

NEC Directive status report 2013

Reporting by Member States under Directive 2001/81/EC
of the European Parliament and of the Council of 23 October 2001 on
national emission ceilings for certain atmospheric pollutants

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European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark
Tel.: +45 33 36 71 00
Fax: +45 33 36 71 99
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

Contents

Acknowledgements	4
Executive summary	5
Units and abbreviations.....	11
1 Introduction	12
1.1 Reporting requirements under the NECD	12
2 Assessment of EU and Member State emissions	16
2.1 Progress of the EU in meeting emission ceilings	16
2.2 Comparison of Member State-reported emissions data with NECD emission ceilings	17
2.3 Progress of non-EU countries in meeting 2010 emission ceilings under the Gothenburg Protocol to the UNECE LRTAP Convention.....	20
2.4 Analysis of emissions per pollutant.....	21
2.5 Timeliness and transparency of reporting	26
2.6 Basis for estimating emissions from mobile sources.....	26
2.7 Potential underestimation of Member State emissions due to non-reporting of emissions from certain sectors	28
3 Conclusions	35
3.1 Emission trends and ceiling assessments.....	35
3.2 Outlook post-2011	35
3.3 Recommended improvements in reporting methodology.....	36
References	37
Appendix 1 Emission data submitted under the NEC Directive.....	39
Appendix 2 Data sources	43
Appendix 3 Reporting status of NECD emissions	44

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The EEA project manager was Anke Lükewille. The desk officer at the European Commission's Directorate-General for the Environment responsible for implementation of the National Emission Ceilings Directive (NECD) is André Zuber.

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Executive summary

This report describes the most recent emission inventory information provided by the Member States of the European Union (EU) at the end of 2013 under Directive 2001/81/EC, the National Emission Ceilings Directive (NECD) (EC, 2001).

The NECD requires all 28 EU Member States to report information annually on emissions of four significant air pollutants: nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC), sulphur dioxide (SO₂) and ammonia (NH₃). These pollutants can cause respiratory problems, contribute to the acidification of soil and surface water, cause eutrophication in sensitive habitats and damage vegetation through exposure to tropospheric ozone resulting from these emissions.

To help protect human health and the environment, the NECD sets pollutant-specific and legally binding emission ceilings for each of these pollutants and for each country. These ceilings were to be met by 2010 as well as in future years.

Member State-reported emissions data and NECD emission ceilings

Each year, by 31 December, Member States are required to report their national emission inventories for the four NECD pollutants. More specifically, final emission data should be submitted for the previous year but one, as should provisional emission data for the previous year. Therefore, at the end of 2013, Member States were required to report

Box ES.1 The EU's new Air Policy Package and revision of the NECD

In January 2011, the European Commission initiated a review of the EU's air policy that included the NECD. Revision of the NECD is consistent with the implementation of the 2005 Thematic Strategy on Air Pollution (EC, 2005a).

The long-term strategic objective of the new European Clean Air Programme, proposed by the European Commission in late 2013 after the policy review, is to attain air quality levels that do not give rise to significant negative impacts on, or risks for, human health and the environment. The first general objective of the proposed Air Policy Package is to achieve full compliance with present air quality policies, and conform to international commitments by 2020. Proposed policy options to help achieve this objective include the full implementation of existing measures addressing transport, small and medium-scale combustion and background pollution (within the Member States, intra-EU and globally). Additional proposed actions include support for national and local actions through EU funds, as well as an improved research and innovation agenda within the EU Framework Programme Horizon 2020. A new NECD would repeal and replace the current annual capping of national emissions of air pollutants. The proposal ensures, however, that the national emission ceilings set in Directive 2001/81/EC for NO_x, NMVOC, SO₂, and NH₃ for 2010 and onwards apply until 2020.

The second general objective of the European Clean Air Programme is to reduce the impact of air pollution beyond 2020, with 2030 being the target year. The new NECD proposes new national emission reduction commitments, applicable from 2020 and 2030 for NO_x, NMVOC, SO₂, NH₃, fine particulate matter (PM_{2.5}) and methane (CH₄). To ensure timely compliance, interim targets applicable to the same pollutants will apply for 2025. The aim of the envisaged staggered tightening of commitments is to achieve compliance with the amended Gothenburg Protocol by 2020 (UNECE, 1999, 2012a and 2012b), followed by more ambitious reductions from 2030 onward. Moreover, the package includes a proposal for a medium combustion plants directive that would establish emission limit values for medium-sized combustion facilities (i.e. with a thermal input ranging from 1 to 50 megawatts).

For more information, see http://ec.europa.eu/environment/air/clean_air_policy.htm.

final emission data for the year 2011, and provisional estimates of emissions for 2012. In instances where Member States did not resubmit new 2010 data, the final emission data submitted in 2012 were used (EEA, 2013a) ⁽¹⁾. Analysis of the final 2010 data (EU-27) indicates that 11 Member States exceeded their respective NO_x ceilings for that year (Austria, Belgium, Denmark, France, Germany, Ireland, Luxembourg, Malta, the Netherlands, Spain and Sweden). Final 2011 data show that eight Member States exceeded their emission ceilings (Austria, Belgium, France, Germany, Ireland, Luxembourg, Slovenia and Spain) (see Table ES.1). Emissions of all of those Member States and Malta were also above this ceiling in 2012, in some instances quite markedly so. In absolute amounts, Germany and France reported the highest exceedances of NO_x ceilings in 2012, by 222 kilotonnes and 173 kilotonnes respectively. In percentage terms, Luxembourg (55 %) and Austria (37 %) continued to exceed their NO_x emission ceilings the most in 2012.

Denmark was the only Member State to have exceeded three of the four emission ceilings under the directive in 2010 (for NO_x, NMVOC and NH₃) (see Table ES.1). According to the final 2011 data, Denmark subsequently brought its NMVOC and NO_x emissions below the ceilings. Germany (NO_x and NH₃), Slovenia (NO_x and NMVOC) and Spain (NO_x and NH₃) exceeded two ceilings in 2011. Provisional 2012 data show that Germany is now below its ceiling for NH₃, and Slovenia is below its ceiling for NMVOC. Only one Member State (Luxembourg) exceeds the ceiling for NMVOC in 2012. For NH₃, three Member States were above the ceilings in 2012 (Denmark, Finland and Spain). All Member States were compliant with emission ceilings for SO₂ in 2010, 2011 and 2012. In total, 11 Member States exceeded 1 or more of the emission limits in 2012, 1 country more than in 2011.

The road transport sector is one of the main factors contributing to the large number of NO_x exceedances, particularly as reductions of NO_x emissions from this sector over the last two decades have not been as large as originally anticipated. This is partly because the sector has grown more than expected, and partly because of the increased penetration of diesel vehicles producing higher NO_x emissions than petrol-fuelled vehicles

(e.g. EEA, 2011). Actual emissions from vehicles driven on roads under normal conditions are also higher than originally expected, with so-called 'real-world emissions' often exceeding the permitted test-cycle emissions used for the certification of vehicles complying with the Euro standards. This is particularly true for light-duty diesel vehicles. Member States regularly update the emission factors used in their inventories, and reported developments in emissions have to be based on 'real-world' emission factors.

Compared to the previous reporting cycle, when only provisional 2011 data were available ⁽²⁾, several Member States reported revised final 2011 emissions data, changing the status of compliance with the emission ceilings, as explained below.

- Provisional 2011 emission data indicated that Slovenia achieved its NO_x and NMVOC emission ceilings. However, the recently submitted final 2011 emission data now indicate that the Slovenian NO_x and NMVOC emissions are slightly above their ceilings. This is mainly due to recalculations in the sector of energy use, and to emissions reported in the agricultural sector.
- Germany's provisional 2011 emission data for NMVOC were above the ceiling, but final 2011 data lie below. The change is mainly due to recalculations in the energy production and distribution sector and the sector of solvent and product use.
- Last year, Denmark reported provisional 2011 emissions of NH₃ lower than the ceiling, but final 2011 data now show that emissions were slightly above the ceiling. The change can mainly be attributed to recalculations in the category 'Synthetic N-fertilizers'.

⁽¹⁾ Croatia joined the EU in July 2013, and therefore data for 2011 and 2012 are shown for informative purposes only (EC, 2013a).

⁽²⁾ 'Provisional 2011 data' in this report refer to data for 2011 reported in the prior (2012) reporting round, which were documented in the previous annual NEC Directive status report 2012 (EEA, 2013a).

Table ES.1 EU-27 Member State progress in meeting NECD emission ceilings

Member State	NO _x			NMVOC			SO ₂			NH ₃		
	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
Austria	x	x	x	✓	✓	✓	✓	✓	✓	✓	✓	✓
Belgium	x	x	x	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bulgaria	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cyprus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Czech Republic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Denmark	x	✓	✓	x	✓	✓	✓	✓	✓	x	x	x
Estonia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Finland	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x
France	x	x	x	✓	✓	✓	✓	✓	✓	✓	✓	✓
Germany	x	x	x	x	✓	✓	✓	✓	✓	✓	x	✓
Greece	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hungary	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ireland	x	x	x	✓	✓	✓	✓	✓	✓	✓	✓	✓
Italy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Latvia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lithuania	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Luxembourg	x	x	x	✓	✓	x	✓	✓	✓	✓	✓	✓
Malta	x	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓
Netherlands	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Poland	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Portugal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Romania	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Slovakia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Slovenia	✓	x	x	✓	x	✓	✓	✓	✓	✓	✓	✓
Spain	x	x	x	✓	✓	✓	✓	✓	✓	x	x	x
Sweden	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
United Kingdom	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	16	19	18	25	26	26	27	27	27	24	23	24
x	11	8	9	2	1	1	0	0	0	3	4	3

Notes: '✓' indicates that the emission ceiling has been achieved.
'x' indicates the ceiling has not been met.

Years 2010 and 2011: final data; 2012: provisional data.

EU progress in meeting its emission ceilings

The EU itself has two different sets of emission ceilings for 2010 and onwards, as set out in the NECD ⁽³⁾.

The less stringent ceilings of Annex I to the NECD are not exceeded on the basis of the reported final 2010, final 2011 and provisional 2012 emissions data (see Figure ES.1). The three stricter Annex II emission ceilings are designed with the aim of

⁽³⁾ Annexes I and II to the NECD define emission ceilings for the EU. The Annex I EU ceilings represent the aggregation of individual Member State ceilings defined in that annex. The Annex II EU ceilings are stricter than those of Annex I and are designed with the aim of attaining, by 2010, for the EU as a whole, the interim environmental objectives set out in Article 5 of the NECD (i.e. a reduction of acidification and health- and vegetation-related ground-level ozone exposure by 2010, compared with the 1990 situation). There is no separate ceiling for NH₃ defined in Annex II to the NECD.

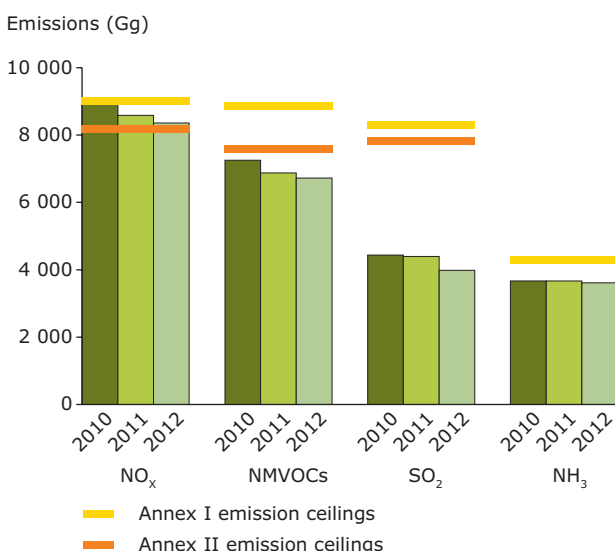
attaining the interim environmental objectives of the NECD by 2010. Only for NO_x are the aggregated EU-27 emissions data above the respective Annex II ceiling for all three years: 2010, 2011 and 2012.

Specifically, the situation with the four NECD pollutants can be described as follows.

- Final 2010 NO_x emissions for the EU-27 are 0.7 % below the aggregated emission ceiling given in Annex I, final 2011 emissions for the EU-27 are 4.7 % below the Annex I ceiling, and provisional 2012 emissions for the EU-27 are 7.1 % below the Annex I ceiling.
- Final 2010 emissions are 9.3 % above the stricter Annex II ceiling of the NECD for the EU-27 as a whole. Final 2011 emission data for the EU-27 exceed by 4.9 % the stricter Annex II ceiling for the EU-27 as a whole, and provisional 2012 emission data for the EU-27 are 2.2 % above the Annex II emission ceilings.

- NMVOC final 2010 emission data for the EU-27 are 18.0 % below the aggregated emission ceiling given in Annex I, the final 2011 emission data for the EU-27 are 22.3 % below the ceiling, and the provisional 2012 emission data are 24.0 % below the Annex I emission ceiling.
- NMVOC final 2010 emission data for the EU-27 are 4.4 % below the Annex II ceiling. For the EU-27, final 2011 and provisional 2012 NMVOC emission data are 9.3 % and 11.3 %, respectively, below the Annex II emission ceilings.
- SO₂ emission data of all years are significantly below the levels of the Annex I and II emissions ceilings, by about 50 %.
- The NH₃ final 2010 emission data are 14.6 % below the EU-27 Annex I emission ceiling. Final 2011 emission data for the EU-27 are 14.6 %, and the provisional 2011 data are 15.9 % below. There is no separate ceiling for NH₃ set out in Annex II to the NECD.

Figure ES.1 EU-27 progress in meeting emission ceilings set out in NECD Annexes I and II: aggregated Member State final 2010, final 2011 and provisional 2012 emission data, compared with EU-27 emission ceilings



Note: The emission ceilings shown are EU-27 emission ceilings, set out in Annexes I and II to the NECD. Annex II to the NECD does not define a ceiling for NH₃. The aggregated emission estimates comprise emission data reported on the basis of fuel used (6 Member States) and fuel sold (21 Member States) for mobile sources. An overview of the basis used by Member States for estimating emissions from mobile sources is given in Table 2.7.

Progress of non-EU countries in meeting emission ceilings under the Gothenburg Protocol's UNECE LRTAP Convention

Three non-EU EEA member countries (Liechtenstein, Norway and Switzerland) have emission ceilings for 2010 and onwards specified under the Gothenburg Protocol of the United Nations Economic Commission for Europe (UNECE) Convention on Long-range Transboundary Air Pollution (LRTAP) (UNECE, 1979, 1999, 2012a and 2012b). Data reported by these countries show that Liechtenstein and Norway exceeded their NO_x and NH₃ emissions ceilings in 2010, 2011 and 2012. Switzerland showed compliance with its ceilings for all pollutants in the years 2010, 2011 and 2012 (Table ES.2).

Past emission trends

Under the NECD, Member States are formally obliged to submit 2 years of emission data. This hampers any reliable assessment of long-term emission trends (either within individual Member States or for the EU as a whole). Nevertheless, several Member States do submit updated emission data under the NECD reporting for all years as far back as 1990. Most of the EU Member States that reported data back to 1990 declare considerable emission reductions of the four NECD pollutants since 1990. A more complete picture of past emission trends in the EU will be provided in mid-2014 when the EEA

Table ES.2 Other EEA member countries' progress in meeting Gothenburg Protocol UNECE LRTAP Convention emission ceilings

Country	NO _x			NMVOC			SO ₂			NH ₃		
	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
Liechtenstein	x	x	x	✓	✓	✓	✓	✓	✓	x	x	x
Norway	x	x	x	✓	✓	✓	✓	✓	✓	x	x	x
Switzerland	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: '✓' indicates that the final (2010 and 2011) or provisional (2012) emission data reported by a country meet or lie below its respective emission ceiling.

'x' indicates that a ceiling is not met.

Emission data for Liechtenstein, Norway and Switzerland are the latest reported data under the LRTAP Convention (2014 submission round), and are compared with the respective emission ceilings of the Gothenburg Protocol.

Liechtenstein has signed but not yet ratified the protocol. Neither Iceland nor Turkey has so far signed the Gothenburg Protocol.

publishes the annual EU emission report under the LRTAP Convention (EEA, 2014a).

