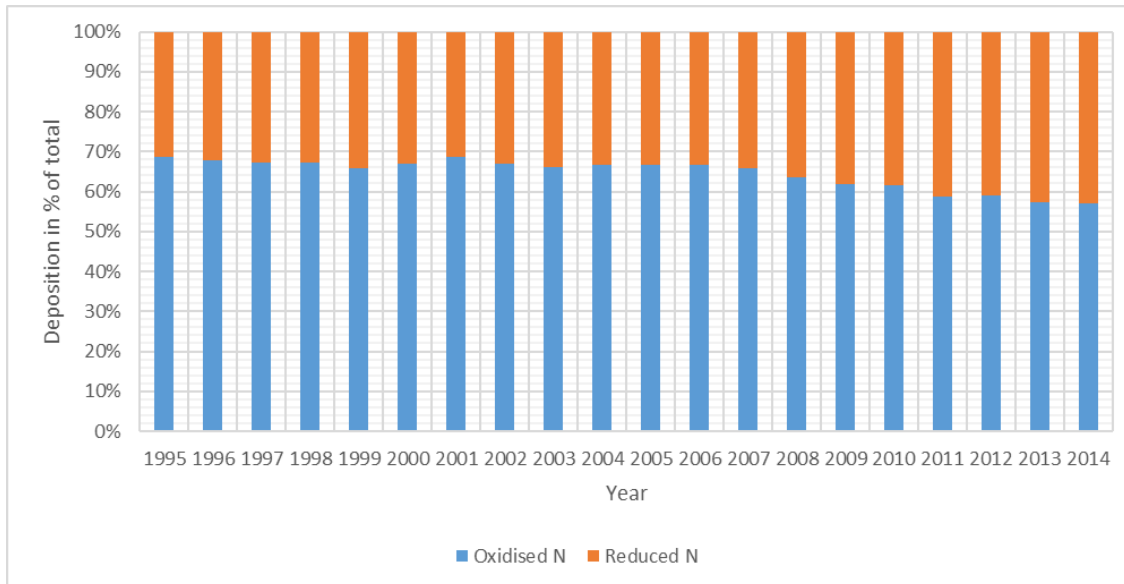


Figure 2.12: Relative annual deposition of oxidised and reduced nitrogen (in % of total deposition) to all the OSPAR Maritime Area in the period 1995-2014

Table 2.6: Annual deposition of oxidised, reduced and total nitrogen to all the OSPAR Maritime Area in the period 1995-2014. Units: kt N per year. Deposition maxima marked in cyan, minima in green

Year	Deposition		
	Ox-N	Rd-N	Tot-N
1995	1494	683	2178
1996	1700	805	2505
1997	1550	751	2301
1998	1332	651	1983
1999	1302	674	1977
2000	1338	664	2002
2001	1306	595	1900
2002	1378	677	2056
2003	1375	708	2083
2004	1201	598	1799
2005	1212	607	1819
2006	1281	638	1919
2007	1108	579	1687
2008	1071	614	1685
2009	1013	622	1635
2010	972	610	1581
2011	927	649	1575

2012	829	573	1403
2013	844	630	1473
2014	888	667	1555

Contribution of depositions in individual OSPAR Regions to annual total nitrogen deposition to all the OSPAR Maritime Area in the period 1995-2014 is shown in Figure 2.13 and corresponding numbers are listed in Table 2.7.

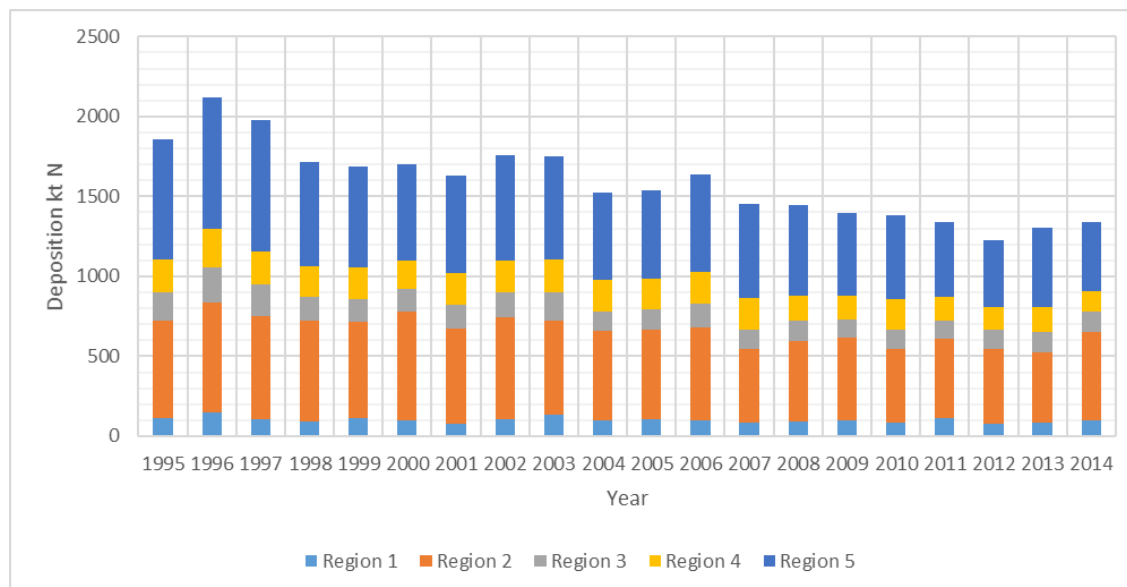


Figure 2.13: Contribution of depositions in individual OSPAR Regions to annual total nitrogen deposition to all the OSPAR Maritime Area in the period 1995-2014

Table 2.7: Contribution of depositions in individual OSPAR Regions to annual total nitrogen deposition to all the OSPAR Maritime Area in the period 1995-2014. The minimum, maximum and average deposition for each Region are also given. Units: kt N per year

Year	OSPAR Region				
	I	II	III	IV	V
1995	432	611	181	202	752
1996	536	688	219	241	821
1997	427	646	194	208	826
1998	356	634	151	187	656
1999	398	602	143	202	631
2000	393	687	139	178	606
2001	345	601	146	200	607
2002	407	639	156	200	654
2003	465	590	177	206	645

Atmospheric Deposition of Nitrogen to the OSPAR Maritime Area in the period 1995-2014

2004	370	560	125	194	551
2005	384	562	131	186	556
2006	376	583	149	200	611
2007	318	461	119	200	590
2008	329	502	131	157	566
2009	337	523	113	149	513
2010	283	466	121	190	521
2011	350	496	112	151	466
2012	253	473	115	141	420
2013	255	440	126	158	493
2014	314	555	122	129	435
Min.	253	440	112	129	420
Av.	366	566	144	184	596
Max.	536	688	219	241	826

Relative contribution of depositions in individual OSPAR Regions to annual total nitrogen deposition to all the OSPAR Maritime Area in the period 1995-2014 is shown in Figure 2.14 and corresponding numbers are listed in Table 2.8.

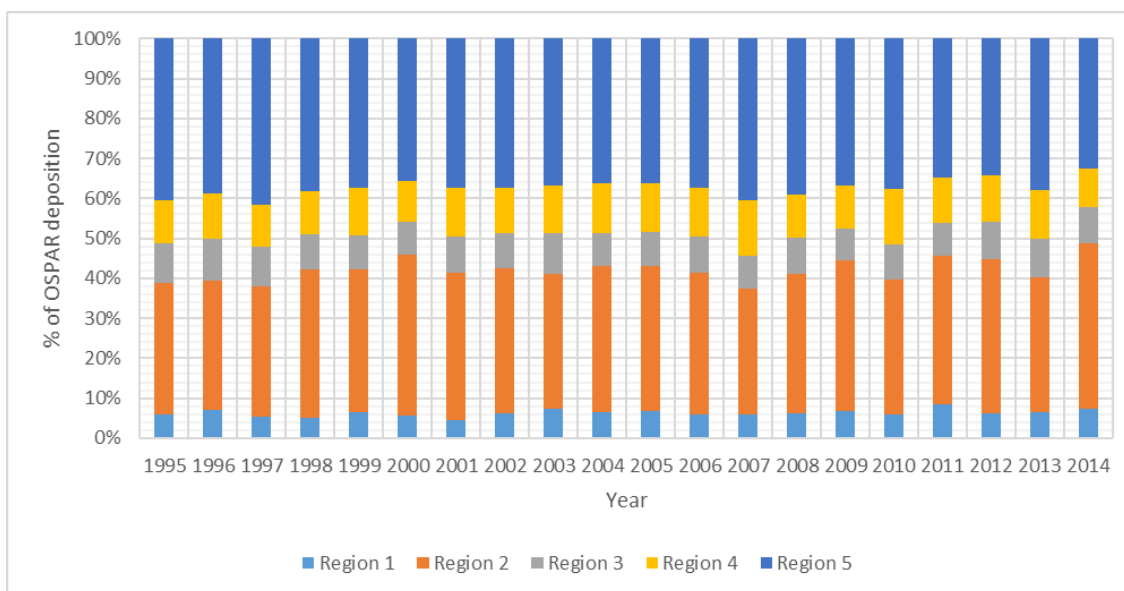


Figure 2.14: Relative contribution of depositions in individual OSPAR Regions to annual total nitrogen deposition to all the OSPAR Maritime Area in the period 1995-2014

Table 2.8: Contribution of depositions in individual OSPAR Regions to annual total nitrogen deposition to all the OSPAR Maritime Area in the period 1995-2014. The minimum, maximum and average deposition for each Region are also given. Units: kt N per year

Year	Region				
	I	II	III	IV	V
1995	20	28	8	9	35
1996	21	27	9	10	33
1997	19	28	8	9	36
1998	18	32	8	9	33
1999	20	30	7	10	32
2000	20	34	7	9	30
2001	18	32	8	11	32
2002	20	31	8	10	32
2003	22	28	8	10	31
2004	21	31	7	11	31
2005	21	31	7	10	31
2006	20	30	8	10	32
2007	19	27	7	12	35
2008	20	30	8	9	34
2009	21	32	7	9	31
2010	18	29	8	12	33
2011	22	31	7	10	30
2012	18	34	8	10	30
2013	17	30	9	11	33
2014	20	36	8	8	28
Min.	17	27	7	8	28
Av.	20	31	8	10	32
Max.	22	36	9	12	36

There are two OSPAR Regions which dominate total nitrogen deposition for all years of the period 1995-2014. These are Region V with 32% average contribution over the entire period and Region II with 31% average contribution over the entire period. They are followed by Region I, 20% average contribution, and Regions IV and III with average contributions 10% and 8% respectively. There are clear trends in the contributions of major Regions V and II. At the beginning of the period, in 1995, deposition to Region V contributes 36% of total deposition to the OSPAR Maritime Area and deposition to Region II, 28%. At the end of the period, in 2014, the relation is almost exactly reverse, deposition to Region II contributes 36% and deposition to Region V contributes 27%.

3. Weather-normalised nitrogen deposition to each OSPAR Region

Calculated annual depositions of nitrogen are dependent on both nitrogen emissions and meteorological conditions for the considered year. An efficient method to eliminate or at least largely reduce the effects of variable meteorological conditions is the normalisation of the depositions. This method has been used for several years in the EMEP calculations for HELCOM concerning nitrogen deposition to the Baltic Sea (Bartnicki et. al. 2016). The same method, based on source-receptor matrices for oxidised and reduced nitrogen, was used for calculating normalised nitrogen deposition to individual OSPAR Regions and to all the OSPAR Maritime Area.

3.1 Normalised deposition to OSPAR Region I

The normalised deposition of total (oxidised+reduced) nitrogen to OSPAR Region I is shown in Figure 3.1. In addition to normalised total deposition, actual annual deposition, as well as, minimum and maximum depositions are shown in Figure 3.1. The corresponding deposition values are listed in Table 3.1.

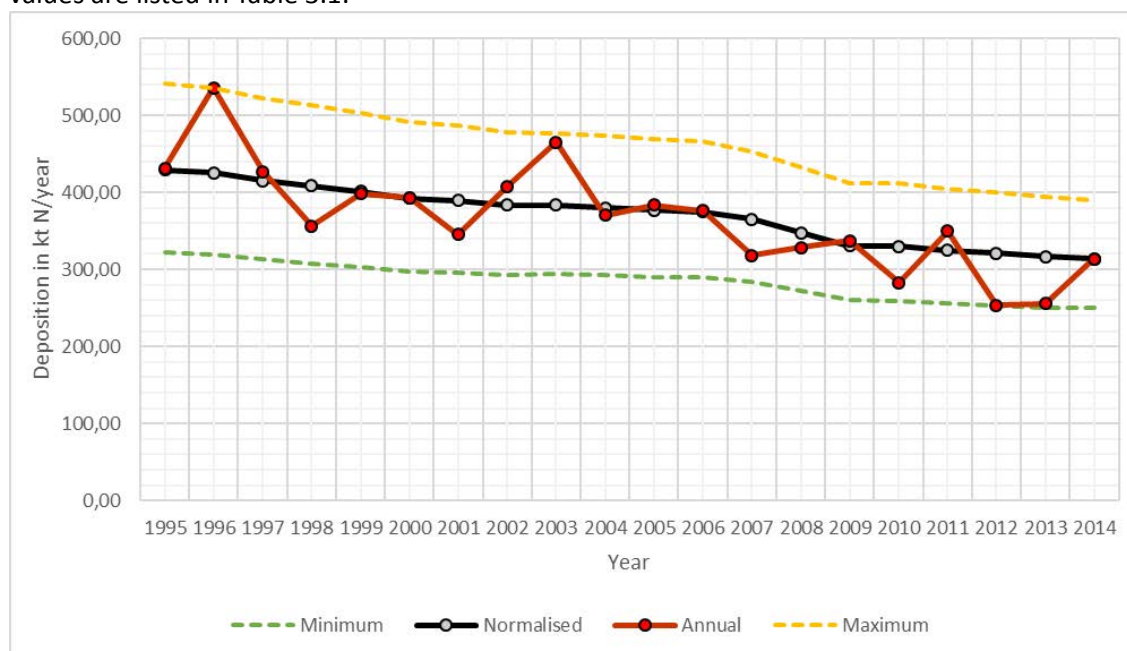


Figure 3.1: Normalised annual deposition of total (oxidised+reduced) nitrogen to OSPAR Region I for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Table 3.1: Normalised annual deposition of total (oxidised+reduced) nitrogen to OSPAR Region I for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Year	Minimum	Normalised	Annual	Maximum
1995	322	429	432	541
1996	320	425	536	536
1997	313	415	427	522
1998	308	408	356	513
1999	303	401	398	503
2000	297	392	393	491
2001	296	389	345	487
2002	293	383	407	478
2003	294	383	465	477
2004	293	380	370	473
2005	291	377	384	469
2006	290	375	376	466
2007	283	365	318	454
2008	272	348	329	433
2009	260	331	337	413
2010	260	330	283	411
2011	256	324	350	404
2012	253	321	253	400
2013	251	317	255	395
2014	251	314	314	390

Compared to actual annual deposition, computed with the same meteorological and emission year, the temporal pattern of computed normalised deposition is very smooth and monotonically decreasing. In 2014, normalised deposition of total nitrogen to Region I is 19% lower than in 1995. The uncertainty to meteorological variability range is indicated by minimum and maximum values of the deposition. This range for the Region I is -23% to 32%.

3.2 Normalised deposition to OSPAR Region II

The normalised deposition of total (oxidised+reduced) nitrogen to OSPAR Region II is shown in Figure 3.2, together with actual annual deposition, minimum and maximum deposition. The corresponding deposition values are listed in Table 3.2.

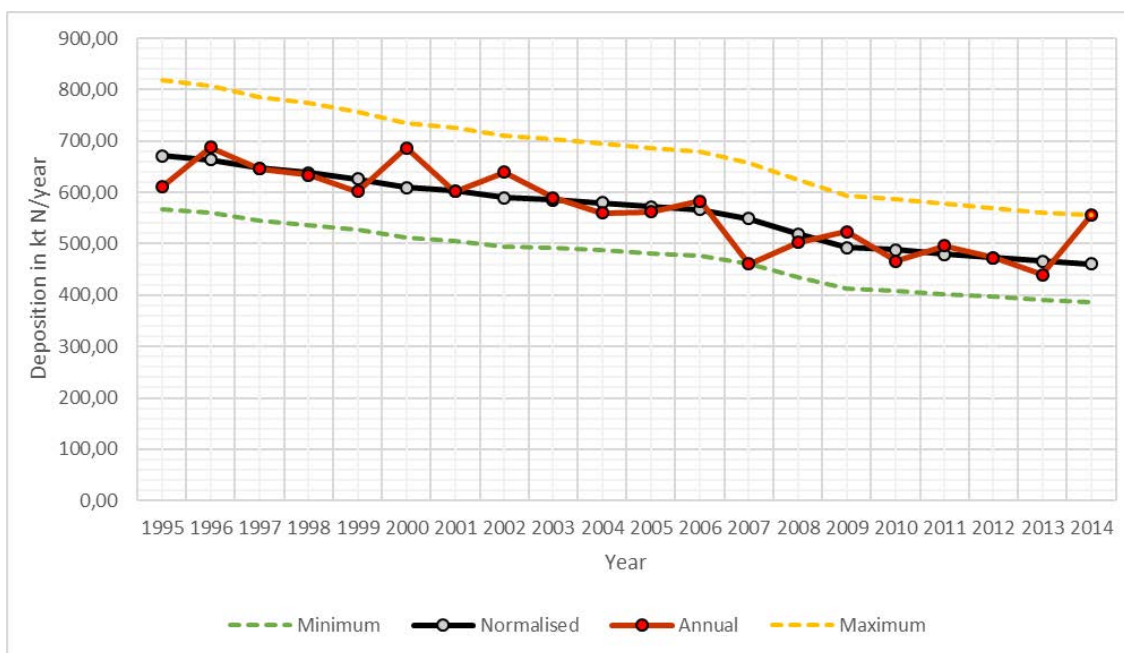


Figure 3.2: Normalised annual deposition of total (oxidised+reduced) nitrogen to OSPAR Region II for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Table 3.2: Normalised annual deposition of total (oxidised+reduced) nitrogen to OSPAR Region II for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Year	Minimum	Normalised	Annual	Maximum
1995	567	671	611	818
1996	560	663	688	808
1997	545	646	646	785
1998	537	638	634	773
1999	526	626	602	758
2000	512	610	687	736
2001	506	602	601	726
2002	495	590	639	710
2003	491	585	590	704
2004	487	579	560	695
2005	481	572	562	686
2006	477	567	583	679
2007	461	549	461	658
2008	435	519	502	623
2009	413	493	523	592
2010	409	488	466	588
2011	401	480	496	577
2012	397	473	473	569
2013	391	466	440	561
2014	387	461	555	555

Also for Region II computed normalised deposition is very smooth and monotonically decreasing. In 2014 normalised deposition of total nitrogen to Region II is 31% lower than in 1995. The range of meteorological uncertainty for the Region II is from -16% to 22%.

3.3 Normalised deposition to OSPAR Region III

The normalised deposition of total (oxidised+reduced) nitrogen to OSPAR Region III is shown in Figure 3.3, together with actual annual deposition, minimum and maximum deposition. The corresponding deposition values are listed in Table 3.3.

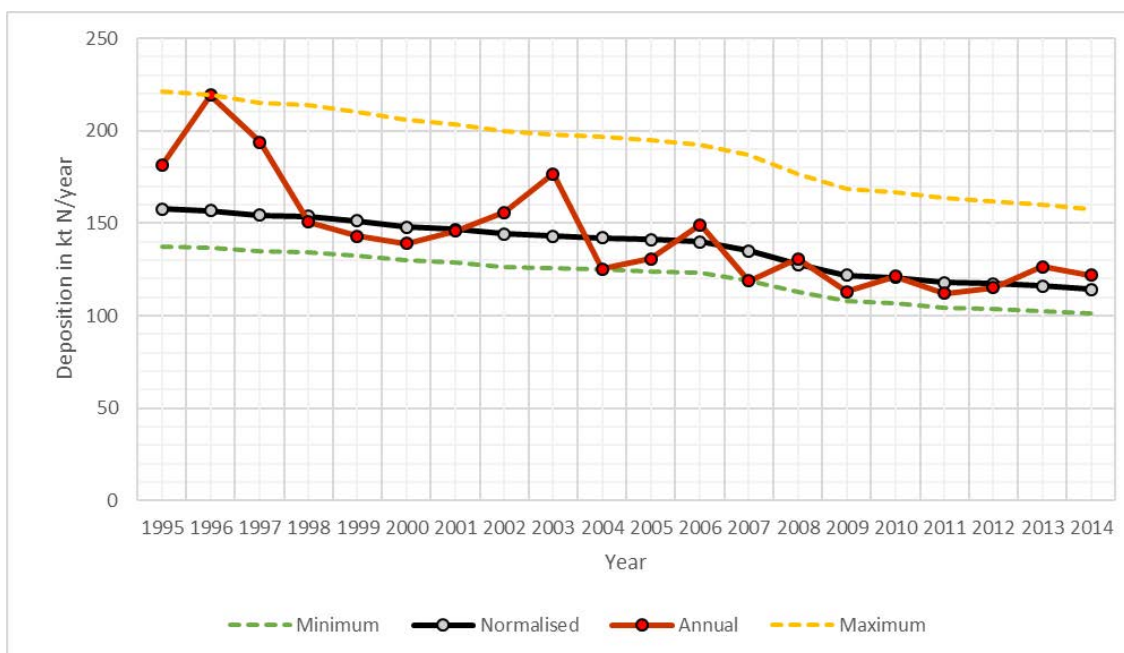


Figure 3.3: Normalised annual deposition of total (oxidised+reduced) nitrogen to OSPAR Region III for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Table 3.3: Normalised annual deposition of total (oxidised+reduced) nitrogen to OSPAR Region III for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Year	Minimum	Normalised	Annual	Maximum
1995	137	137	181	221
1996	137	137	219	219
1997	135	135	194	215
1998	135	135	151	214
1999	133	133	143	210
2000	130	130	139	206
2001	129	129	146	204
2002	127	127	156	200
2003	126	126	177	198
2004	125	125	125	197
2005	124	124	131	195
2006	123	123	149	193
2007	119	119	119	187
2008	113	113	131	177
2009	108	108	113	168
2010	107	107	121	167
2011	104	104	112	163
2012	104	104	115	162
2013	103	103	126	160
2014	101	101	122	157

Computed normalised deposition is very smooth and monotonically decreasing for Region III. In 2014, normalised deposition of total nitrogen to Region III is 27% lower than in 1995. The range of meteorological uncertainty for the Region III is -13% to 40%.

3.4 Normalised deposition to OSPAR Region IV

The normalised deposition of total (oxidised+reduced) nitrogen to OSPAR Region IV is shown in Figure 3.4, together with actual annual deposition, minimum and maximum deposition. The corresponding deposition values are listed in Table 3.4.

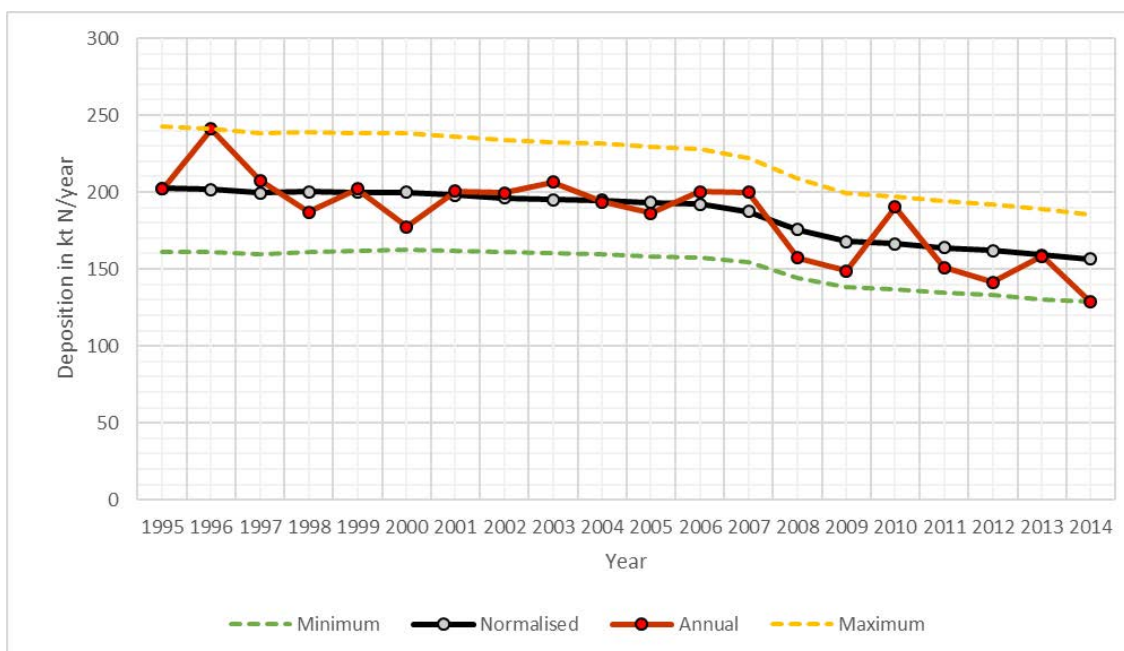


Figure 3.4: Normalised annual deposition of total (oxidised+reduced) nitrogen to OSPAR Region IV for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Table 3.4: Normalised annual deposition of total (oxidised+reduced) nitrogen to OSPAR Region IV for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Year	Minimum	Normalised	Annual	Maximum
1995	161	202	202	243
1996	161	202	241	241
1997	160	199	208	238
1998	161	200	187	239
1999	162	200	202	238
2000	163	200	178	238
2001	161	198	200	236
2002	161	196	200	234
2003	160	195	206	232
2004	160	195	194	231
2005	158	193	186	230
2006	157	192	200	228
2007	154	187	200	222
2008	144	176	157	209
2009	138	168	149	199
2010	137	166	190	197
2011	135	164	151	194
2012	133	162	141	192
2013	131	159	158	189
2014	129	156	129	185

Computed normalised deposition is smooth and monotonically decreasing for Region IV. In 2014, normalised deposition of total nitrogen to Region IV is 23% lower than in 1995. The range of meteorological uncertainty for the Region IV is -21% to 20%.

3.5 Normalised deposition to OSPAR Region V

The normalised deposition of total (oxidised+reduced) nitrogen to OSPAR Region V is shown in Figure 3.5, together with actual annual deposition, minimum and maximum deposition. The corresponding deposition values are listed in Table 3.5.

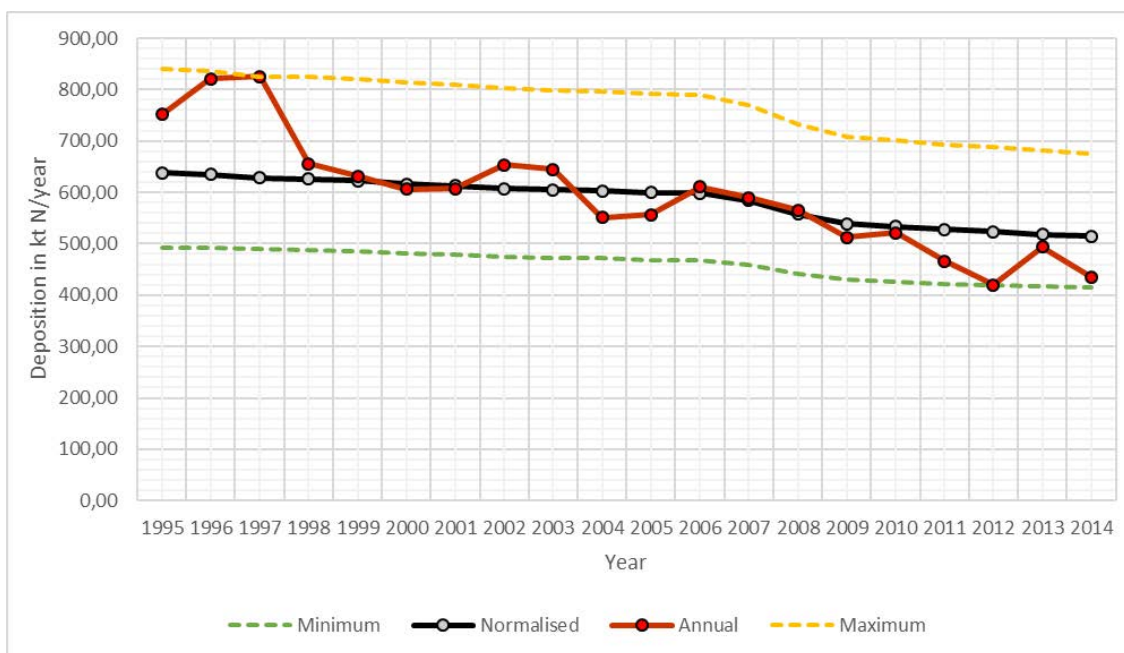


Figure 3.5: Normalised annual deposition of total (oxidised+reduced) nitrogen to OSPAR Region V for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Table 3.5: Normalised annual deposition of total (oxidised+reduced) nitrogen to OSPAR Region V for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Year	Minimum	Normalised	Annual	Maximum
1995	492	638	752	839
1996	492	635	821	836
1997	489	628	826	826
1998	489	626	656	825
1999	486	622	631	821
2000	481	616	606	814
2001	479	613	607	809
2002	475	607	654	802
2003	473	605	645	799
2004	471	603	551	796
2005	469	600	556	791
2006	469	598	611	789
2007	458	584	590	769
2008	441	558	566	733
2009	429	539	513	707
2010	426	533	521	701
2011	422	528	466	693
2012	420	524	420	687
2013	417	519	493	681
2014	416	515	435	674

Computed normalised deposition is smooth and monotonically decreasing for Region V. In 2014, normalised deposition of total nitrogen to Region V is 19% lower than in 1995. The range of meteorological uncertainty for the Region V is -23% to 32%.

3.6 Normalised deposition to all the OSPAR Maritime Area

The normalised deposition of total (oxidised+reduced) nitrogen to all the OSPAR Maritime Area is shown in Figure 3.6, together with actual annual deposition, minimum and maximum deposition. The corresponding deposition values are listed in Table 3.6.