Completeness of data reporting

a) Assessment of possible underestimation

The reporting guidelines of the LRTAP Convention (UNECE, 2014) (and through Annex III of the NECD, by extension applicable also to reporting under the NECD) allow Member States to report emissions as 'not estimated' (NE) for sectors where emissions are known to occur but have not been calculated or reported. Ideally 'NE' should only be used for sources that are very small, where, for example, it may be less cost-effective to develop a specific estimation methodology compared with improving the accuracy of estimates for more significant sources.

By definition, use of the 'NE' notation key means national inventories are incomplete; emissions totals are therefore underestimated. Section 2.7 of this report provides a first assessment of the possible magnitude of this underestimation. By adding an estimate of the potential underestimation to the reported Member States' total, an indication can be obtained of whether the difference in emissions is likely to affect the number of Member States complying with their ceilings.

For most Member States, the addition of the potential underestimate to their national totals does not change the evaluation of whether their emissions are above or below emission ceilings, i.e. in general, the potential underestimation is low for all pollutants. However, for Germany, the addition of the potential underestimation increases the 2012 NH₃ emissions so they exceed the ceiling.

Similarly, applying the same analysis to the final 2011 data indicates that for two Member States, the addition of the potential underestimate to the national totals increases emissions above the respective 2010 ceilings. This is the case for Denmark (NO_x) and Germany (NMVOC).

The methodology used to assess the potential underestimate is relatively simple, but provides a useful initial indicator of where underestimations might have occurred, and where the estimation of emissions might therefore be investigated in more detail. It is a cause for concern that for some Member States, the compilation of incomplete emission inventories may lead to exceedances of emission ceilings.

b) Pollutant–source combinations not included in the original 2010 emission ceilings

Since the original integrated assessment modelling undertaken to support the determination of the 2010 emissions ceilings, improved knowledge has become available on the sources of air pollutants. In several instances, 'new' emission source categories for the pollutants covered within the scope of the NECD have been identified, and in some cases, on the basis of subsequent measurements, emission factors have been developed that now enable emission estimates to be made.

An analysis described in this report, presents two such cases (NO_x and NMVOC emissions from the agriculture sector), in order to determine the magnitude of these as compared with the national totals and national emission ceilings. Based on the NO_x emission estimates provided by 20 Member States, NO_x from agriculture contributes to less than 11 % to the respective national totals. NMVOC

emissions from agriculture (provided by 19 Member States) have a higher contribution, up to 34 % of total emissions. The analysis demonstrates that incomplete reporting coupled with the apparent significant contribution of such sources to national totals may well cause emissions to be underestimated in a number of Member States, in some cases significantly so.

At EU-27 level, the subtraction of NO_x and NMVOC emissions from the agriculture sector amount to 2.1 % and 3.8 %, respectively, of the total emissions in 2012 (Table ES.3).

Transparency of reported information

Providing inventory reports or additional explanatory information that describes the methods

and sources of the reported data is not mandatory under the NECD; this limits the transparency of the data submission. Nevertheless, 11 Member States (Austria, Belgium, Croatia, Finland, Germany, Latvia, the Netherlands, Poland, Romania, Slovakia and Spain) voluntarily submitted an inventory report together with their NECD inventories.

Public access to data and reports

Data described in this report are available from the EEA online data viewer (EEA, 2014b).

The EEA also publishes individual fact sheets (EEA, 2013b) for each Member State, providing additional analyses of various parameters; these include the current progress towards achieving the respective emission ceilings for each pollutant.

Table ES.3 Effect on NO_x and NMVOC emissions of the 'new' emission source category 'agriculture' on EU total emissions

in Gg	NO _x			NMVOC		
	2010	2011	2012	2010	2011	2012
EU-27 emissions as reported	8 942	8 582	8 361	7 252	6 878	6 726
Amount of the agriculture sector	170	181	175	249	254	255
EU-27 without emissions from the agriculture sector	8 772	8 401	8 186	7 003	6 624	6 471
Annex I emission ceiling	9 003	9 003	9 003	8 848	8 848	8 848
Annex II emission ceiling	8 180	8 180	8 180	7 585	7 585	7 585

Units and abbreviations

CDR	(Eionet) Central Data Repository
CEIP	(EMEP) Centre on Emission Inventories and Projections
EEA	European Environment Agency
Eionet	European Environmental Information and Observation Network of the EEA
EMEP	Cooperative programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe
ETC/ACM	European Topic Centre for Air Pollution and Climate Change Mitigation
EU	European Union
Gg	1 gigagram = 10^9 g = 1 kiloton (kt)
IIR	Informative Inventory Report
LRTAP Convention	UNECE Convention on Long-range Transboundary Air Pollution
NE	'not estimated' (notation key)
NECD	National Emission Ceilings Directive
NFR	nomenclature for reporting (UNECE)
NH ₃	ammonia
NMVOG	non-methane volatile organic compound
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
PM	particulate matter
PM _{2.5}	fine particulate matter, i.e. with a diameter of 2.5 micrometres or less
SO ₂	sulphur dioxide
SO _x	sulphur oxides
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change

1 Introduction

'The aim [of the National Emission Ceilings Directive] is to limit emissions of acidifying and eutrophying pollutants and ozone precursors in order to improve the protection in the Community of the environment and human health ... by establishing national emission ceilings'

Directive 2001/81/EC, the National Emission Ceilings Directive (NECD) (EC, 2001) highlights the importance of reporting air pollutant emission data for assessing progress in reducing air pollution in the European Union (EU) and for ascertaining whether the Member States are in compliance with their commitments ⁽⁴⁾.

This report provides an overview of emission data submitted by Member States under the NECD. It also presents a comparison of the emission ceilings of nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC) ⁽⁵⁾, sulphur dioxide (SO₂), and ammonia (NH₃) emissions and the reported emission data for 2011 and 2012. Additionally, final 2010 emission data are discussed within this report. In instances where Member States did not resubmit new 2010 data, the emission data submitted in 2012 were used (EEA, 2013a). A summary of progress made by selected non-EU European Environment Agency (EEA) member countries ⁽⁶⁾ towards emission ceilings set out in the Gothenburg Protocol of the United Nations Economic Commission for Europe (UN ECE) Convention on Long-range Transboundary Air Pollution (LRTAP Convention; UNECE, 1979, 1999, 2012a and 2012b) is also provided.

1.1 Reporting requirements under the NECD

Articles 2, 6, 7 and 8 of the NECD set out the requirements for EU Member States on national inventories, projections and programmes. According to these provisions, Member States are to prepare and annually update national total emissions

estimates for the pollutants NO_x, NMVOC, SO₂, and NH₃. In previous years, Member States were also required to report projected emissions for the year 2010 for all four pollutants (this is no longer required). In addition, by 31 December each year, the Member States should report to the European Commission and the EEA these national emission inventories; final emission data should be submitted for the previous year but one, as well as provisional emission data for the previous year.

Member States were also obliged to report their updated national programmes for progressive reduction of national emissions of NO_x, NMVOC, SO₂, and NH₃ to the European Commission by the end of 2006.

To help ensure that information on emissions reported by Member States is consistent and harmonised, the NECD (Annex III) requires Member States to prepare emission inventories using the methodologies agreed upon by the LRTAP Convention. It also requests that Member States use the latest version of the *EMEP/Corinair emission inventory guidebook* (since renamed the *EMEP/EEA air pollutant emission inventory guidebook* (EMEP/EEA, 2013)), in preparing their inventories and projections.

Moreover, it is considered good practice for Member States to adhere to the principles outlined in the UNECE guidelines for reporting emission data under the LRTAP Convention (UNECE, 2014). The historic emission data presented must be 'transparent, consistent, comparable, complete and accurate'.

Further, the guidelines specify how emissions from transport should be estimated and reported. Austria, Belgium, Ireland, Lithuania, Luxembourg, the Netherlands and the United Kingdom may therefore additionally choose to use the national emission total calculated on the basis of fuels used in the geographic area of the Party as a basis for compliance.

⁽⁴⁾ Croatia joined the EU in July 2013, and therefore data for 2011 and 2012 is shown for informative purposes only.

⁽⁵⁾ The NECD defines VOCs as being non-methane volatile organic compounds (NMVOC), i.e. methane (CH₄) is not considered in the directive of 2001.

⁽⁶⁾ The non-EU EEA member countries are Iceland, Liechtenstein, Norway, Switzerland and Turkey.

1.1.1 Scope

The NECD covers emissions from all relevant sources of NO_x, NMVOC, SO₂ and NH₃ which arise as a result of human activities within the territory of the Member States and their exclusive economic zones, except:

- emissions from international maritime traffic;
- aircraft emissions beyond the landing and take-off cycle;
- emissions in the Canary Islands, for Spain;
- emissions in the overseas departments, for France;
- emissions in Madeira and the Azores, for Portugal.

1.1.2 Preparation of the annual NECD status report and access to information

As specified in Article 7 of the NECD, the European Commission, assisted by the EEA, must, in cooperation with Member States and based on information provided by them, prepare inventories and projections for the relevant pollutants. A description of the quality assurance/quality control activities related to the compilation of the EU inventory, together with a description of the institutional arrangements and the data flow underpinning this report, are available in EEA (2012).

The NECD also requires that inventories and projections be made publicly available. Data described in this report are available both online from an EEA data viewer (EEA, 2014b) and also separately for download in database files.

1.1.3 Differences between NECD, LRTAP Convention and UNFCCC inventory reporting

In addition to reporting emission data under the NECD, Member States are also required to report emissions of certain pollutants under two other international reporting obligations: the protocols of the LRTAP Convention (UNECE, 1979), and the EU Monitoring Mechanism Regulation (EC, 2013b) and its implementing provisions (EC, 2005). Table 1.1 provides an overview of Member States' air pollution reporting obligations.

The three reporting obligations listed in Table 1.1 differ mainly in the number and type of air pollutants for which reporting is required, the geographical coverage of countries (e.g. whether overseas dependencies are included in the territories of France, Portugal, Spain or the United Kingdom), and whether domestic and international aviation and navigation are included in the national total. The NECD, LRTAP Convention and UNFCCC inventories differ in terms of the pollutants included, and slightly in terms of the sectors included in the official national totals. The major differences are summarised in Table 1.2.

Table 1.1 Overview of air pollutant emission reporting obligations in the EU

Legal obligation	Emission-reporting requirements	Annual reporting deadline for EU Member States	Annual reporting deadline for the EU
NECD	Emissions of NO _x , NMVOC, SO ₂ and NH ₃	31 December	n/a
LRTAP Convention	Emissions ^(a) of NO _x (as NO ₂), NMVOC, SO _x (as SO ₂), NH ₃ , CO, HMs, POPs and PM	15 February	30 April
EU Monitoring Mechanism/ UNFCCC	Emissions of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆ , NO _x , CO, NMVOC and SO ₂	15 January (to the European Commission) 15 April (to the UNFCCC)	15 April

Note: ^(a) Parties are formally required to report only on the substances and for the years set forth in protocols that have entered into force and that have been ratified by the Party.

CH₄: methane; CO: carbon monoxide; CO₂: carbon dioxide; HFCs: hydrofluorocarbons; HMs: heavy metals; N₂O: nitrous oxide; NO₂: nitrogen dioxide; PFCs: perfluorocarbons; PM: particulate matter; POPs: persistent organic pollutants; SF₆: sulphur hexafluoride; SO_x: sulphur oxides.

Table 1.2 Major differences between reporting obligations: LRTAP Convention, NECD and EU Greenhouse Gas (GHG) Monitoring Mechanism

Source categories	Included in national totals	Not included in national totals but reported as a 'memo item'
Domestic aviation (landing and take-off)	NEC, LRTAP, UNFCCC	n/a
Domestic aviation (cruise)	UNFCCC	NEC, LRTAP
International aviation (landing and take-off)	NEC, LRTAP	UNFCCC
International aviation (cruise)	n/a	NEC, LRTAP, UNFCCC
National navigation (domestic shipping)	NEC, LRTAP, UNFCCC	n/a
International inland shipping	NEC, LRTAP	UNFCCC
International maritime navigation	n/a	NEC, LRTAP, UNFCCC
Road transport (fuel sold ^(a))	NEC ^(b) , LRTAP ^(b) , UNFCCC	n/a

Note: NEC: NO_x, NMVOC, SO₂ and NH₃.

LRTAP: NO_x, NMVOC, SO_x, NH₃, CO, HMs, POPs and PM.

UNFCCC: CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NO_x, NMVOC, SO₂ and CO.

^(a) In addition, Member States may also report emission estimates based on fuel used as an additional 'memo item'.

^(b) Austria, Belgium, Ireland, Lithuania, Luxembourg, the Netherlands, Switzerland and the United Kingdom may additionally choose to use the national emission total calculated on the basis of fuels used instead of fuels sold in the geographic area of the Party as a basis for compliance (UNECE, 2014).

Emission ceilings

By 2010 at the latest, Member States were to have limited their annual emissions of NO_x, NMVOC, SO₂, and NH₃ to comply with the ceilings set out in the NECD, and they were to ensure that the emission ceilings are not exceeded in any year after 2010. In this report, final 2011 emission data and provisional 2012 emission data reported by Member States are compared with the emission ceilings set out in Annex I to the NECD. Additionally, final 2010 emission data (gap-filled with final 2010 data of the previous reporting round (EEA, 2013a) for those Member States which did not report 2010 data in 2013) are compared with the EU-27 ceilings as well.

Emission ceilings for the individual Member States and for the EU-27 as a whole (as set out in Annexes I and II to the NECD) are shown in Table 1.3 and Table 1.4.

The emission ceilings presented in Annex II to the NECD (see Table 1.4) have been designed with the aim of achieving the EU's interim environmental objectives set out in Article 5 of the NECD, by 2010. Meeting those objectives was expected to result in fewer European ecosystem areas where the critical loads for acidification are exceeded, and in reduced health- and vegetation-related exposure to ground-level ozone, compared with the situation in 1990. Those interim objectives were supposed to have been met by 2010 (for the evaluation of progress towards those targets, see also EEA, 2012a and 2012b). The Annex II emission ceilings for the EU are stricter than the aggregated Member State emission ceilings given in Annex I of the NECD. There is no ceiling for NH₃ in Annex II of the NECD.

Table 1.3 National 2010 emission ceilings for NO_x, NMVOC, SO₂ and NH₃, as set out in NECD Annex I

Member State	NO _x (Gg)	NMVOC (Gg)	SO ₂ (Gg)	NH ₃ (Gg)
Austria	103	159	39	66
Belgium	176	139	99	74
Bulgaria	247	175	836	108
Cyprus	23	14	39	9
Czech Republic	286	220	265	80
Denmark	127	85	55	69
Estonia	60	49	100	29
Finland	170	130	110	31
France	810	1 050	375	780
Germany	1 051	995	520	550
Greece	344	261	523	73
Hungary	198	137	500	90
Ireland	65	55	42	116
Italy	990	1 159	475	419
Latvia	61	136	101	44
Lithuania	110	92	145	84
Luxembourg	11	9	4	7
Malta	8	12	9	3
Netherlands	260	185	50	128
Poland	879	800	1 397	468
Portugal	250	180	160	90
Romania	437	523	918	210
Slovakia	130	140	110	39
Slovenia	45	40	27	20
Spain	847	662	746	353
Sweden	148	241	67	57
United Kingdom	1 167	1 200	585	297
EU-27	9 003	8 848	8 297	4 294
Croatia	87	90	70	30

Table 1.4 EU 2010 emission ceilings for NO_x, NMVOC and SO₂, as set out in NECD Annex II

Region	NO _x (Gg)	NMVOC (Gg)	SO ₂ (Gg)
EU-27	8 180	7 585	7 832

2 Assessment of EU and Member State emissions

This chapter compares emissions and ceilings, and presents emission trends of NO_x, NMVOC, SO₂ and NH₃, as reported by the Member States under the NECD. Appendices 1, 2 and 3 provide an overview of the data available up to and including 1 April 2014 from the current NECD reporting round used in this report. Data provided in previous reporting cycles are not considered in this report, except in instances where Member States did not resubmit new 2010 data, in which case the emission data submitted in 2012 were used (EEA, 2013a).

2.1 Progress of the EU in meeting emission ceilings

Figure 2.1 and Tables 2.1, 2.2 and 2.3 illustrate the progress of the EU-27 towards meeting its emission ceilings as specified in Annexes I and II to the NECD. For all pollutants, the final 2010, final 2011 and provisional 2012 emission data are lower than the respective aggregated 2010 ceiling (Annex I to the NECD).

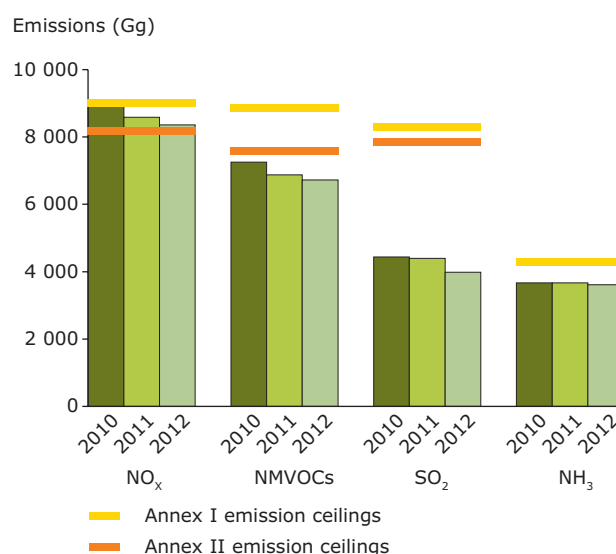
Of the three stricter Annex II emission ceilings designed with the aim of achieving the NECD's interim environmental objectives by 2010, only NO_x emission data are above the ceiling for the final 2010, final 2011, and provisional 2012 data (see Figure 2.1 and Table 2.1, Table 2.2 and Table 2.3).

A further reduction of 2.2 % from 2012 emission levels is required (Table 2.3) for the EU-27 to attain its Annex II NO_x emission ceiling. There is, however, some uncertainty concerning this figure, as the assessment is based on provisional 2012 emission data. Final 2012 emission data will be reported at the end of 2014.

Evaluation of previous submissions shows that the range of recalculations (provisional to final) is expected to be in the range of a few percent. For instance, a comparison of provisional 2011 emission

data (submitted in 2012) and final 2011 emission data (submitted in 2013) for the EU-27 (see Table 2.5) showed that for NO_x, emissions were slightly lower in the final estimate (– 0.4 %). For NMVOC, SO₂ and NH₃, such recalculations in the national emission inventories led to a slight increase at the EU-27 level (+ 0.002 % for NMVOC and + 0.3 % for SO₂ and + 1.0 % for NH₃).

Figure 2.1 EU-27 progress in meeting emission ceilings set out in NECD Annexes I and II: aggregated Member State final 2010, final 2011 and provisional 2012 emission data, compared with EU-27 emission ceilings



Note: The emission ceilings shown are the EU-27 emission ceilings set out in Annexes I and II to the NECD⁽⁷⁾. Annex II to the NECD does not define a ceiling for NH₃.

The aggregated emission estimates are a mix of emission data reported on the basis of fuel used (6 Member States) and fuel sold (21 Member States) for mobile sources. An overview of the basis on which emissions from mobile sources was estimated is given in Table 2.7.

(7) Annexes I and II to the NECD define emission ceilings for the EU (EC, 2001). The Annex I EU ceilings represent the aggregation of individual Member State ceilings defined in that annex. The Annex II EU ceilings are stricter than those of Annex I and are designed with the aim of attaining, by 2010, for the EU as a whole, the interim environmental objectives set out in Article 5 of the NECD (i.e. a reduction of European ecosystem areas where the critical loads for acidification are exceeded, as well as of vegetation-related ground-level ozone exposure by 2010, compared with the 1990 situation). There is no separate ceiling for NH₃ defined in Annex II to the NECD.

Table 2.1 Comparison of aggregated EU-27 final 2010 emission data with emission ceilings

	Final 2010 emission data (Gg)	Annex I emission ceilings (Gg)	Difference from emissions (Gg)	Difference from emissions (%)	Annex II emission ceilings (Gg)	Difference from emissions (Gg)	Difference from emissions (%)
NO _x	8 942	9 003	- 61	- 0.7 %	8 180	762	9.3 %
NMVOG	7 252	8 848	- 1 596	- 18.0 %	7 585	- 333	- 4.4 %
SO ₂	4 439	8 297	- 3 858	- 46.5 %	7 832	- 3 393	- 43.3 %
NH ₃	3 667	4 294	- 627	- 14.6 %	-	-	-

Note: The emission ceilings shown are the EU-27 emission ceilings set out in Annexes I and II to the NECD. Annex II to the NECD does not define a ceiling for NH₃.

Table 2.2 Comparison of aggregated EU-27 final 2011 emission data with emission ceilings

	Final 2011 emission data (Gg)	Annex I emission ceilings (Gg)	Difference from emissions (Gg)	Difference from emissions (%)	Annex II emission ceilings (Gg)	Difference from emissions (Gg)	Difference from emissions (%)
NO _x	8 582	9 003	- 421	- 4.7 %	8 180	402	4.9 %
NMVOG	6 878	8 848	- 1 970	- 22.3 %	7 585	- 707	- 9.3 %
SO ₂	4 397	8 297	- 3 900	- 47.0 %	7 832	- 3 435	- 43.9 %
NH ₃	3 667	4 294	- 627	- 14.6 %	-	-	-

Note: The emission ceilings shown are the EU-27 emission ceilings set out in Annexes I and II to the NECD. Annex II to the NECD does not define a ceiling for NH₃.

Table 2.3 Comparison of aggregated EU-27 provisional 2012 emission data with emission ceilings

	Provisional 2012 emission data (Gg)	Annex I emission ceilings (Gg)	Difference from emissions (Gg)	Difference from emissions (%)	Annex II emission ceilings (Gg)	Difference from emissions (Gg)	Difference from emissions (%)
NO _x	8 361	9 003	- 642	- 7.1 %	8 180	181	2.2 %
NMVOG	6 726	8 848	- 2 122	- 24.0 %	7 585	- 859	- 11.3 %
SO ₂	3 982	8 297	- 4 315	- 52.0 %	7 832	- 3 850	- 49.2 %
NH ₃	3 611	4 294	- 683	- 15.9 %	-	-	-

Note: The emission ceilings shown are the EU-27 emission ceilings set out in Annexes I and II to the NECD. Annex II to the NECD does not define a ceiling for NH₃.

2.2 Comparison of Member State-reported emissions data with NECD emission ceilings

Table 2.4 provides an overview of Member State final 2010, final 2011 and provisional 2012 emission data submitted under the NECD, as compared to the emission ceilings.

Analysis of the official final 2010 data indicates that 11 Member States exceeded their respective NO_x ceilings for that year (Austria, Belgium, Denmark,

France, Germany, Ireland, Luxembourg, Malta, Netherlands, Spain and Sweden). Eight Member States (Austria, Belgium, France, Germany, Ireland, Luxembourg, Slovenia and Spain) exceeded the ceiling in 2011. The same eight Member States and Malta exceeded the NO_x emission ceiling in 2012. The highest exceedance in 2012 (in percentage terms) was reported for Luxembourg (55 %) — see also Figure 2.2.

Provisional 2012 emission data of NMVOG are above the ceilings for only one Member State

Table 2.4 Overview of Member States final 2010, final 2011 and provisional 2012 emission data submitted under NECD and emission ceilings for 2010

Member State	NO _x final emission data (Gg)		NO _x provisional emission data (Gg)	NO _x ceilings (Annex I)	Emissions ceiling comparison			NMVOC final emission data (Gg)		NMVOC provisional emission data (Gg)	NMVOC ceilings (Annex I)	Emissions ceiling comparison		
	2010	2011	2012		2010	2011	2012	2010	2011	2012		2010	2011	2012
Austria	147.9	144.6	141.1	103	*	*	*	131.5	125.9	132.9	159	✓	✓	✓
Belgium	221.0	208.4	206.1	176	*	*	*	115.8	105.0	106.3	139	✓	✓	✓
Bulgaria	116.9	135.6	124.0	247	✓	✓	✓	93.1	90.9	91.3	175	✓	✓	✓
Cyprus	18.0	20.8	21.0	23	✓	✓	✓	11.7	9.6	9.3	14	✓	✓	✓
Czech Republic	239.1	225.4	210.1	286	✓	✓	✓	150.9	136.1	132.1	220	✓	✓	✓
Denmark	132.3	125.2	115.5	127	*	✓	✓	86.6	80.0	77.1	85	*	✓	✓
Estonia	36.7	35.9	32.4	60	✓	✓	✓	35.0	33.1	33.7	49	✓	✓	✓
Finland	166.5	153.6	146.5	170	✓	✓	✓	116.2	105.6	104.8	130	✓	✓	✓
France	1 067.1	1 000.8	983.0	810	*	*	*	817.5	737.7	711.2	1 050	✓	✓	✓
Germany	1 328.1	1 293.6	1 273.4	1 051	*	*	*	1 024.2	981.3	953.7	995	*	✓	✓
Greece	318.8	296.0	258.6	344	✓	✓	✓	184.6	158.6	151.8	261	✓	✓	✓
Hungary	162.5	130.6	117.0	198	✓	✓	✓	108.6	100.2	99.1	137	✓	✓	✓
Ireland	76.7	69.0	71.2	65	*	*	*	45.8	44.3	43.1	55	✓	✓	✓
Italy	963.6	929.9	909.1	990	✓	✓	✓	1 080.3	989.2	953.0	1 159	✓	✓	✓
Latvia	36.4	31.5	35.2	61	✓	✓	✓	52.7	50.8	54.2	136	✓	✓	✓
Lithuania	60.2	55.7	57.8	110	✓	✓	✓	61.8	58.8	59.3	92	✓	✓	✓
Luxembourg	17.9	17.7	17.1	11	*	*	*	8.5	8.4	9.8	9	✓	✓	*
Malta	8.1	7.9	8.6	8	*	✓	*	2.5	3.0	3.2	12	✓	✓	✓
Netherlands	271.9	257.3	248.0	260	*	✓	✓	149.7	148.5	145.7	185	✓	✓	✓
Poland	862.1	845.9	817.3	879	✓	✓	✓	653.4	638.3	630.3	800	✓	✓	✓
Portugal	187.2	177.3	168.8	250	✓	✓	✓	177.7	171.8	168.4	180	✓	✓	✓
Romania	217.9	222.5	226.1	437	✓	✓	✓	365.4	356.2	355.1	523	✓	✓	✓
Slovakia	88.6	85.2	81.0	130	✓	✓	✓	62.4	68.3	61.2	140	✓	✓	✓
Slovenia	44.7	46.3	45.1	45	✓	*	*	34.6	40.7	39.3	40	✓	*	✓
Spain	886.2	881.1	854.7	847	*	*	*	630.3	602.5	582.1	662	✓	✓	✓
Sweden	148.0	138.8	131.1	148	*	✓	✓	187.9	189.1	185.7	241	✓	✓	✓
United Kingdom	1 117.4	1 045.0	1 061.6	1 167	✓	✓	✓	863.1	843.8	831.9	1 200	✓	✓	✓
EU-27	8 942.1	8 581.5	8 361.3	9 003	✓	✓	✓	7 251.8	6 878.0	6 725.6	8 848	✓	✓	✓
Croatia (*)	68.6	65.2	59.2	87				77.4	72.7	68.5	90			

Notes: (*) Croatia joined the EU in July 2013, and therefore data for 2011 and 2012 are shown for informative purposes only.

'✓' indicates that provisional emission data reported by a Member State meet or lie below the respective emission ceiling.

'*' indicates that a ceiling is not met.

In preparing emission inventories and projections under the NECD, Member States are to apply the principles outlined in the UNECE guidelines for reporting emission data under the LRTAP Convention (UNECE, 2014). These guidelines specify how emissions from transport should be reported. Austria, Belgium, Ireland, Lithuania, Luxembourg, the Netherlands and the United Kingdom may additionally choose to use the national emission total calculated on the basis of fuels used in the geographic area of the Party as a basis for compliance. The sum of EU-27 emissions is therefore based on a mix of emissions reported by Member States based on fuel used (6 Member States) and fuel sold (21/22 Member States) data.

(Luxembourg, 9 %; see Figure 2.3), while for NH₃, three Member States exceeded their ceilings in 2012 (Finland (18 %), Spain (7 %) and Denmark (3 %)); see Figure 2.5. All Member States complied with the emission ceilings for SO₂; see also Figure 2.5.

In summary, final 2011 emission data show that 10 Member States exceeded one or more of the

emission limits set by the NECD. On the basis of the provisional 2012 data, 11 Member States reported emission data above the ceiling for at least one pollutant. NO_x emissions of Malta and NMVOC emissions of Luxembourg were below the ceiling in 2011, but exceeded the ceilings in 2012 according to the provisional 2012 emission data (see Section 2.4 for an explanation of this).

Table 2.4 Overview of Member States final 2010, final 2011 and provisional 2012 emission data submitted under NECD and emission ceilings for 2010 (cont.)

Member State	SO ₂ final emission data (Gg)		SO ₂ provisional emission data (Gg)	SO ₂ ceilings (Annex I)	Emissions ceiling comparison		NH ₃ final emission data (Gg)		NH ₃ provisional emission data (Gg)	NH ₃ ceilings (Annex I)	Emissions ceiling comparison		Emission estimates from mobile sources based on:		
	2010	2011	2012		2010	2011	2010	2011	2012		2010	2011		2012	
Austria	18.6	18.1	17.3	39	✓	✓	✓	62.9	62.1	62.0	66	✓	✓	✓	Fuel used
Belgium	62.3	54.4	49.8	99	✓	✓	✓	69.4	68.3	68.4	74	✓	✓	✓	Fuel used
Bulgaria	387.2	514.6	328.9	836	✓	✓	✓	50.8	39.5	39.0	108	✓	✓	✓	Fuel sold
Cyprus	22.1	21.0	16.3	39	✓	✓	✓	5.5	5.1	4.9	9	✓	✓	✓	Fuel sold
Czech Republic	170.3	164.8	158.1	265	✓	✓	✓	68.6	65.7	63.4	80	✓	✓	✓	Fuel sold
Denmark	14.9	14.0	12.5	55	✓	✓	✓	73.0	71.9	70.8	69	x	x	x	Fuel sold
Estonia	83.2	72.7	40.6	100	✓	✓	✓	10.3	10.4	10.8	29	✓	✓	✓	Fuel sold
Finland	66.8	61.0	51.4	110	✓	✓	✓	37.6	37.1	36.7	31	x	x	x	Fuel sold
France	287.5	246.0	232.0	375	✓	✓	✓	690.6	721.1	679.0	780	✓	✓	✓	Fuel sold
Germany	430.4	423.9	427.1	520	✓	✓	✓	548.5	560.2	545.4	550	✓	x	✓	Fuel sold
Greece	265.2	262.2	244.9	523	✓	✓	✓	64.4	61.6	61.2	73	✓	✓	✓	Fuel sold
Hungary	32.3	34.7	31.6	500	✓	✓	✓	65.4	60.8	58.9	90	✓	✓	✓	Fuel sold
Ireland	26.3	24.7	23.2	42	✓	✓	✓	107.7	103.6	104.5	116	✓	✓	✓	Fuel used
Italy	210.2	195.1	183.3	475	✓	✓	✓	379.0	382.4	405.1	419	✓	✓	✓	Fuel sold
Latvia	3.3	3.0	2.4	101	✓	✓	✓	18.8	18.1	19.0	44	✓	✓	✓	Fuel sold
Lithuania	31.5	28.7	36.4	145	✓	✓	✓	38.1	36.6	38.0	84	✓	✓	✓	Fuel sold
Luxembourg	2.2	1.8	2.0	4	✓	✓	✓	4.6	4.5	4.5	7	✓	✓	✓	Fuel used
Malta	8.1	7.9	7.7	9	✓	✓	✓	1.5	1.6	1.5	3	✓	✓	✓	Fuel sold
Netherlands	34.0	33.6	33.9	50	✓	✓	✓	127.5	125.2	120.2	128	✓	✓	✓	Fuel used
Poland	935.6	897.5	853.3	1 397	✓	✓	✓	271.5	270.5	262.5	468	✓	✓	✓	Fuel sold
Portugal	66.8	61.4	56.2	160	✓	✓	✓	48.2	47.9	47.9	90	✓	✓	✓	Fuel sold
Romania	350.4	321.6	259.7	918	✓	✓	✓	159.8	159.2	158.5	210	✓	✓	✓	Fuel sold
Slovakia	69.4	68.5	58.5	110	✓	✓	✓	24.9	24.2	25.2	39	✓	✓	✓	Fuel sold
Slovenia	9.8	10.9	10.1	27	✓	✓	✓	17.4	17.8	17.5	20	✓	✓	✓	Fuel sold
Spain	403.9	439.8	390.1	746	✓	✓	✓	388.2	378.2	377.5	353	x	x	x	Fuel sold
Sweden	32.0	29.1	27.7	67	✓	✓	✓	51.8	51.8	51.4	57	✓	✓	✓	Fuel sold
United Kingdom	415.3	385.7	426.8	585	✓	✓	✓	280.9	282.1	277.3	297	✓	✓	✓	Fuel used
EU-27	4 439.5	4 396.6	3 81.9	8 297	✓	✓	✓	3 667.0	3 667.3	3 611.3	4 294	✓	✓	✓	
Croatia (*)	35.5	33.4	25.7	70				37.7	37.7	37.4	30				Fuel sold

Notes: (*) Croatia joined the EU in July 2013, and therefore data for 2011 and 2012 are shown for informative purposes only.