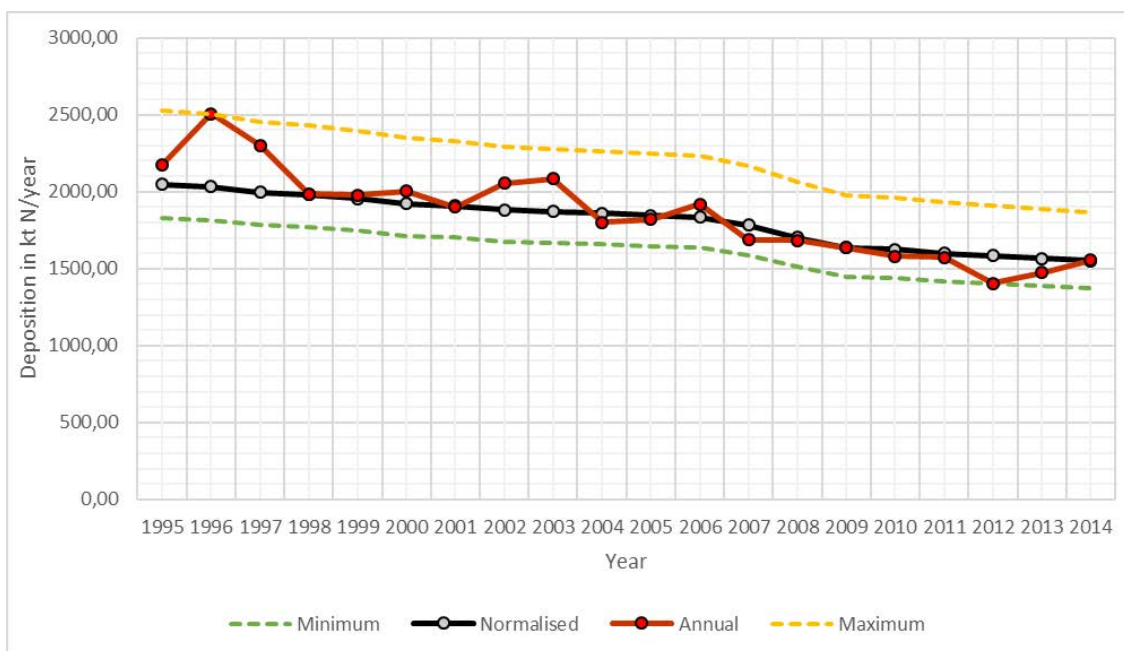


Figure 3.6: Normalised annual deposition of total (oxidised+reduced) nitrogen to all the OSPAR Maritime Area for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period

Table 3.6: Normalised annual deposition of total (oxidised+reduced) nitrogen to all the OSPAR Maritime Area for the period 1995-2014 and actual annual deposition, minimum deposition and maximum deposition for the same period. Units: kt N per year

Year	Minimum	Normalised	Annual	Maximum
1995	1827	2049	2178	2528
1996	1816	2032	2505	2505
1997	1784	1996	2301	2454
1998	1770	1981	1983	2431
1999	1748	1957	1977	2394
2000	1715	1924	2002	2350
2001	1701	1908	1900	2328
2002	1676	1881	2056	2292
2003	1668	1871	2083	2280
2004	1657	1860	1799	2264
2005	1643	1845	1819	2245
2006	1634	1835	1919	2230
2007	1589	1783	1687	2169
2008	1511	1701	1685	2063
2009	1450	1635	1635	1974
2010	1439	1623	1581	1961
2011	1416	1601	1575	1931
2012	1403	1585	1403	1911
2013	1386	1567	1473	1888
2014	1376	1552	1555	1866

Computed normalised deposition is very smooth and monotonically decreasing in case of all the OSPAR Maritime Area. In 2014, normalised deposition of total nitrogen to all the OSPAR Maritime Area is 24% lower than in 1995. The range of meteorological uncertainty for the Region V is -12% to 23%.

4. Source apportionment of the atmospheric deposition to each OSPAR region

One of the tasks of the present project was the identification of the main sources contributing to nitrogen deposition to five OSPAR Regions and to all the OSPAR Maritime Area. Source apportionment was calculated for all years of the period 1995-2014, based on the actual deposition.

4.1 Apportionment for OSPAR Region I

The source apportionments for OSPAR Region I is presented in Table 4.1 for the period 1995-2014. Comparison of the top ten contributors to atmospheric nitrogen deposition to OSPAR Region II for the beginning of the period in 1995 and for the end of a period in 2014 is shown in Figure 4.2. United Kingdom and Germany are the highest two contributors for both years. However, the relative contribution of the United Kingdom is significantly decreasing, 15% in 2014 from 21% in 1995. The contribution from Germany remains on the same level, 11% in 1995 and 10% in 2014, but Norway's contribution is twice as much in 2014 (8%) compared to 1995 (4%). There is a clear increase of the contribution from ship traffic on the North Sea, from 3% to 7%, and from ship traffic on the Atlantic Ocean, from 3% to 5%. Concerning sources external to OSPAR Contracting Parties, Russia and Poland are among the list of the top ten contributors for both 1995 and 2014.

Table 4.1-1: Source apportionments for OSPAR Region I for 1995-2004. Units: kt N per year

Source	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Belgium	10	13	9	7	9	8	8	9	13	7
Denmark	10	21	13	10	11	10	8	13	12	9
Finland	11	10	9	12	13	11	8	8	6	10
France	30	36	28	21	18	18	19	26	37	19
Germany	48	62	40	31	46	41	36	49	62	40
Iceland	2	2	2	2	3	2	2	2	2	2
Ireland	8	13	13	7	8	8	8	8	13	7
Luxembourg	1	1	1	0	1	1	1	1	1	1
Netherlands	16	15	13	11	14	11	11	14	18	12
Norway	16	21	18	19	21	18	16	19	16	17
Portugal	1	1	1	1	1	1	1	1	1	1
Spain	9	11	9	5	4	7	7	7	11	5
Switzerland	1	1	1	1	1	1	1	2	2	1
Sweden	11	15	10	10	11	9	8	10	7	9
United Kingdom	90	117	107	66	77	81	66	81	99	67
Italy	7	6	3	2	3	6	5	4	10	4
Poland	20	30	17	12	19	15	15	21	19	18
Russia	28	29	22	27	31	33	24	19	20	33
North Sea	14	20	18	15	18	20	17	23	23	20
Atlantic Ocean	12	13	13	12	12	13	14	15	15	14
Remaining sources	85	98	79	84	79	80	72	75	78	75
All EMEP sources	432	536	427	356	398	393	345	407	465	370

Table 4.1-2: Source apportionments for OSPAR Region I for 2005-2014. Units: kt N per year

Source	Year									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Belgium	8	8	5	5	6	4	6	3	3	6
Denmark	9	9	5	7	6	5	8	5	7	8
Finland	9	9	9	8	9	8	9	9	8	7
France	22	25	13	19	20	12	25	10	11	15
Germany	42	34	23	29	28	18	41	16	23	31
Iceland	2	3	5	6	5	5	7	7	5	7
Ireland	7	10	7	6	8	6	6	6	8	7
Luxembourg	1	1	0	0	0	0	1	0	0	1
Netherlands	12	12	7	9	8	6	10	5	6	9
Norway	14	16	16	17	17	18	20	16	20	24
Portugal	2	2	0	1	1	0	1	1	0	0
Spain	15	12	2	5	6	2	8	3	2	2
Switzerland	1	1	1	1	1	0	1	0	0	1
Sweden	8	8	5	8	7	7	7	6	6	9
United Kingdom	65	74	62	60	55	37	49	32	46	48
Italy	3	4	1	5	1	1	3	1	1	0
Poland	18	13	11	13	12	11	15	10	9	12
Russia	34	27	36	26	37	34	22	38	18	19
North Sea	20	22	13	18	19	15	22	15	17	22
Atlantic Ocean	15	17	13	12	13	12	15	12	13	15
Remaining sources	77	72	82	72	79	83	74	58	53	71
All EMEP sources	384	376	318	329	337	283	350	253	255	314

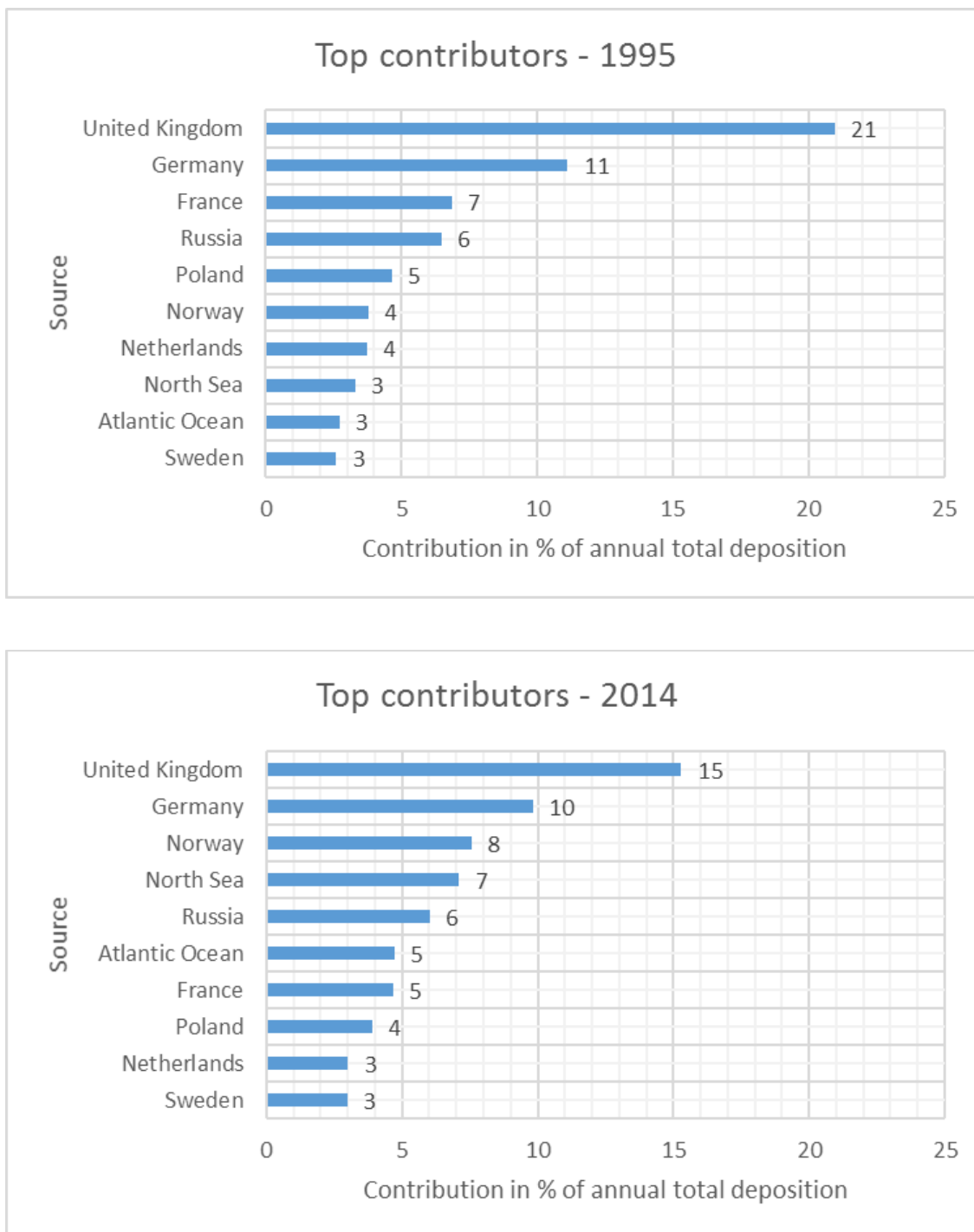


Figure 4.1: Comparison of main contributors to annual total nitrogen deposition to OSPAR

Region I in 1995 and 2014. Units: % of total nitrogen deposition to Region I

4.2 Apportionment for OSPAR Region II

Source apportionments for OSPAR Region II is presented in Table 4.2 for the period 1995-2014.

Table 4.2-1: Source apportionments for OSPAR Region II for 1995-2004. Units: kt N per year

Source	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Belgium	21	24	25	23	22	28	21	22	23	18
Denmark	28	39	30	34	29	30	30	33	24	26
Finland	1	2	1	2	1	1	2	2	1	1
France	84	83	87	86	82	105	73	84	89	68
Germany	73	98	80	79	77	95	91	82	78	77
Iceland	0	0	0	0	0	0	0	0	0	0
Ireland	12	11	13	13	14	12	12	11	11	12
Luxembourg	1	1	1	1	1	1	1	1	1	1
Netherlands	38	38	44	39	38	43	36	36	37	32
Norway	10	10	10	11	10	9	11	10	9	10
Portugal	2	1	2	2	2	2	2	3	2	2
Spain	17	11	14	14	15	22	15	21	21	13
Switzerland	2	2	1	1	1	2	2	1	2	2
Sweden	7	12	7	8	7	6	8	10	5	6
United Kingdom	192	180	195	200	189	206	168	169	162	160
Italy	11	9	7	5	4	8	7	4	5	5
Poland	18	44	19	17	14	12	18	25	13	16
Russia	3	7	5	4	2	2	2	6	2	3
North Sea	37	39	42	42	43	47	46	54	51	49
Atlantic Ocean	10	9	12	12	12	14	13	14	13	15
Remaining sources	44	69	50	43	40	40	44	51	41	46
All EMEP sources	611	688	646	634	602	687	601	639	590	560

Table 4.2-2: Source apportionments for OSPAR Region II for 2005-2014. Units: kt N per year

Source	Year									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Belgium	19	19	14	16	17	15	19	18	15	20
Denmark	23	25	19	22	22	24	20	22	22	25
Finland	2	2	1	1	1	2	0	1	1	0
France	79	82	56	69	78	61	77	70	63	78
Germany	66	68	48	71	76	67	71	71	70	105 ¹
Iceland	0	0	0	0	0	0	0	0	0	0
Ireland	12	13	10	10	10	7	11	10	9	10
Luxembourg	1	1	0	1	1	1	1	1	1	1
Netherlands	32	30	27	34	32	30	33	36	32	39
Norway	9	10	8	8	7	10	7	8	8	7
Portugal	2	2	1	1	1	1	1	1	1	1
Spain	19	19	8	6	8	7	10	7	8	8
Switzerland	1	2	1	1	1	1	2	1	1	1
Sweden	5	6	5	5	5	8	4	5	6	6
United Kingdom	163	167	153	141	131	114	132	128	110	120
Italy	5	7	2	4	3	2	4	2	2	2
Poland	13	15	11	15	19	19	15	11	15	23
Russia	6	4	4	3	6	5	1	2	2	4
North Sea	48	52	50	48	45	40	43	44	37	49
Atlantic Ocean	15	16	11	11	13	11	13	14	10	10
Remaining sources	40	44	32	35	46	40	31	23	26	44
All EMEP sources	562	583	461	502	523	466	496	473	440	555

Comparison of the top ten contributors to atmospheric nitrogen deposition to OSPAR Region II for the beginning of the period in 1995 and for the end of a period in 2014 is shown in Figure 4.2. There is a significant reduction in the United Kingdom's contribution between 1995 and 2014, from 31% to 22%. Also, there is a reduction in contribution from Spain, which disappears from the top ten list in 2014. In contrast, there are increases by Germany from 12% to 19%, North Sea from 6% to 9%, Belgium and Poland from 3% to 4%. In addition, ship emissions from Atlantic Ocean appear on the list in 2014 with 2% contribution.

Eutrophication is particularly important in Region II. Therefore, on request from OSPAR, two additional figures are presented. In Figure 4.3, a comparison of main contributors (in absolute terms) to total nitrogen deposition to the OSPAR Region II in the period 2006-2014 is presented. A comparison of relative (in percent of total deposition to OSPAR Region II) contributions to total nitrogen deposition to the OSPAR Region II in the period 2006-2014 is shown in Figure 4.4.

In absolute terms, contributions from the United Kingdom decline in the considered period, as well as contributions from Ireland and to less extent contributions from ship traffic integrated over the North Sea and Atlantic Ocean. Absolute contributions from Germany, Netherlands and absolute contributions from the external source (Poland) are increasing. However, the relative contributions from these sources remain rather stable over the entire period.

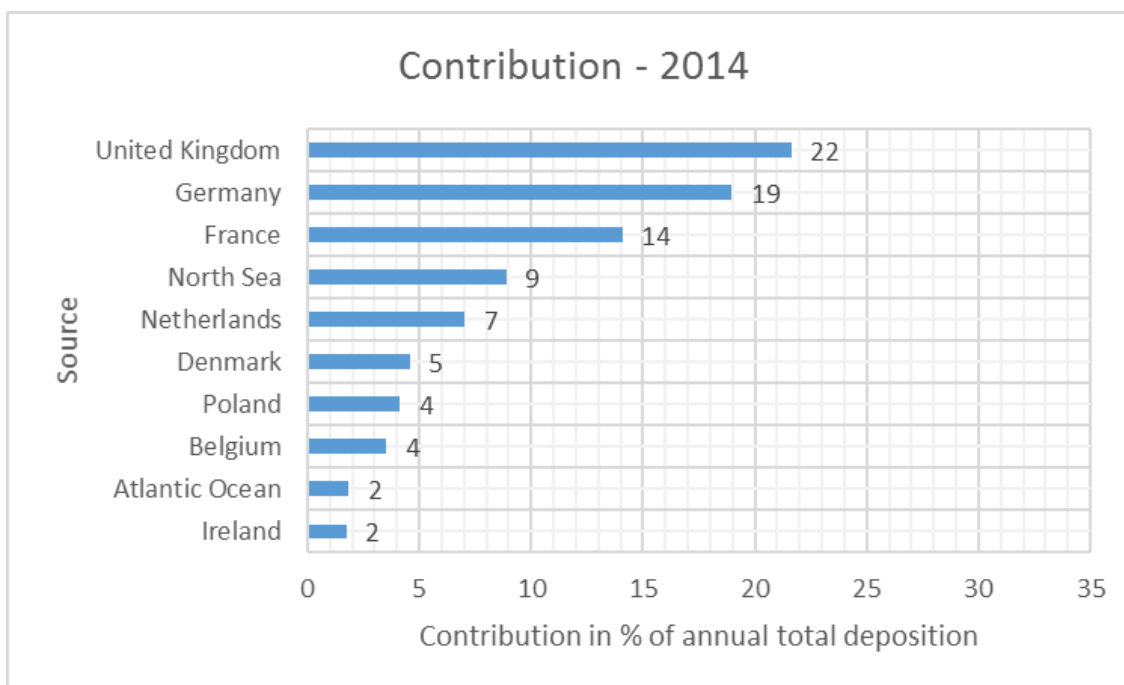
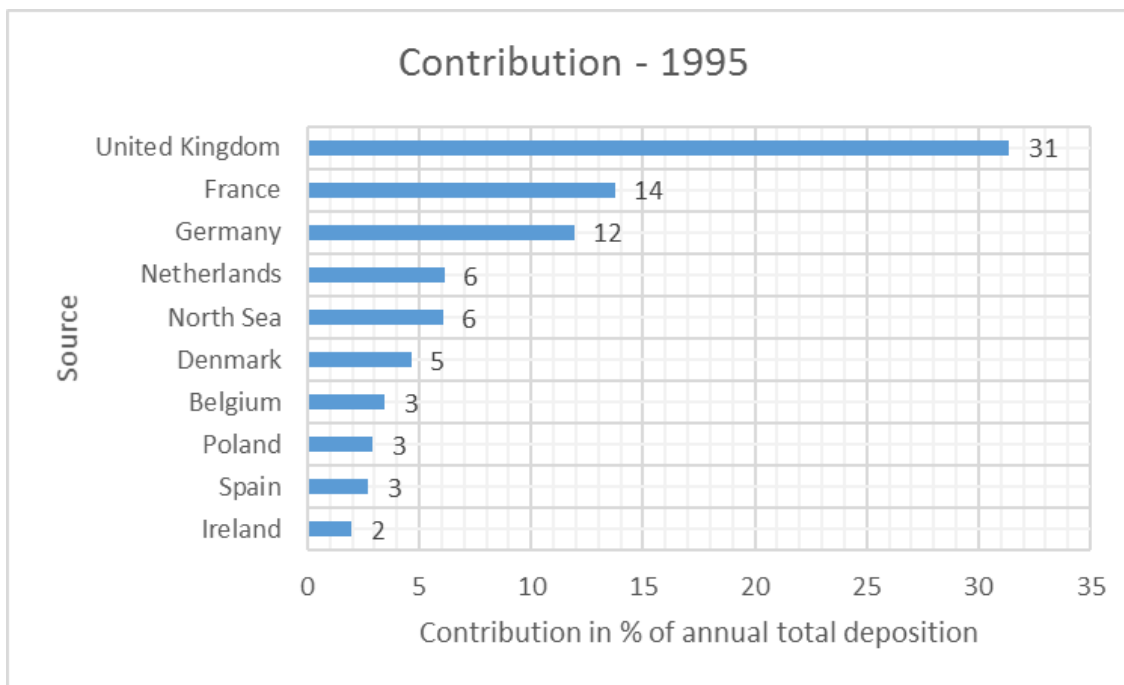


Figure 4.2: Comparison of main contributors to annual total nitrogen deposition to OSPAR Region II in 1995 and 2014. Units: % of total nitrogen deposition to Region II

Atmospheric Deposition of Nitrogen to the OSPAR Maritime Area in the period 1995-2014

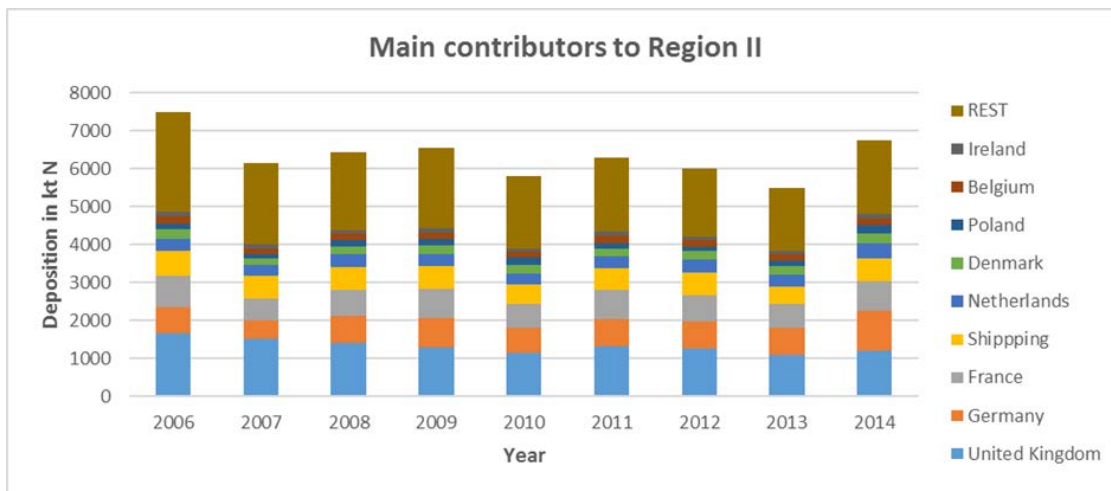


Figure 4.3: Comparison of main contributors to annual nitrogen deposition to OSPAR Region II in 2006–2014. Units: kt N per year

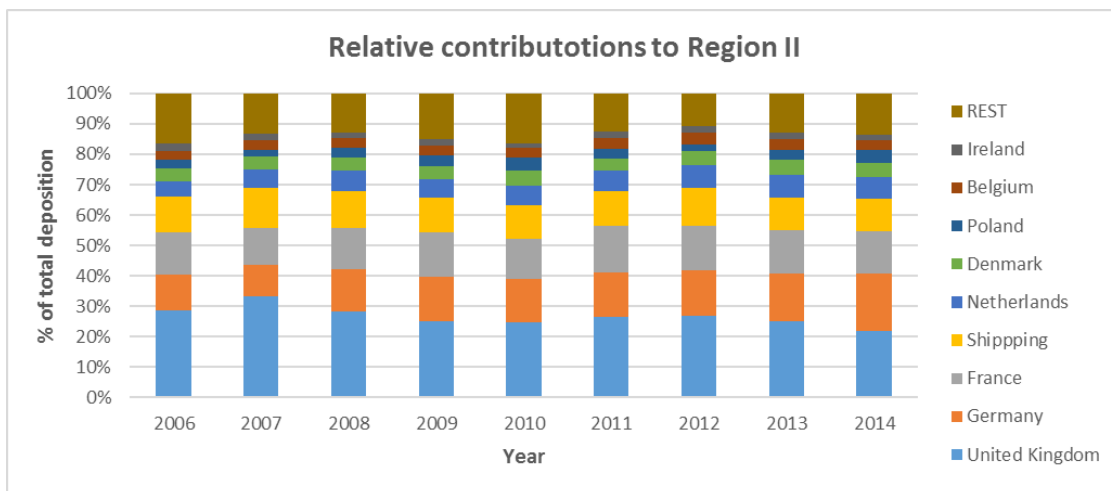


Figure 4.4: Comparison of relative contributions to annual nitrogen deposition to OSPAR Region II in 2006–2014. Units: % of annual total nitrogen deposition to OSPAR Region II

4.3 Apportionment for OSPAR Region III

Source apportionments for OSPAR Region III is presented in Table 4.3 for the period 1995-2014.

Table 4.3-1: Source apportionments for OSPAR Region III for 1995-2004. Units: kt N per year

Source	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Belgium	3	6	5	3	2	2	3	3	4	2
Denmark	1	2	1	1	1	1	1	1	1	1
Finland	0	0	0	0	0	0	0	0	0	0
France	25	31	31	16	16	13	15	20	31	14
Germany	11	19	13	5	6	4	7	8	9	6
Iceland	0	0	0	0	0	0	0	0	0	0
Ireland	26	24	25	28	27	28	25	24	24	23
Luxembourg	0	0	0	0	0	0	0	0	0	0
Netherlands	4	4	6	3	3	3	4	3	4	3
Norway	1	1	1	1	1	1	1	1	1	1
Portugal	2	2	1	2	1	1	1	2	1	1
Spain	9	9	9	8	6	7	7	10	14	5
Switzerland	0	1	1	0	0	0	0	0	0	0
Sweden	1	1	1	0	0	0	1	0	0	0
United Kingdom	64	76	62	56	52	52	50	48	49	42
Italy	2	4	2	1	0	1	1	1	2	1
Poland	3	6	2	1	1	1	2	2	2	1
Russia	0	1	1	0	0	0	0	1	0	0
North Sea	6	7	8	5	6	6	7	6	9	6
Atlantic Ocean	10	10	11	10	10	11	11	11	12	11
Remaining sources	12	16	14	10	10	9	10	12	13	8
All EMEP sources	181	219	194	151	143	139	146	156	177	125

Table 4.3-2: Source apportionments for OSPAR Region III for 2005-2014. Units: kt N per year

Source	Year									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Belgium	2	3	2	2	1	2	2	2	3	2
Denmark	1	1	1	1	1	1	0	0	1	1
Finland	0	0	0	0	0	0	0	0	0	0
France	17	20	14	17	13	12	14	15	17	17
Germany	6	9	6	8	4	4	4	4	10	6
Iceland	0	0	0	0	0	0	0	0	0	0
Ireland	22	22	24	24	23	24	23	23	22	22
Luxembourg	0	0	0	0	0	0	0	0	0	0
Netherlands	3	3	3	3	2	2	2	2	4	3
Norway	0	1	0	0	0	1	0	1	1	0
Portugal	2	2	0	0	1	0	1	0	1	1
Spain	8	10	2	3	2	2	6	2	3	3
Switzerland	0	0	0	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0	0	1	0
United Kingdom	43	44	39	43	36	46	37	43	40	44
Italy	0	1	1	1	0	0	1	0	1	0
Poland	1	2	2	1	1	1	1	1	2	1
Russia	1	1	0	0	1	0	0	0	0	0
North Sea	7	7	6	8	6	5	5	7	6	6
Atlantic Ocean	11	13	10	9	10	10	10	9	8	9
Remaining sources	7	10	8	7	12	10	6	4	7	5
All EMEP sources	131	149	119	131	113	121	112	115	126	122

Comparison of the top ten contributors to atmospheric nitrogen deposition to OSPAR Region III for the beginning of the period in 1995 and for the end of a period in 2014 is shown in Figure 4.5. Both pictures are dominated by the United Kingdom with contributions of 35% in 1995 and 36% in 2014. A large increase can be noticed for Ireland, the second contributor on the list, from 14% in 1995 to 18% in 2014. An increase in contribution from ship traffic takes place as well, from 3% and 6% in 1995 to 5% and 7% in 2014, for emissions from the North Sea and Atlantic Ocean, respectively. Decreases in contribution occur for Spain and Poland, from 5% to 3% and from 2% to 1%, respectively.

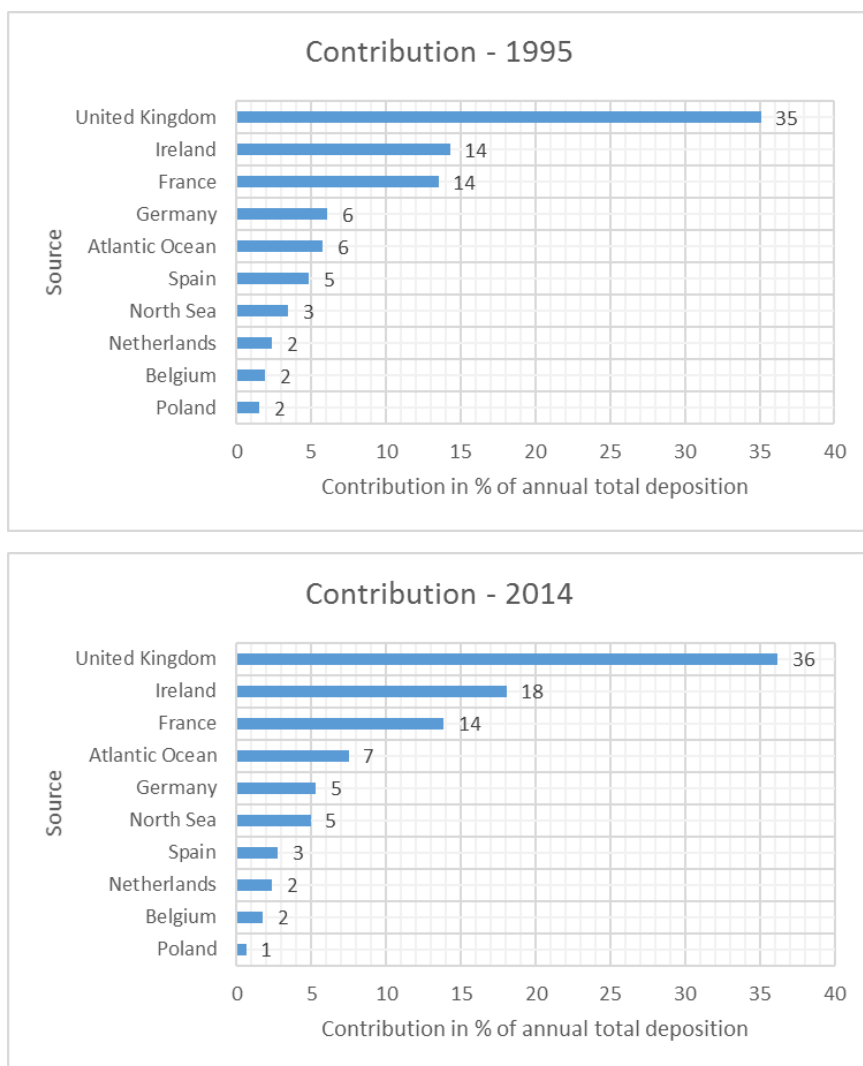


Figure 4.5: Comparison of main contributors to annual total nitrogen deposition to OSPAR Region III in 1995 and 2014. Units: % of total nitrogen deposition to Region III

4.4 Apportionment for OSPAR Region IV

Source apportionments for OSPAR Region IV is presented in Table 4.4 for the period 1995-2014.

Table 4.4-1: Source apportionments for OSPAR Region IV for 1995-2004. Units: kt N per year

Source	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Belgium	4	7	3	3	4	2	2	3	2	4
Denmark	1	1	1	1	1	1	1	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0
France	58	76	63	45	57	42	54	52	52	50
Germany	8	12	9	9	8	5	7	9	8	8
Iceland	0	0	0	0	0	0	0	0	0	0
Ireland	3	3	2	3	3	3	4	2	2	3
Luxembourg	0	0	0	0	0	0	0	0	0	0
Netherlands	4	4	3	3	4	3	3	3	2	4
Norway	0	0	0	0	1	0	0	0	0	0
Portugal	13	12	16	14	16	15	16	16	17	13
Spain	35	37	45	37	46	45	41	45	53	39
Switzerland	0	1	1	1	0	0	1	0	1	0
Sweden	0	0	0	0	0	0	0	0	0	0
United Kingdom	28	33	12	24	17	17	23	17	12	23
Italy	3	4	3	2	2	2	2	2	3	2
Poland	2	2	2	2	1	0	1	2	2	1
Russia	0	0	0	0	0	0	0	0	0	0
North Sea	5	7	4	5	5	4	6	5	4	7
Atlantic Ocean	24	26	27	23	25	25	27	27	30	27
Remaining sources	13	14	16	14	13	12	13	14	15	10
All EMEP sources	202	241	208	187	202	178	200	200	206	194

Table 4.4-2: Source apportionments for OSPAR Region IV for 2005-2014. Units: kt N per year

Source	Year									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Belgium	3	3	4	2	3	4	2	2	3	2
Denmark	1	1	0	0	1	1	0	0	1	0
Finland	0	0	0	0	0	0	0	0	0	0
France	47	52	68	51	53	59	44	44	54	36
Germany	5	9	8	6	8	8	6	5	9	3
Iceland	0	0	0	0	0	0	0	0	0	0
Ireland	3	2	3	3	2	3	2	3	4	2
Luxembourg	0	0	0	0	0	0	0	0	0	0
Netherlands	2	3	3	2	3	5	2	2	4	2
Norway	0	0	0	0	0	0	0	0	0	0
Portugal	15	14	9	8	6	8	9	7	7	8
Spain	39	47	41	39	24	30	39	36	28	35
Switzerland	0	1	1	0	0	0	0	0	0	0
Sweden	0	0	0	0	0	0	0	0	0	0
United Kingdom	22	13	20	10	8	21	8	11	14	8
Italy	1	3	2	2	0	0	1	1	0	0
Poland	1	1	1	1	1	1	1	1	1	0
Russia	0	0	0	0	0	1	0	0	0	0
North Sea	6	5	8	4	5	8	5	5	6	3
Atlantic Ocean	29	30	21	19	17	18	19	18	15	18
Remaining sources	12	15	9	9	16	22	12	7	10	10
All EMEP sources	186	200	200	157	149	190	151	141	158	129

Comparison of the top ten contributors to atmospheric nitrogen deposition to OSPAR Region IV for the beginning of the period in 1995 and for the end of a period in 2014 is shown in Figure 4.6. France is the top and dominating contributor to nitrogen deposition in Region IV with 29% and 28% in 1995 and 2014. There is a significant increase of Spanish contribution from 17% in 1995 to 27% in 2014. There is also increase in contribution from the Atlantic Ocean from 12% to 14% and Portugal from 6% to 7%, from 1995 to 2014. On the other hand, there is a significant

drop in contribution from the United Kingdom, from 14% in 1995 to only 6% in 2014. A 1% decrease of the contribution between 1995 and 2014 can be noticed for Germany, North Sea, Netherlands and Belgium.

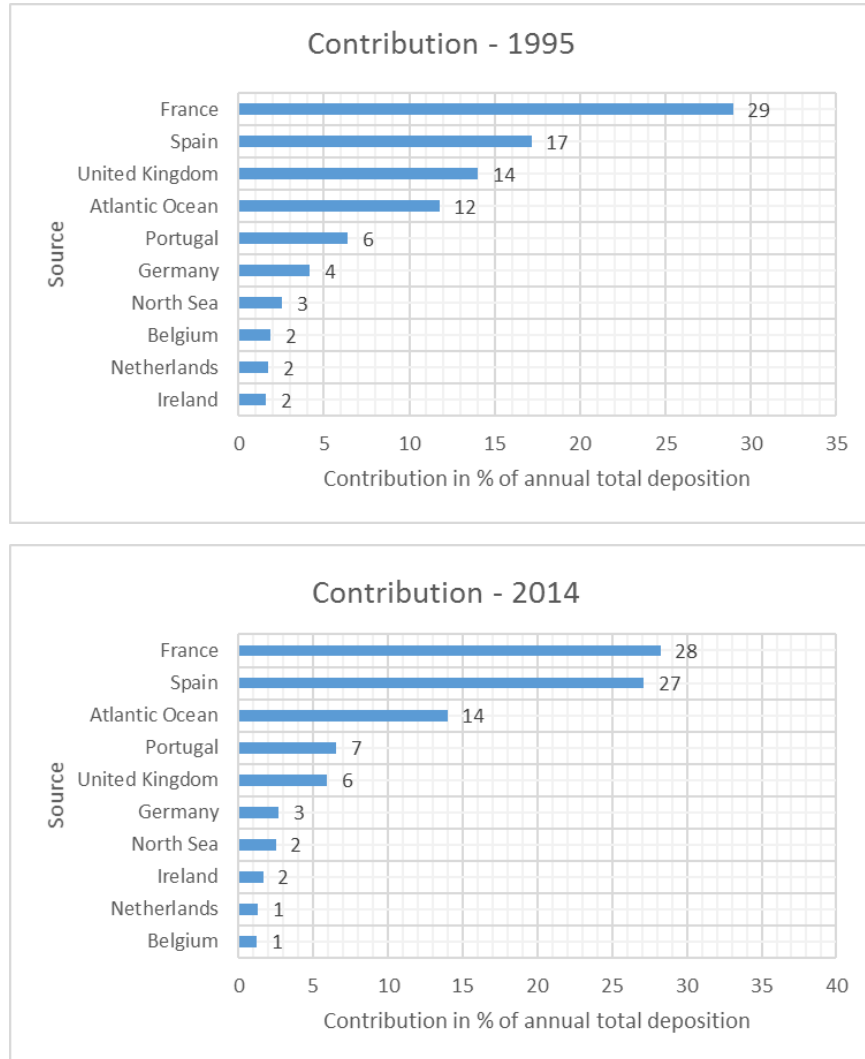


Figure 4.6: Comparison of main contributors to annual total nitrogen deposition to OSPAR Region IV in 1995 and 2014. Units: % of total nitrogen deposition to Region IV

4.5 Apportionment for OSPAR Region V

Source apportionments for OSPAR Region V is presented in Table 4.5 for the period 1995-2014.

Table 4.5-1: Source apportionments for OSPAR Region V for 1995-2004. Units: kt N per year

Source	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Belgium	16	18	21	11	14	9	11	13	12	10
Denmark	7	7	6	4	6	4	6	5	5	3
Finland	1	1	1	1	1	1	1	1	1	1
France	90	101	130	80	60	72	65	63	87	68
Germany	51	65	51	40	42	23	38	47	44	29
Iceland	1	1	1	1	1	2	1	1	1	1
Ireland	32	38	32	27	31	32	25	32	25	21
Luxembourg	1	1	2	1	1	1	1	1	1	1
Netherlands	20	19	23	14	18	10	13	16	13	12
Norway	4	3	3	3	3	3	3	3	3	2
Portugal	13	8	21	16	13	16	16	15	14	15
Spain	46	29	64	39	36	54	55	35	53	51
Switzerland	2	2	3	2	1	1	2	1	2	1
Sweden	3	2	2	2	2	2	3	3	2	2
United Kingdom	134	189	133	104	113	104	97	110	91	83
Italy	9	9	10	8	2	5	9	3	13	6
Poland	12	22	9	9	11	5	8	12	9	5
Russia	2	2	3	2	2	1	2	3	2	2
North Sea	15	22	18	12	15	12	17	18	17	16
Atlantic Ocean	79	77	88	82	79	84	82	88	87	87
Remaining sources	214	207	206	196	179	166	152	184	164	135
All EMEP sources	752	821	826	656	631	606	607	654	645	551

Table 4.5-2: Source apportionments for OSPAR Region V for 2005-2014. Units: kt N per year

Source	Year									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Belgium	9	12	10	10	7	8	5	6	10	7
Denmark	4	3	3	4	4	3	2	2	5	3
Finland	1	1	0	0	0	1	0	0	1	0
France	60	79	75	77	76	65	62	62	64	62
Germany	26	44	38	42	21	25	21	19	41	23
Iceland	1	1	1	2	2	2	3	3	1	2
Ireland	24	21	25	24	26	34	26	28	33	31
Luxembourg	1	1	1	1	0	1	1	1	1	1
Netherlands	11	14	11	13	9	11	7	8	16	9
Norway	3	3	2	2	2	2	1	2	2	2
Portugal	21	19	6	10	6	6	7	5	4	5
Spain	61	60	35	41	24	20	33	23	18	16
Switzerland	1	2	2	2	1	1	1	1	1	1
Sweden	2	2	1	1	2	1	1	1	2	1
United Kingdom	88	81	72	70	52	73	60	62	90	67
Italy	3	7	4	12	2	2	4	2	2	1
Poland	4	7	10	6	4	3	4	3	6	3
Russia	1	3	3	2	2	2	1	1	1	1
North Sea	16	17	13	15	12	14	10	14	17	9
Atlantic Ocean	95	93	51	44	42	40	43	46	39	43
Remaining sources	126	140	226	186	218	206	173	131	140	147
All EMEP sources	556	611	590	566	513	521	466	420	493	435

Comparison of the top ten contributors to atmospheric nitrogen deposition to OSPAR Region V for the beginning of the period in 1995 and for the end of a period in 2014 is shown in Figure 4.7. In Region V the first three major contributors are the same in 1995 and 2014. These are United Kingdom with 18% and 15%, France with 12% and 14% and Atlantic Ocean 11% and 10%. An increase of contribution can be observed for Ireland with 4% to 7%. The decrease in contribution can be noticed for Germany 7% to 5%, Spain 6% to 4%, Netherlands 3% to 2% and Portugal 2% to 1%.

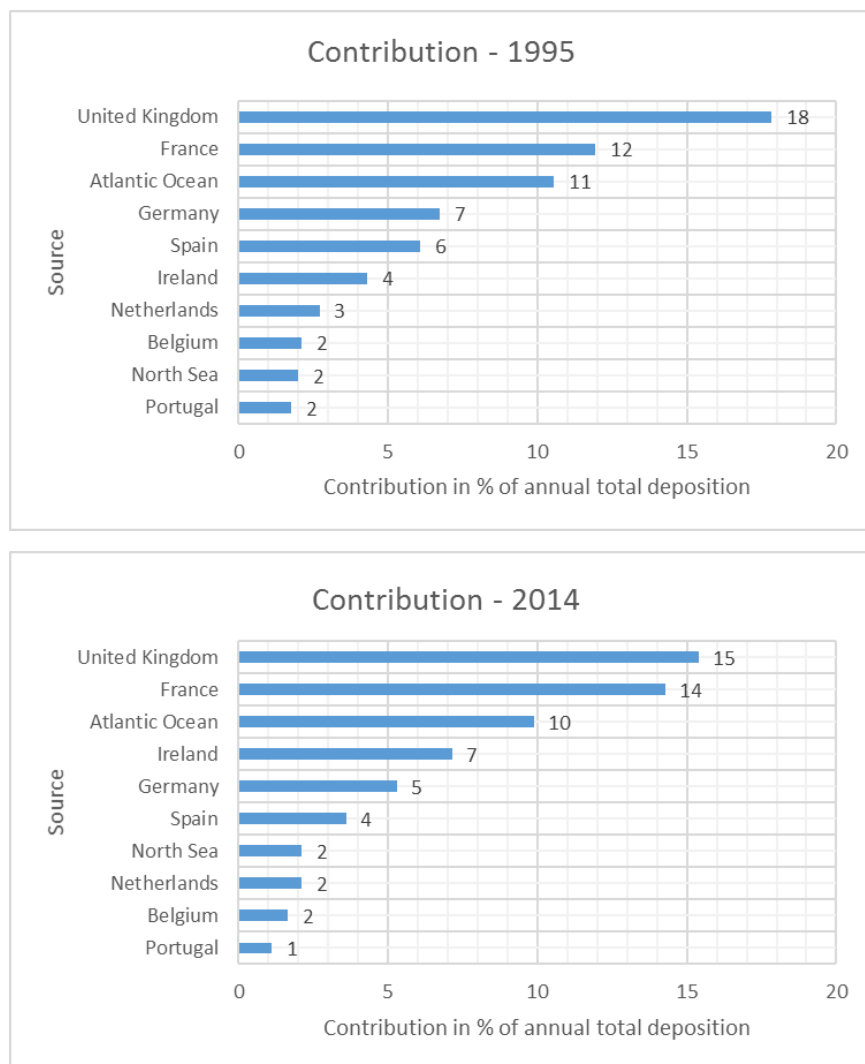


Figure 4.7: Comparison of main contributors to annual total nitrogen deposition to OSPAR Region V in 1995 and 2014. Units: % of total nitrogen deposition to Region V

4.6 Apportionment for the OSPAR Maritime Area

Source apportionments for the OSPAR Maritime Area is presented in Table 4.6 for the period 1995-2014.

Table 4.6-1: Source apportionments for the OSPAR Maritime Area for 1995-2004. Units: kt N per year

Source	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Belgium	54	67	62	47	52	50	45	51	54	42
Denmark	48	70	51	50	48	45	46	52	42	39
Finland	13	14	12	15	15	12	11	12	9	12
France	286	327	340	247	233	250	225	245	296	218
Germany	191	255	193	165	180	169	179	195	201	160
Iceland	4	3	4	4	4	4	4	4	4	4
Ireland	81	89	84	121	82	82	74	78	74	66
Luxembourg	3	4	4	3	3	3	3	3	4	3
Netherlands	82	80	89	69	76	70	66	72	74	62
Norway	31	35	32	34	35	32	31	33	28	29
Portugal	32	24	42	34	32	36	36	36	36	32
Spain	115	97	142	104	107	136	125	118	152	114
Switzerland	6	7	7	5	4	5	6	5	7	5
Sweden	22	29	20	21	20	17	19	23	15	17
United Kingdom	508	595	507	451	447	459	405	426	413	374
Italy	31	33	26	19	11	20	24	15	33	17
Poland	55	103	49	41	46	33	44	63	45	41
Russia	33	40	31	34	36	36	29	29	25	38
North Sea	78	96	90	79	87	88	93	106	104	96
Atlantic Ocean	136	134	151	138	138	148	146	155	157	154
Remaining sources	368	404	366	346	321	307	290	335	311	274
All EMEP sources	2178	2505	2301	1983	1977	2002	1900	2056	2083	1799

Table 4.6-2: Source apportionments for the OSPAR Maritime Area 2005-2014. Units: kt N per year

Source	Year									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Belgium	41	44	35	36	35	32	33	31	34	36
Denmark	38	39	29	34	33	34	30	29	35	38
Finland	11	12	10	9	10	11	10	10	10	8
France	226	257	226	233	239	209	222	201	209	208
Germany	145	164	124	157	136	122	143	115	153	169
Iceland	4	4	6	9	8	8	10	10	6	9
Ireland	68	68	69	68	69	75	68	69	75	72
Luxembourg	3	3	1	2	2	3	3	3	3	3
Netherlands	60	62	51	61	55	54	55	52	62	62
Norway	26	29	27	28	26	31	28	27	31	33
Portugal	41	39	17	19	16	16	19	14	14	15
Spain	142	148	89	94	64	62	96	71	60	63
Switzerland	4	6	5	5	3	3	5	3	2	3
Sweden	16	16	12	14	14	17	12	12	15	17
United Kingdom	379	378	345	324	282	290	286	275	300	287
Italy	12	22	9	24	7	6	14	6	5	4
Poland	38	38	35	37	37	35	36	25	33	40
Russia	42	36	43	31	45	41	25	42	22	24
North Sea	97	103	90	95	87	83	84	84	82	90
Atlantic Ocean	164	168	105	95	96	90	101	100	86	95
Remaining sources	263	281	358	309	372	360	297	223	236	277
All EMEP sources	1819	1919	1687	1685	1635	1581	1575	1403	1473	1555

Comparison of the top ten contributors to atmospheric nitrogen deposition to the OSPAR Maritime Area at the beginning of the period in 1995 and at the end of a period in 2014 is shown in Figure 4.8. In four out of five OSPAR Regions the United Kingdom is the number one contributor to nitrogen deposition. France is the number one contributor to nitrogen deposition in the OSPAR Region IV and is second or third contributor to three other Regions. Germany is the second highest contributor to OSPAR Regions I and III, and it is also close to the top in the remaining Regions. These facts are reflected in relative contributions from different sources to nitrogen deposition to the OSPAR Maritime Area, as a sum of depositions to all Regions. In this case, United Kingdom, France and Germany are the first, second and third contributors, respectively. Next on the list and especially in 2014 are ship emissions from Atlantic Ocean and from the North Sea. In addition, four other OSPAR Contracting Parties are on the lists for both

years. These are Spain, Ireland, Netherlands and Denmark. The only contributor from external non-OSPAR countries is Poland.

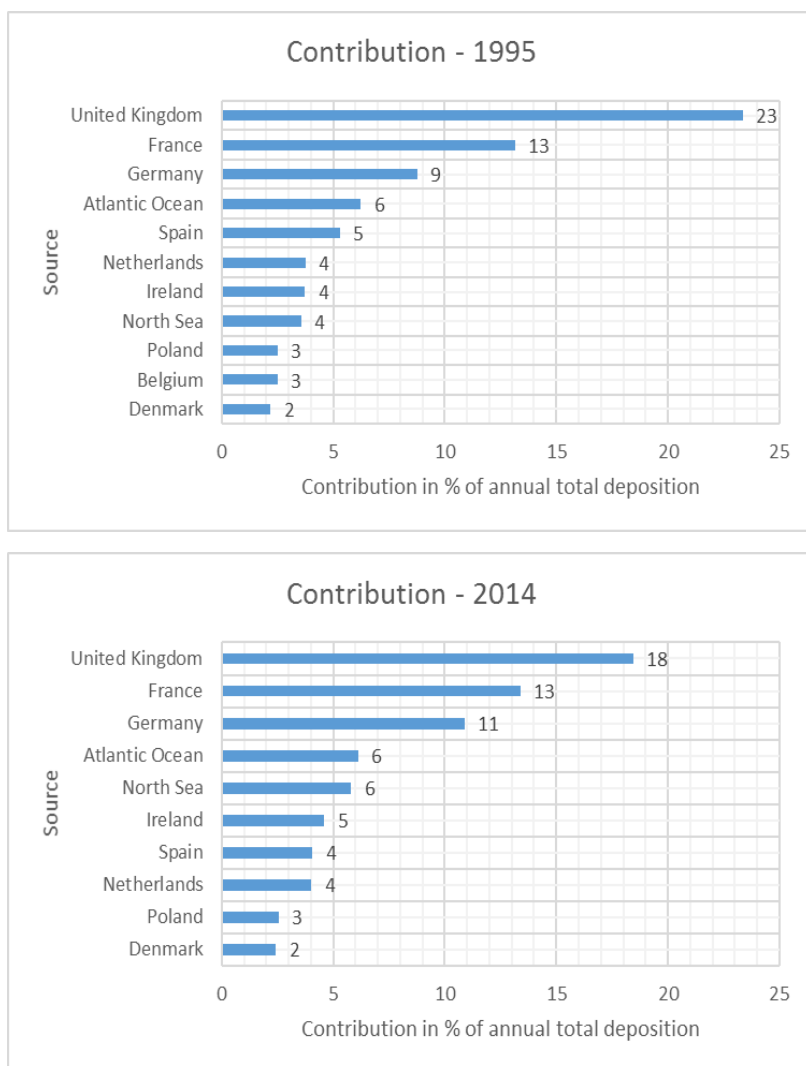


Figure 4.8: Comparison of main contributors to annual total nitrogen deposition to the OSPAR Maritime Area in 1995 and 2014. Units: % of total nitrogen deposition to the OSPAR Maritime Area

5. Summary and conclusions

The latest version (rv4.9) of the EMEP/MSC-W model has been used for calculating atmospheric nitrogen deposition to the OSPAR Maritime Area. Annual and normalised nitrogen annual depositions were calculated for each OSPAR Region, for the period 1995-2014 and presented in the report. In addition, source apportionment for each OSPAR region was calculated for the same period and the major contributors to each Region identified. Finally, annual nitrogen oxides and ammonia emissions for 1980, 1985 and each year of the 1990-2014 period are also presented in the Appendix of this report.

5.1 Annual depositions

The calculated annual depositions of oxidised, reduced and total nitrogen to the OSPAR Maritime Area indicate a clear reduction of the depositions to all Regions when annual depositions in 1995 are compared with annual depositions in 2014. The only increase (14%) can be noticed in the case of reduced nitrogen deposition to OSPAR Region II. Comparison of annual depositions in 1995 and 2014 in % of 1995 values is shown in Table 5.1.

Table 5.1: Comparison of annual nitrogen (oxidised, reduced and total) depositions in 1995 and 2014 in % of 1995 values

Region	Nitrogen deposition		
	Oxidised	Reduced	Total
Region I	-33	-10	-27
Region II	-23	+14	-9
Region III	-47	-11	-33
Region IV	-49	-13	-36
Region V	-54	-11	-42
OSPAR	-41	-2	-29

Depositions of oxidised nitrogen to all OSPAR Regions decrease significantly in the period 1995-2014, with maximum reduction (-54%) in Region V. Depositions of reduced nitrogen are also lower in four out of five Regions with maximum reduction (-13%) in Region IV. Annual depositions of total (oxidised + reduced) nitrogen decrease in all Regions 1995-2014 with maximum reduction (-42%) in Region V.

The distribution of total nitrogen deposition to the OSPAR Maritime Area over individual Regions is shown in Figure 5.1. The total nitrogen deposition in Figure 5.1 is shown as average over the period 1995-2014.

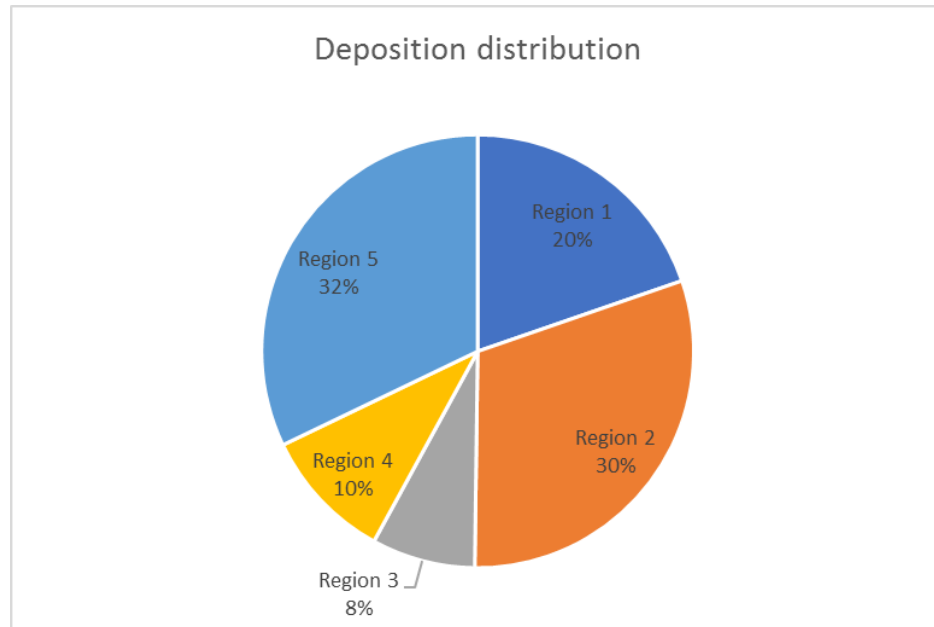


Figure 5.1: Distribution among individual OSPAR Regions of total nitrogen deposition to the OSPAR Maritime Area, averaged over the period 1995-2014

Most of the nitrogen in the period 1995-2014 is deposited in Regions V and II, 32% and 30% respectively. The relatively lowest deposition can be noticed for OSPAR Region III. The relative contributions of Regions I, III and IV to nitrogen depositions to the OSPAR Maritime Area remain on the same level over the entire period. The contribution from the OSPAR Region II is increasing 8% between years 1995 and 2014, whereas contribution from OSPAR Region V is decreasing 7% in the same period.

5.2 Normalised depositions

Normalised deposition of total nitrogen was calculated for all OSPAR Regions and the OSPAR Maritime Area, and for all years of the period 1995-2014. In addition to normalised deposition values, also minimum deposition and maximum deposition were calculated representing the best meteorological case and worst meteorological case, respectively. Minimum and maximum expressed in percent of normalised deposition indicate the range of meteorological uncertainty for each OSPAR Region.

The relative changes of annual total depositions to each Region and to the OSPAR Maritime Area, in the period 1995-2014, are shown in Table 5.2. The meteorological uncertainty range is also shown in Table 5.2.

Table 5.2: Relative change in annual total nitrogen deposition to OSPAR Regions and to the OSPAR Maritime Area. Uncertainty ranges due to meteorological condition in % of normalised deposition

OSPAR Region	Normalised deposition	Uncertainty range	
		Min.	Max
Region I	-19%	-23%	32%
Region II	-31%	-16%	22%
Region III	-27%	-13%	40%
Region IV	-23%	-21%	20%
Region V	-19%	-23%	32%
OSPAR	-24%	-12%	23%

For all OSPAR regions there is a decrease of annual deposition of total nitrogen, with the most significant decline in OSPAR Region II, -31%. A relatively small decline (19%) can be noticed for the two largest OSPAR Regions I and V.

The most uncertain, concerning inter-annual meteorological variability, is in Regions I and V, followed by Regions III, IV and II. The OSPAR Region II shows the least influence of meteorological conditions on calculated normalised deposition. Even more certain in this classification of the entire OSPAR region represented by the sum of all OSPAR Regions. The meteorological uncertainty is inversely proportional to the size of considered area.

The patterns of normalised depositions are very smooth and monotone compared to actual annual depositions, for all Regions and for the OSPAR Maritime Area.

5.3 Source apportionment

Source apportionment was calculated for all individual OSPAR Regions and for all the OSPAR Maritime Area including all Regions, for all years of the period 1995-2014. These source-receptor relations were calculated for 25 EMEP emission sources which are most important for nitrogen deposition to the OSPAR Maritime Area. These sources included all 15 individual OSPAR Contracting Parties, the three most important external sources (Italy, Poland and Russia) and ship traffic on the North Sea and on the Atlantic Ocean. The contributions from all sources and for each year of the period 1995-2014 are shown and discussed in the report.

The most important sources contributing to total nitrogen deposition in OSPAR Region I, in 1995 are United Kingdom (21%), Germany (11%) and France (7%), followed by Russia (6%) and Poland (5%) as the most important external sources. In 2014, United Kingdom (15%), Germany (10%)

and Norway (8%) are the top three contributors followed by North Sea (7%), Russia (6%) and Atlantic Ocean (5%). There is a decrease in the contribution from the United Kingdom and France and an increase of contribution from Norway and ship traffic on the North Sea and on the Atlantic Ocean.

The most important sources contributing to total nitrogen deposition OSPAR Region II, in 1995 are United Kingdom (31%), France (14%) and Germany (12%), followed by Netherlands (6%), the North Sea (6%) and Denmark (5%). In 2014, United Kingdom (22%), Germany (19%) and France (14%) are the top three contributors followed by North Sea (9%), Netherlands (7%) and Denmark (5%). There is a decrease in the contribution from the United Kingdom and an increase of contribution from Germany and ship traffic on the North Sea.

The most important sources contributing to total nitrogen deposition OSPAR Region III, in 1995 are United Kingdom (35%), Ireland (14%) and France (14%), followed by Germany (6%), Atlantic Ocean (6%) and Spain (5%). In 2014, United Kingdom (36%), Ireland (18%) and France (14%) are the top three contributors followed by the Atlantic Ocean (7%), Germany (5%) and the North Sea (5%). There is a decrease in the contribution from Germany and Spain and increases of contributions from United Kingdom, Ireland, ship traffic on the Atlantic Ocean and ship traffic on the North Sea.