'✓' indicates that provisional emission data reported by a Member State meet or lie below the respective emission ceiling.
'x' indicates that a ceiling is not met.

In preparing emission inventories and projections under the NECD, Member States are to apply the principles outlined in the UNECE guidelines for reporting emission data under the LRTAP Convention (UNECE, 2014). These guidelines specify how emissions from transport should be reported. Austria, Belgium, Ireland, Lithuania, Luxembourg, the Netherlands and the United Kingdom may additionally choose to use the national emission total calculated on the basis of fuels used in the geographic area of the Party as a basis for compliance. The sum of EU-27 emissions is therefore based on a mix of emissions reported by Member States based on fuel used (6 Member States) and fuel sold (21/22 Member States) data.

In comparing provisional 2011 data with final 2011 data, recalculations of emission data changed the status of three Member States: Denmark (NH₃), Germany (NMVOC) and Slovenia (NO_x and NMVOC) (see Table 2.5 and Section 2.4 for an explanation of this). Some Member States reported very large differences between the provisional 2011 and final 2011 data: Latvia had the highest change

for NH₃ (+ 40.1 %), followed by Slovenia (+ 36.2 % for NMVOC), Bulgaria (+ 32.6 % for SO₂), Portugal (+ 32.0 % for SO₂), Latvia for NMVOC (- 27.3 %) and Lithuania (+ 25.0 % for NH₃) (see Section 2.4 for an explanation of this).

Table 2.5 Comparison of provisional 2011 emission data (submitted in 2012) and final 2011 emission data (submitted in the latest 2013 reporting round)

Member State	NO _x			NMVOC			SO ₂			NH ₃		
	Are 2011 provisional data below the ceiling?	Are 2011 final data below the ceiling?	Change between provisional and final data (in %)	Are 2011 provisional data below the ceiling?	Are 2011 final data below the ceiling?	Change between provisional and final data (in %)	Are 2011 provisional data below the ceiling?	Are 2011 final data below the ceiling?	Change between provisional and final data (in %)	Are 2011 provisional data below the ceiling?	Are 2011 final data below the ceiling?	Change between provisional and final data (in %)
Austria	No	No	0.3 %	Yes	Yes	- 0.3 %	Yes	Yes	- 2.1 %	Yes	Yes	- 0.1 %
Belgium	No	No	- 0.8 %	Yes	Yes	4.4 %	Yes	Yes	- 2.4 %	Yes	Yes	1.3 %
Bulgaria	Yes	Yes	17.1 %	Yes	Yes	- 3.9 %	Yes	Yes	32.6 %	Yes	Yes	- 19.6 %
Cyprus	Yes	Yes	- 0.3 %	Yes	Yes	- 0.2 %	Yes	Yes	- 0.6 %	Yes	Yes	0.0 %
Czech Republic	Yes	Yes	0.0 %	Yes	Yes	- 6.6 %	Yes	Yes	- 3.5 %	Yes	Yes	- 0.1 %
Denmark	Yes	Yes	- 0.3 %	Yes	Yes	0.7 %	Yes	Yes	0.7 %	Yes	No	5.0 %
Estonia	Yes	Yes	0.6 %	Yes	Yes	0.1 %	Yes	Yes	0.1 %	Yes	Yes	0.0 %
Finland	Yes	Yes	- 1.2 %	Yes	Yes	- 3.0 %	Yes	Yes	6.5 %	No	No	- 0.7 %
France	No	No	- 0.4 %	Yes	Yes	0.5 %	Yes	Yes	- 3.4 %	Yes	Yes	7.0 %
Germany	No	No	0.1 %	No	Yes	- 2.7 %	Yes	Yes	- 4.7 %	No	No	- 0.6 %
Greece	Yes	Yes	0.2 %	Yes	Yes	0.2 %	Yes	Yes	0.1 %	Yes	Yes	0.0 %
Hungary	Yes	Yes	1.1 %	Yes	Yes	- 0.2 %	Yes	Yes	- 0.4 %	Yes	Yes	- 6.1 %
Ireland	No	No	2.0 %	Yes	Yes	2.8 %	Yes	Yes	5.4 %	Yes	Yes	- 4.6 %
Italy	Yes	Yes	- 0.7 %	Yes	Yes	- 4.1 %	Yes	Yes	- 7.6 %	Yes	Yes	- 1.4 %
Latvia	Yes	Yes	- 1.7 %	Yes	Yes	- 27.3 %	Yes	Yes	- 8.1 %	Yes	Yes	40.1 %
Lithuania	Yes	Yes	10.3 %	Yes	Yes	- 14.6 %	Yes	Yes	- 19.1 %	Yes	Yes	25.0 %
Luxembourg	No	No	- 1.7 %	Yes	Yes	- 5.6 %	Yes	Yes	1.0 %	Yes	Yes	- 3.0 %
Malta	Yes	Yes	0.0 %	Yes	Yes	0.0 %	Yes	Yes	0.0 %	Yes	Yes	0.0 %
Netherlands	Yes	Yes	- 0.8 %	Yes	Yes	2.9 %	Yes	Yes	0.2 %	Yes	Yes	5.5 %
Poland	Yes	Yes	- 0.6 %	Yes	Yes	- 2.1 %	Yes	Yes	- 1.4 %	Yes	Yes	0.0 %
Portugal	Yes	Yes	0.9 %	Yes	Yes	- 3.1 %	Yes	Yes	32.0 %	Yes	Yes	2.4 %
Romania	Yes	Yes	0.5 %	Yes	Yes	0.5 %	Yes	Yes	- 2.9 %	Yes	Yes	0.0 %
Slovakia	Yes	Yes	0.3 %	Yes	Yes	0.0 %	Yes	Yes	0.0 %	Yes	Yes	0.0 %
Slovenia	Yes	No	4.2 %	Yes	No	36.2 %	Yes	Yes	0.0 %	Yes	Yes	6.4 %
Spain	No	No	- 5.7 %	Yes	Yes	0.8 %	Yes	Yes	- 11.9 %	No	No	- 0.7 %
Sweden	Yes	Yes	- 4.6 %	Yes	Yes	6.8 %	Yes	Yes	- 1.5 %	Yes	Yes	0.1 %
United Kingdom	Yes	Yes	1.2 %	Yes	Yes	12.2 %	Yes	Yes	1.8 %	Yes	Yes	- 2.8 %
EU-27	Yes	Yes	- 0.4 %	Yes	Yes	0.002 %	Yes	Yes	0.3 %	Yes	Yes	1.0 %

Note: Negative percentage values mean that emission data of the latest 2013 submission are lower than the provisional data reported in 2012.

2.3 Progress of non-EU countries in meeting 2010 emission ceilings under the Gothenburg Protocol to the UNECE LRTAP Convention

Three non-EU EEA member countries (Liechtenstein, Norway and Switzerland) have emissions ceilings for 2010 and onwards specified

under the Gothenburg Protocol of the LRTAP Convention (UNECE, 1979, 1999, 2012a and 2012b). Data reported by these countries show that Liechtenstein and Norway exceeded their NO_x and NH₃ emissions ceilings in 2010, 2011 and 2012. Switzerland complied with its ceilings for all pollutants in the years 2010, 2011 and 2012 (see Table 2.6).

Table 2.6 Progress by other EEA member countries in meeting Gothenburg Protocol UNECE LRTAP Convention emission ceilings

Country	NO _x emission data (Gg)	NO _x emission data (Gg)	NO _x provisional emission data (Gg)	NO _x ceilings	Emissions ceiling comparison			NMVO emission data (Gg)	NMVO emission data (Gg)	NMVO provisional emission data (Gg)	NMVO ceilings	Emissions ceiling comparison		
	2010	2011	2012		2010	2011	2012	2010	2011	2012		2010	2011	2012
Liechtenstein	0.63	0.65	0.70	0.37	*	*	*	0.41	0.41	0.42	0.86	✓	✓	✓
Norway	180	172	164	156	*	*	*	142	135	136	195	✓	✓	✓
Switzerland	75	71	69	79	✓	✓	✓	90	87	85	144	✓	✓	✓

Country	SO ₂ emission data (Gg)	SO ₂ emission data (Gg)	SO ₂ provisional emission data (Gg)	SO ₂ ceilings	Emissions ceiling comparison			NH ₃ emission data (Gg)	NH ₃ emission data (Gg)	NH ₃ pro-visual emission data (Gg)	NH ₃ ceilings	Emissions ceiling comparison		
	2010	2011	2012		2010	2011	2012	2010	2011	2012		2010	2011	2012
Liechtenstein	0.03	0.03	0.03	0.11	✓	✓	✓	0.17	0.17	0.17	0.15	*	*	*
Norway	19	18	17	22	✓	✓	✓	27	27	27	23	*	*	*
Switzerland	12	11	11	26	✓	✓	✓	63	62	62	63	✓	✓	✓

Note: '✓' indicates that the final (2010 and 2011) or provisional (2012) emission data reported by a country meet or lie below its respective emission ceiling.

'*' indicates that a ceiling is not met.

Emission data for Liechtenstein, Norway and Switzerland are the latest reported data under the LRTAP Convention (2014 submission round), and are compared with the respective emission ceilings of the Gothenburg Protocol.

Liechtenstein has signed but not yet ratified the protocol. Neither Iceland nor Turkey has yet signed the Gothenburg Protocol.

2.4 Analysis of emissions per pollutant

Figure 2.4, and Figure 2.5 illustrate the relative difference (%) between final 2010, final 2011 and provisional 2012 emissions and the respective emission ceilings. Positive percentage values indicate that emissions were above the emission ceiling.

2.4.1 NO_x emissions

The largest emitters of NO_x in 2012 were Germany, the United Kingdom, and France. Between 2011 and 2012, 21 of 28 Member States reported emission reductions. The total reduction for the EU-28 between 2011 and 2012 amounts to – 2.6 %. The highest absolute reductions between 2011 and 2012 occurred in Greece, Poland and Spain.

Provisional 2012 NO_x emission data show that nine Member States (Austria, Belgium, France, Germany, Ireland, Luxembourg, Malta, Slovenia and Spain) did not achieve their ceilings in the year 2012. A total

of 8 Member States exceeded their respective NO_x ceilings in 2011 (Austria, Belgium, France, Germany, Ireland, Luxembourg, Slovenia and Spain), and 11 in 2010.

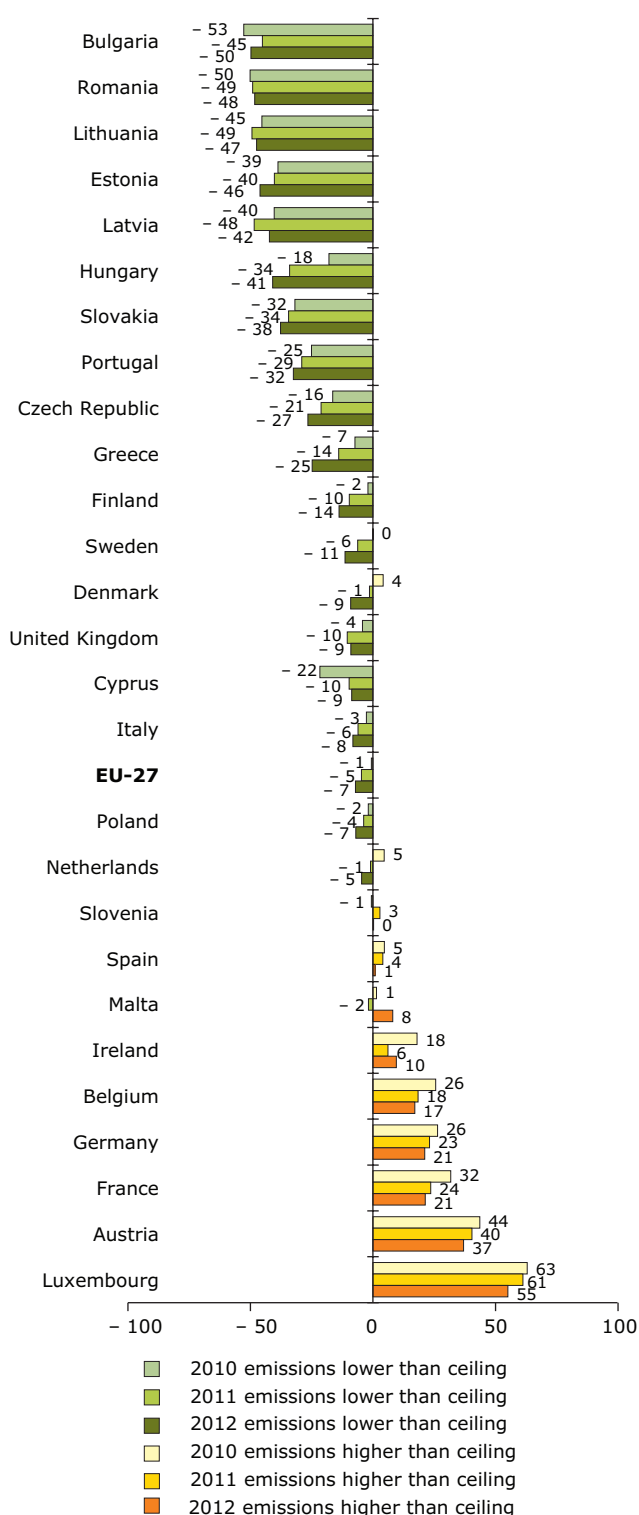
In 2011, Malta complied with its NO_x ceiling, but due to increases mainly in the energy use and road transport sectors, Malta's provisional emission data for 2012 now exceeds the ceiling.

Provisional 2011 emission data (submitted in 2012) indicated that Slovenia complied with its NO_x emission ceiling. However, the recently submitted final 2011 emission data now indicate that the Slovenian NO_x emissions are slightly above its ceiling, mainly due to emissions reported in the agriculture sector.

The aggregated final 2010, 2011 and provisional 2012 emission data for NO_x in the EU-27 lie between the Annex I and the stricter Annex II emission ceiling. A further reduction of 2.2 % from the 2010 emission level is required to meet the Annex II emission level.

(⁸) The relative difference between emissions and the emission ceilings was estimated as $100 \times (E_{em} - E_{ceiling})/E_{ceiling}$ (%), where E_{em} are the emissions of years 2010, 2011 or 2012, respectively, and $E_{ceiling}$ is the 2010 emission ceiling value.

Figure 2.2 Distance from ceiling (%) for NO_x emissions in 2010, 2011 and 2012



Note: The reported national totals of Austria, Belgium, Ireland, Luxembourg, the Netherlands and the United Kingdom are based on fuel used. All other Member States reported a national total based on fuel sold. The aggregated EU-27 emission total is based on data for fuel used and for fuel sold (see Section 2.6).

2.4.2 NMVOC emissions

The largest emitters of NMVOC in 2012 were Germany, Italy and the United Kingdom. Between 2011 and 2012, 20 Member States reported emission reductions. The total reduction for the EU-28 between 2011 and 2012 amounts to -2.3%. The highest absolute reductions between 2011 and 2012 occurred in Italy, Germany and France.

For 2012, the provisional NMVOC 2012 emission data of 26 Member States fell below their respective ceilings (see Figure 2.3). Only Luxembourg exceeded its ceiling in the year 2012. By contrast, Luxembourg's final 2011 NMVOC emissions were compliant with the ceiling. Emission increases occurred mainly in the solvent and Energy production and distribution sector.

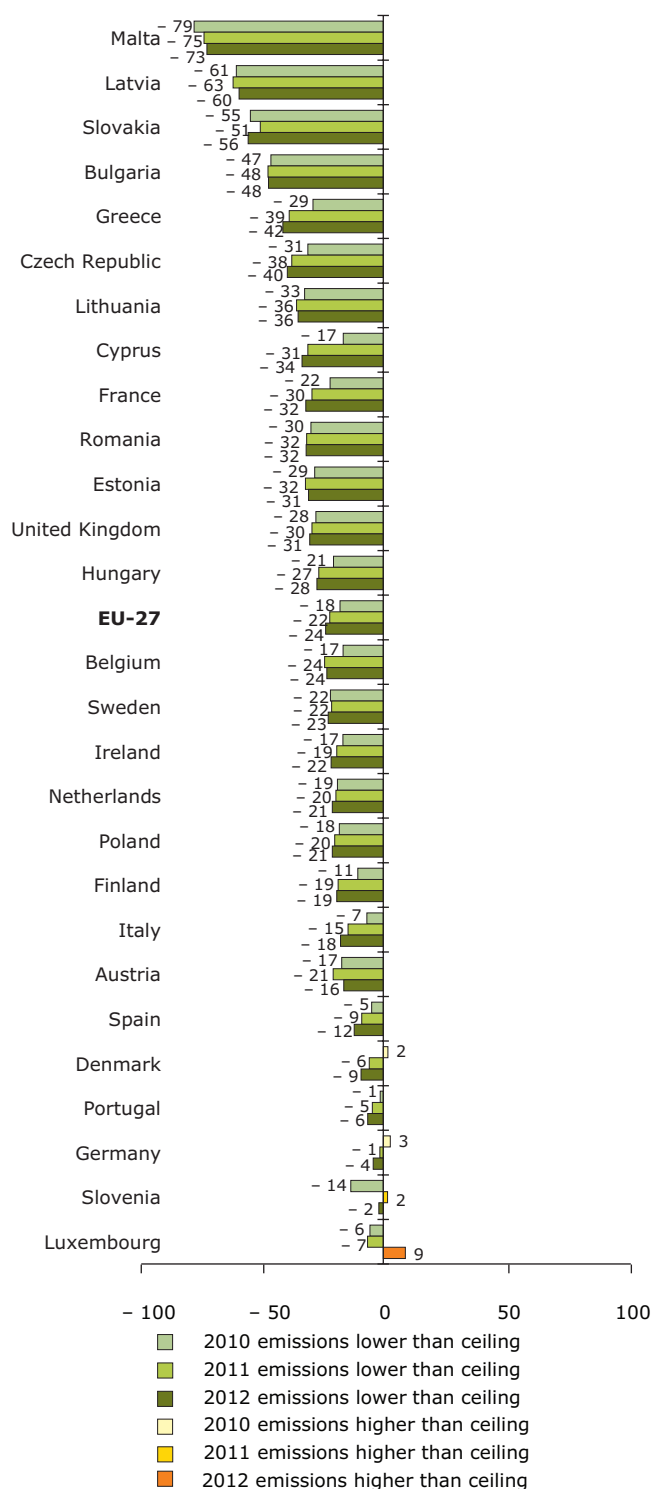
Based on final 2011 emission data, Germany attained its emissions ceiling for NMVOC. This differs from the last submission (in December 2012): Germany's provisional 2011 data were above the NMVOC emission ceiling (see Table 2.5). The changes are mainly due to recalculations in the Energy production and distribution sector and the solvent and product use sector.

Latvia reported a large difference between the provisional 2011 data (submitted in the previous reporting round) and the final 2011 data (-27.3%). The biggest change occurred within the 'Industrial processes' sector in the category 'Road paving with asphalt'. The received explanation for the difference was the previous use of incorrect emission factors in the Industrial Processes sector. This was corrected within the 2014 resubmission.

Provisional 2011 emission data (submitted in 2012) indicated that Slovenia attained its NMVOC emission ceiling. However, recently submitted final 2011 emission data now indicate that Slovenian NMVOC emissions are above its ceiling; this is mainly attributable to recalculations in the sectors Commercial, institutional and households and Energy production and distribution, and emissions reported in the agriculture sector.

The aggregated final 2010, 2011 and provisional 2012 NMVOC emission data in the EU-27 are lower than the respective EU ceilings (Annex I and Annex II emission ceilings).

Figure 2.3 Distance from ceiling (%) for NMVOC emissions in 2010, 2011 and 2012



Note: The national totals of Austria, Belgium, Ireland, Luxembourg, the Netherlands and the United Kingdom are based on fuel used. All other Member States reported a national total based on fuel sold. The aggregated EU-27 emission total is based on data for fuel used and for fuel sold (see Section 2.6).

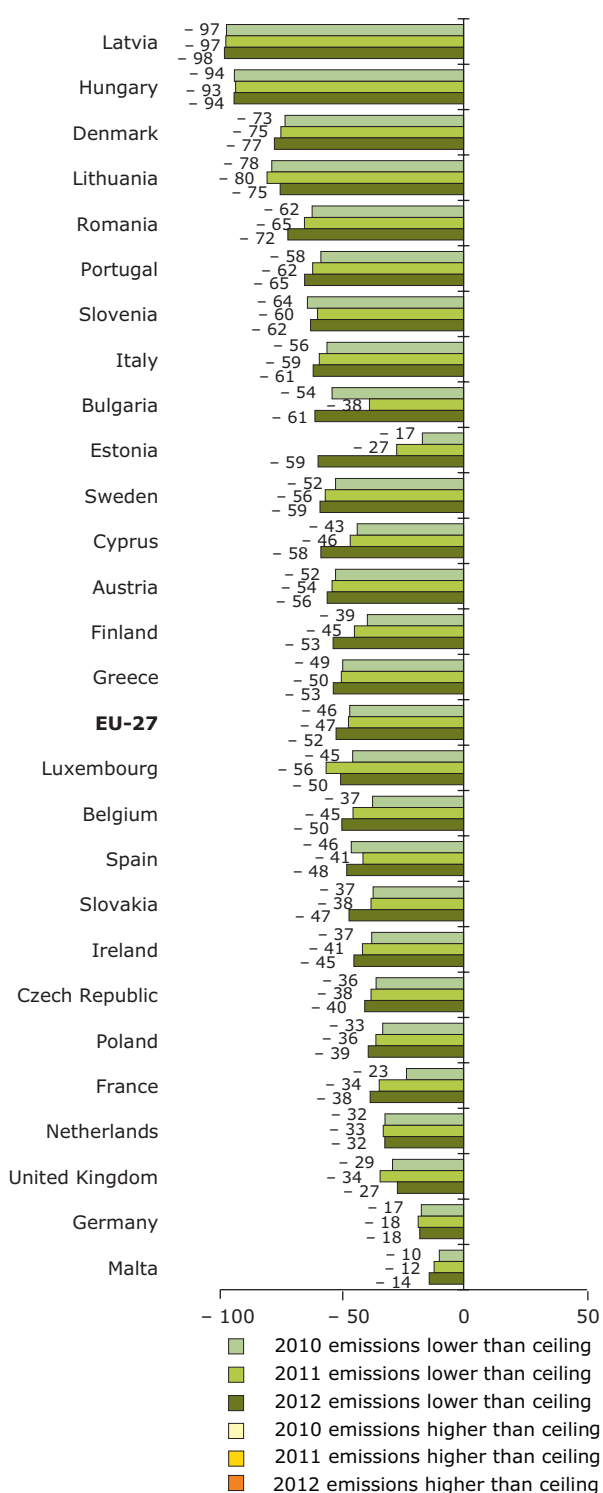
2.4.3 SO₂ emissions

The largest emitters of SO₂ in 2012 were Poland, Germany and the United Kingdom. Between 2011 and 2012, 23 Member States reported emission reductions. The total reduction for the EU-28 between 2011 and 2012 amounts to -9.5%. The highest absolute reductions between 2011 and 2012 occurred in Bulgaria, Romania and Spain.

Bulgaria reported very large differences between the provisional 2011 (submitted in the previous reporting round) and final 2011 data (+32.6%). The highest changes occurred within the sectors Energy production and distribution and Energy use in industry in the categories 'Public Electricity and Heat Production' and 'Stationary combustion in manufacturing industries and construction: Iron and steel'.

Also, Portugal reported major differences between the provisional 2011 and final 2011 data (+32.0%). These differences arise mainly from recalculations in the category 'Public Electricity and Heat Production' within the Energy production and distribution sector.

Final 2010, 2011 and provisional 2012 SO₂ emission data of all EU-27 Member States were below their respective ceilings (Figure 2.4).

Figure 2.4 Distance from ceiling (%) for SO₂ emissions in 2010, 2011 and 2012


Note: The national totals of Austria, Belgium, Ireland, Luxembourg, the Netherlands and the United Kingdom are based on fuel used. All other Member States reported a national total based on fuel sold. The aggregated EU-27 emission total is based on data for fuel used and for fuel sold (see Section 2.6).

2.4.4 NH₃ emissions

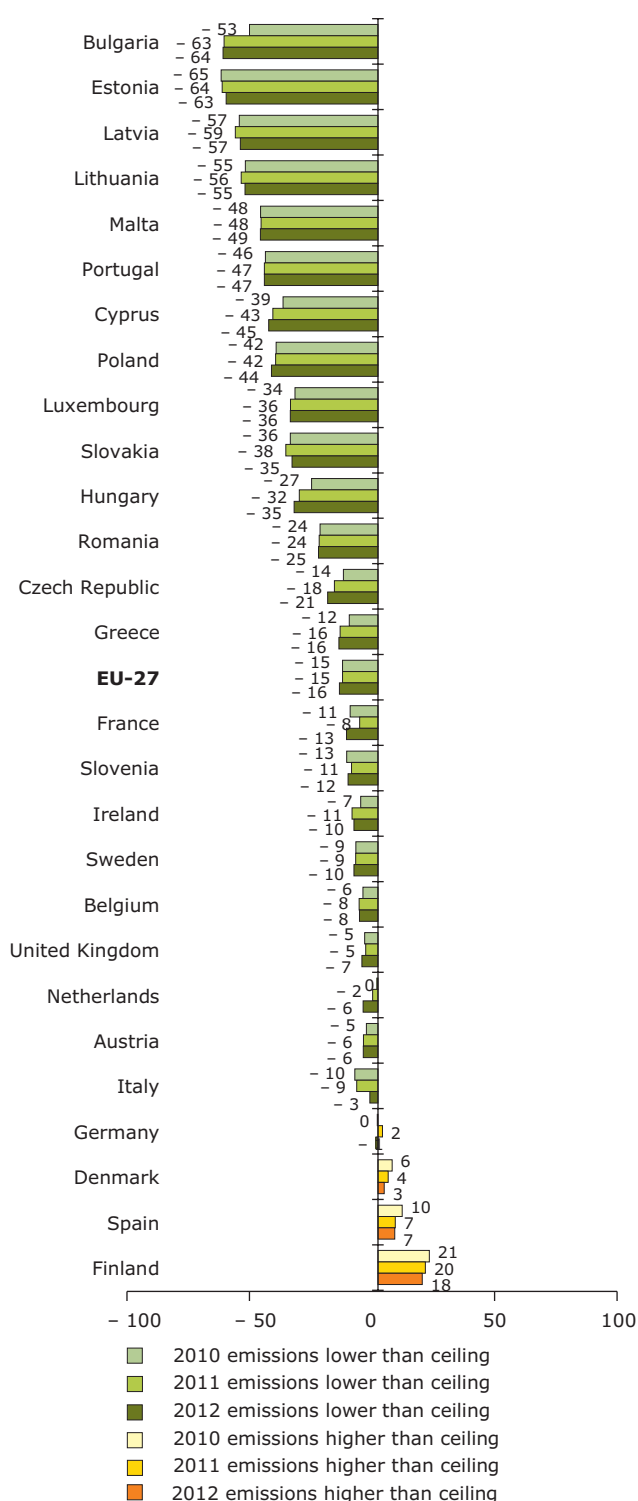
The largest emitters of NH₃ in 2012 were France, Germany and Italy. Between 2011 and 2012, 21 of 28 Member States reported emission reductions. The total reduction for the EU-28 between 2011 and 2012 amounts to -1.5%. The highest absolute reductions between 2011 and 2012 occurred in France and Germany.

Final 2010 emission data show that three EU-27 Member States (Finland, Spain and Denmark) reported emissions exceeding the respective emissions ceilings, as did four EU-27 Member States in 2011 (Finland, Spain, Denmark and Germany). Provisional NH₃ emission data of 24 Member States in the year 2012 indicated compliance with their respective ceilings (see Figure 2.5). Three Member States (Finland, Spain and Denmark) did not achieve their ceilings in the year 2012; emissions from Finland and Spain show a rather stable emission trend over the years, with no or limited reductions.

In Finland, NH₃ emission calculation methods have been improved since setting the national ceiling for NH₃. The Finnish ammonia emission inventory was updated during the last year: it took into account new information, and used improved calculation methods for agriculture as well as updated information on emissions for the other sectors. A slight decrease of NH₃ emissions is expected after 2012, but emissions are expected to stay at the level of between 35 Gg and 37 Gg for the period up to 2050 (NEC report of Finland, 2013).

Danish NH₃ emissions have decreased over past years, with the provisional 2011 emission data (submitted in 2012) indicating that Denmark attained its NH₃ emission ceiling. However, the final 2011 emission data subsequently submitted in 2013 indicate that emissions are slightly above the ceiling. This is mainly due to recalculations in the agricultural source category 'Synthetic N-fertilizers'. In Germany the situation for NH₃ is rather complex. The current reported NH₃ emissions are below the national emission ceiling. However, the national total fluctuates greatly with agricultural activity, namely the sale and application of mineral fertilisers. These activities depend on a variety of external parameters, such as prices and economic growth, and do not show a clear trend. In 2011, NH₃ emissions peaked and exceeded the ceiling set in the NEC Directive (IIR of Germany, 2014).

Latvia reported very large differences between the provisional 2011 (submitted in the previous reporting round) and final 2011 data (+40.1%).

Figure 2.5 Distance from ceiling (%) for NH₃ emissions in 2010, 2011 and 2012


Note: The reported national totals of Austria, Belgium, Ireland, Luxembourg, the Netherlands and the United Kingdom are based on fuel used. All other Member States reported a national total based on fuel sold. The aggregated EU-27 emission total is based on data for fuel used and for fuel sold (see Section 2.6).

The highest recalculations occurred in the category '4 D 1 a Synthetic N-fertilizers' of the agriculture sector and in the category '1 A 4 b i Residential: Stationary plants' of the Commercial, institutional and households sector. The changes are mainly due to updates in NH₃ emission included in the recently revised *EMEP/EEA air pollutant emission inventory guidebook – 2013* (EMEP/EEA 2013). The guidebook provides updated NH₃ emission factors for fertiliser use and biomass for the nomenclature for reporting, NFR⁽⁹⁾, categories '1 A 2' and '1 A 4'. Therefore, emissions which were not estimated previously for these categories, have increased the NH₃ emissions of the inventory for 2011 (source: comment received by Latvia in 2014).

Lithuania also reported major differences between the provisional 2011 and final 2011 data (+ 25.0 %). These differences arise mainly from changes in diverse categories of the agriculture sector and in the category 'Residential: Stationary plants' of the energy use sector.

The aggregated final 2010, 2011 and provisional 2012 NH₃ emission data in the EU-27 are lower than the respective EU ceiling (Annex I emission ceilings).

⁽⁹⁾ Nomenclature for reporting under UNECE Convention on Long-range Transboundary Air Pollution.