The most important sources contributing to total nitrogen deposition OSPAR Region IV, in 1995 are France (29%), Spain (17%) and United Kingdom (14%), followed by the Atlantic Ocean (12%), Portugal (6%) and Germany (4%). In 2014, France (28%), Spain (27%) and the Atlantic Ocean (10%) are the top three contributors followed by Portugal (7%), United Kingdom (6%) and Germany (3%). There is a decrease in the contribution from the United Kingdom and increases of contributions from Spain, and the Atlantic Ocean.

The most important sources contributing to total nitrogen deposition OSPAR Region V, in 1995 are United Kingdom (18%), France (12%) and the Atlantic Ocean (11%), followed by Germany (7%), Spain (6%) and Ireland (4%). In 2014, United Kingdom (15%), France (14%) and Atlantic Ocean (10%) are the top three contributors followed by Ireland (7%), Germany (5%) and Spain (4%). There is a decrease in the contribution from the United Kingdom Germany and Spain, and increases of contributions from France and Ireland.

The most important sources contributing to total nitrogen deposition all the OSPAR Maritime Area, in 1995 are United Kingdom (23%), France (13%) and Germany (9%), followed by the Atlantic Ocean (6%), Spain (5%) and Netherlands (4%). In 2014, United Kingdom (18%), France (13%) and Germany (10%) remain the top three contributors followed by the Atlantic Ocean (6%), the North Sea (6%) and Ireland (5%). There is a decrease in the contribution from the United Kingdom Germany, Spain and Netherlands, and increases of contributions from Germany, the North Sea and Ireland.

References

Bartnicki J. and H. Fagerli (2004a) Atmospheric supply of nitrogen (emissions and deposition) to OSPAR Convention Waters. Summary Report for UBA. EMEP Technical Note MSC-W 2/2004. Norwegian Meteorological Institute. Oslo. Norway.

Bartnicki J. and H. Fagerli (2004b) Atmospheric nitrogen in the OSPAR Convention Area in the period 1990-2001. EMEP Technical Report MSC-W 4/2004. Norwegian Meteorological Institute. Oslo. Norway.

Bartnicki J. and H. Fagerli (2006) Atmospheric supply of nitrogen in the OSPAR Convention Waters in the period 1990-2004. Summary Report for the OSPAR Convention. EMEP Technical Report MSC-W 4/2006. Norwegian Meteorological Institute. Oslo. Norway.

Bartnicki J., Gusev A., Aas W. and A. Benedictow (2016) Atmospheric supply of nitrogen, cadmium, mercury, Benzo(a)pyrene and PBDEs to the Baltic Sea in 2014. EMEP Centres Joint Report for HELCOM. Technical Report MSC/W 1/2016. Norwegian Meteorological Institute. Oslo. Norway.

EMEP Status Report (2016) Transboundary particulate matter, photo-oxidants, acidifying and eutrophying components. Joint MSC-W & CCC & CEIP Report. EMEP Status Report 1/2016

Simpson. D., Benedictow. A., Berge. H., Bergström. R., Emberson. L. D., Fagerli. H., Flechard. C. R., Hayman. G. D., Gauss. M., Jonson. J. E., Jenkin. M. E., Nyíri. A., Richter. C., Semeena. V. S., Tsyro. S., Tuovinen. J.-P., Valdebenito. Á., and Wind. P. (2012) The EMEP MSC-W chemical transport model – technical description. *Atmos. Chem. Phys.*, 12. 7825-7865. doi:10.5194/acp-12-7825-2012.

Supplementary material to EMEP Status Report 1/2016. "EMEP/MSC-W model performance for acidifying and eutrophying components. photo-oxidants and particulate matter in 2014" Joint MSC-W & CCC Report.

Appendix A: Time series of nitrogen emissions

In this Appendix, nitrogen emission data are shown as used in the EMEP/MSC-W model calculations performed in 2016 and presented to Second Joint Session of the Steering Body to the EMEP and the Working Group on Effects, which took place 13-16 September 2016 in Geneva. The emissions for 2014 were derived from the 2016 official data submissions to UNECE CLRTAP as of May 2016. The gridded distributions of the 2014 emissions were provided by the EMEP Centre on Emission Inventories and Projections (CEIP). The emissions for the period of 2000–2013 were derived from the data submissions to UNECE CLRTAP as of May 2015. Re-submissions of emission data in 2016 are not included since the gridded data set for 2000–2013 has not been updated by CEIP this year.

Here time series of nitrogen emissions (nitrogen oxides and ammonia) from each Contracting Party divided by SNAP sector are presented. Annual nitrogen emissions are presented for 1980, 1985 and then for each year of the period: 1995-2014. The definitions of the SNAP emission sectors are given in the table below.

Sector 1	Combustion in energy and transformation industry
Sector 2	Non-industrial combustion plants
Sector 3	Combustion in manufacturing industry
Sector 4	Production processes
Sector 5	Extraction and distribution of fossil fuels and geothermal energy
Sector 6	Solvent and other product use
Sector 7	Road transport
Sector 8	Other mobile sources and machinery (including ship traffic)
Sector 9	Waste treatment and disposal
Sector 10	Agriculture
Sector 11	Other sources and sinks

A.1. Emissions from Belgium

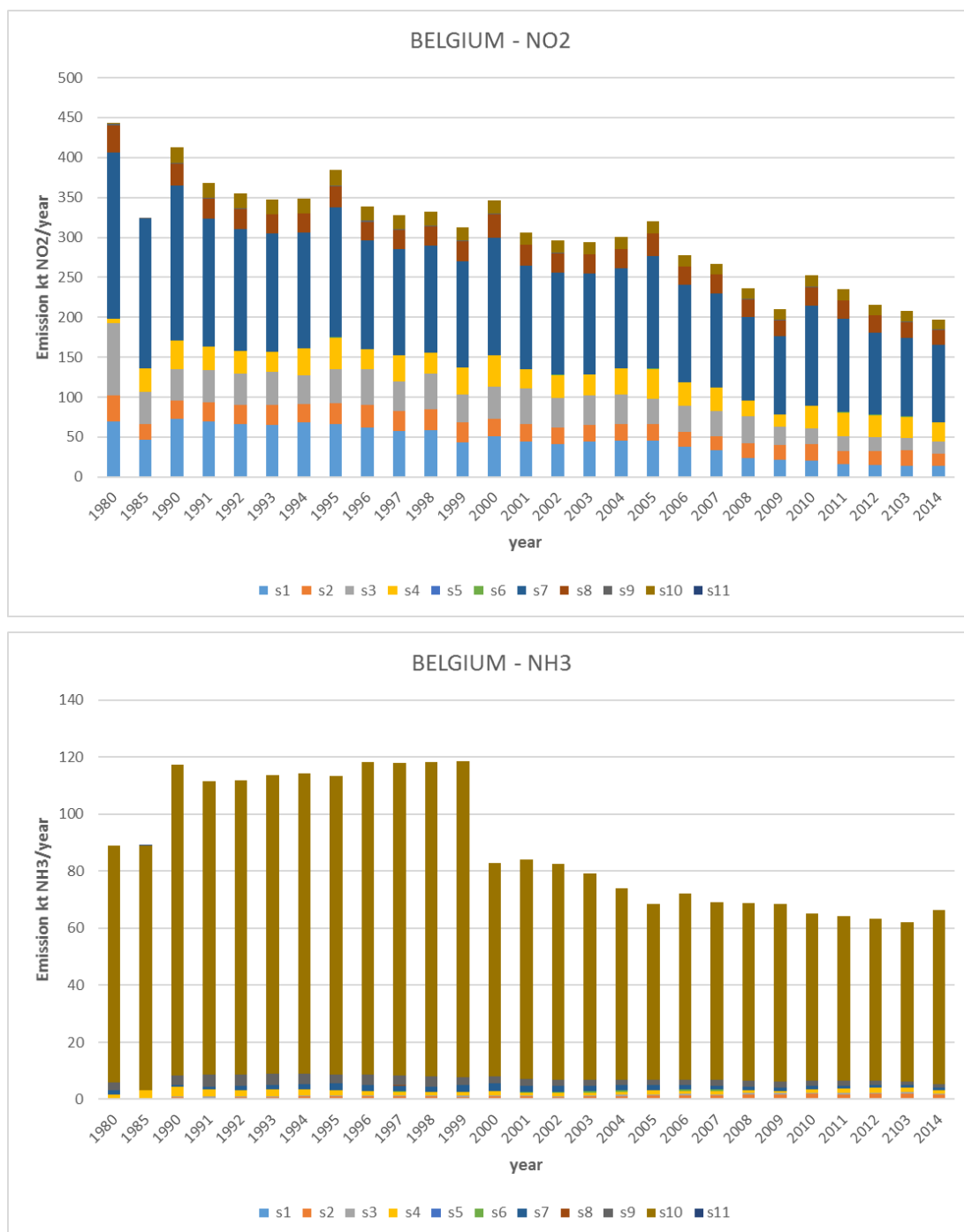


Fig A.1: Annual emissions of nitrogen oxides and ammonia from Belgium, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.1-1: Annual emissions of nitrogen oxides from Belgium, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	69.8	32.6	89.9	5.3	0.0	0.0	208.2	34.5	1.6	0.0	0.0
1985	46.5	20.0	40.4	28.8	0.0	0.0	188.1	0.0	1.2	0.0	0.0
1990	72.9	23.2	38.8	36.4	0.0	0.1	193.5	27.5	1.1	19.6	0.0
1991	69.1	23.9	40.4	29.8	0.0	0.0	160.7	24.7	1.1	18.6	0.0
1992	66.6	23.8	39.1	28.5	0.0	0.0	153.0	24.7	0.9	18.5	0.0
1993	65.6	24.1	42.3	24.6	0.0	0.0	148.1	23.9	0.8	18.5	0.0
1994	68.0	23.7	35.7	33.5	0.0	0.0	145.0	23.7	0.5	18.4	0.0
1995	66.3	25.8	43.1	39.4	0.0	0.4	162.5	26.7	0.6	19.4	0.0
1996	62.4	28.2	44.0	25.0	0.0	0.0	136.2	23.7	1.1	17.9	0.0
1997	57.7	24.9	36.8	33.1	0.0	0.0	133.0	23.9	0.6	17.4	0.0
1998	58.9	25.3	45.3	26.4	0.0	0.0	133.4	24.6	1.0	16.9	0.0
1999	43.9	24.2	35.5	33.4	0.0	0.0	133.2	25.5	0.7	16.4	0.0
2000	51.1	21.5	40.0	39.5	0.0	0.3	146.6	30.0	0.7	16.8	0.0
2001	44.4	22.0	44.1	24.5	0.0	0.0	129.5	25.9	0.7	15.5	0.0
2002	41.0	20.9	37.3	28.6	0.0	0.0	127.9	24.6	0.5	15.1	0.0
2003	44.2	21.2	36.4	27.1	0.0	0.0	125.4	24.2	0.5	14.7	0.0
2004	45.7	20.8	36.8	32.4	0.0	0.0	125.1	24.4	0.6	14.3	0.0
2005	45.5	20.9	31.4	37.7	0.0	0.2	141.5	27.4	0.6	14.6	0.0
2006	37.4	19.0	32.8	29.3	0.0	0.0	121.8	23.1	0.1	13.7	0.0
2007	33.7	17.4	31.8	29.0	0.0	0.0	118.3	23.3	0.1	13.6	0.0
2008	23.4	18.6	34.2	19.3	0.0	0.1	104.6	22.3	0.5	13.4	0.0
2009	21.9	17.9	22.8	16.1	0.0	0.0	97.7	20.0	0.6	13.2	0.0
2010	20.0	20.7	20.3	28.4	0.0	0.3	124.8	23.3	0.7	13.9	0.0
2011	16.0	16.7	18.5	29.7	0.0	0.3	117.1	22.7	0.6	13.5	0.0
2012	15.2	17.8	17.3	27.2	0.0	0.2	103.0	21.7	0.6	13.1	0.0
2103	14.1	19.3	15.4	26.7	0.0	0.3	98.0	20.5	0.5	13.1	0.0
2014	14.1	15.1	15.4	23.8	0.0	0.2	96.6	19.1	0.5	12.3	0.0

Table A.1-2: Annual emissions of ammonia from Belgium, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.1	0.4	0.1	1.2	0.0	0.0	1.5	0.0	2.6	83.1	0.0
1985	0.0	0.0	0.0	3.1	0.0	0.0	0.1	0.0	0.0	85.8	0.0
1990	0.0	0.7	0.3	3.2	0.0	0.0	0.7	0.0	3.4	108.9	0.0
1991	0.1	0.5	0.3	2.6	0.0	0.0	1.0	0.0	4.0	102.9	0.0
1992	0.0	0.6	0.4	2.2	0.0	0.0	1.3	0.0	4.1	103.1	0.0
1993	0.0	0.6	0.4	2.5	0.0	0.0	1.5	0.0	4.0	104.6	0.0
1994	0.0	0.9	0.4	2.1	0.0	0.2	1.7	0.0	3.8	105.1	0.0
1995	0.0	0.9	0.3	1.9	0.0	0.0	2.3	0.0	3.3	104.5	0.0
1996	0.0	1.1	0.4	1.5	0.0	0.0	1.9	0.0	3.8	109.6	0.0
1997	0.0	0.9	0.4	1.4	0.0	0.2	1.9	0.0	3.6	109.4	0.0
1998	0.0	0.9	0.4	1.1	0.0	0.0	1.9	0.0	3.5	110.3	0.0
1999	0.0	0.8	0.4	1.2	0.0	0.1	2.4	0.0	2.9	110.7	0.0
2000	0.1	0.9	0.4	1.6	0.0	0.0	2.7	0.0	2.4	74.6	0.0
2001	0.0	0.9	0.5	1.0	0.0	0.2	2.1	0.0	2.5	76.8	0.0
2002	0.0	0.8	0.3	1.0	0.0	0.4	2.0	0.0	2.3	75.5	0.0
2003	0.0	1.0	0.4	1.0	0.0	0.4	1.9	0.0	2.2	72.3	0.0
2004	0.0	1.1	0.5	1.1	0.0	0.4	1.8	0.0	2.0	67.1	0.0
2005	0.1	1.2	0.4	1.5	0.0	0.0	1.9	0.0	1.9	61.6	0.0
2006	0.1	1.2	0.7	1.0	0.0	0.4	1.5	0.0	2.1	65.3	0.0
2007	0.1	1.2	0.5	1.2	0.0	0.5	1.4	0.0	1.9	62.3	0.0
2008	0.1	1.5	0.6	0.9	0.0	0.2	1.2	0.0	2.1	62.1	0.0
2009	0.1	1.6	0.5	0.6	0.0	0.2	1.1	0.0	2.2	62.4	0.0
2010	0.2	2.0	0.3	1.2	0.0	0.0	1.1	0.0	1.7	58.6	0.0
2011	0.2	1.4	0.8	1.4	0.0	0.0	1.1	0.0	1.7	57.7	0.0
2012	0.2	1.7	0.3	1.8	0.0	0.0	0.9	0.0	1.6	56.9	0.0
2103	0.2	1.9	0.5	1.4	0.0	0.0	0.9	0.0	1.3	56.0	0.0
2014	0.2	1.4	0.2	1.3	0.0	0.1	0.9	0.0	1.1	61.1	0.0

A.2. Emissions from Denmark

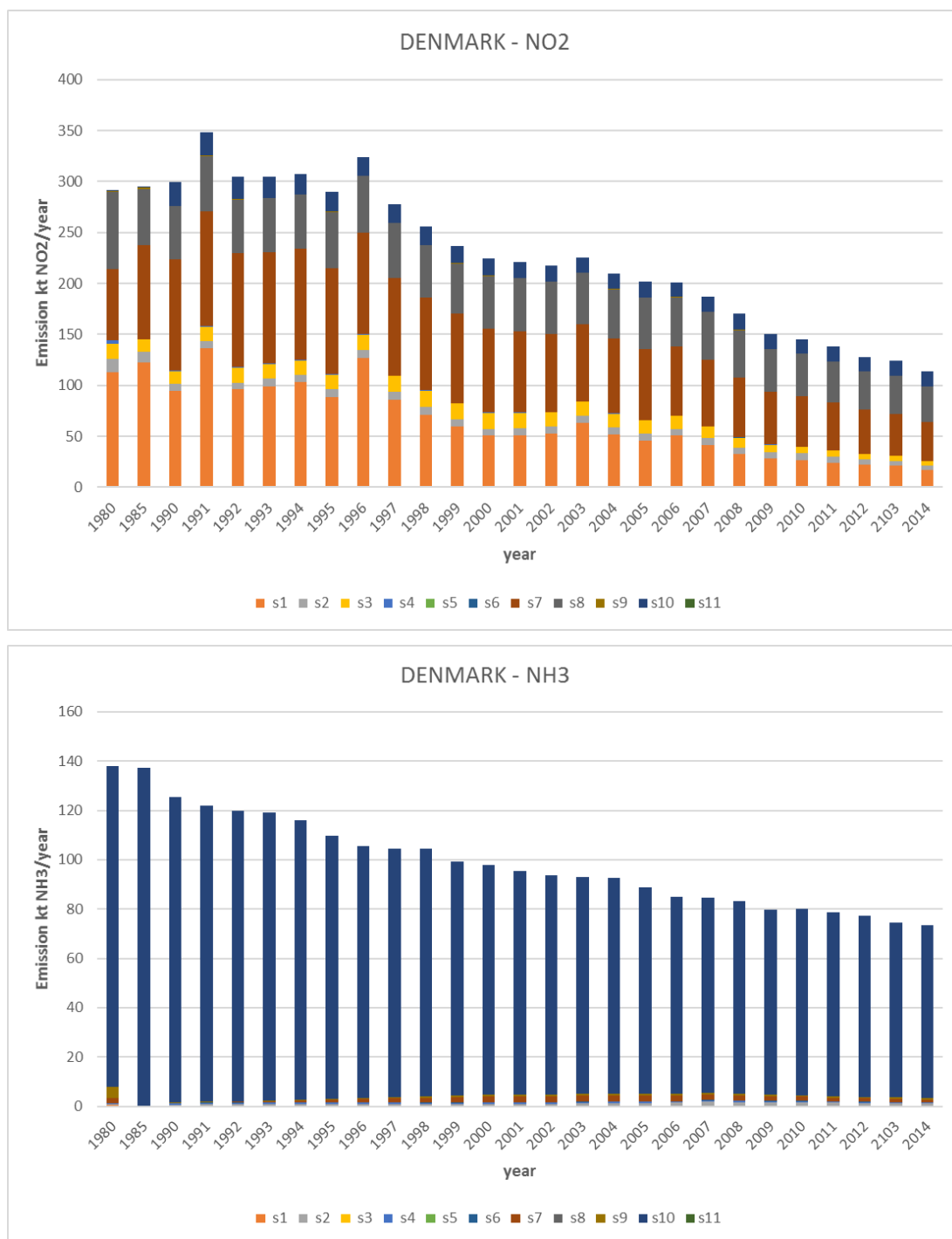


Fig A.2: Annual emissions of nitrogen oxides and ammonia from Denmark, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.2-1: Annual emissions of nitrogen oxides from Denmark, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	112.6	13.1	15.3	3.6	0.0	0.0	69.6	75.5	0.9	0.7	0.0
1985	122.3	10.9	12.0	0.0	0.0	0.0	92.1	55.1	1.7	1.0	0.0
1990	94.6	7.0	12.0	0.8	0.0	0.0	109.0	52.7	0.2	22.9	0.0
1991	136.2	7.3	14.0	0.8	0.0	0.0	112.3	54.4	0.4	22.7	0.0
1992	96.0	6.8	14.5	0.7	0.0	0.1	111.3	52.9	0.4	21.7	0.0
1993	99.1	7.3	14.3	0.6	0.0	0.0	108.9	53.4	0.3	20.4	0.0
1994	103.4	7.2	14.1	0.6	0.0	0.0	108.7	53.0	0.5	19.9	0.0
1995	88.6	7.5	14.3	0.6	0.0	0.0	103.6	55.3	0.3	19.3	0.0
1996	126.6	8.0	15.3	0.5	0.0	0.1	99.3	55.6	0.3	18.3	0.0
1997	85.7	7.7	15.6	0.6	0.0	0.1	95.5	53.8	0.4	18.1	0.0
1998	71.3	7.5	15.9	0.5	0.0	0.1	91.3	50.9	0.3	18.1	0.0
1999	59.7	7.3	15.2	0.5	0.0	0.1	87.5	49.0	0.6	17.2	0.0
2000	50.7	6.7	15.7	0.4	0.0	0.1	82.3	51.6	0.4	16.5	0.0
2001	50.8	6.9	15.6	0.4	0.0	0.1	79.7	51.6	0.4	16.0	0.0
2002	52.6	6.7	14.2	0.4	0.0	0.1	76.4	51.5	0.4	15.1	0.0
2003	63.3	6.9	13.5	0.5	0.0	0.1	75.3	50.7	0.4	15.1	0.0
2004	52.0	6.6	13.5	0.3	0.0	0.1	73.4	48.2	0.4	15.3	0.0
2005	46.1	6.8	12.9	0.0	0.0	0.1	69.9	50.2	0.3	15.2	0.0
2006	50.7	6.5	12.6	0.0	0.0	0.1	67.8	48.6	0.3	14.5	0.0
2007	41.8	6.4	11.1	0.0	0.0	0.1	66.1	46.6	0.3	14.8	0.0
2008	32.8	6.2	9.7	0.0	0.0	0.0	59.2	46.1	0.3	15.7	0.0
2009	28.2	6.2	7.4	0.0	0.0	0.1	51.9	41.7	0.2	14.8	0.0
2010	27.0	6.5	6.1	0.0	0.0	0.0	49.6	41.5	0.3	14.3	0.0
2011	24.3	5.6	5.8	0.0	0.0	0.0	47.6	39.8	0.2	14.5	0.0
2012	21.9	5.3	5.2	0.0	0.0	0.1	43.7	37.7	0.2	14.0	0.0
2103	20.9	5.1	5.0	0.0	0.0	0.1	40.7	37.5	0.2	14.4	0.0
2014	16.8	4.4	4.5	0.0	0.0	0.0	38.5	34.6	0.2	14.2	0.0

Table A.2-2: Annual emissions of ammonia from Denmark, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.6	0.3	0.1	0.3	0.0	0.0	1.9	0.0	4.8	130.0	0.0
1985	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	137.2	0.0
1990	0.0	0.6	0.0	0.6	0.0	0.1	0.1	0.0	0.2	123.7	0.0
1991	0.0	0.7	0.0	0.6	0.0	0.1	0.2	0.0	0.2	120.0	0.0
1992	0.0	0.8	0.0	0.6	0.0	0.1	0.4	0.0	0.3	117.8	0.0
1993	0.0	0.8	0.0	0.6	0.0	0.1	0.5	0.0	0.3	116.7	0.0
1994	0.0	0.8	0.0	0.7	0.0	0.1	0.8	0.0	0.3	113.4	0.0
1995	0.0	0.8	0.0	0.6	0.0	0.1	1.1	0.0	0.3	106.8	0.0
1996	0.0	0.9	0.0	0.6	0.0	0.1	1.4	0.0	0.3	102.4	0.0
1997	0.0	0.8	0.0	0.6	0.0	0.1	1.7	0.0	0.4	100.7	0.0
1998	0.0	0.7	0.0	0.6	0.0	0.1	2.1	0.0	0.4	100.7	0.0
1999	0.0	0.7	0.0	0.6	0.0	0.1	2.4	0.0	0.5	95.0	0.0
2000	0.0	0.9	0.0	0.5	0.0	0.1	2.5	0.0	0.5	93.2	0.0
2001	0.0	1.0	0.0	0.5	0.0	0.1	2.6	0.0	0.5	90.8	0.0
2002	0.0	0.9	0.0	0.5	0.0	0.1	2.6	0.0	0.6	89.0	0.0
2003	0.0	1.1	0.0	0.5	0.0	0.2	2.6	0.0	0.6	88.0	0.0
2004	0.0	1.2	0.0	0.6	0.0	0.2	2.5	0.0	0.5	87.6	0.0
2005	0.0	1.3	0.0	0.5	0.0	0.2	2.4	0.0	0.5	83.8	0.0
2006	0.0	1.4	0.0	0.5	0.0	0.2	2.3	0.0	0.6	80.1	0.0
2007	0.0	1.8	0.0	0.6	0.0	0.2	2.2	0.0	0.6	79.3	0.0
2008	0.0	1.7	0.0	0.5	0.0	0.2	2.0	0.0	0.6	78.4	0.0
2009	0.0	1.6	0.0	0.5	0.0	0.1	1.9	0.0	0.6	75.0	0.0
2010	0.0	1.6	0.0	0.4	0.0	0.1	1.7	0.0	0.5	75.5	0.0
2011	0.0	1.4	0.0	0.3	0.0	0.1	1.6	0.0	0.6	74.7	0.0
2012	0.0	1.4	0.0	0.4	0.0	0.1	1.4	0.0	0.6	73.3	0.0
2103	0.0	1.3	0.0	0.3	0.0	0.1	1.3	0.0	0.8	70.5	0.0
2014	0.0	1.1	0.0	0.3	0.0	0.1	1.2	0.0	0.8	69.8	0.0

A.3. Emissions from Finland

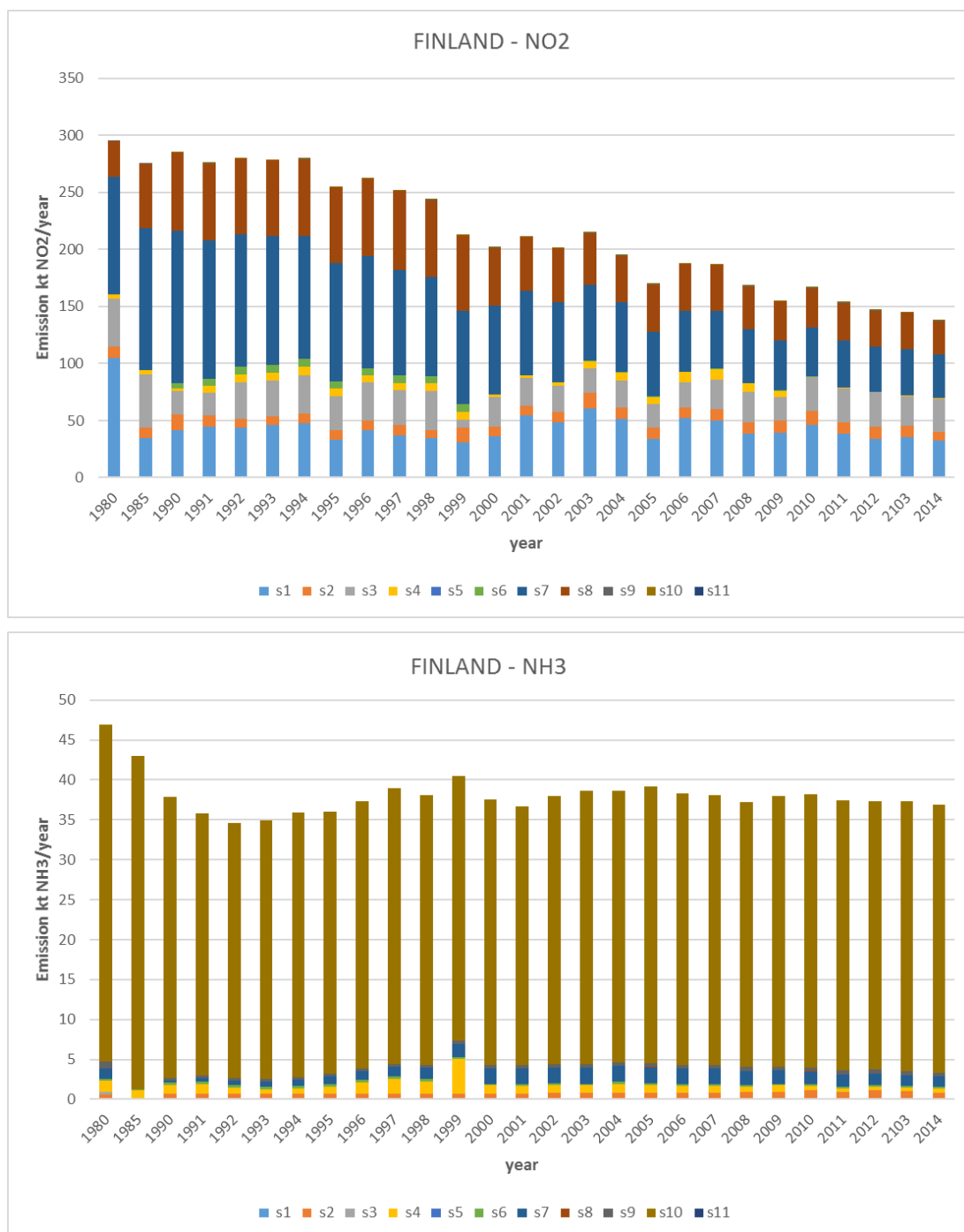


Fig A.3: Annual emissions of nitrogen oxides and ammonia from Finland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.3-1: Annual emissions of nitrogen oxides from Finland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	104.9	9.9	41.9	3.6	0.0	0.0	103.1	31.5	0.1	0.0	0.0
1985	34.4	9.6	46.2	3.8	0.0	0.0	124.1	56.7	0.1	0.0	0.0
1990	41.5	13.5	20.9	2.3	0.0	5.0	133.4	68.7	0.1	0.1	0.0
1991	44.7	9.5	20.4	6.0	0.0	6.0	121.2	67.6	0.1	0.0	0.0
1992	43.6	7.9	32.3	6.6	0.0	6.7	116.3	66.0	0.2	0.0	0.0
1993	46.1	7.7	31.4	6.7	0.0	6.7	112.8	66.3	0.2	0.0	0.0
1994	47.3	8.6	34.1	6.9	0.0	6.9	108.1	67.3	0.2	0.0	0.0
1995	33.0	8.6	29.9	6.5	0.0	6.5	103.6	65.9	0.2	0.0	0.0
1996	41.2	8.5	33.8	6.2	0.0	6.2	98.4	67.5	0.2	0.0	0.0
1997	36.9	9.3	30.2	6.4	0.0	6.4	92.9	68.9	0.2	0.0	0.0
1998	34.5	7.3	34.4	6.5	0.0	6.5	87.0	67.1	0.2	0.0	0.0
1999	30.6	13.1	6.7	7.0	0.0	7.0	81.5	66.8	0.2	0.0	0.0
2000	36.2	8.2	25.8	2.3	0.0	0.0	78.5	50.2	0.2	0.0	0.0
2001	54.6	8.8	23.8	2.3	0.0	0.0	73.9	47.6	0.2	0.0	0.0
2002	48.7	8.6	23.1	3.2	0.0	0.2	69.7	47.3	0.2	0.0	0.0
2003	60.8	13.2	21.5	6.0	0.0	1.0	66.1	45.6	0.3	0.0	0.0
2004	51.5	10.2	23.3	6.7	0.0	0.9	61.0	40.9	0.2	0.0	0.0
2005	33.8	10.1	20.3	6.0	0.0	0.7	56.9	41.3	0.2	0.0	0.0
2006	52.2	9.3	21.8	9.0	0.0	0.5	52.9	41.7	0.2	0.0	0.0
2007	50.2	10.0	25.7	9.0	0.2	0.4	50.5	40.3	0.2	0.0	0.0
2008	38.8	9.9	26.3	7.6	0.2	0.1	47.1	37.7	0.3	0.0	0.0
2009	39.2	10.9	20.4	5.5	0.1	0.2	44.1	33.9	0.3	0.0	0.0
2010	46.2	11.8	30.2	0.2	0.1	0.1	43.4	34.3	0.3	0.0	0.0
2011	38.7	9.9	29.9	0.6	0.0	0.0	41.2	33.0	0.3	0.0	0.0
2012	34.0	10.6	30.2	0.6	0.0	0.0	39.1	31.7	0.4	0.0	0.0
2103	35.3	9.8	26.2	0.6	0.0	0.0	40.5	31.9	0.5	0.1	0.0
2014	32.0	8.3	29.0	0.6	0.0	0.0	38.0	28.9	0.6	0.1	0.0

Table A.3-2: Annual emissions of ammonia from Finland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.0	0.6	0.4	1.4	0.0	0.2	1.3	0.0	0.9	42.1	0.0
1985	0.0	0.0	0.2	1.0	0.0	0.0	0.0	0.0	0.0	41.8	0.0
1990	0.0	0.7	0.0	1.1	0.0	0.3	0.3	0.0	0.3	35.1	0.0
1991	0.0	0.7	0.0	1.2	0.0	0.3	0.4	0.0	0.3	32.8	0.0
1992	0.0	0.7	0.0	0.8	0.0	0.3	0.5	0.0	0.3	32.0	0.0
1993	0.0	0.7	0.0	0.6	0.0	0.3	0.7	0.0	0.3	32.4	0.0
1994	0.0	0.7	0.0	0.7	0.0	0.3	0.8	0.0	0.3	33.1	0.0
1995	0.0	0.7	0.0	0.9	0.0	0.3	1.0	0.0	0.4	32.8	0.0
1996	0.0	0.7	0.0	1.5	0.0	0.3	1.0	0.0	0.4	33.4	0.0
1997	0.0	0.7	0.0	1.8	0.0	0.3	1.2	0.0	0.4	34.5	0.0
1998	0.0	0.7	0.0	1.5	0.0	0.3	1.4	0.0	0.4	33.8	0.0
1999	0.0	0.7	0.0	4.3	0.0	0.3	1.7	0.0	0.4	33.1	0.0
2000	0.0	0.7	0.0	1.1	0.0	0.2	1.9	0.0	0.4	33.2	0.0
2001	0.0	0.7	0.0	0.9	0.0	0.3	2.0	0.0	0.4	32.3	0.0
2002	0.0	0.8	0.0	0.9	0.0	0.3	2.0	0.0	0.4	33.5	0.0
2003	0.0	0.8	0.0	1.0	0.0	0.2	2.0	0.0	0.4	34.2	0.0
2004	0.0	0.8	0.0	1.2	0.0	0.2	2.0	0.0	0.4	34.0	0.0
2005	0.0	0.8	0.0	1.0	0.0	0.3	2.0	0.0	0.5	34.7	0.0
2006	0.0	0.8	0.0	0.9	0.0	0.2	1.9	0.0	0.5	34.0	0.0
2007	0.0	0.8	0.0	0.8	0.0	0.3	1.9	0.0	0.5	33.8	0.0
2008	0.0	0.9	0.0	0.7	0.0	0.2	1.8	0.0	0.5	33.2	0.0
2009	0.0	0.9	0.0	0.8	0.0	0.1	1.7	0.0	0.5	33.8	0.0
2010	0.0	1.1	0.0	0.6	0.0	0.1	1.6	0.0	0.5	34.3	0.0
2011	0.0	0.9	0.0	0.5	0.0	0.2	1.5	0.0	0.5	33.8	0.0
2012	0.0	1.1	0.0	0.5	0.0	0.2	1.4	0.0	0.5	33.6	0.0
2103	0.0	1.0	0.0	0.5	0.0	0.2	1.4	0.0	0.5	33.8	0.0
2014	0.0	0.8	0.0	0.5	0.0	0.2	1.3	0.0	0.5	33.5	0.0

A.4. Emissions from France

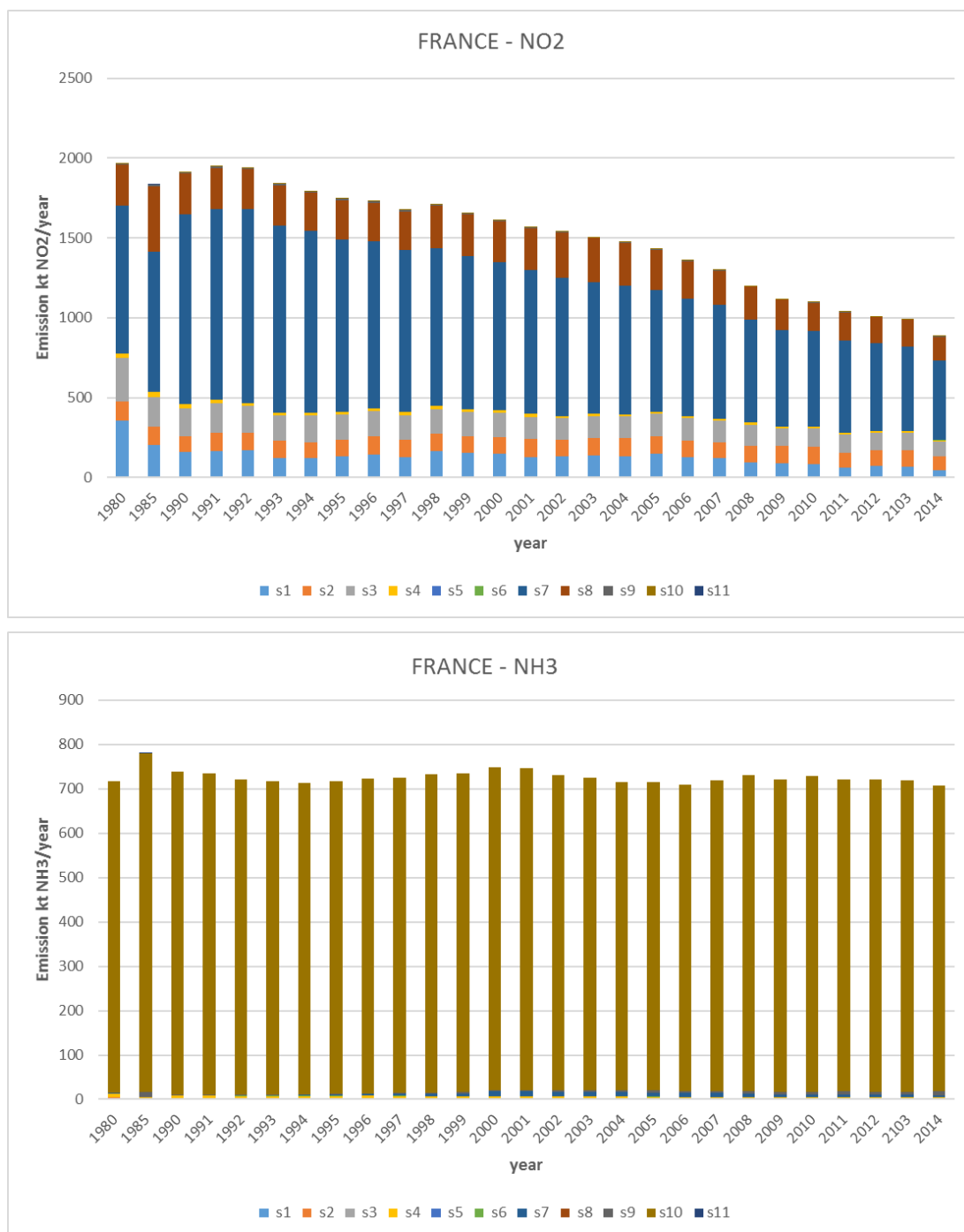


Fig A.4: Annual emissions of nitrogen oxides and ammonia from France, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.4-1: Annual emissions of nitrogen oxides from France, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	356.3	122.2	271.2	26.3	0.0	0.0	926	258.2	4.9	1.4	0.0
1985	203.9	112.9	187.9	30.0	0.0	0.0	879	408.8	12.0	0.0	5.4
1990	158.3	100.8	175.4	27.2	0.0	0.0	1183	257.5	6.9	1.5	0.0
1991	164.9	116.4	183.6	24.4	0.0	0.0	1193	256.1	7.0	1.6	0.0
1992	168.0	112.2	165.8	21.1	0.0	0.0	1213	251.7	7.1	1.6	0.0
1993	122.4	108.3	156.5	17.7	0.0	0.0	1172	253.3	7.2	1.5	0.0
1994	121.1	100.0	165.4	17.7	0.0	0.0	1137	240.5	7.1	1.6	0.0
1995	131.8	103.7	157.4	17.5	0.0	0.0	1080	246.1	7.0	1.5	0.0
1996	144.7	112.6	157.9	18.5	0.0	0.0	1042	244.5	6.6	1.7	0.0
1997	129.5	104.0	156.4	18.4	0.0	0.0	1017	241.3	6.0	1.6	0.0
1998	164.8	108.9	155.0	18.2	0.0	0.0	988	266.8	5.4	1.8	0.0
1999	152.2	106.5	150.1	17.5	0.0	0.0	960	260.4	4.7	1.7	0.0
2000	151.0	103.0	150.4	18.6	0.0	0.0	927	253.9	4.8	1.7	0.0
2001	128.0	113.9	137.6	17.3	0.0	0.0	900	265.2	4.4	1.4	0.0
2002	134.5	102.5	132.8	15.1	0.0	0.0	867	280.9	4.0	1.4	0.0
2003	138.3	107.3	137.4	14.7	0.0	0.0	825	274.9	3.9	1.0	0.0
2004	134.5	111.2	135.5	15.1	0.0	0.0	804	267.5	3.6	1.0	0.0
2005	149.9	110.5	137.1	14.5	0.0	0.0	763	250.5	3.8	0.8	0.0
2006	127.3	103.7	140.2	13.1	0.0	0.0	735	236.2	3.3	0.8	0.0
2007	119.5	97.6	138.3	14.1	0.0	0.0	710	214.6	2.9	0.8	0.0
2008	96.2	103.4	130.3	12.4	0.0	0.0	647	204.2	2.9	1.0	0.0
2009	90.9	104.5	112.7	10.7	0.0	0.0	604	189.1	2.7	1.1	0.0
2010	83.8	107.6	116.6	9.6	0.0	0.0	599	175.9	2.8	1.0	0.0
2011	63.3	92.4	113.7	9.3	0.0	0.0	581	172.7	2.4	1.0	0.0
2012	71.8	96.3	112.5	7.8	0.0	0.0	551	164.7	2.4	1.1	0.0
2103	68.6	101.1	111.8	7.5	0.0	0.0	530	167.0	2.3	1.0	0.0
2014	47.4	87.3	92.4	6.1	0.0	0.9	498	147.7	2.3	3.6	0.0

Table A.4-2: Annual emissions of ammonia from France, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.3	3.8	1.0	8.2	0.0	0.3	0.6	0.1	0.6	701.7	0.0
1985	0.0	0.0	0.0	4.6	0.0	0.5	0.6	0.0	10.4	763.9	0.5
1990	0.0	0.0	0.9	7.7	0.0	0.3	0.8	0.0	0.8	729.0	0.0
1991	0.0	0.0	0.8	7.5	0.0	0.3	0.8	0.0	0.8	725.4	0.0
1992	0.0	0.0	0.8	7.0	0.0	0.3	1.0	0.0	0.8	710.6	0.0
1993	0.0	0.0	0.8	6.9	0.0	0.3	1.6	0.0	0.8	706.0	0.0
1994	0.0	0.0	0.8	6.9	0.0	0.3	2.6	0.0	1.0	701.0	0.0
1995	0.0	0.0	0.8	6.9	0.0	0.3	3.4	0.0	1.1	704.1	0.0
1996	0.0	0.0	0.8	7.0	0.0	0.3	4.3	0.0	1.2	709.4	0.0
1997	0.0	0.0	0.8	6.8	0.0	0.3	5.2	0.0	1.2	710.8	0.0
1998	0.0	0.0	0.9	6.6	0.0	0.3	5.9	0.0	1.5	718.0	0.0
1999	0.0	0.0	0.9	5.9	0.0	0.3	6.6	0.0	2.0	718.3	0.0
2000	0.0	0.0	0.9	6.0	0.0	0.3	11.1	0.0	1.9	727.5	0.0
2001	0.0	0.0	0.9	5.6	0.0	0.3	11.4	0.0	2.5	726.6	0.0
2002	0.0	0.0	1.0	5.1	0.0	0.3	11.0	0.0	3.1	711.2	0.0
2003	0.0	0.0	1.0	5.4	0.0	0.3	10.7	0.0	3.5	704.0	0.0
2004	0.0	0.0	1.0	5.1	0.0	0.3	10.3	0.0	3.7	695.1	0.0
2005	0.0	0.0	0.7	5.0	0.0	0.3	9.6	0.0	4.1	694.5	0.0
2006	0.1	0.0	0.7	3.6	0.0	0.3	9.1	0.0	4.9	691.0	0.0
2007	0.1	0.0	0.8	4.1	0.0	0.3	8.6	0.0	5.1	700.1	0.0
2008	0.2	0.0	1.0	4.1	0.0	0.3	7.7	0.0	5.4	712.6	0.0
2009	0.2	0.0	0.8	3.1	0.0	0.3	7.2	0.0	5.9	704.4	0.0
2010	0.1	0.0	0.9	3.1	0.0	0.3	6.5	0.0	6.5	711.1	0.0
2011	0.2	0.0	0.9	3.4	0.0	0.3	6.0	0.0	6.9	703.6	0.0
2012	0.1	0.0	1.0	3.2	0.0	0.3	5.4	0.0	7.3	704.4	0.0
2103	0.1	0.0	1.3	3.1	0.0	0.3	5.1	0.0	7.7	700.6	0.0
2014	0.2	0.0	1.2	3.1	0.0	0.3	4.8	0.0	8.1	689.9	0.0

A.5. Emissions from Germany

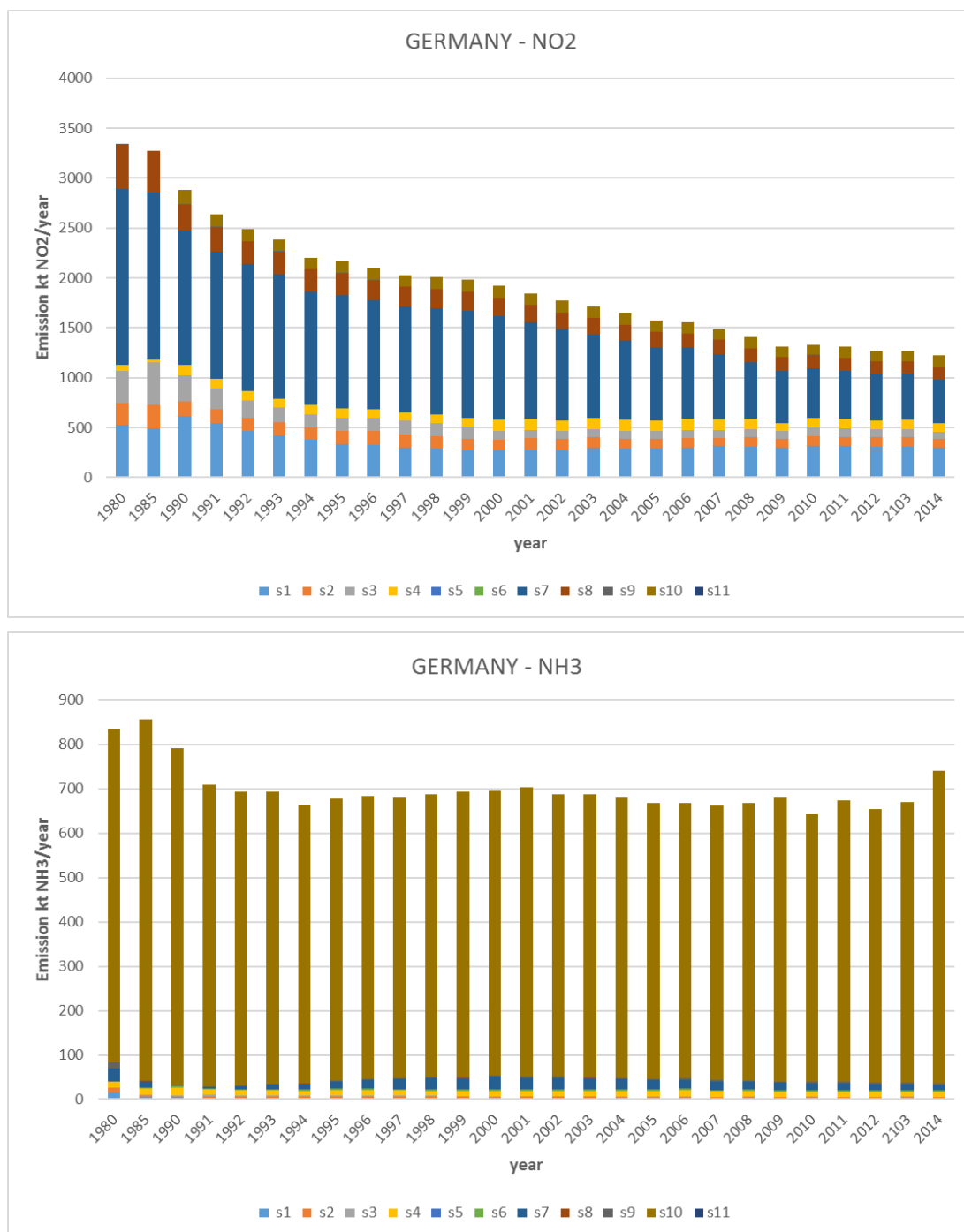


Fig A.5: Annual emissions of nitrogen oxides and ammonia from Germany, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.5-1: Annual emissions of nitrogen oxides from Germany, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	524.0	220.1	326.5	55.0	0.0	0.0	1766	439.2	2.9	0.0	0.0
1985	493.4	231.9	432.8	24.8	0.0	0.0	1669	424.6	0.0	0.0	0.0
1990	612.4	149.3	260.8	103.7	0.1	0.7	1343	266.6	7.7	138.3	0.0
1991	542.5	144.7	209.3	95.7	0.1	0.7	1272	241.6	6.4	126.7	0.0
1992	469.6	131.1	173.0	92.8	0.1	0.7	1272	225.1	5.6	122.5	0.0
1993	419.7	134.5	147.5	88.8	0.1	0.7	1246	225.7	6.0	117.7	0.0
1994	378.8	125.7	131.2	89.7	0.1	0.7	1136	222.3	5.9	109.4	0.0
1995	337.8	127.2	136.0	91.9	0.1	0.7	1136	216.8	4.2	116.2	0.0
1996	329.2	140.8	129.2	87.2	0.1	0.7	1086	201.7	4.4	115.7	0.0
1997	301.7	132.2	132.8	87.0	0.1	0.7	1061	195.2	4.1	114.4	0.0
1998	292.5	124.4	128.1	84.9	0.1	0.7	1061	195.0	3.7	115.5	0.0
1999	274.0	113.8	123.7	83.7	0.1	0.7	1073	189.1	3.0	119.9	0.0
2000	272.8	107.2	82.2	118.4	0.1	0.7	1034	183.6	2.5	123.6	0.0
2001	277.1	118.9	80.1	108.1	0.1	0.8	968	175.2	2.1	117.7	0.0
2002	278.4	109.1	77.4	106.3	0.1	0.7	914	167.9	1.6	114.3	0.0
2003	303.9	103.5	80.6	106.7	0.1	0.7	841	163.4	1.2	113.9	0.0
2004	291.8	95.5	77.8	110.4	0.1	0.7	801	156.3	0.8	114.5	0.0
2005	293.1	92.8	77.1	105.8	0.1	0.7	738	152.0	0.8	112.7	0.0
2006	302.3	98.3	78.5	106.4	0.1	0.7	714	143.9	0.7	112.2	0.0
2007	316.8	77.5	80.2	109.0	0.1	0.8	651	142.3	0.7	105.4	0.0
2008	309.5	93.4	82.2	100.5	0.1	0.7	571	139.3	0.7	113.7	0.0
2009	300.6	87.5	75.6	83.7	0.1	0.7	520	137.3	0.7	104.0	0.0
2010	317.1	101.1	84.5	90.8	0.1	0.7	502	132.1	0.7	104.3	0.0
2011	319.5	88.8	85.8	92.2	0.1	0.7	479	131.4	0.7	113.1	0.0
2012	310.9	94.5	77.5	89.2	0.0	0.7	463	125.0	0.7	107.9	0.0
2103	307.0	102.6	78.0	88.8	0.0	0.7	461	121.9	0.7	108.8	0.0
2014	300.5	83.1	74.0	89.0	0.0	0.4	435	119.1	0.7	122.3	0.0

Table A.5-2: Annual emissions of ammonia from Germany, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	13.7	12.0	0.8	14.4	0.0	0.0	28.7	0.1	14.2	751.2	0.0
1985	4.5	4.3	2.7	13.0	0.0	2.4	13.2	1.3	0.0	815.6	0.0
1990	3.9	3.6	2.3	17.3	0.0	2.8	1.1	0.3	0.2	760.8	0.0
1991	3.8	4.0	2.1	12.2	0.0	2.8	3.5	0.2	0.3	679.7	0.0
1992	3.7	3.8	2.0	10.9	0.0	3.0	7.2	0.2	0.4	662.9	0.0
1993	3.8	4.0	1.8	10.4	0.0	3.1	10.6	0.2	0.5	659.0	0.0
1994	3.7	3.8	1.6	9.8	0.0	3.2	13.1	0.2	0.8	627.0	0.0
1995	3.7	3.7	1.5	11.7	0.0	3.2	16.4	0.2	1.1	636.7	0.0
1996	3.5	4.2	1.4	12.1	0.0	3.2	19.6	0.2	1.5	638.9	0.0
1997	3.2	4.0	1.3	11.1	0.0	3.2	22.6	0.2	1.6	632.9	0.0
1998	3.0	3.8	1.4	11.3	0.0	3.2	24.4	0.2	1.7	637.8	0.0
1999	2.8	3.3	1.1	11.5	0.0	3.4	24.9	0.2	2.0	643.8	0.0
2000	2.7	3.1	0.9	12.7	0.0	3.4	28.5	0.2	2.3	642.0	0.0
2001	2.7	3.6	0.9	11.4	0.0	3.5	26.7	0.2	2.4	652.1	0.0
2002	2.7	3.2	0.8	12.0	0.0	3.3	26.0	0.2	2.9	637.0	0.0
2003	2.8	3.1	0.8	12.2	0.0	3.4	24.6	0.2	2.9	638.2	0.0
2004	2.8	2.9	0.7	12.2	0.0	3.4	23.5	0.2	2.9	631.2	0.0
2005	2.8	2.8	0.8	12.2	0.0	3.4	21.4	0.2	2.9	621.3	0.0
2006	2.8	3.0	0.8	13.8	0.0	3.4	20.3	0.2	2.9	621.2	0.0
2007	2.8	2.0	0.8	12.3	0.0	3.5	19.2	0.2	3.2	619.1	0.0
2008	2.7	2.7	0.8	12.0	0.0	3.4	17.9	0.2	3.1	626.1	0.0
2009	2.7	2.4	0.8	11.3	0.0	3.4	16.8	0.2	3.2	639.4	0.0
2010	2.7	2.5	0.9	11.4	0.0	3.4	15.3	0.2	3.1	603.2	0.0
2011	2.7	2.1	1.0	11.7	0.0	3.4	14.8	0.2	3.4	635.5	0.0
2012	2.7	2.2	0.9	11.6	0.0	3.4	13.5	0.2	3.6	616.8	0.0
2103	2.6	2.4	1.0	11.5	0.0	3.3	13.0	0.2	3.6	633.3	0.0
2014	2.5	2.0	0.9	11.5	0.0	2.7	12.6	0.2	3.5	703.7	0.0

A.6. Emissions from Iceland

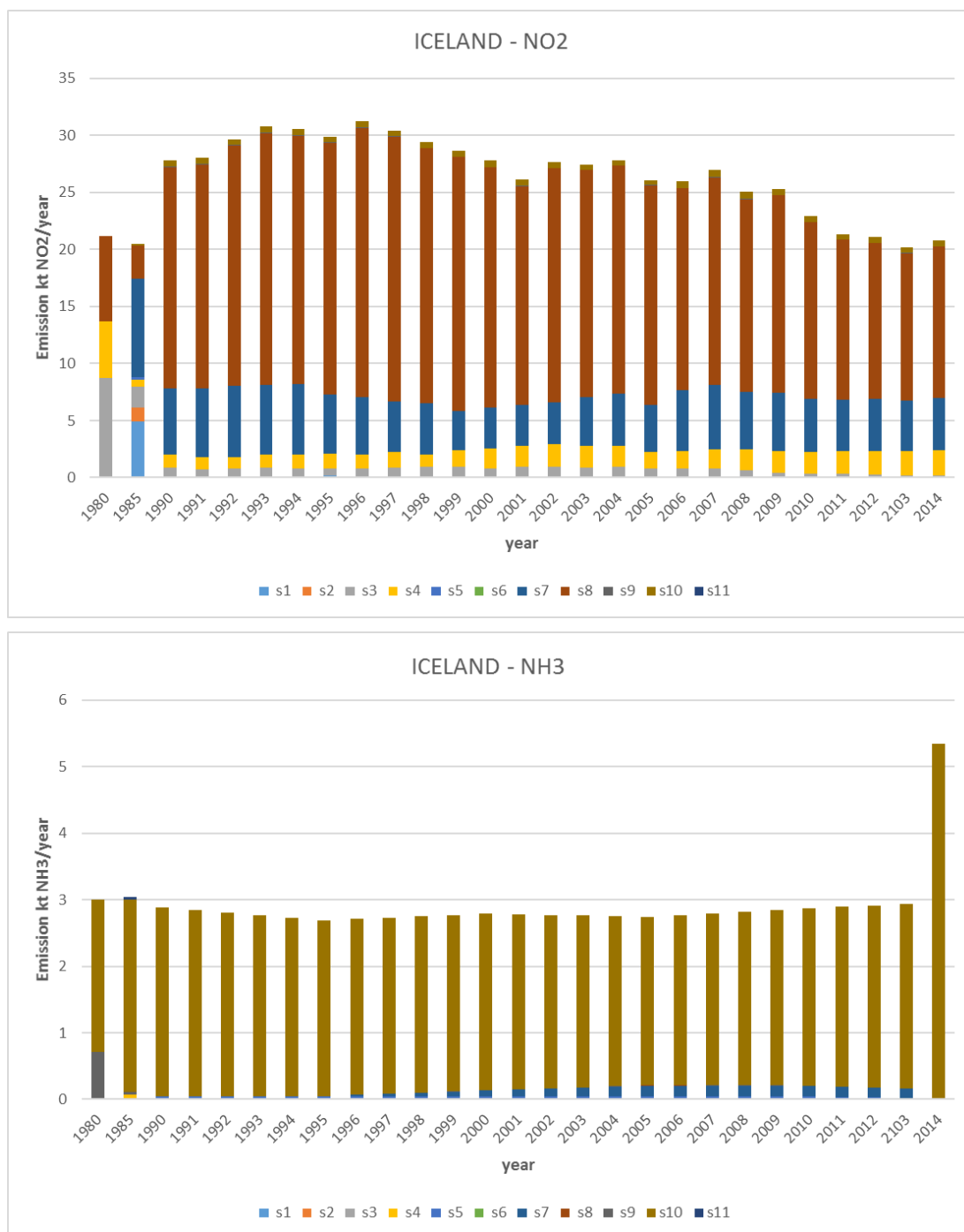


Fig A.6: Annual emissions of nitrogen oxides and ammonia from Iceland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.6-1: Annual emissions of nitrogen oxides from Iceland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.0	0.0	8.7	5.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0
1985	4.9	1.2	1.8	0.6	0.2	0.0	8.6	2.9	0.0	0.2	0.0
1990	0.1	0.0	0.8	1.1	0.0	0.0	5.8	19.4	0.1	0.6	0.0
1991	0.1	0.0	0.6	1.1	0.0	0.0	6.1	19.6	0.1	0.5	0.0
1992	0.1	0.0	0.7	1.0	0.0	0.0	6.2	21.1	0.1	0.5	0.0
1993	0.1	0.0	0.7	1.2	0.0	0.0	6.1	22.1	0.1	0.5	0.0
1994	0.1	0.0	0.7	1.2	0.0	0.0	6.2	21.8	0.1	0.5	0.0
1995	0.2	0.0	0.6	1.3	0.0	0.0	5.2	22.0	0.0	0.5	0.0
1996	0.1	0.0	0.7	1.2	0.0	0.0	5.0	23.6	0.0	0.5	0.0
1997	0.1	0.0	0.8	1.4	0.0	0.0	4.4	23.2	0.0	0.5	0.0
1998	0.1	0.0	0.8	1.1	0.0	0.0	4.4	22.4	0.0	0.5	0.0
1999	0.1	0.0	0.8	1.4	0.0	0.0	3.5	22.3	0.0	0.6	0.0
2000	0.1	0.0	0.7	1.7	0.0	0.0	3.6	21.1	0.0	0.6	0.0
2001	0.1	0.0	0.9	1.9	0.0	0.0	3.6	19.2	0.0	0.5	0.0
2002	0.1	0.0	0.9	2.0	0.0	0.0	3.6	20.6	0.0	0.5	0.0
2003	0.1	0.0	0.7	1.9	0.0	0.0	4.3	19.9	0.0	0.5	0.0
2004	0.1	0.0	0.8	1.9	0.0	0.0	4.6	20.0	0.0	0.4	0.0
2005	0.1	0.0	0.7	1.5	0.0	0.0	4.1	19.2	0.0	0.4	0.0
2006	0.1	0.0	0.7	1.5	0.0	0.0	5.4	17.7	0.0	0.5	0.0
2007	0.1	0.0	0.7	1.7	0.0	0.0	5.6	18.2	0.0	0.6	0.0
2008	0.1	0.0	0.6	1.9	0.0	0.0	5.0	16.9	0.0	0.7	0.0
2009	0.1	0.0	0.4	1.9	0.0	0.0	5.1	17.3	0.0	0.5	0.0
2010	0.0	0.0	0.3	2.0	0.0	0.0	4.6	15.5	0.0	0.5	0.0
2011	0.0	0.0	0.3	2.0	0.0	0.0	4.5	14.0	0.0	0.5	0.0
2012	0.1	0.0	0.2	2.1	0.0	0.0	4.6	13.6	0.0	0.5	0.0
2103	0.1	0.0	0.1	2.1	0.0	0.0	4.5	12.9	0.0	0.5	0.0
2014	0.0	0.0	0.2	2.2	0.0	0.0	4.6	13.2	0.0	0.5	0.0