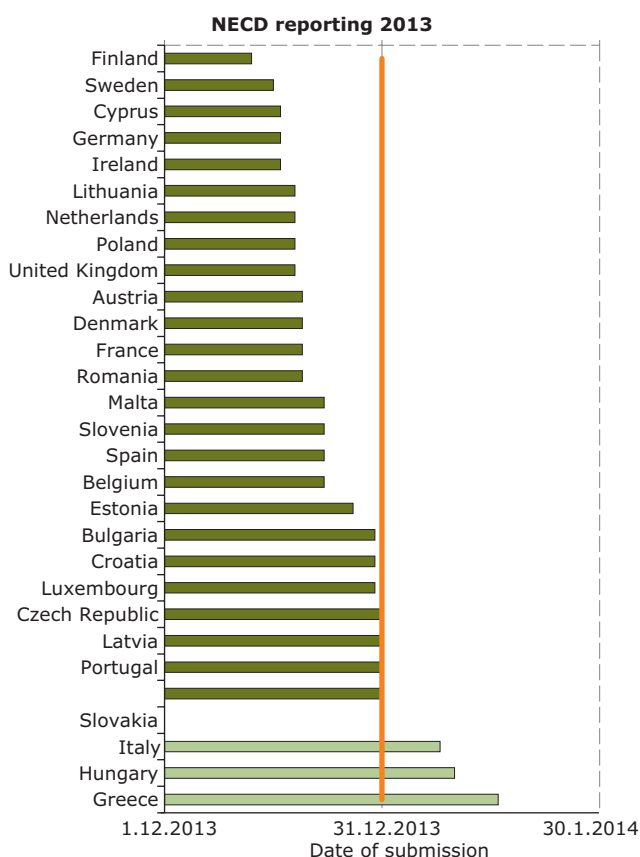
2.5 Timeliness and transparency of reporting

Information in this section is based on submissions from Member States delivered to the EEA via the Eionet Reportnet Central Data Repository (CDR), submissions delivered directly to the Commission and explanatory information provided by Member States directly to the ETC/ACM.

2.5.1 Timeliness and completeness

In the 2013 reporting cycle ⁽¹⁰⁾, all Member States provided the mandatory information on final 2011 emissions and the provisional 2012 emission data. Three Member States submitted these data after the formal deadline for submission: Italy, Hungary and Greece (Figure 2.6).

Figure 2.6 Reporting status – date of first NECD inventory submission to CDR or European Commission



⁽¹⁰⁾ The reporting deadline for the 2013 reporting cycle was 31.12.2013.

⁽¹¹⁾ For comparison, 22 Member States submitted Informative Inventory Reports (IIRs) under the LRTAP Convention by 31 March 2014 (EEA, 2014a).

⁽¹²⁾ Emphasis added.

Data from the Member States must be compiled in order to allow comparison with the respective EU-27 ceilings as set out in Annexes I and II to the NECD. It is therefore extremely important that Member States report complete emission data sets.

2.5.2 Transparency of submitted information

Providing inventory reports or explanatory information that describes the methods and sources of reported data is not mandatory under the NECD, meaning that the transparency of submitted information is rather limited. Nevertheless, 11 Member States (Austria, Belgium, Croatia, Finland, Germany, Latvia, the Netherlands, Poland, Romania, Slovakia and Spain) voluntarily submitted an inventory report together with their NECD inventories ⁽¹¹⁾.

More detailed information about the quality of the 2013 NECD submissions (for example, in terms of its internal consistency and completeness) will be provided in the annual joint EEA and EMEP/CEIP inventory review report (EMEP/EEA, 2014).

2.6 Basis for estimating emissions from mobile sources

In preparing emission inventories and projections under the NECD, Member States should apply the principles outlined in the UNECE guidelines for reporting emission data under the LRTAP Convention (UNECE, 2014). Paragraph 15 of these guidelines specifies how emissions from transport should be reported: 'For emissions from transport, Parties within the EMEP region should calculate and report emissions consistent with national energy balances reported to Eurostat or the International Energy Agency. Emissions from road vehicle transport should therefore be calculated and reported *on the basis of the fuel sold in the Party concerned*. [...] *In addition* ⁽¹²⁾, Parties may report emissions from road vehicles based on fuel used or kilometres driven in the geographic area of the Party. The method for the estimate(s) should be clearly specified in the IIR (informative inventory report).'

Paragraph 16 of the guidelines details the basis for compliance checking: 'For Parties within the EMEP region for which emission ceilings are derived from

national energy projections based on the amount of fuels sold, compliance checking will be based on the reporting on the basis of fuels sold in the geographic area of the Party. Other Parties within the EMEP region (Austria, Belgium, Ireland, Lithuania, Luxembourg, the Netherlands, Switzerland and United Kingdom) may choose to use the national emission total calculated on the basis of fuels used in the geographic area of the Party as a basis for compliance.'

The difference between transport emissions estimated using the amount of fuel sold within a country and emissions estimated using the amount of fuel consumed (i.e. fuel used) in a country can be

relatively large for countries where 'tank tourism' occurs, i.e. where fuel purchased within a country is actually used outside the country and vice versa. This can lead to omissions or double counting at EU level.

The sum of EU-27 emissions is based on information reported by Member States that includes both data on fuel used (6 Member States) and fuel sold (21/22 Member States). Table 2.7 gives an overview of Member State reporting. The 'Method used' column lists the different models used by Member States, in order to provide an indication of consistency for the calculation of emissions from road transport.

Table 2.7 Basis for estimating emissions from mobile sources

Member State	Road transport		Other transport sectors	Two national totals reported
	Fuel used/fuel sold	Method used	Fuel used/fuel sold	Yes/No
Austria (*)	Fuel used	HBEFA v3.1, v3.2 (a)	n/a	Yes
Belgium (*)	Fuel used	Wallonia: COPERT IV, v10.0 (b) for 2012, COPERT IV v9.1 for 2005–2011; Brussels Capital Region: COPERT IV, v8.1; Flanders: MIMOSA (c) - EF of COPERT IV, v9.1 for 2010 and later, MIMOSA - EF of COPERT v8.0 for years before 2010	Fuel used	No
Bulgaria	Fuel sold	COPERT IV, v10	Fuel sold	No
Croatia	Fuel sold	COPERT IV	Fuel sold	No
Cyprus	Fuel sold	COPERT IV, v9.1	n/a	No
Czech Republic	Fuel sold	Country-specific model	n/a	No (2011 Yes)
Denmark	Fuel sold	National approach, based on COPERT IV methodology	Fuel sold	No
Estonia	Fuel sold	COPERT IV	n/a	No
Finland	Fuel sold	LIISA (d), sub-model of LIPASTO (e)	Fuel sold	No
France	Fuel sold	COPERT IV, v9	1A3ai(i), 1A3aii(i), 1A3aii(ii), 1A4ci, 1A4cii: fuel used; 1A3ai(ii), 1A3c, 1A3di(i), 1A3dii, 1A4cii: fuel sold	No
Germany	Fuel sold	TREMOT, v5.2 (f)	Fuel sold	No
Greece	Fuel sold	COPERT IV, v8.1	n/a	No
Hungary	Fuel sold	COPERT IV, v9.1	n/a	No
Ireland (*)	Fuel used	COPERT IV, v10.0	n/a	Yes
Italy	Fuel sold	COPERT IV, v10.0	Fuel sold	No
Latvia	Fuel sold	COPERT IV	1A4ci, 1A4cij, 1A4cii, 1A5b: fuel used; 1A3ai(i), 1A3ai(ii), 1A3aii(i), 1A3aii(ii), 1A3c, 1A3di(i), 1A3di(ii), 1A3dii: fuel sold	No
Lithuania (*)	Fuel sold	COPERT IV, v10.0	Fuel sold	No
Luxembourg (*)	Fuel used	GLOBEMI (g)	Fuel sold	Yes
Malta	Fuel sold	Country-specific model	1A3di(i), 1A3dii: fuel used; 1A3ai(i), 1A3ai(ii), 1A3aii(ii), 1A4ci, 1A4cii: fuel sold	No

Table 2.7 Basis for estimating emissions from mobile sources (cont.)

Member State	Road transport		Other transport sectors	Two national totals reported
	Fuel used/fuel sold	Method used	Fuel used/fuel sold	Yes/No
Netherlands (*)	Fuel used	VERSIT+ (h)	n/a	Yes
Poland	Fuel sold	National approach	1A3c: fuel used; 1A3ai(i), 1A3ai(ii), 1A3aii(i), 1A3aii(ii), 1A3di(i), 1A3di(ii), 1A3dii, 1A4ci, 1A4cii, 1A4ciii: fuel sold	No
Portugal	Fuel sold	COPERT IV, v9.0	n/a	No
Romania	Fuel sold	COPERT IV	Fuel sold	No
Slovakia	Fuel sold	COPERT IV, v9.0	Fuel sold	No
Slovenia	Fuel sold	COPERT IV, v9.0	Fuel sold	No
Spain	Fuel sold	COPERT IV, v10.0	1A3ai(i), 1A3aii(i), 1A3dii (Diesel oil), 1A4ci (Diesel oil), 1A4cii, 1A4ciii: fuel used; 1A3c, 1A3dii (Residual oil), 1A4ci (Fuels other than diesel oil): fuel sold	No
Sweden	Fuel sold	HBEFA 3.1	n/a	No
United Kingdom (*)	Fuel used	Country-specific model; NO _x : COPERT IV, v10	n/a	No

Notes: (*) indicates that these countries may additionally report national emission totals calculated on the basis of fuels used in the geographic area of the Party as a basis for compliance.

(a) The Handbook Emission Factors for Road Transport (INFRAS, 2014).

(b) Computer Programme to Calculate Emissions from Road Transportation (EMEP/EEA, 2013).

(c) Road emission model (Lewyckij et al., 2004).

(d) Road traffic exhaust emissions calculation software (Mäkelä et al., 2002; VTT, 2014a).

(e) Calculation system for traffic exhaust emissions and energy consumption in Finland (VTT, 2014b).

(f) Transport Emission Estimation Model (Knörr et al., 2009).

(g) Global emission model (Hausberger, 1998).

(h) 'VERSIT' refers to 'verkeerssituatie', 'traffic situation' in Dutch (Smit et al., 2006 and 2007).

2.7 Potential underestimation of Member State emissions due to non-reporting of emissions from certain sectors

The official reporting guidelines of the LRTAP Convention (UNECE, 2014) (and through Annex III to the NECD, by extension applicable also to reporting under the NECD) allow countries to report emissions as 'NE' for those sectors where emissions are known to occur but have not been estimated or reported.

Countries should separately report the reasons why emissions are not estimated. Concerning 'NE' emissions, the *EMEP/EEA air pollutant emission inventory guidebook* (EMEP/EEA, 2013) recommends that the following be included in an IIR:

- a list of sources not estimated in the inventory;
- a qualitative assessment of their importance, currently and in future;
- a description of intentions to calculate these in future or an explanation of why there are no such plans.

In the previous NECD status report (EEA, 2013a), a first order assessment was made of the underestimation in national emission inventories that may occur due to the use of the notation key ⁽¹³⁾ 'NE' by Member States. This analysis was repeated again in this year's assessment (see Table 2.8 and Figure 2.7). The main intention of the analysis is to encourage Member States to review source categories reported as 'NE', and to provide estimates

⁽¹³⁾ Where methodological or data gaps in inventories exist, information on these gaps should be presented in a transparent manner. Amongst others, parties should use notation keys to fill the blanks in all the tables of the NFR inventory.

in future, especially when these sources may add significantly to the currently reported national totals.

Further, a separate analysis was performed so as to determine the number of Member States that report emissions of NO_x and NMVOC from the agriculture sector, source-pollutant combinations that were not included in the original modelling undertaken to support the determination of the 2010 emissions ceilings.

2.7.1 Assessment of potential underestimated emissions

In assessing the importance of source categories reported as not estimated ('NE'), for each NFR⁽¹⁴⁾ source category, the mean emissions for a given year were calculated. In doing so, the notation keys 'not applicable' ('NA') and 'not occurring' ('NO') were estimated as zero; 'included elsewhere' ('IE'), 'confidential' ('C') and 'NE' were excluded. The remaining notation key 'not relevant' ('NR') was not used by any Member State.

In the next step, the share (in percentage terms) of the mean emissions of each category to the mean national total (i.e. the aggregated total of the mean emissions of each category) was calculated. Source categories reported as 'NE' in national inventories were then assumed to contribute as much to the national total of the Member State as the share made by the same source category. In a final step, the potential underestimated emissions arising from use of the 'NE' notation key were added to the 2012 national totals of the Member States, and compared with the ceilings within the NECD to determine whether the difference in emissions is likely to affect the number of Member States attaining their ceilings. Although this method is a simple tool, it does provide an initial indication of situations where underestimations might have occurred, which can then be investigated in more detail.

2.7.2 Assessment results

Certain Member States used the notation key 'NE' for a considerable number of source categories (see Figure 2.7 and Table 2.8). Romania, for example, reported 46 source categories of SO₂ as 'NE'. By contrast, 7 Member States used 'NE' only for up to

10 source categories (sum of all 4 pollutants), and 4 Member States for no source category at all.

17 Member States (of 24) that made use of the notation key 'NE' provided reasons for using it in their data submissions under the NECD, and it should be noted that Member States might provide more information under their LRTAP Convention submissions. The information made available, however, varied somewhat in terms of its informative value.

Table 2.8 also shows, for the sources reported as 'NE', the estimated underestimation of these sources as a percentage of the original reported national total. Generally, the potential underestimation is low for all pollutants. There are only a few cases where the potential underestimation is above 10 % (NO_x and NMVOC in Bulgaria, and NMVOC in Lithuania, Ireland and Malta).

For most Member States, the addition of the potential underestimate to their national totals does not affect the evaluation: Member States will not exceed the emission ceilings because of it. However, for Germany (NH₃), the addition of the potential underestimate increases the 2012 emissions to above the level of the 2010 ceiling. For Germany the two 'NE's used for NH₃ emissions are in the categories '6 C d Cremation' and '6 D Other waste'. While NH₃ emissions from cremation are considered to be small, emission factors for 6 D (composting) are currently being developed in Germany. Germany has informally indicated that this gap will be closed in their next NECD inventory submission.

The same analysis was carried out to assess the possible underestimation of the final 2011 emission data (detailed results are not shown). For two Member States, the addition of the potential underestimate to their national totals of the year 2011 increases the 2011 emissions above the level of the respective 2010 ceiling (Denmark for NO_x, and Germany for NMVOC).

2.7.3 Assessment of Member State reporting for 'new' source categories

Since the original integrated assessment modelling undertaken to support the determination of the 2010 emissions ceilings, our knowledge has

⁽¹⁴⁾ NFR: Nomenclature for reporting under UNECE Convention on Long-range Transboundary Air Pollution.

Table 2.8 'Not estimated' source categories and their contribution to total emissions in 2012 (EU-27)

Member State	NO _x				NMVOC				SO ₂				NH ₃			
	Number of source categories NE	Potential underestimation of emissions (%)	Are 2012 emissions lower than ceiling?	Are 2012 emissions + potential underestimation lower than ceiling?	Number of source categories NE	Potential underestimation of emissions (%)	Are 2012 emissions lower than ceiling?	Are 2012 emissions + potential underestimation lower than ceiling?	Number of source categories NE	Potential underestimation of emissions (%)	Are 2012 emissions lower than ceiling?	Are 2012 emissions + potential underestimation lower than ceiling?	Number of source categories NE	Potential underestimation of emissions (%)	Are 2012 emissions lower than ceiling?	Are 2012 emissions + potential underestimation lower than ceiling?
Austria	0	0 %	No	No	0	0 %	Yes	Yes	0	0 %	Yes	Yes	0	0 %	Yes	Yes
Belgium	9	2 %	No	No	17	4 %	Yes	Yes	8	1 %	Yes	Yes	19	1 %	Yes	Yes
Bulgaria	14	12 %	Yes	Yes	14	16 %	Yes	Yes	13	1 %	Yes	Yes	15	6 %	Yes	Yes
Cyprus	0	0 %	Yes	Yes	0	0 %	Yes	Yes	0	0 %	Yes	Yes	0	0 %	Yes	Yes
Czech Republic	35	4 %	Yes	Yes	31	7 %	Yes	Yes	23	1 %	Yes	Yes	33	7 %	Yes	Yes
Denmark	22	3 %	Yes	Yes	20	5 %	Yes	Yes	7	2 %	Yes	Yes	18	2 %	No	No
Estonia	1	0 %	Yes	Yes	1	1 %	Yes	Yes	1	0 %	Yes	Yes	2	0 %	Yes	Yes
Finland	0	0 %	Yes	Yes	0	0 %	Yes	Yes	0	0 %	Yes	Yes	2	0 %	No	No
France	1	0 %	No	No	12	3 %	Yes	Yes	0	0 %	Yes	Yes	1	1 %	Yes	Yes
Germany	3	0 %	No	No	16	4 %	Yes	Yes	2	0 %	Yes	Yes	2	1 %	Yes	No
Greece	11	1 %	Yes	Yes	14	5 %	Yes	Yes	7	1 %	Yes	Yes	0	0 %	Yes	Yes
Hungary	1	0 %	Yes	Yes	16	3 %	Yes	Yes	1	0 %	Yes	Yes	4	0 %	Yes	Yes
Ireland	26	3 %	No	No	26	12 %	Yes	Yes	16	4 %	Yes	Yes	40	5 %	Yes	Yes
Italy	15	2 %	Yes	Yes	0	0 %	Yes	Yes	0	0 %	Yes	Yes	0	0 %	Yes	Yes
Latvia	2	0 %	Yes	Yes	2	0 %	Yes	Yes	2	0 %	Yes	Yes	14	1 %	Yes	Yes
Lithuania	10	1 %	Yes	Yes	14	17 %	Yes	Yes	9	3 %	Yes	Yes	19	8 %	Yes	Yes
Luxembourg	1	0 %	No	No	2	0 %	No	No	1	0 %	Yes	Yes	3	1 %	Yes	Yes
Malta	1	0 %	No	No	6	10 %	Yes	Yes	2	0 %	Yes	Yes	1	0 %	Yes	Yes
Netherlands	3	1 %	Yes	Yes	14	3 %	Yes	Yes	0	0 %	Yes	Yes	4	2 %	Yes	Yes
Poland	1	0 %	Yes	Yes	2	1 %	Yes	Yes	2	1 %	Yes	Yes	0	0 %	Yes	Yes
Portugal	10	0 %	Yes	Yes	13	3 %	Yes	Yes	14	1 %	Yes	Yes	29	2 %	Yes	Yes
Romania	30	5 %	Yes	Yes	28	3 %	Yes	Yes	46	7 %	Yes	Yes	33	3 %	Yes	Yes
Slovakia	2	1 %	Yes	Yes	3	0 %	Yes	Yes	2	0 %	Yes	Yes	3	0 %	Yes	Yes
Slovenia	0	0 %	No	No	0	0 %	Yes	Yes	0	0 %	Yes	Yes	0	0 %	Yes	Yes
Spain	12	0 %	No	No	26	5 %	Yes	Yes	16	0 %	Yes	Yes	24	5 %	No	No
Sweden	16	2 %	Yes	Yes	21	4 %	Yes	Yes	5	0 %	Yes	Yes	15	2 %	Yes	Yes
United Kingdom	0	0 %	Yes	Yes	2	1 %	Yes	Yes	1	0 %	Yes	Yes	1	0 %	Yes	Yes

Notes: To enable comparison between Member States, the analysis is based on converted NFR tables for Italy. The number of source categories that were not estimated may vary slightly from the number originally reported by Italy.

Bold figures indicate that the number of the notation key 'NE' increased by more than five, as compared with the submissions of 2012.

Ireland and Luxembourg lack data based on fuel used for road vehicle transport, and consequently data in these categories are based on fuel sold for the calculation of the underestimation.

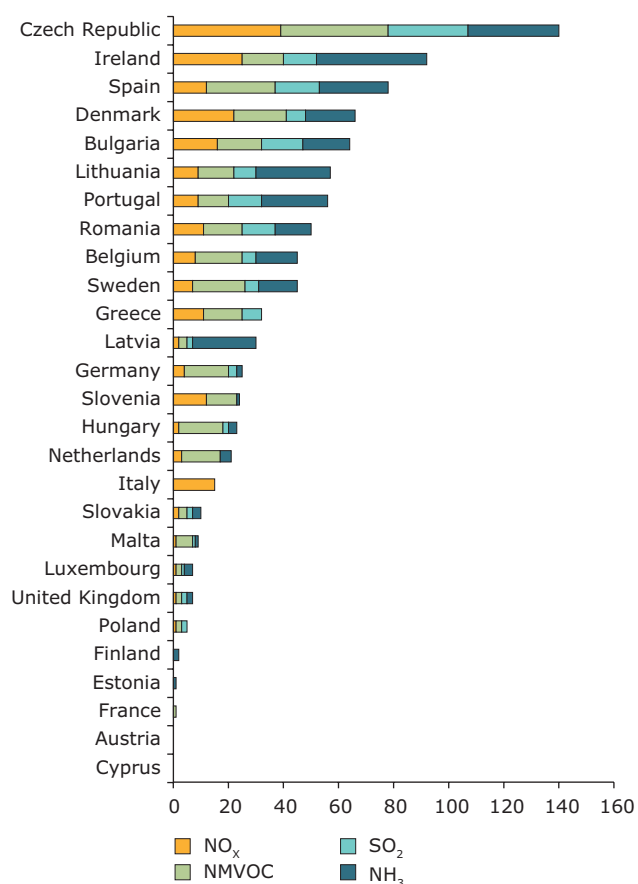
advanced concerning the sources of air pollutants. In several instances, 'new' emission sources for the pollutants covered within the scope of the NECD have been recognised; on the basis of subsequent measurements, emission factors have been developed that now enable emission estimates to be made.

As a result, several (but not all) Member States now report emissions from 'new' pollutant–source category combinations that were not included in the original modelling. Examples of such combinations

are NO_x and NMVOC emissions from the agriculture sector (NFR code 4).

The *EMEP/EEA air pollutant emission inventory guidebook* (EMEP/EEA, 2013) provides Member States with default methodologies and emission factors that they can use in order to estimate emissions. Not all 'new' pollutant–source combinations are assigned a default method with default emission factors in the guidebook. This occurs, for example, when scientific evidence

Figure 2.7 Number of Member State 'not estimated' source categories for NO_x , NMVOC, SO_2 and NH_3



is deemed insufficient to recommend an emission factor as suitable for use across Europe. Nevertheless, in a number of Member States, national methods and data are available that have been applied to estimate emissions for these combinations.

A study was therefore performed to assess the number of Member States that report emissions from selected 'new' sources (NO_x and NMVOC from the agriculture sector), and to determine the significance of these emissions with respect to the reported national totals and national emissions ceilings. The shares of emissions from the agriculture sector relative to the Member States' ceilings and national totals were calculated (see Table 2.9 and Table 2.10), and the numbers of NFR categories where values were reported were given. The NO_x and NMVOC emissions from all Member States and categories of the agriculture sector were also summed and compared with the total EU-27 emissions of the years 2010, 2011 and 2012 (Table 2.11).

NO_x emissions from the agriculture sector (Table 2.9)

Data for NO_x from the agriculture sector were reported by 20 Member States for the year 2012, although 10 of these countries reported data only for 1 of the 19 agriculture source sub-categories included in the reporting format. Germany, Hungary and Slovenia submitted data for the highest number of sub-categories (13 to 15 of the total 19). In 2012, NO_x emissions in the agriculture sector corresponded to 10 %, 6 % and 5 % of the emission ceilings in Germany, Hungary and Austria respectively. The share of national total NO_x emissions that was attributed to agricultural activities was 11 %, and 8 % for Hungary and Germany respectively. In other Member States, NO_x emissions from agriculture was reported to account for a relatively small share (4 % and lower) of total NO_x emissions in 2012 (see Table 2.9).

Table 2.9 Share of NO_x emissions from the agriculture sector to Member States' national total and ceilings in 2012

Member State	Share of NO_x emissions on the national total	Share of NO_x emissions on the emission ceiling	Number of categories, where values were reported
Hungary	11 %	6 %	14
Germany	8 %	10 %	15
Austria	4 %	5 %	12
Estonia	4 %	< 2 %	9
Slovenia	3 %	3 %	13
Netherlands	< 3 %	< 3 %	8
Bulgaria	< 3 %	< 2 %	1
Spain	< 3 %	< 3 %	2
Luxembourg	< 2 %	< 3 %	1
Poland	< 2 %	< 2 %	1
Croatia	< 2 %		12
Cyprus	< 2 %	< 1 %	11
Portugal	< 1 %	< 1 %	1
Greece	< 1 %	< 1 %	1
Romania	< 1 %	< 1 %	8
France	< 1 %	< 1 %	1
Denmark	< 1 %	< 1 %	1
Italy	< 1 %	< 1 %	1
Latvia	< 1 %	< 1 %	1
Finland	< 1 %	< 1 %	1

NMVOC emissions from the agriculture sector (Table 2.10)

Data for NMVOC in the agriculture sector were reported by 19 Member States in 2012, 10 of which reported data only for 1 of the agriculture 19 source sub-categories included in the reporting format.

Table 2.10 Share of NMVOC emissions from the agriculture sector to Member States' national total and ceilings in 2012

Member State	Share of NMVOC emissions on the national total	Share of NMVOC emissions on the emission ceiling	Number of categories, where values were reported
Bulgaria	34 %	17 %	2
Cyprus	24 %	16 %	10
Romania	18 %	12 %	8
Slovenia	14 %	13 %	11
Estonia	11 %	8 %	8
Spain	11 %	9 %	1
United Kingdom	9 %	6 %	8
Luxembourg	< 2 %	< 3 %	1
Latvia	< 2 %	< 1 %	1
Portugal	< 2 %	< 2 %	1
Austria	< 2 %	< 2 %	2
Slovakia	< 1 %	< 1 %	1
Denmark	< 1 %	< 1 %	1
France	< 1 %	< 1 %	1
Poland	< 1 %	< 1 %	2
Italy	< 1 %	< 1 %	9
Netherlands	< 1 %	< 1 %	1
Finland	< 1 %	< 1 %	1
Ireland	< 1 %	< 1 %	1

Slovenia, Cyprus and Italy submitted data for the highest number of sub-categories (9 to 11 of the total 19). In 2012, NMVOC emissions in the agriculture sector often made up a notable fraction of the respective emission ceiling in some Member States (for instance, in Bulgaria (17 %), Cyprus (16 %) and Slovenia (13 %)). For the Member States reporting NMVOC emissions from this sector, emissions reported are sometimes very significant in relation to their national totals: Bulgaria (34 %), Cyprus (24 %), Romania (18 %), Slovenia (14 %), Estonia and Spain (11 %) and the United Kingdom (9 %). In other Member States, NMVOC emissions from agriculture formed only a relatively small share (below 2 %) of total NMVOC emissions in 2012.

At EU-27 level in 2012, subtraction of NMVOC emissions from the agriculture sector amounts to 3.8 % of the total emissions (Table 2.11). However, for NO_x , even the subtraction of the 2.1 % emissions from the agriculture sector would not bring the EU emissions 2012 below the level of the Annex II NO_x ceiling.

2.7.4 Natural sources

Emissions from 'Natural sources' are not considered anthropogenic in nature and therefore are included neither in the NECD emission ceilings nor in the reported national totals for Member States. Countries may however voluntarily include information for these sources in their submissions. Examples of natural sources are volcanoes and other geothermal activities both eruptive and non-eruptive, fires in non-managed or managed forests and other vegetation (but excluding agricultural burning of stubble), and other sources such as volatilisation of certain NMVOC from vegetation. Emission estimates from such sources

Table 2.11 Effect on NO_x and NMVOC emissions of the 'new' emission source category agriculture on EU total emissions

in Gg	NO_x			NMVOC		
	2010	2011	2012	2010	2011	2012
EU-27 emissions as reported	8 942	8 582	8 361	7 252	6 878	6 726
Amount of the agriculture sector	170	181	175	249	254	255
EU-27 without emissions from the agriculture sector	8 772	8 401	8 186	7 003	6 624	6 471
Annex I emission ceiling	9 003	9 003	9 003	8 848	8 848	8 848
Annex II emission ceiling	8 180	8 180	8 180	7 585	7 585	7 585

are typically subject to high uncertainty. More information concerning estimating emissions from natural sources is available in EMEP/EEA (2013).

Table 2.12 shows a compilation of the emissions reported by the EU Member States for natural sources. In 2012, just eight Member States voluntarily reported emissions from such sources. The magnitude of these emissions compared to the reported national totals is in some instances significant, many times greater than the national total (e.g. Italy, SO₂ volcanoes). Significant emissions are reported by:

- France NMVOC 'Other sources' (forests) – 13 % of national total;
- Italy SO₂ 'Volcanoes' – 1 300 % of national total;
- Netherlands NO_x 'Other sources' (NO_x from volatilisation of NO from agricultural and non-agricultural land), 10 % of national total;
- Poland NMVOC 'Other sources' (forests – reported under the general memo item NFR category 7B 'Other not included in national total' so not shown in the table below), 42 % of national total;
- Portugal NMVOC 'Forest fires' 10 %, and 'Other sources' (biogenic emissions), 295 % of national total;
- UK NMVOC 'Other sources' (biogenic emissions), 11 % of national total.

Table 2.12 Voluntary reporting of emissions from natural sources, 2012

Member State	NO _x						NMVOC					
	Volcanoes (11A)		Forest fires (11B)		Other sources (11C)		Volcanoes (11A)		Forest fires (11B)		Other sources (11C)	
	Emissions (Gg)	% of NT (*)	Emissions (Gg)	% of NT (*)	Emissions (Gg)	% of NT (*)	Emissions (Gg)	% of NT (*)	Emissions (Gg)	% of NT (*)	Emissions (Gg)	% of NT (*)
Austria	NO	-	NO	-	NO	-	NO	-	NO	-	NO	-
Belgium	NO	-	NO	-	NO	-	NO	-	NO	-	NO	-
Bulgaria	-	-	-	-	-	-	-	-	-	-	-	-
Croatia	NO	-	0.57	0.96	NO	-	NO	-	1.70	2.48	NO	-
Cyprus	NO	-	NE	-	NE	-	NO	-	NE	-	NE	-
Czech Republic	NO	-	NO	-	NO	-	NO	-	NO	-	NO	-
Denmark	NO	-	NE	-	NE	-	NO	-	NE	-	NE	-
Estonia	-	-	-	-	-	-	-	-	-	-	-	-
Finland	NO	-	NA	-	NA	-	NO	-	NA	-	NA	-
France	NO	-	0.58	0.06	0.44 ^(*)	0.04	NO	-	1.49	0.21	95.78 ^(*)	13.47
Germany	NO	-	0.04	0.00	NO	-	NO	-	0.10	0.01	NO	-
Greece	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	NO	-	NE	-	NO	-	NO	-	NE	-	NO	-
Italy	NA	-	0.04	0.00	-	-	NA	-	2.89	0.30	-	-
Latvia	NO	-	0.06	0.17	NO	-	NO	-	NA	-	NO	-
Lithuania	NO	-	NE	-	NE	-	NO	-	NE	-	NE	-
Luxembourg	-	-	-	-	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	NO	-	NO	-	23.68 ^(b)	9.55	NO	-	NO	-	NO	-
Poland	NA	-	NA	-	-	-	NA	-	0.10	0.02	-	-
Portugal	NA	-	3.30	1.96	NA	-	NA	-	17.59	10.44	497.48	295.38
Romania	NO	-	NE	-	NE	-	NO	-	NE	-	NE	-
Slovakia	-	-	-	-	-	-	-	-	-	-	-	-
Slovenia	NO	-	NO	-	NO	-	NO	-	NO	-	NO	-
Spain	-	-	-	-	-	-	-	-	-	-	-	-
Sweden	NO	-	NE	-	NO	-	NO	-	NE	-	NO	-
United Kingdom	NO	-	0.13	0.01	0.70	0.07	NO	-	0.35	0.04	91.56	11.01

Table 2.12 Voluntary reporting of emissions from natural sources, 2012 (cont.)