Table A6-2: Annual emissions of ammonia from Iceland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	2.3	0.0
1985	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	2.9	0.0
1990	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0
1991	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0
1992	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0
1993	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0
1994	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0
1995	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0
1996	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0
1997	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0
1998	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.6	0.0
1999	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.6	0.0
2000	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.7	0.0
2001	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.6	0.0
2002	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.6	0.0
2003	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.6	0.0
2004	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	2.6	0.0
2005	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	2.5	0.0
2006	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	2.6	0.0
2007	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	2.6	0.0
2008	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	2.6	0.0
2009	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	2.6	0.0
2010	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	2.7	0.0
2011	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	2.7	0.0
2012	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	2.7	0.0
2103	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.8	0.0
2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0

A.7. Emissions from Ireland

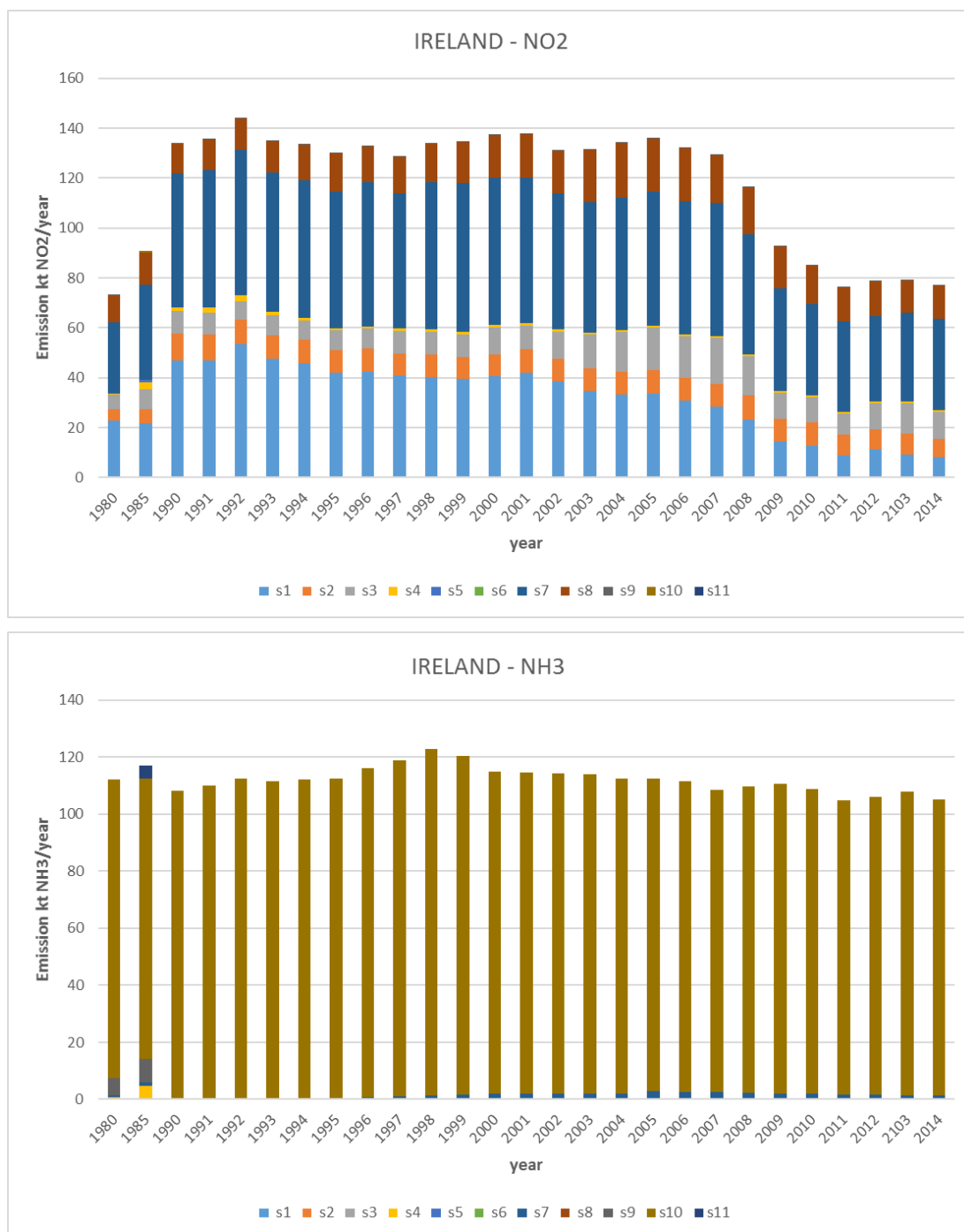


Fig A.7: Annual emissions of nitrogen oxides and ammonia from Ireland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.7-1: Annual emissions of nitrogen oxides from Ireland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	22.8	4.7	5.8	0.5	0.0	0.0	28.5	10.7	0.0	0.0	0.0
1985	21.8	5.5	8.2	2.7	0.9	0.0	38.2	12.7	0.0	0.9	0.0
1990	47.0	10.7	9.2	1.4	0.0	0.0	53.8	11.8	0.0	0.0	0.0
1991	46.8	10.7	8.7	2.1	0.0	0.0	55.1	12.1	0.0	0.0	0.0
1992	53.7	9.7	7.4	2.3	0.0	0.0	58.3	12.4	0.0	0.0	0.0
1993	47.5	9.6	7.8	1.4	0.0	0.0	55.9	12.8	0.0	0.0	0.0
1994	45.7	9.5	7.8	0.8	0.0	0.0	55.4	14.2	0.0	0.0	0.0
1995	42.1	9.0	8.1	0.8	0.0	0.0	54.7	15.3	0.0	0.0	0.0
1996	42.5	9.2	8.1	0.8	0.0	0.0	57.8	14.2	0.0	0.0	0.0
1997	40.9	8.8	9.0	1.0	0.0	0.0	54.2	14.7	0.0	0.0	0.0
1998	40.3	9.2	9.0	1.0	0.0	0.0	59.0	15.2	0.0	0.0	0.0
1999	39.6	8.8	9.0	1.0	0.0	0.0	59.9	16.1	0.0	0.0	0.0
2000	40.6	8.9	10.5	1.1	0.0	0.0	59.0	17.2	0.0	0.0	0.0
2001	42.2	9.1	9.4	1.2	0.0	0.0	58.3	17.6	0.0	0.0	0.0
2002	38.7	8.9	10.9	1.0	0.0	0.0	54.4	17.2	0.0	0.0	0.0
2003	34.6	9.0	13.6	0.8	0.0	0.0	52.4	20.8	0.0	0.0	0.0
2004	33.4	8.8	16.0	0.7	0.0	0.0	53.1	22.0	0.0	0.0	0.0
2005	33.5	9.4	17.3	0.8	0.0	0.0	53.7	21.2	0.0	0.0	0.0
2006	30.9	9.1	16.6	0.8	0.0	0.0	53.5	21.0	0.0	0.0	0.0
2007	28.4	9.0	18.4	0.8	0.0	0.0	53.4	19.0	0.0	0.0	0.0
2008	23.0	9.8	15.8	0.8	0.0	0.0	47.9	19.0	0.0	0.0	0.0
2009	14.3	9.4	10.3	0.7	0.0	0.0	41.3	16.7	0.0	0.0	0.0
2010	12.6	9.6	10.0	0.7	0.0	0.0	36.8	15.4	0.0	0.0	0.0
2011	8.8	8.4	8.5	0.7	0.0	0.0	36.0	13.9	0.0	0.0	0.0
2012	11.2	8.2	10.4	0.7	0.0	0.0	34.3	13.7	0.0	0.0	0.0
2103	9.4	8.1	12.5	0.7	0.0	0.0	35.5	12.8	0.0	0.0	0.0
2014	8.3	7.3	10.7	0.7	0.0	0.0	36.8	13.2	0.0	0.0	0.0

Table A.7-2: Annual emissions of ammonia from Ireland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.0	0.2	0.0	0.5	0.0	0.0	0.8	0.0	5.9	104.6	0.0
1985	0.0	0.0	0.0	4.7	0.0	0.0	1.2	0.0	8.2	98.4	4.7
1990	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	108.0	0.0
1991	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	109.7	0.0
1992	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	112.1	0.0
1993	0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.0	0.0	111.2	0.0
1994	0.0	0.1	0.1	0.0	0.0	0.0	0.3	0.0	0.0	111.7	0.0
1995	0.0	0.1	0.1	0.0	0.0	0.0	0.4	0.0	0.0	111.8	0.0
1996	0.0	0.1	0.1	0.0	0.0	0.0	0.6	0.0	0.0	115.4	0.0
1997	0.0	0.1	0.1	0.0	0.0	0.0	0.8	0.0	0.0	117.7	0.0
1998	0.0	0.1	0.1	0.0	0.0	0.0	1.1	0.0	0.0	121.4	0.0
1999	0.0	0.1	0.1	0.0	0.0	0.0	1.4	0.0	0.0	118.7	0.0
2000	0.0	0.1	0.1	0.0	0.0	0.0	1.7	0.0	0.0	113.0	0.0
2001	0.0	0.1	0.2	0.0	0.0	0.0	1.8	0.0	0.0	112.5	0.0
2002	0.0	0.1	0.2	0.0	0.0	0.0	1.9	0.0	0.0	112.3	0.0
2003	0.0	0.1	0.2	0.0	0.0	0.0	1.8	0.0	0.0	112.0	0.0
2004	0.0	0.1	0.2	0.0	0.0	0.0	1.8	0.0	0.0	110.5	0.0
2005	0.0	0.1	0.2	0.0	0.0	0.0	2.5	0.0	0.0	109.7	0.0
2006	0.0	0.1	0.3	0.0	0.0	0.0	2.3	0.0	0.0	109.0	0.0
2007	0.0	0.1	0.2	0.0	0.0	0.0	2.1	0.0	0.0	106.0	0.0
2008	0.0	0.1	0.2	0.0	0.0	0.0	2.1	0.0	0.0	107.2	0.0
2009	0.0	0.1	0.2	0.0	0.0	0.0	1.8	0.0	0.0	108.6	0.0
2010	0.0	0.1	0.2	0.0	0.0	0.0	1.5	0.0	0.0	107.0	0.0
2011	0.0	0.1	0.2	0.0	0.0	0.0	1.4	0.0	0.0	103.2	0.0
2012	0.0	0.1	0.2	0.0	0.0	0.0	1.2	0.0	0.0	104.4	0.0
2103	0.0	0.1	0.2	0.0	0.0	0.0	1.1	0.0	0.0	106.3	0.0
2014	0.0	0.1	0.3	0.0	0.0	0.0	1.0	0.0	0.0	103.9	0.0

A.8. Emissions from Luxembourg

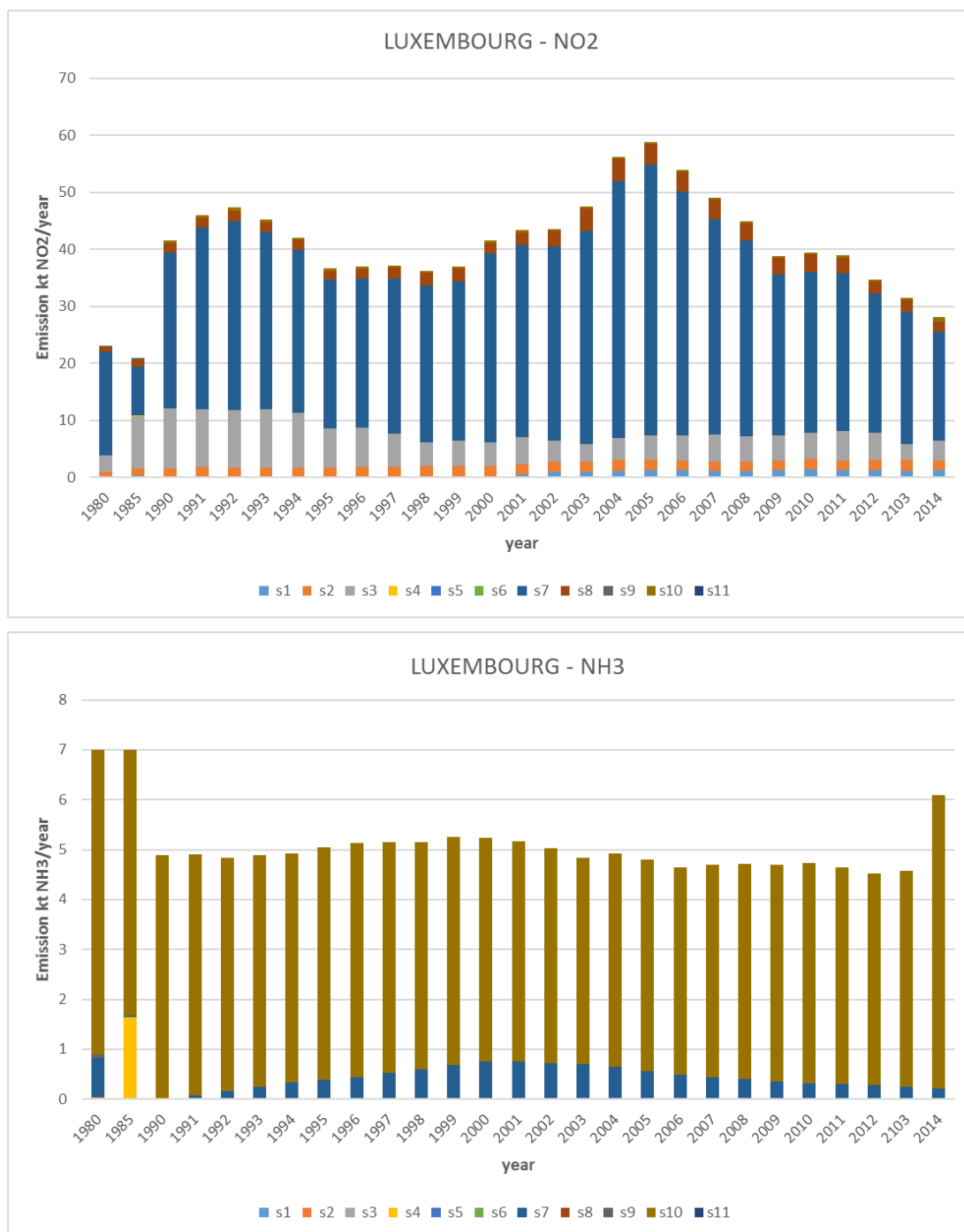


Fig A.8: Annual emissions of nitrogen oxides and ammonia from Luxembourg, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.8-1: Annual emissions of nitrogen oxides from Luxembourg, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.1	0.9	2.8	0.0	0.0	0.0	18.3	0.9	0.0	0.0	0.0
1985	0.4	1.2	9.1	0.2	0.0	0.0	8.5	1.3	0.3	0.0	0.0
1990	0.0	1.5	10.6	0.0	0.0	0.0	27.3	1.7	0.0	0.4	0.0
1991	0.0	1.8	10.1	0.0	0.0	0.0	31.9	1.7	0.0	0.5	0.0
1992	0.1	1.7	10.0	0.0	0.0	0.0	33.2	1.8	0.0	0.5	0.0
1993	0.1	1.7	10.3	0.0	0.0	0.0	31.0	1.7	0.0	0.4	0.0
1994	0.1	1.6	9.7	0.0	0.0	0.0	28.5	1.7	0.0	0.4	0.0
1995	0.1	1.6	6.9	0.0	0.0	0.0	26.0	1.5	0.0	0.4	0.0
1996	0.1	1.8	6.8	0.0	0.0	0.0	26.0	1.7	0.0	0.4	0.0
1997	0.2	1.7	5.8	0.0	0.0	0.0	27.1	1.9	0.0	0.4	0.0
1998	0.2	1.8	4.2	0.0	0.0	0.0	27.4	2.2	0.0	0.4	0.0
1999	0.2	1.8	4.5	0.0	0.0	0.0	27.9	2.2	0.0	0.4	0.0
2000	0.2	1.8	4.2	0.0	0.0	0.0	33.0	1.9	0.0	0.4	0.0
2001	0.5	1.9	4.7	0.0	0.0	0.0	33.7	2.2	0.0	0.3	0.0
2002	0.9	1.8	3.8	0.0	0.0	0.0	34.0	2.7	0.0	0.4	0.0
2003	1.0	1.8	3.0	0.0	0.0	0.0	37.4	4.0	0.0	0.3	0.0
2004	1.1	1.9	3.8	0.0	0.0	0.0	45.0	4.0	0.0	0.4	0.0
2005	1.2	1.8	4.3	0.0	0.0	0.0	47.4	3.7	0.0	0.3	0.0
2006	1.2	1.8	4.3	0.0	0.0	0.0	42.8	3.6	0.0	0.3	0.0
2007	1.2	1.7	4.7	0.0	0.0	0.0	37.7	3.6	0.0	0.3	0.0
2008	1.1	1.8	4.3	0.0	0.0	0.0	34.3	3.2	0.0	0.3	0.0
2009	1.2	1.7	4.4	0.0	0.0	0.0	28.3	2.9	0.0	0.3	0.0
2010	1.4	1.9	4.6	0.0	0.0	0.0	28.2	3.1	0.0	0.3	0.0
2011	1.3	1.6	5.3	0.0	0.0	0.0	27.7	2.7	0.0	0.3	0.0
2012	1.3	1.8	4.7	0.0	0.0	0.0	24.4	2.1	0.0	0.3	0.0
2103	1.2	1.9	2.8	0.0	0.0	0.0	23.2	2.1	0.0	0.3	0.0
2014	1.3	1.5	3.5	0.0	0.0	0.0	19.1	1.8	0.0	0.9	0.0

Table A.8-2: Annual emissions of ammonia from Luxembourg, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.1	6.1	0.0
1985	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	5.3	0.0
1990	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0
1991	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	4.8	0.0
1992	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	4.7	0.0
1993	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	4.6	0.0
1994	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	4.6	0.0
1995	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	4.7	0.0
1996	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	4.7	0.0
1997	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	4.6	0.0
1998	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	4.5	0.0
1999	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	4.6	0.0
2000	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	4.5	0.0
2001	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	4.4	0.0
2002	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	4.3	0.0
2003	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	4.1	0.0
2004	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	4.3	0.0
2005	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	4.2	0.0
2006	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	4.2	0.0
2007	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	4.3	0.0
2008	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	4.3	0.0
2009	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	4.3	0.0
2010	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	4.4	0.0
2011	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	4.3	0.0
2012	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	4.2	0.0
2103	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	4.3	0.0
2014	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	5.9	0.0

A.9. Emissions from The Netherlands

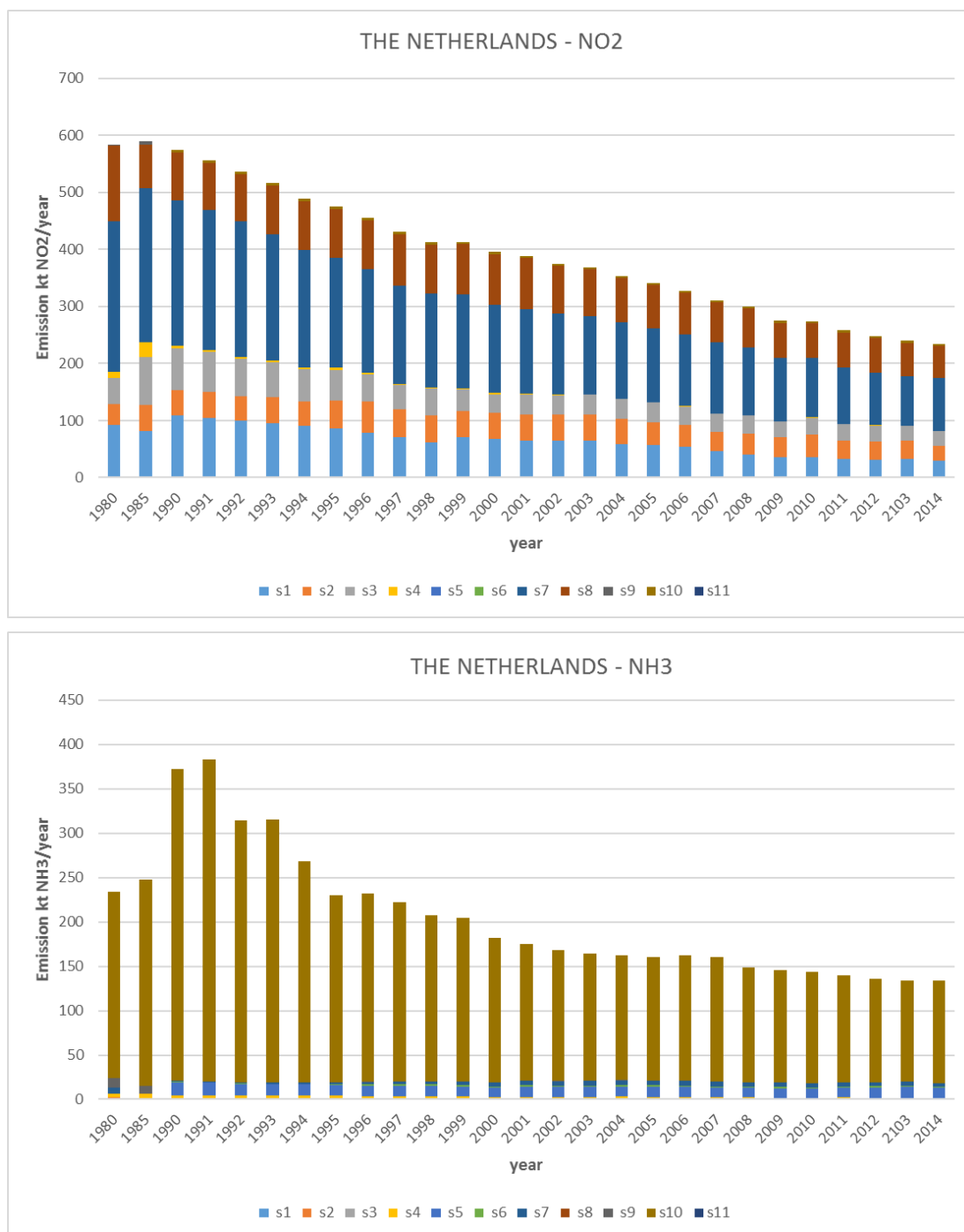


Fig A.9: Annual emissions of nitrogen oxides and ammonia from The Netherlands, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.9-1: Annual emissions of nitrogen oxides from The Netherlands, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	92.6	37.0	45.1	11.0	0.0	0.0	263.4	133.7	0.3	0.0	0.0
1985	82.2	45.2	84.3	25.7	0.0	0.0	269.3	77.1	5.1	0.0	0.0
1990	109.7	42.9	73.9	5.1	0.0	0.1	254.1	83.9	0.0	4.0	0.0
1991	105.0	45.6	69.8	2.9	0.0	0.1	245.4	83.0	0.0	4.2	0.0
1992	100.3	42.1	65.7	2.7	0.0	0.1	238.7	82.0	0.0	4.2	0.0
1993	95.6	45.1	61.6	2.5	0.0	0.1	221.1	86.1	0.0	4.1	0.0
1994	90.9	42.2	57.5	2.3	0.0	0.1	206.1	85.7	0.0	4.1	0.0
1995	86.1	49.6	53.4	3.2	0.0	0.1	193.1	85.1	0.0	4.0	0.0
1996	77.9	55.7	47.5	2.4	0.0	0.1	182.1	85.7	0.0	3.9	0.0
1997	71.4	47.8	42.9	2.2	0.0	0.1	171.9	90.3	0.0	3.8	0.0
1998	61.9	46.6	47.4	2.5	0.0	0.1	164.2	86.0	0.0	3.6	0.0
1999	71.3	45.4	38.6	1.6	0.0	0.1	163.7	88.7	0.0	3.6	0.0
2000	68.3	44.9	33.2	1.8	0.0	0.1	154.9	88.9	0.0	3.4	0.0
2001	65.0	46.4	34.1	2.1	0.0	0.1	147.8	89.2	0.0	3.4	0.0
2002	65.4	44.9	33.7	1.7	0.0	0.1	141.8	84.3	0.0	3.2	0.0
2003	65.5	45.5	34.3	0.7	0.0	0.1	136.8	83.3	0.0	3.1	0.0
2004	59.1	43.1	35.5	0.5	0.0	0.1	134.2	78.1	0.0	3.0	0.0
2005	57.4	39.3	34.6	0.5	0.0	0.1	130.4	75.5	0.0	3.1	0.0
2006	54.3	37.5	33.0	0.5	0.0	0.1	126.2	72.5	0.0	3.0	0.0
2007	45.8	34.3	32.1	0.5	0.0	0.1	123.7	70.7	0.0	3.2	0.0
2008	41.0	36.2	31.7	0.5	0.0	0.1	119.3	67.3	0.0	3.2	0.0
2009	35.3	35.8	27.3	0.5	0.0	0.1	110.3	62.2	0.0	3.3	0.0
2010	36.0	39.3	29.6	0.5	0.0	0.1	104.7	60.7	0.0	3.3	0.0
2011	32.8	31.8	28.9	0.7	0.0	0.1	99.3	61.1	0.0	3.3	0.0
2012	31.6	31.6	27.9	0.7	0.0	0.1	92.6	59.8	0.1	3.2	0.0
2103	32.7	32.4	25.4	0.7	0.0	0.0	87.2	57.8	0.1	3.3	0.0
2014	30.2	26.1	24.7	0.7	0.0	0.0	92.4	57.2	0.1	3.4	0.0

Table A.9-2: Annual emissions of ammonia from The Netherlands, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	1.0	1.3	0.1	4.2	0.0	0.0	6.4	0.0	11.2	209.7	0.0
1985	0.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	8.7	232.6	0.0
1990	0.0	0.0	0.6	4.1	14.3	1.3	0.9	0.0	0.0	351.3	0.0
1991	0.0	0.0	0.5	3.7	14.7	0.3	1.2	0.0	0.1	362.5	0.0
1992	0.0	0.0	0.5	3.7	13.2	0.3	1.5	0.0	0.1	294.9	0.0
1993	0.0	0.0	0.4	3.7	13.2	0.3	1.7	0.0	0.2	295.4	0.0
1994	0.0	0.0	0.4	3.7	12.6	0.3	1.9	0.0	0.3	249.2	0.0
1995	0.1	0.0	0.3	3.8	11.5	1.3	2.2	0.0	0.3	210.8	0.0
1996	0.1	0.0	0.2	3.4	11.7	1.3	2.6	0.0	0.3	212.6	0.0
1997	0.1	0.0	0.2	3.3	12.1	1.3	3.0	0.0	0.3	202.0	0.0
1998	0.1	0.0	0.2	3.4	11.8	1.4	3.3	0.0	0.3	186.7	0.0
1999	0.0	0.0	0.2	3.0	11.2	1.4	3.7	0.0	0.3	184.5	0.0
2000	0.0	0.0	0.0	2.7	10.3	1.3	4.4	0.0	0.3	162.6	0.0
2001	0.1	0.0	0.0	2.7	11.7	1.3	4.8	0.0	0.3	154.4	0.0
2002	0.1	0.0	0.1	2.4	11.5	1.4	5.1	0.0	0.3	147.3	0.0
2003	0.1	0.0	0.1	2.5	11.4	1.4	5.2	0.0	0.3	143.1	0.0
2004	0.2	0.0	0.1	3.1	11.2	1.3	5.4	0.0	0.3	140.8	0.0
2005	0.3	0.0	0.0	2.3	11.8	1.3	5.4	0.0	0.3	138.5	0.0
2006	0.1	0.0	0.0	2.1	11.7	1.3	5.3	0.0	0.3	140.9	0.0
2007	0.1	0.0	0.0	1.9	11.3	1.3	5.3	0.0	0.3	139.9	0.0
2008	0.1	0.0	0.8	1.3	10.7	1.3	5.1	0.0	0.3	129.1	0.0
2009	0.1	0.0	0.6	1.2	10.6	1.3	4.9	0.0	0.3	126.9	0.0
2010	0.1	0.0	0.5	1.2	10.2	1.3	4.8	0.0	0.3	125.4	0.0
2011	0.1	0.0	0.8	1.1	11.3	1.3	4.7	0.0	0.2	120.2	0.0
2012	0.1	0.0	0.8	0.9	11.8	1.3	4.4	0.0	0.2	116.0	0.0
2103	0.1	0.0	0.4	1.0	12.6	1.2	4.5	0.0	0.2	113.8	0.0
2014	0.1	0.0	0.3	1.0	11.6	1.2	3.8	0.0	0.2	115.6	0.0

A.10. Emissions from Norway

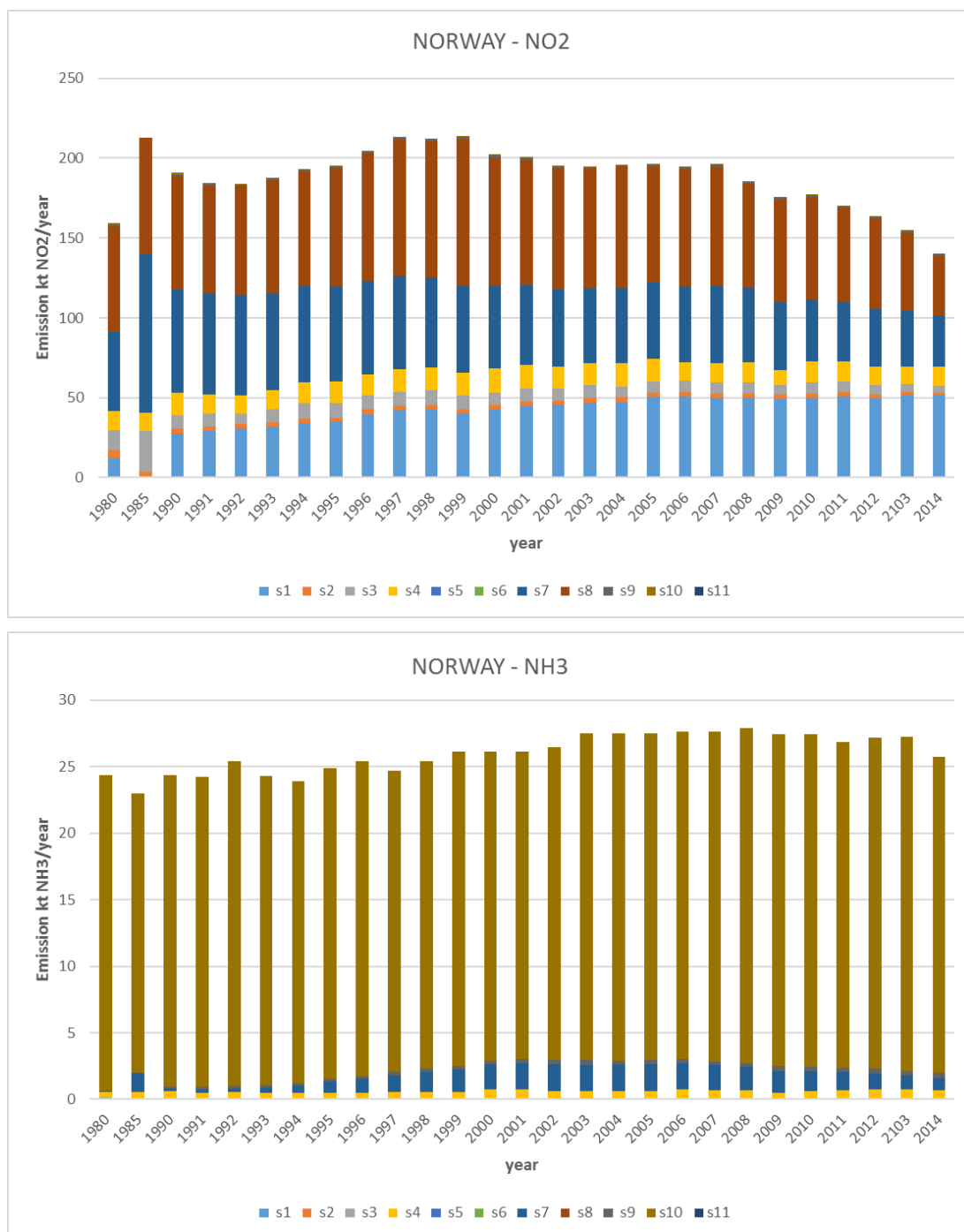


Fig A.10: Annual emissions of nitrogen oxides and ammonia from Norway, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.10-1: Annual emissions of nitrogen oxides from Norway, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	12.4	4.8	12.2	12.3	0.0	0.0	49.6	65.7	0.9	1.3	0.0
1985	0.4	3.0	25.6	11.7	0.0	0.0	98.9	73.1	0.0	0.0	0.0
1990	27.6	2.9	8.5	14.0	0.0	0.0	64.7	71.0	1.1	0.9	0.0
1991	29.3	2.5	8.1	11.9	0.0	0.0	63.2	67.9	0.8	0.7	0.0
1992	31.0	2.3	7.0	11.1	0.0	0.0	62.8	68.3	0.8	0.4	0.0
1993	31.9	2.4	8.4	12.3	0.0	0.0	60.4	70.8	1.0	0.5	0.0
1994	34.1	2.6	9.5	13.5	0.0	0.0	60.3	71.3	1.0	0.4	0.0
1995	35.0	2.6	9.1	13.3	0.0	0.0	59.5	74.2	1.1	0.5	0.0
1996	39.4	3.1	9.0	13.2	0.0	0.0	57.9	80.2	1.4	0.5	0.0
1997	42.0	2.8	8.9	14.2	0.0	0.0	58.5	85.3	1.3	0.4	0.0
1998	43.0	2.7	8.8	14.4	0.0	0.0	56.2	85.2	1.2	0.4	0.0
1999	39.9	2.8	8.8	14.2	0.0	0.0	54.2	91.9	1.3	0.4	0.0
2000	42.8	2.4	8.1	14.8	0.0	0.0	52.1	80.0	1.3	0.4	0.0
2001	44.8	2.7	8.4	14.6	0.0	0.0	50.0	78.1	1.4	0.3	0.0
2002	45.3	2.9	7.8	13.5	0.0	0.0	48.2	75.9	1.2	0.2	0.0
2003	46.4	3.2	8.5	13.4	0.0	0.0	46.9	75.2	0.8	0.2	0.0
2004	47.3	2.8	6.9	14.8	0.0	0.0	46.5	76.4	0.8	0.2	0.0
2005	50.5	2.6	7.0	14.0	0.0	0.0	48.2	72.7	0.9	0.2	0.0
2006	50.8	2.7	7.2	11.4	0.0	0.0	47.8	73.3	1.0	0.1	0.0
2007	50.0	2.5	7.1	12.2	0.0	0.0	48.5	73.9	1.4	0.1	0.0
2008	50.0	2.4	7.0	12.9	0.0	0.0	46.5	65.0	1.2	0.2	0.0
2009	49.3	2.5	6.3	9.2	0.0	0.0	42.6	64.2	0.9	0.1	0.0
2010	49.6	2.9	7.4	12.6	0.0	0.0	39.1	64.2	1.3	0.1	0.0
2011	51.0	2.4	6.9	12.5	0.0	0.0	37.2	59.0	0.9	0.1	0.0
2012	49.7	2.4	5.7	11.6	0.0	0.0	36.2	56.5	0.9	0.1	0.0
2103	51.3	2.1	4.9	11.2	0.0	0.0	34.9	49.1	0.8	0.1	0.0
2014	51.5	1.8	4.2	11.8	0.0	0.0	32.4	37.1	0.8	0.1	0.0

Table A.10-2: Annual emissions of ammonia from Norway, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.0	0.1	0.1	0.4	0.0	0.0	0.0	0.0	0.0	23.7	0.0
1985	0.0	0.1	0.0	0.5	0.0	0.0	1.5	0.0	0.0	21.0	0.0
1990	0.0	0.1	0.0	0.6	0.0	0.0	0.2	0.0	0.1	23.4	0.0
1991	0.0	0.1	0.0	0.4	0.0	0.0	0.2	0.0	0.2	23.3	0.0
1992	0.0	0.1	0.0	0.5	0.0	0.0	0.3	0.0	0.2	24.3	0.0
1993	0.0	0.1	0.0	0.4	0.0	0.0	0.4	0.0	0.2	23.2	0.0
1994	0.0	0.1	0.0	0.4	0.0	0.0	0.5	0.0	0.2	22.7	0.0
1995	0.0	0.1	0.0	0.5	0.0	0.0	0.8	0.0	0.2	23.4	0.0
1996	0.0	0.1	0.0	0.4	0.0	0.0	1.0	0.0	0.2	23.7	0.0
1997	0.0	0.1	0.0	0.5	0.0	0.0	1.2	0.0	0.3	22.6	0.0
1998	0.0	0.1	0.0	0.5	0.0	0.0	1.5	0.0	0.2	23.1	0.0
1999	0.0	0.1	0.0	0.5	0.0	0.0	1.7	0.0	0.3	23.6	0.0
2000	0.0	0.1	0.0	0.7	0.0	0.0	1.9	0.0	0.3	23.2	0.0
2001	0.0	0.1	0.0	0.7	0.0	0.0	2.0	0.0	0.3	23.1	0.0
2002	0.0	0.1	0.0	0.5	0.0	0.0	2.0	0.0	0.3	23.5	0.0
2003	0.0	0.1	0.0	0.5	0.0	0.0	2.0	0.0	0.4	24.5	0.0
2004	0.0	0.1	0.0	0.5	0.0	0.0	2.0	0.0	0.3	24.6	0.0
2005	0.0	0.1	0.0	0.5	0.0	0.0	2.0	0.0	0.3	24.6	0.0
2006	0.0	0.1	0.0	0.7	0.0	0.0	1.9	0.0	0.3	24.6	0.0
2007	0.0	0.1	0.0	0.6	0.0	0.0	1.9	0.0	0.2	24.8	0.0
2008	0.0	0.1	0.0	0.6	0.0	0.0	1.8	0.0	0.3	25.1	0.0
2009	0.0	0.1	0.0	0.4	0.0	0.0	1.6	0.0	0.3	24.9	0.0
2010	0.0	0.1	0.0	0.5	0.0	0.0	1.5	0.0	0.3	25.0	0.0
2011	0.0	0.1	0.0	0.6	0.0	0.0	1.3	0.0	0.3	24.5	0.0
2012	0.0	0.1	0.0	0.6	0.0	0.0	1.2	0.0	0.4	24.9	0.0
2103	0.0	0.1	0.0	0.6	0.0	0.0	1.1	0.0	0.3	25.1	0.0
2014	0.0	0.1	0.0	0.6	0.0	0.0	0.9	0.0	0.3	23.7	0.0

A.11. Emissions from Portugal

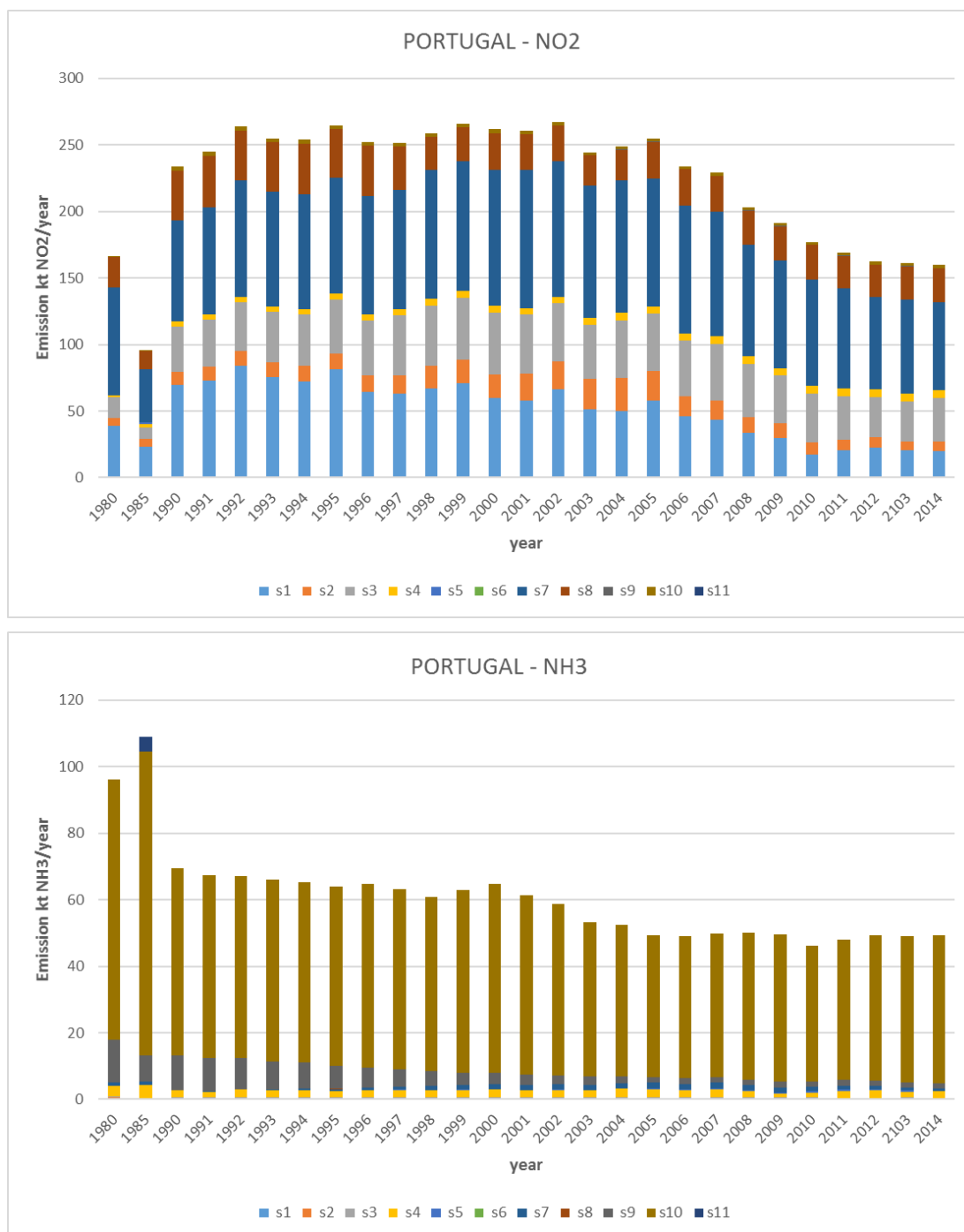


Fig A.11: Annual emissions of nitrogen oxides and ammonia from Portugal, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.11-1: Annual emissions of nitrogen oxides from Portugal, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	12.4	4.8	12.2	12.3	0.0	0.0	49.6	65.7	0.9	1.3	0.0
1985	0.4	3.0	25.6	11.7	0.0	0.0	98.9	73.1	0.0	0.0	0.0
1990	27.6	2.9	8.5	14.0	0.0	0.0	64.7	71.0	1.1	0.9	0.0
1991	29.3	2.5	8.1	11.9	0.0	0.0	63.2	67.9	0.8	0.7	0.0
1992	31.0	2.3	7.0	11.1	0.0	0.0	62.8	68.3	0.8	0.4	0.0
1993	31.9	2.4	8.4	12.3	0.0	0.0	60.4	70.8	1.0	0.5	0.0
1994	34.1	2.6	9.5	13.5	0.0	0.0	60.3	71.3	1.0	0.4	0.0
1995	35.0	2.6	9.1	13.3	0.0	0.0	59.5	74.2	1.1	0.5	0.0
1996	39.4	3.1	9.0	13.2	0.0	0.0	57.9	80.2	1.4	0.5	0.0
1997	42.0	2.8	8.9	14.2	0.0	0.0	58.5	85.3	1.3	0.4	0.0
1998	43.0	2.7	8.8	14.4	0.0	0.0	56.2	85.2	1.2	0.4	0.0
1999	39.9	2.8	8.8	14.2	0.0	0.0	54.2	91.9	1.3	0.4	0.0
2000	42.8	2.4	8.1	14.8	0.0	0.0	52.1	80.0	1.3	0.4	0.0
2001	44.8	2.7	8.4	14.6	0.0	0.0	50.0	78.1	1.4	0.3	0.0
2002	45.3	2.9	7.8	13.5	0.0	0.0	48.2	75.9	1.2	0.2	0.0
2003	46.4	3.2	8.5	13.4	0.0	0.0	46.9	75.2	0.8	0.2	0.0
2004	47.3	2.8	6.9	14.8	0.0	0.0	46.5	76.4	0.8	0.2	0.0
2005	50.5	2.6	7.0	14.0	0.0	0.0	48.2	72.7	0.9	0.2	0.0
2006	50.8	2.7	7.2	11.4	0.0	0.0	47.8	73.3	1.0	0.1	0.0
2007	50.0	2.5	7.1	12.2	0.0	0.0	48.5	73.9	1.4	0.1	0.0
2008	50.0	2.4	7.0	12.9	0.0	0.0	46.5	65.0	1.2	0.2	0.0
2009	49.3	2.5	6.3	9.2	0.0	0.0	42.6	64.2	0.9	0.1	0.0
2010	49.6	2.9	7.4	12.6	0.0	0.0	39.1	64.2	1.3	0.1	0.0
2011	51.0	2.4	6.9	12.5	0.0	0.0	37.2	59.0	0.9	0.1	0.0
2012	49.7	2.4	5.7	11.6	0.0	0.0	36.2	56.5	0.9	0.1	0.0
2103	51.3	2.1	4.9	11.2	0.0	0.0	34.9	49.1	0.8	0.1	0.0
2014	51.5	1.8	4.2	11.8	0.0	0.0	32.4	37.1	0.8	0.1	0.0

Table A.11-2: Annual emissions of ammonia from Portugal, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.0	0.1	0.1	0.4	0.0	0.0	0.0	0.0	0.0	23.7	0.0
1985	0.0	0.1	0.0	0.5	0.0	0.0	1.5	0.0	0.0	21.0	0.0
1990	0.0	0.1	0.0	0.6	0.0	0.0	0.2	0.0	0.1	23.4	0.0
1991	0.0	0.1	0.0	0.4	0.0	0.0	0.2	0.0	0.2	23.3	0.0
1992	0.0	0.1	0.0	0.5	0.0	0.0	0.3	0.0	0.2	24.3	0.0
1993	0.0	0.1	0.0	0.4	0.0	0.0	0.4	0.0	0.2	23.2	0.0
1994	0.0	0.1	0.0	0.4	0.0	0.0	0.5	0.0	0.2	22.7	0.0
1995	0.0	0.1	0.0	0.5	0.0	0.0	0.8	0.0	0.2	23.4	0.0
1996	0.0	0.1	0.0	0.4	0.0	0.0	1.0	0.0	0.2	23.7	0.0
1997	0.0	0.1	0.0	0.5	0.0	0.0	1.2	0.0	0.3	22.6	0.0
1998	0.0	0.1	0.0	0.5	0.0	0.0	1.5	0.0	0.2	23.1	0.0
1999	0.0	0.1	0.0	0.5	0.0	0.0	1.7	0.0	0.3	23.6	0.0
2000	0.0	0.1	0.0	0.7	0.0	0.0	1.9	0.0	0.3	23.2	0.0
2001	0.0	0.1	0.0	0.7	0.0	0.0	2.0	0.0	0.3	23.1	0.0
2002	0.0	0.1	0.0	0.5	0.0	0.0	2.0	0.0	0.3	23.5	0.0
2003	0.0	0.1	0.0	0.5	0.0	0.0	2.0	0.0	0.4	24.5	0.0
2004	0.0	0.1	0.0	0.5	0.0	0.0	2.0	0.0	0.3	24.6	0.0
2005	0.0	0.1	0.0	0.5	0.0	0.0	2.0	0.0	0.3	24.6	0.0
2006	0.0	0.1	0.0	0.7	0.0	0.0	1.9	0.0	0.3	24.6	0.0
2007	0.0	0.1	0.0	0.6	0.0	0.0	1.9	0.0	0.2	24.8	0.0
2008	0.0	0.1	0.0	0.6	0.0	0.0	1.8	0.0	0.3	25.1	0.0
2009	0.0	0.1	0.0	0.4	0.0	0.0	1.6	0.0	0.3	24.9	0.0
2010	0.0	0.1	0.0	0.5	0.0	0.0	1.5	0.0	0.3	25.0	0.0
2011	0.0	0.1	0.0	0.6	0.0	0.0	1.3	0.0	0.3	24.5	0.0
2012	0.0	0.1	0.0	0.6	0.0	0.0	1.2	0.0	0.4	24.9	0.0
2103	0.0	0.1	0.0	0.6	0.0	0.0	1.1	0.0	0.3	25.1	0.0
2014	0.0	0.1	0.0	0.6	0.0	0.0	0.9	0.0	0.3	23.7	0.0

A.12. Emissions from Spain

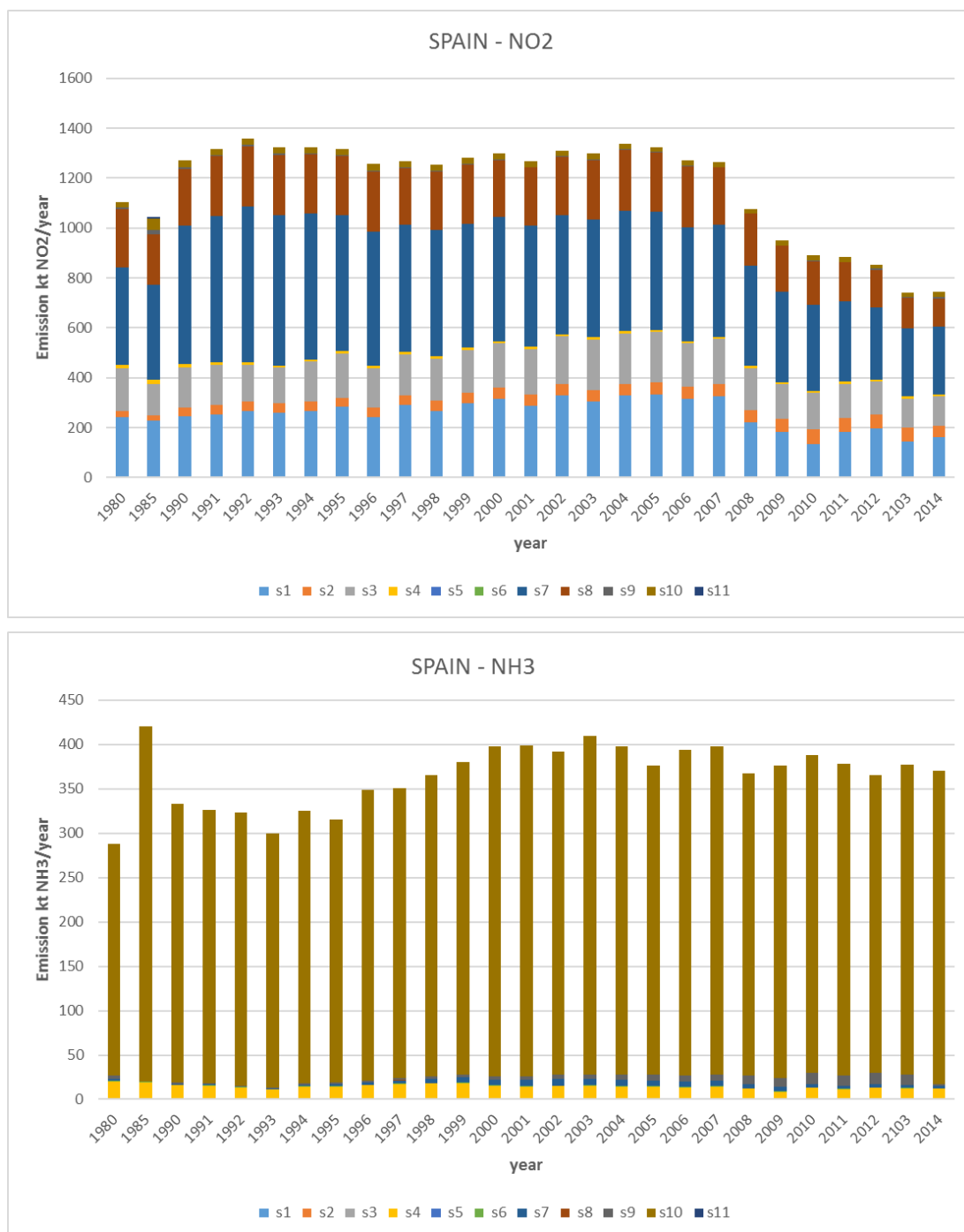


Fig A.12: Annual emissions of nitrogen oxides and ammonia from Spain, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.12-1: Annual emissions of nitrogen oxides from Spain, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	243.0	24.0	171.0	14.0	0.0	0.0	390.1	234.0	7.0	19.0	0.0
1985	230.0	21.0	125.0	15.0	0.0	0.0	383.0	202.0	16.0	46.0	7.0
1990	245.4	34.8	160.2	14.4	0.0	0.0	554.2	228.8	5.3	26.7	0.0
1991	253.6	37.9	160.5	11.4	0.0	0.0	586.1	237.6	4.6	26.0	0.0
1992	266.4	38.9	145.7	10.4	0.0	0.0	626.3	241.0	4.3	24.8	0.0
1993	260.8	38.5	141.2	8.9	0.0	0.0	601.6	242.6	7.0	23.3	0.0
1994	267.3	38.8	157.9	9.9	0.0	0.0	583.2	238.6	4.0	24.6	0.0
1995	282.8	37.4	175.9	9.5	0.0	0.0	546.1	237.1	3.4	23.5	0.0
1996	243.1	37.6	156.8	9.3	0.0	0.0	537.3	241.3	3.7	26.5	0.0
1997	291.8	38.4	164.2	9.5	0.0	0.0	510.1	225.1	3.3	26.7	0.0
1998	267.5	40.5	167.3	9.6	0.0	0.0	505.7	234.5	3.2	26.2	0.0
1999	298.8	42.1	171.5	9.5	0.0	0.0	496.1	234.6	3.1	25.9	0.0
2000	317.1	42.3	178.2	9.8	0.0	0.0	495.9	228.8	3.0	24.6	0.0
2001	289.3	43.1	182.4	9.8	0.0	0.0	484.4	232.6	3.2	22.1	0.0
2002	330.7	44.2	190.7	9.5	0.0	0.0	476.7	234.7	3.5	19.1	0.0
2003	305.7	45.0	202.4	9.2	0.0	0.0	470.3	240.3	3.4	23.7	0.0
2004	329.2	47.1	201.0	8.9	0.0	0.0	484.2	241.1	3.5	20.8	0.0
2005	333.1	48.0	202.4	9.0	0.0	0.0	473.4	236.0	3.0	17.6	0.0
2006	315.0	49.7	173.7	8.9	0.0	0.0	455.4	244.4	3.1	19.7	0.0
2007	326.2	48.6	180.4	9.0	0.0	0.0	449.4	228.0	3.1	20.2	0.0
2008	222.0	49.8	166.6	8.6	0.0	0.0	401.1	209.0	3.1	17.0	0.0
2009	183.2	51.6	140.6	7.6	0.0	0.0	360.4	184.4	2.7	18.5	0.0
2010	135.9	56.3	146.8	8.3	0.0	0.0	344.6	175.5	2.9	20.6	0.0
2011	184.4	55.3	135.5	8.4	0.0	0.0	321.6	156.5	2.9	20.2	0.0
2012	196.3	55.7	132.0	7.8	0.0	0.0	291.4	150.0	3.9	16.5	0.0
2103	145.2	55.7	116.0	7.6	0.0	0.0	272.1	125.0	3.7	17.3	0.0
2014	160.5	48.0	116.9	8.0	0.0	0.0	273.1	111.7	4.8	21.9	0.0

Table A.12-2: Annual emissions of ammonia from Spain, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.2	0.6	0.3	19.0	0.0	1.0	2.4	0.0	3.0	261.0	0.0
1985	0.0	0.0	0.0	19.0	0.0	1.0	0.0	0.0	0.0	400.0	0.0
1990	0.1	0.0	0.0	15.7	0.0	0.7	0.4	0.0	2.1	313.8	0.0
1991	0.1	0.0	0.0	15.5	0.0	0.7	0.4	0.0	1.6	307.8	0.0
1992	0.1	0.0	0.0	13.0	0.0	0.7	0.4	0.0	1.2	307.8	0.0
1993	0.1	0.0	0.0	10.7	0.0	0.7	0.8	0.0	1.3	286.5	0.0
1994	0.1	0.0	0.0	14.3	0.0	0.7	1.6	0.0	1.5	307.4	0.0
1995	0.1	0.0	0.0	14.4	0.0	0.7	2.1	0.0	1.7	296.1	0.0
1996	0.1	0.0	0.0	15.8	0.0	0.7	3.0	0.0	2.0	326.9	0.0
1997	0.1	0.0	0.0	17.0	0.0	0.7	3.8	0.0	2.5	326.3	0.0
1998	0.1	0.0	0.0	17.8	0.0	0.7	4.8	0.0	2.5	339.3	0.0
1999	0.1	0.0	0.0	18.1	0.0	0.7	5.9	0.0	2.8	352.1	0.0
2000	0.1	0.0	0.0	15.3	0.0	0.7	6.3	0.0	3.5	371.3	0.0
2001	0.1	0.0	0.0	14.6	0.0	0.7	6.4	0.0	3.9	372.6	0.0
2002	0.1	0.0	0.0	14.8	0.0	0.7	7.3	0.0	4.9	364.1	0.0
2003	0.1	0.0	0.0	15.0	0.0	0.7	7.0	0.0	5.3	381.4	0.0
2004	0.1	0.0	0.0	14.2	0.0	0.7	6.8	0.0	6.4	369.6	0.0
2005	0.1	0.0	0.0	14.0	0.0	0.7	6.4	0.0	6.8	348.4	0.0
2006	0.1	0.0	0.0	13.3	0.0	0.7	5.8	0.0	7.1	367.0	0.0
2007	0.1	0.0	0.0	14.6	0.0	0.7	5.3	0.0	7.7	369.6	0.0
2008	0.1	0.0	0.0	11.8	0.0	0.7	4.7	0.0	9.4	340.2	0.0
2009	0.1	0.0	0.0	8.5	0.0	0.7	4.4	0.0	10.0	352.1	0.0
2010	0.1	0.0	0.0	12.7	0.0	0.7	4.0	0.0	12.4	358.4	0.0
2011	0.1	0.0	0.0	11.0	0.0	0.7	3.7	0.0	11.8	350.9	0.0
2012	0.1	0.0	0.0	12.9	0.0	0.7	3.6	0.0	12.2	335.5	0.0
2103	0.1	0.0	0.0	12.1	0.0	0.7	3.0	0.0	12.3	349.0	0.0
2014	0.1	0.0	0.0	11.8	0.0	0.7	2.8	0.0	1.6	353.6	0.0

A.13. Emissions from Sweden

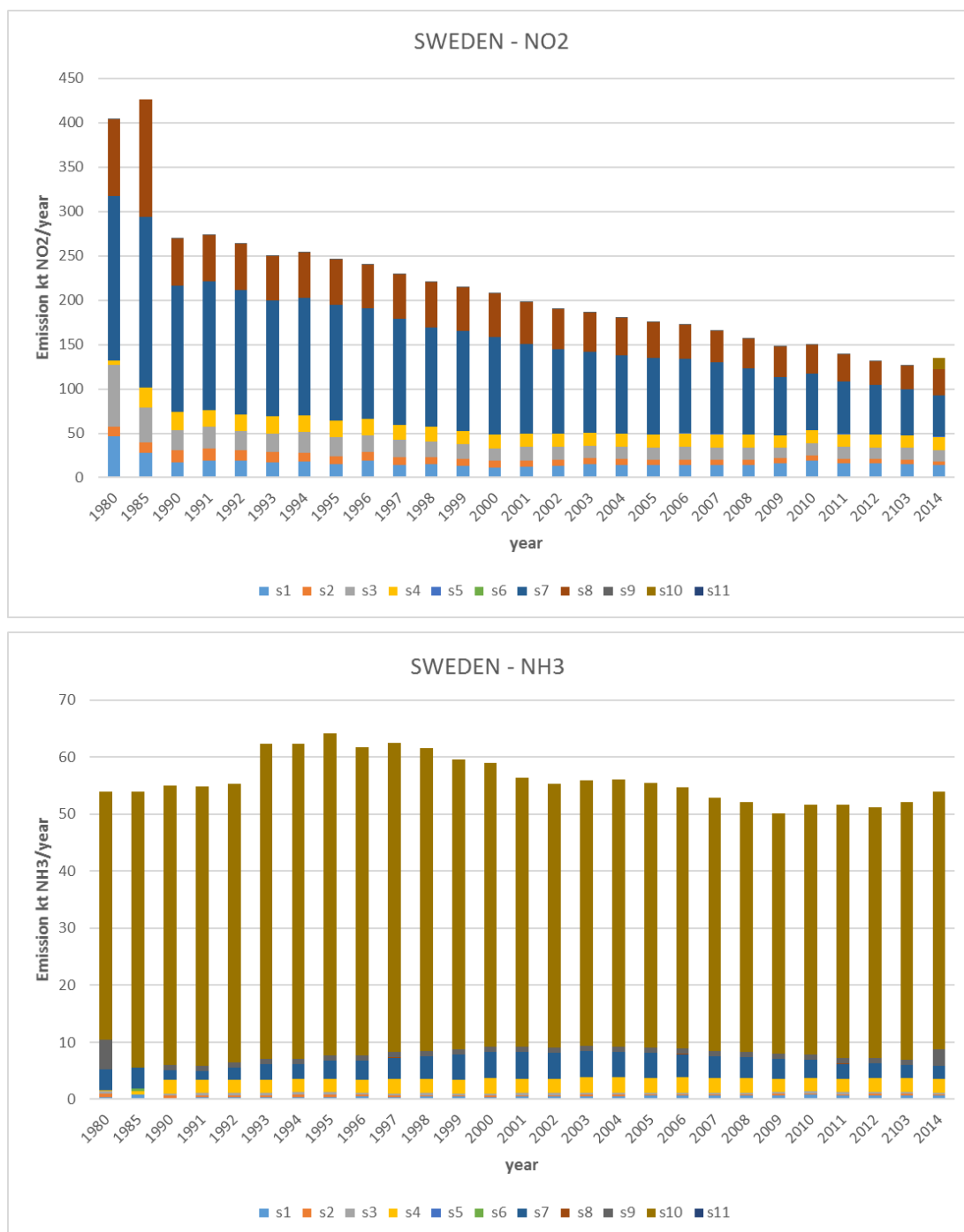


Fig A.13: Annual emissions of nitrogen oxides and ammonia from Sweden, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.13-1: Annual emissions of nitrogen oxides from Sweden, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	46.2	10.9	69.8	4.8	0.0	0.0	185.7	86.5	0.1	0.0	0.0
1985	28.2	11.2	39.5	22.3	0.0	0.0	192.8	132.0	0.0	0.0	0.0
1990	17.0	13.4	23.2	20.1	0.0	0.0	142.8	52.6	0.1	0.0	0.0
1991	19.4	13.3	24.4	19.0	0.0	0.0	145.5	51.5	0.1	0.0	0.0
1992	18.7	11.9	22.1	18.6	0.0	0.0	140.1	52.2	0.1	0.0	0.0
1993	17.5	11.0	21.2	19.5	0.0	0.0	130.3	50.0	0.1	0.0	0.0
1994	17.8	10.5	22.7	18.9	0.0	0.0	132.9	50.5	0.1	0.0	0.0
1995	14.8	9.2	21.4	18.9	0.0	0.0	130.0	51.1	0.1	0.0	0.0
1996	19.3	9.2	19.1	18.6	0.0	0.0	124.4	49.5	0.1	0.0	0.0
1997	14.3	8.5	19.5	17.0	0.0	0.0	119.4	50.5	0.1	0.0	0.0
1998	14.8	8.1	18.3	15.8	0.0	0.0	112.6	50.7	0.1	0.0	0.0
1999	13.5	7.6	16.5	15.0	0.0	0.0	112.4	49.7	0.1	0.0	0.0
2000	11.4	7.5	13.8	15.3	0.0	0.0	110.3	48.7	0.1	0.0	0.0
2001	12.5	6.8	15.3	15.2	0.0	0.0	100.9	46.6	0.1	0.0	0.0
2002	13.5	6.6	14.6	14.8	0.0	0.0	95.1	45.1	0.1	0.0	0.0
2003	14.9	6.9	14.2	14.6	0.0	0.0	90.6	44.9	0.2	0.0	0.0
2004	14.1	6.6	13.9	15.3	0.0	0.0	87.7	42.3	0.2	0.0	0.0
2005	14.4	6.1	13.3	15.1	0.0	0.0	85.9	40.6	0.2	0.0	0.0
2006	14.4	5.4	14.5	15.5	0.3	0.0	83.2	38.6	0.2	0.0	0.0
2007	14.1	5.6	14.0	15.1	0.4	0.0	80.7	35.5	0.2	0.0	0.0
2008	14.7	5.4	13.6	14.6	0.4	0.0	74.3	33.8	0.1	0.0	0.0
2009	16.2	5.6	12.0	13.6	0.4	0.0	65.9	33.9	0.1	0.0	0.0
2010	19.1	5.6	14.3	14.1	0.4	0.0	63.5	32.5	0.2	0.0	0.0
2011	15.8	5.1	13.8	14.3	0.4	0.0	58.8	31.1	0.2	0.0	0.0
2012	15.7	4.9	13.4	14.7	0.2	0.0	55.2	27.3	0.2	0.0	0.0
2103	15.5	4.7	13.2	14.2	0.2	0.0	51.5	26.5	0.2	0.0	0.0
2014	13.8	4.7	12.8	14.6	0.2	0.0	46.9	29.3	0.2	12.5	0.0

Table A.13-2: Annual emissions of ammonia from Sweden, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.3	0.7	0.4	0.1	0.0	0.0	3.7	0.0	5.1	43.6	0.0
1985	0.9	0.0	0.0	0.6	0.0	0.4	3.7	0.0	0.0	48.4	0.0
1990	0.3	0.4	0.4	2.4	0.0	0.0	1.7	0.0	0.9	48.9	0.0
1991	0.3	0.4	0.4	2.3	0.0	0.0	1.5	0.0	0.9	48.9	0.0
1992	0.3	0.3	0.4	2.3	0.0	0.0	2.1	0.0	0.9	48.9	0.0
1993	0.4	0.4	0.4	2.2	0.0	0.0	2.7	0.0	0.9	55.3	0.0
1994	0.4	0.3	0.5	2.3	0.0	0.0	2.6	0.0	0.9	55.3	0.0
1995	0.4	0.3	0.5	2.3	0.0	0.0	3.2	0.0	0.9	56.5	0.0
1996	0.6	0.2	0.4	2.3	0.0	0.0	3.3	0.0	0.9	54.0	0.0
1997	0.4	0.2	0.4	2.5	0.0	0.0	3.8	0.0	0.9	54.2	0.0
1998	0.5	0.2	0.4	2.5	0.0	0.0	4.0	0.0	0.9	53.2	0.0
1999	0.5	0.2	0.4	2.4	0.0	0.0	4.4	0.0	0.9	50.7	0.0
2000	0.4	0.2	0.3	2.7	0.0	0.0	4.6	0.0	0.9	49.7	0.0
2001	0.5	0.2	0.4	2.6	0.0	0.0	4.7	0.0	0.9	47.2	0.0
2002	0.5	0.2	0.4	2.5	0.0	0.0	4.6	0.0	0.9	46.1	0.0
2003	0.6	0.2	0.3	2.8	0.0	0.0	4.5	0.0	0.9	46.6	0.0
2004	0.6	0.2	0.3	2.7	0.0	0.0	4.4	0.0	0.9	47.0	0.0
2005	0.6	0.2	0.3	2.7	0.0	0.0	4.3	0.0	0.9	46.4	0.0
2006	0.6	0.2	0.4	2.7	0.0	0.0	4.1	0.0	0.9	45.8	0.0
2007	0.6	0.2	0.3	2.6	0.0	0.0	3.8	0.0	0.9	44.3	0.0
2008	0.7	0.2	0.3	2.5	0.0	0.0	3.7	0.0	0.9	43.8	0.0
2009	0.7	0.2	0.3	2.4	0.0	0.0	3.4	0.0	0.9	42.2	0.0
2010	0.8	0.2	0.3	2.4	0.0	0.0	3.1	0.0	0.9	43.8	0.0
2011	0.7	0.2	0.3	2.4	0.0	0.0	2.6	0.0	0.9	44.5	0.0
2012	0.7	0.2	0.3	2.5	0.0	0.0	2.6	0.0	0.9	44.0	0.0
2103	0.8	0.2	0.3	2.5	0.0	0.0	2.3	0.0	0.9	45.2	0.0
2014	0.7	0.2	0.3	2.5	0.0	0.0	2.2	0.0	2.9	45.2	0.0

A.14. Emissions from Switzerland

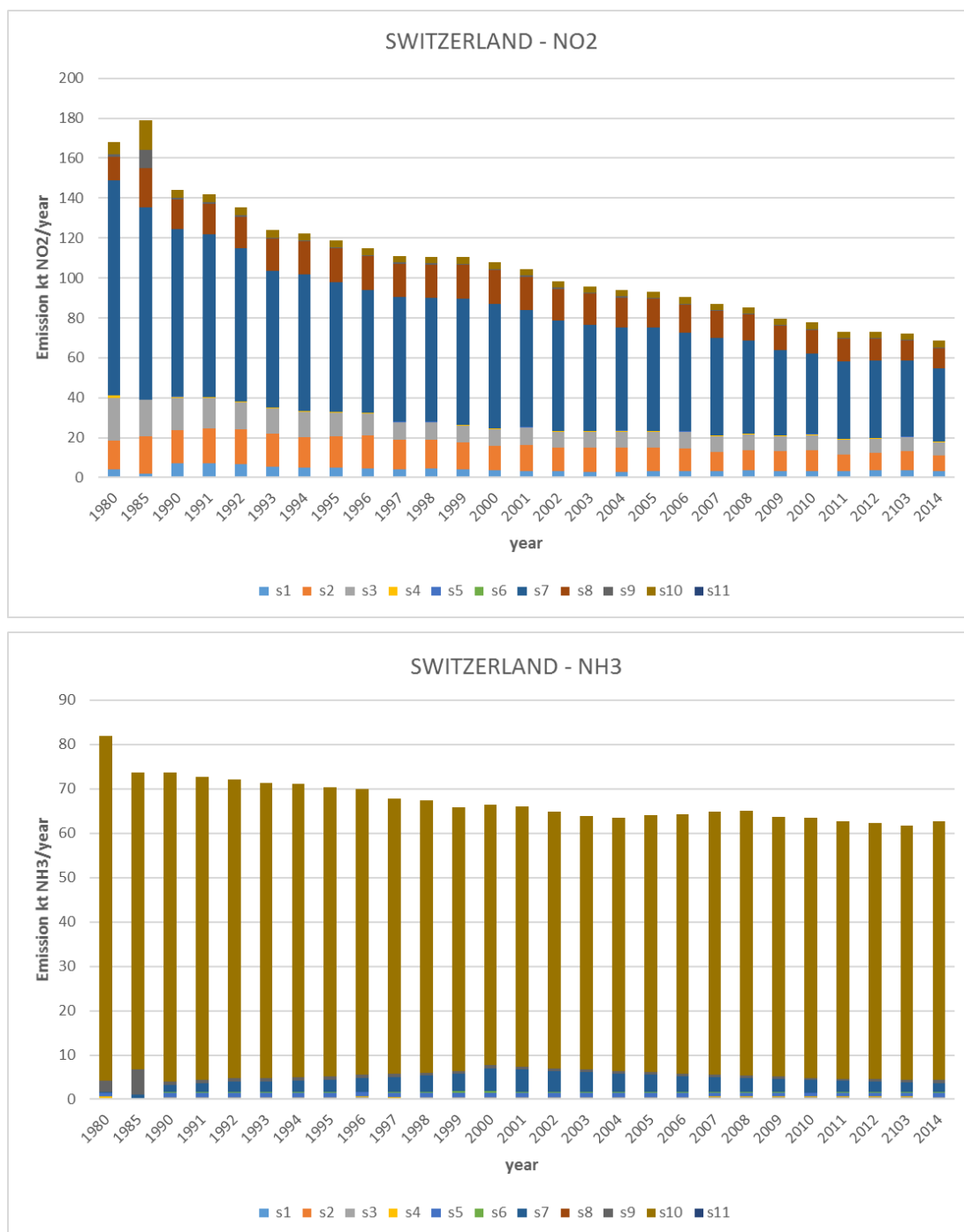


Fig A.14: Annual emissions of nitrogen oxides and ammonia from Switzerland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.14-1: Annual emissions of nitrogen oxides from Switzerland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	4.3	14.2	21.2	1.5	0.1	0.1	107.5	12.0	1.0	6.3	0.0
1985	2.0	18.7	18.2	0.0	0.0	0.0	96.4	19.7	9.2	14.7	0.0
1990	7.0	16.7	16.3	0.5	0.1	0.0	83.7	15.2	0.6	3.9	0.0
1991	7.0	17.8	15.0	0.4	0.1	0.0	81.4	15.4	0.7	3.9	0.0
1992	6.7	17.3	13.6	0.4	0.1	0.0	76.7	15.8	0.7	3.8	0.0
1993	5.6	16.4	12.5	0.4	0.1	0.0	68.3	16.1	0.7	3.7	0.0
1994	5.2	15.0	12.6	0.4	0.1	0.0	68.5	16.4	0.6	3.6	0.0
1995	4.9	15.7	12.0	0.3	0.1	0.0	65.1	16.7	0.6	3.6	0.0
1996	4.8	16.2	11.0	0.3	0.1	0.0	61.6	16.8	0.6	3.5	0.0
1997	4.3	14.5	8.7	0.3	0.1	0.0	62.4	16.8	0.6	3.3	0.0
1998	4.4	14.6	8.5	0.3	0.1	0.0	61.9	16.8	0.6	3.3	0.0
1999	4.0	13.7	8.4	0.3	0.1	0.0	63.0	16.9	0.6	3.3	0.0
2000	3.6	12.4	8.1	0.4	0.1	0.0	62.6	17.0	0.6	3.2	0.0
2001	3.3	13.0	8.5	0.4	0.1	0.0	58.8	16.5	0.6	3.3	0.0
2002	3.1	12.0	7.7	0.4	0.1	0.0	55.3	15.9	0.6	3.2	0.0
2003	2.6	12.4	7.7	0.5	0.1	0.0	53.4	15.3	0.6	3.2	0.0
2004	3.0	12.1	8.0	0.5	0.1	0.0	51.8	14.8	0.6	3.1	0.0
2005	3.1	11.9	8.0	0.3	0.1	0.0	51.5	14.4	0.6	3.1	0.0
2006	3.4	11.2	8.1	0.4	0.1	0.0	49.5	13.9	0.6	3.1	0.0
2007	3.2	9.9	7.8	0.4	0.1	0.0	48.7	13.4	0.6	3.2	0.0
2008	3.5	10.3	7.6	0.4	0.1	0.0	46.8	12.9	0.6	3.2	0.0
2009	3.4	9.9	7.3	0.3	0.1	0.0	42.7	12.2	0.6	3.1	0.0
2010	3.5	10.4	7.5	0.4	0.1	0.0	40.4	11.7	0.6	3.2	0.0
2011	3.4	8.4	7.0	0.4	0.1	0.0	39.0	11.1	0.6	3.1	0.0
2012	3.5	9.1	6.8	0.4	0.1	0.0	38.8	10.6	0.5	3.1	0.0
2103	3.6	9.6	6.9	0.4	0.1	0.0	38.1	10.0	0.6	3.0	0.0
2014	3.4	7.6	6.8	0.3	0.1	0.0	36.6	10.2	0.4	3.2	0.0

Table A.14-2: Annual emissions of ammonia from Switzerland, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.0	0.2	0.1	0.4	0.6	0.2	0.1	0.0	2.5	77.8	0.0
1985	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	5.6	67.0	0.0
1990	0.0	0.2	0.2	0.2	0.9	0.2	1.5	0.0	0.9	69.6	0.0
1991	0.0	0.3	0.2	0.1	0.9	0.2	1.9	0.0	0.9	68.3	0.0
1992	0.0	0.2	0.2	0.1	0.9	0.2	2.3	0.0	0.9	67.3	0.0
1993	0.0	0.2	0.2	0.1	0.9	0.2	2.4	0.0	0.8	66.4	0.0
1994	0.0	0.2	0.2	0.1	0.9	0.2	2.7	0.0	0.8	66.1	0.0
1995	0.0	0.2	0.2	0.1	0.9	0.2	2.7	0.0	0.8	65.1	0.0
1996	0.0	0.2	0.2	0.2	1.0	0.2	3.0	0.0	0.8	64.5	0.0
1997	0.0	0.2	0.2	0.1	1.0	0.2	3.3	0.0	0.8	62.0	0.0
1998	0.0	0.2	0.2	0.1	1.0	0.2	3.6	0.0	0.7	61.3	0.0
1999	0.0	0.2	0.2	0.1	1.0	0.2	3.9	0.0	0.7	59.4	0.0
2000	0.0	0.2	0.2	0.2	1.0	0.2	5.1	0.0	0.7	58.7	0.0
2001	0.0	0.2	0.2	0.1	1.0	0.2	5.0	0.0	0.7	58.7	0.0
2002	0.0	0.2	0.2	0.1	0.9	0.2	4.7	0.0	0.7	57.8	0.0
2003	0.0	0.2	0.2	0.1	0.9	0.2	4.4	0.0	0.6	57.1	0.0
2004	0.0	0.2	0.2	0.1	0.9	0.2	4.2	0.0	0.6	57.1	0.0
2005	0.0	0.2	0.2	0.1	0.9	0.2	3.9	0.0	0.6	57.9	0.0
2006	0.0	0.2	0.2	0.1	0.8	0.2	3.6	0.0	0.6	58.5	0.0
2007	0.0	0.2	0.2	0.1	0.8	0.2	3.4	0.0	0.6	59.3	0.0
2008	0.0	0.2	0.2	0.1	0.8	0.1	3.2	0.0	0.5	59.7	0.0
2009	0.0	0.2	0.2	0.1	0.8	0.1	3.0	0.0	0.5	58.6	0.0
2010	0.1	0.3	0.2	0.1	0.8	0.1	2.8	0.0	0.5	58.6	0.0
2011	0.1	0.2	0.2	0.1	0.8	0.1	2.6	0.0	0.5	58.1	0.0
2012	0.1	0.2	0.2	0.1	0.9	0.1	2.4	0.0	0.5	57.7	0.0
2103	0.1	0.3	0.2	0.1	0.9	0.1	2.2	0.0	0.5	57.3	0.0
2014	0.0	0.1	0.3	0.1	1.0	0.1	2.1	0.0	0.7	58.3	0.0

A.15. Emissions from the United Kingdom

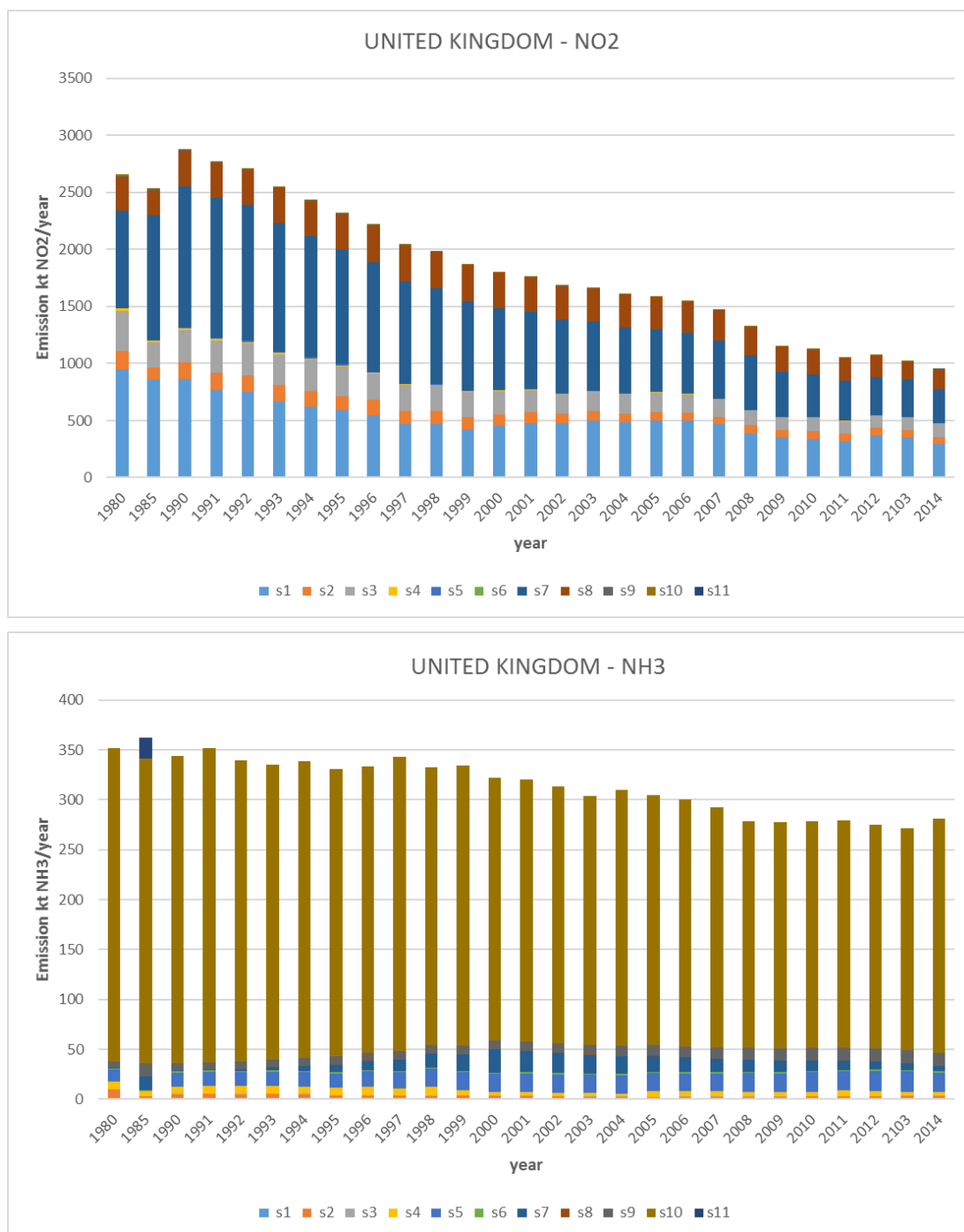


Fig A.15: Annual emissions of nitrogen oxides and ammonia from the United Kingdom divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Table A.15-1: Annual emissions of nitrogen oxides from the United Kingdom, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Nitrogen oxides emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	953	156	353	25	1	0	848	298	13	15	0
1985	855	112	221	15	1	0	1097	215	10	14	0
1990	866	142	282	15	11	0	1237	309	9	9	0
1991	768	152	282	13	11	0	1227	301	8	8	0
1992	755	145	276	12	11	0	1192	304	8	6	0
1993	666	145	269	11	11	0	1129	303	8	0	0
1994	622	135	274	11	11	0	1066	306	7	0	0
1995	589	124	260	8	11	0	1006	311	7	0	0
1996	546	133	234	8	8	0	961	314	7	0	0
1997	467	118	227	8	2	0	899	317	5	0	0
1998	468	113	228	7	1	0	841	320	5	0	0
1999	422	110	219	7	2	0	784	318	5	0	0
2000	453	100	206	7	1	0	716	310	4	0	0
2001	476	98	192	5	1	0	683	298	5	0	0
2002	475	85	172	3	1	0	645	293	5	0	0
2003	501	80	177	3	1	0	608	286	4	0	0
2004	482	78	173	3	1	0	582	285	4	0	0
2005	500	73	171	3	1	0	555	279	4	0	0
2006	502	70	160	3	1	0	534	269	3	0	0
2007	468	66	157	3	0	0	511	263	4	0	0
2008	384	74	133	3	1	0	479	248	3	0	0
2009	352	67	111	2	0	0	393	220	3	0	0
2010	337	73	120	2	0	0	373	214	3	0	0
2011	319	63	113	2	0	0	354	197	3	0	0
2012	372	64	110	1	0	0	336	185	3	0	0
2103	351	66	115	2	0	0	323	159	3	0	0
2014	291	65	119	2	0	0	300	169	3	0	0

Table A.15-2: Annual emissions of ammonia from the United Kingdom, divided by sectors, for 1980, 1985 and then each year in the period 1990-2014

Ammonia emissions											
Year	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
1980	0.0	10.0	0.3	7.5	11.8	1.2	0.6	0.1	6.2	313.7	0.0
1985	0.0	3.4	0.0	4.5	0.0	1.3	14.0	0.0	12.6	305.2	21.7
1990	0.0	5.1	0.3	7.6	13.9	1.2	0.8	0.1	7.1	307.8	0.0
1991	0.0	5.5	0.3	7.7	14.2	1.2	0.9	0.1	7.2	314.3	0.0
1992	0.1	5.0	0.2	7.8	14.4	1.2	1.5	0.1	7.3	301.8	0.0
1993	0.2	5.4	0.2	7.7	14.2	1.2	3.2	0.1	7.4	295.7	0.0
1994	0.3	4.6	0.3	7.7	14.3	1.2	5.2	0.1	7.5	297.2	0.0
1995	0.3	3.4	0.3	7.7	14.4	1.2	7.1	0.1	8.5	287.7	0.0
1996	0.3	3.4	0.3	8.6	15.4	1.2	9.0	0.1	8.3	287.1	0.0
1997	0.3	3.2	0.3	6.8	16.4	1.2	11.5	0.1	8.5	294.8	0.0
1998	0.4	3.0	0.3	9.3	17.6	1.2	13.9	0.1	8.4	278.2	0.0
1999	0.5	3.2	0.3	5.2	18.2	1.2	16.0	0.1	8.6	280.6	0.0
2000	0.7	2.6	0.2	4.0	18.1	1.2	23.3	0.1	8.7	263.4	0.0
2001	0.8	2.5	0.3	4.0	18.2	1.2	21.7	0.1	9.6	262.5	0.0
2002	0.8	2.1	0.3	3.8	18.1	1.2	20.3	0.1	10.0	257.2	0.0
2003	0.8	1.8	0.3	3.5	18.4	1.2	18.5	0.1	10.3	249.3	0.0
2004	0.7	1.7	0.2	3.4	18.3	1.2	17.3	0.1	10.5	256.3	0.0
2005	0.7	1.4	0.3	5.6	18.4	1.2	15.9	0.1	10.6	250.3	0.0
2006	0.7	1.5	0.4	5.3	18.0	1.2	14.8	0.1	10.8	247.6	0.0
2007	0.7	1.6	0.4	5.1	18.1	1.2	13.6	0.1	11.3	240.1	0.0
2008	0.8	1.7	0.5	4.5	18.9	1.2	12.1	0.1	11.8	226.7	0.0
2009	0.8	1.8	0.3	4.2	18.8	1.2	11.5	0.1	12.8	226.3	0.0
2010	0.8	2.1	0.3	4.6	19.6	1.2	10.2	0.1	12.8	227.3	0.0
2011	0.9	1.9	0.4	5.6	19.5	1.2	9.1	0.1	12.9	227.7	0.0
2012	0.8	2.2	0.3	5.2	20.0	1.2	8.0	0.1	13.0	224.1	0.0
2103	0.9	2.4	0.3	3.9	20.5	1.2	7.2	0.1	12.9	221.9	0.0
2014	0.1	3.2	1.0	3.2	19.2	1.2	5.6	0.0	13.3	234.3	0.0



Victoria House
37-63 Southampton Row
London WC1B 4DA
United Kingdom

t: +44 (0)20 7430 5200
f: +44 (0)20 7242 3737
e: secretariat@ospar.org
www.ospar.org

**OSPAR's vision is of a clean, healthy and biologically diverse
North-East Atlantic used sustainably**

ISBN: 978-1-911458-39-5
Publication Number: 699/2017

© OSPAR Commission, 2017. Permission may be granted by the publishers for the report to be wholly or partly reproduced in publications provided that the source of the extract is clearly indicated.

© Commission OSPAR, 2017. La reproduction de tout ou partie de ce rapport dans une publication peut être autorisée par l'Editeur, sous réserve que l'origine de l'extrait soit clairement mentionnée.