Member State	SO ₂						NH ₃					
	Volcanoes (11A)		Forest fires (11B)		Other sources (11C)		Volcanoes (11A)		Forest fires (11B)		Other sources (11C)	
	Emissions (Gg)	% of NT (*)	Emissions (Gg)	% of NT (*)	Emissions (Gg)	% of NT (*)	Emissions (Gg)	% of NT (*)	Emissions (Gg)	% of NT (*)	Emissions (Gg)	% of NT (*)
Austria	NO	-	NO	-	NO	-	NO	-	NO	-	NO	-
Belgium	NO	-	NO	-	NO	-	NO	-	NO	-	NO	-
Bulgaria		-		-		-		-		-		-
Croatia	NO	-	0.11	0.44	NO	-	NO	-	0.11	0.30	NO	-
Cyprus	NO	-	NE	-	NE	-	NO	-	NE	-	NE	-
Czech Republic	NO	-	NO	-	NO	-	NO	-	NO	-	NO	-
Denmark	NO	-	NE	-	NE	-	NO	-	NE	-	NE	-
Estonia		-		-		-		-		-		-
Finland	NO	-	NA	-	NA	-	NO	-	NA	-	NA	-
France	NO	-	0.13	0.05	NA	-	NO	-	0.13	0.02	NA	-
Germany	NO	-	0.01	0.00	NO	-	NO	-	0.01	0.00	NO	-
Greece		-		-		-		-		-		-
Hungary		-		-		-		-		-		-
Ireland	NO	-	NE	-	NO	-	NO	-	NE	-	NO	-
Italy	2 500	1 364.07	0.18	0.10		-	NA	-	0.24	0.06		-
Latvia	NO	-	NA	-	NO	-	NO	-	NA	-	NO	-
Lithuania	NO	-	NE	-	NE	-	NO	-	NE	-	NE	-
Luxembourg		-		-		-		-		-		-
Malta		-		-		-		-		-		-
Netherlands	NO	-	NO	-	NO	-	NO	-	NO	-	NO	-
Poland	NA	-	NA	-		-	NA	-	NA	-		-
Portugal	NA	-	NE	-	NA	-	NA	-	NE	-	NA	-
Romania	NO	-	NE	-	NE	-	NO	-	NE	-	NE	-
Slovakia		-		-		-		-		-		-
Slovenia	NO	-	NO	-	NO	-	NO	-	NO	-	NO	-
Spain		-		-		-		-		-		-
Sweden	NO	-	NE	-	NO	-	NO	-	NE	-	NO	-
United Kingdom	NO	-	NA	-	NA	-	NO	-	NA	-	8.64	3.11

Note: (*) Natural sources are not included in the reported National Totals (NT).

(^a) Lightening.

(^b) Volatilisation of NO from agricultural and non-agricultural land.

(^c) Deciduous and coniferous forests, natural grassland.

3 Conclusions

This chapter summarises the overall emission trends in the Member States and the problems encountered during the compilation of the inventory submissions. Further, the chapter offers suggestions for improvement.

3.1 Emission trends and ceiling assessments

3.1.1 Comparison of final 2010 emission estimates and ceilings

A total of 12 Member States reported emission data above the ceiling of at least one pollutant. The final emission data exceed the respective ceilings for three of the four pollutants in Denmark (NO_x , NMVOC and NH_3), and for two pollutants in Germany (NO_x and NMVOC) and Spain (NO_x and NH_3).

3.1.2 Comparison of final 2011 emission estimates and ceilings

A total of 10 Member States reported emission data above the ceiling of at least one pollutant, based on the final 2011 data. The final emission data exceed the respective ceilings for two of the four pollutants in Germany (NO_x and NH_3), Slovenia (NO_x and NMVOC) and Spain (NO_x and NH_3).

3.1.3 Comparison of provisional 2012 emission estimates and ceilings

A total of 11 Member States reported emission data above the ceiling of at least one pollutant. The provisional 2012 emission data exceed the respective ceilings for two of the four pollutants in Luxembourg (NO_x and NMVOC) and Spain (NO_x and NH_3).

Based on the provisional 2012 emissions data, the highest number of ceiling exceedances was reported for NO_x (nine Member States). One Member State reported provisional 2012 emission data for NMVOC above the ceiling, and three countries reported exceedances of NH_3 . All Member States continue to meet their SO_2 ceilings.

3.1.4 Emission trends

The NECD does not formally require Member States to report complete emission time-series data back to 1990. Between 2011 and 2012, emission reductions were reported by about three-quarters of the Member States for NO_x , NMVOC, SO_2 and NH_3 . A more complete picture of past emission trends in the EU will be available in mid-2014, when the EEA publishes its annual EU emission inventory report under the LRTAP Convention (EEA, 2014a).

Completeness of 2012 emissions compared to ceilings

A number of Member States used the notation key 'NE' to indicate that emissions from specific source categories were not estimated. Generally, the potential underestimation occurring as a result of this (in percentage terms) is low for all pollutants. There are, however, a few cases where the potential underestimation is greater than 10 % (NO_x and NMVOC in Bulgaria, and NMVOC in Lithuania, Ireland and Malta). For Germany, the potential underestimation may increase the 2012 NH_3 emissions to levels above the respective 2010 ceiling. Member States are encouraged to review and limit their use of the 'NE' notation key when reporting emission data in future, and to provide numerical estimates where relevant and applicable.

The following Member States exceed their ceilings in 2010, 2011 and 2012 when taking also into account the potential under-reporting of emissions: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, Malta, Slovenia and Spain. Of these, Austria, Belgium, Finland, France, Germany and Luxembourg report exceedances larger than 10 % above their ceilings for all three years 2010, 2011 and 2012.

3.2 Outlook post-2010

The NECD called for emission ceilings to be complied with by 2010, and not to be exceeded in any year following. In addition to those Member States that report exceedances, it is noted that a number of others have reported emissions for 2012 which lie just below the value of their respective ceilings, e.g. the Netherlands for NO_x , Slovenia and Germany

for NMVOC, and Germany and Italy for NH₃. It is important that all Member States take appropriate measures to limit any future increase in emissions which would result in their ceilings being exceeded.

3.3 Recommended improvements in reporting methodology

It is important that the completeness of Member States' reporting improves in line with the reporting criteria of the EMEP reporting guidelines. Classifying specific emission source categories as 'NE' should be limited only to insignificant sources of emissions, in accordance with the definitions included in the reporting guidelines. It is a cause of concern that the compilation of incomplete emission inventories may lead to emission levels rising above emission ceilings. The reporting of the best-performing Member States might be used to establish a benchmark that could encourage others

to develop more comprehensive reporting over the next few years.

To help improve the transparency of the reported NECD data, it is always strongly recommended that Member States should submit an accompanying informative inventory report (IIR). Such a report should include explanatory information on the reported inventory, such as whether countries report on the basis of fuel used or sold, provide explanation for time series changes and recalculations, document uncertainties etc.

It is also important that there be improved transparency regarding measures taken by Member States and the contribution of these measures to compliance with the national emission ceilings, e.g. implementing the standards for best available techniques (BATs) or including specific additional requirements for certain types of industry or agriculture.

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Appendix 1 Emission data submitted under the NEC Directive

Tables A1.1, A1.2, A1.3 and A1.4 show, for each pollutant, a comparison ⁽¹⁵⁾ between 2012 emissions and those reported for the years 2011 and 1990 (if data were reported) ⁽¹⁶⁾. Data shown in these tables are only from the 2013 submission. The national totals of the Member States are either emission estimates based on fuel used or fuel sold for mobile sources. An overview is given in Table 2.4 and Table 2.7 of the main report.

Table A1.1 NO_x data reported by Member States

NO _x (Gg)	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	NECD emission ceilings	Change 2011–2012 (%)	Change 1990–2012 (%)	Contribution to EU-27 in 2012 (%)
Austria	182	163	164	169	168	166	160	148	148	145	141	103	-2.4	-22.3	1.7
Belgium	402	394	329	293	275	265	240	208	221	208	206	176	-1.1	-48.7	2.4
Bulgaria										136	124	247	-8.6		1.5
Cyprus										21	21	23	1.2		0.2
Czech Republic										225	210	286	-6.8		2.5
Denmark	276	270	208	186	186	173	155	137	132	125	115	127	-7.7	-58.2	1.4
Estonia	74	39	38	37	35	39	36	30	37	36	32	60	-9.8	-56.0	0.4
Finland	285	254	201	169	188	187	168	155	167	154	147	170	-4.6	-48.7	1.7
France	1 866	1 714	1 578	1 404	1 331	1 271	1 170	1 088	1 067	1 001	983	810	-1.8	-47.3	11.7
Germany	2 875	2 172	1 919	1 565	1 556	1 479	1 404	1 305	1 328	1 294	1 273	1 051	-1.6	-55.7	15.1
Greece										296	259	344	-12.6		3.1
Hungary										131	117	198	-10.4		1.4
Ireland	128	122	122	121	116	113	104	83	77	69	71	65	3.3	-44.4	0.8
Italy										930	909	990	-2.2		10.8
Latvia	84	49	41	42	42	42	38	35	36	31	35	61	12.0	-58.2	0.4
Lithuania										60	56	58	3.7		0.7
Luxembourg										18	17	11	-3.8		0.2
Malta			8	9	9	9	9	9	8	8	9	8	10.1		0.1
Netherlands	575	477	395	337	323	308	298	272	272	257	248	260	-3.6	-56.9	2.9
Poland		1 063	844	851	855	860	830	809	862	846	817	879	-3.4		9.7
Portugal	235	268	268	265	243	237	211	199	187	177	169	250	-4.8	-28.3	2.0
Romania										223	226	437	1.6		2.7
Slovakia			107	102	96	96	94	84	89	85	81	130	-5.0		1.0
Slovenia										46	45	45	-2.5		0.5
Spain	1 270	1 316	1 299	1 322	1 270	1 261	1 074	947	886	881	855	847	-3.0	-32.7	10.1
Sweden	268	245	207	175	170	163	155	146	148	139	131	148	-5.5	-51.2	1.6
United Kingdom						1 473	1 322	1 151	1 117	1 045	1 062	1 167	1.6		12.6
EU-27										8 582	8 361	9 003	-2.6		100
Croatia	95	66	74	81	82	85	83	75	69	65	59	87	-9.2	-37.9	

⁽¹⁵⁾ Changes in emissions in each country during 2011 and 2012 are expressed as $100 \times (E_{\text{curr}} - E_{\text{prev}})/E_{\text{prev}}$ (%), where E_{curr} and E_{prev} are current and previous total emissions in each year. Changes in emissions in each country from 1990 to 2012 are expressed as $100 \times (E_{\text{curr}} - E_{1990})/E_{1990}$ (%), where E_{curr} and E_{1990} are current and 1990 total emissions in each year.

⁽¹⁶⁾ Croatia joined the EU in July 2013, and therefore data for 2011 and 2012 is shown for informative purposes only.

Table A1.2 NMVOC data reported by Member States

NMVOC (Gg)	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	NECD emission ceilings	Change 2011–2012 (%)	Change 1990–2012 (%)	Contribution to EU-27 in 2012 (%)
Austria	273	224	176	159	170	157	149	120	132	126	133	159	5.6	- 51.4	2.0
Belgium	314	270	191	149	144	134	127	114	116	105	106	139	1.2	- 66.1	1.6
Bulgaria										91	91	175	0.4		1.3
Cyprus										10	9	14	- 3.6		0.1
Czech Republic										136	132	220	- 3.0		1.9
Denmark	162	164	136	112	107	102	97	90	87	80	77	85	- 3.6	- 52.3	1.1
Estonia	70	50	45	40	38	39	37	35	35	33	34	49	1.8	- 51.9	0.5
Finland	257	218	166	136	131	129	118	111	116	106	105	130	- 0.8	- 59.2	1.5
France	2 591	2 166	1 742	1 261	1 145	1 021	929	830	817	738	711	1 050	- 3.6	- 72.6	10.5
Germany	3 067	1 769	1 372	1 124	1 113	1 051	997	912	1 024	981	954	995	- 2.8	- 68.9	14.0
Greece										159	152	261	- 4.3		2.2
Hungary										100	99	137	- 1.1		1.5
Ireland	85	76	65	55	54	53	51	48	46	44	43	55	- 2.9	- 49.1	0.6
Italy										989	953	1 159	- 3.7		14.0
Latvia	80	66	57	56	56	54	52	52	53	51	54	136	6.7	- 32.1	0.8
Lithuania									62	59	59	92	0.9		0.9
Luxembourg										8	10	9	16.9		0.1
Malta			3	3	4	3	3	3	3	3	3	12	4.9		0.0
Netherlands	482	341	238	172	164	162	160	149	150	149	146	185	- 1.9	- 69.7	2.1
Poland		680	575	575	628	614	637	617	653	638	630	800	- 1.3		9.3
Portugal	289	279	255	207	200	194	187	175	178	172	168	180	- 2.0	- 41.8	2.5
Romania										356	355	523	- 0.3		5.2
Slovakia			66	73	70	67	67	64	62	68	61	140	- 10.4		0.9
Slovenia										41	39	40	- 3.6		0.6
Spain	1 023	948	960	803	774	756	692	635	630	602	582	662	- 3.4	- 43.1	8.6
Sweden	359	277	222	198	194	191	187	188	188	189	186	241	- 1.8	- 48.3	2.7
United Kingdom						1 073	992	895	863	844	832	1 200	- 1.4		12.2
EU-27										6 878	6 726	8 848	- 2.2		100
Croatia	112	77	83	101	110	114	109	78	77	73	68	90	- 5.7	- 38.7	

Table A1.3 SO₂ data reported by Member States

SO ₂ (Gg)	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	NECD emission ceilings	Change 2011–2012 (%)	Change 1990–2012 (%)	Contribution to EU-27 in 2012 (%)
Austria	74	47	31	27	28	25	22	17	19	18	17	39	- 4.4	- 76.5	0.4
Belgium	361	261	174	145	135	126	98	77	62	54	50	99	- 8.4	- 86.2	1.2
Bulgaria										515	329	836	- 36.1		8.2
Cyprus										21	16	39	- 22.3		0.4
Czech Republic										165	158	265	- 4.1		3.9
Denmark	178	141	31	25	28	25	20	15	15	14	13	55	- 10.5	- 92.9	0.3
Estonia	274	116	97	76	70	88	69	55	83	73	41	100	- 44.2	- 85.2	1.0
Finland	263	99	79	69	84	83	70	59	67	61	51	110	- 15.7	- 80.4	1.3
France	1 305	972	633	460	434	424	359	311	288	246	232	375	- 5.7	- 82.2	5.8
Germany	5 282	1 705	638	460	471	454	454	407	430	424	427	520	0.8	- 91.9	10.7
Greece										262	245	523	- 6.6		6.1
Hungary										35	32	500	- 9.2		0.8
Ireland	183	161	139	72	61	54	45	32	26	25	23	42	- 5.9	- 87.3	0.6
Italy										195	183	475	- 6.1		4.6
Latvia	102	49	16	7	6	6	5	4	3	3	2	101	- 18.9	- 97.6	0.1
Lithuania									32	29	36	145	26.7		0.9
Luxembourg										2	2	4	13.6		0.0
Malta			24	11	11	12	11	8	8	8	8	9	- 2.3		0.2
Netherlands	192	129	73	64	64	61	51	37	34	34	34	50	0.9	- 82.3	0.8
Poland		2 255	1 451	1 217	1 292	1 229	1 007	868	936	898	853	1 397	- 4.9		21.3
Portugal	302	310	245	180	158	152	108	75	67	61	56	160	- 8.6	- 81.4	1.4
Romania										322	260	918	- 19.2		6.5
Slovakia			127	89	88	71	69	64	69	68	59	110	- 14.5		1.5
Slovenia										11	10	27	- 7.0		0.3
Spain	2 091	1 799	1 464	1 255	1 139	1 106	486	434	404	440	390	746	- 11.3	- 81.3	9.7
Sweden	105	69	42	36	36	32	30	29	32	29	28	67	- 4.9	- 73.6	0.7
United Kingdom						588	491	398	415	386	427	585	10.7		10.7
EU-27										4 397	3 982	8 297	- 9.5		100
Croatia	174	82	62	64	60	67	57	60	35	33	26	70	- 23.1	- 85.2	

Table A1.4 NH₃ data reported by Member States

NH ₃ (Gg)	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	NECD emission ceilings	Change 2010–2011 (%)	Change 1990–2011 (%)	Contribution to EU-27 in 2011 (%)
Austria	65	71	65	62	62	63	62	63	63	62	62	66	- 0.1	- 5.2	1.7
Belgium	121	116	86	72	72	69	69	69	69	68	68	74	0.1	- 43.4	1.9
Bulgaria										39	39	108	- 1.2		1.1
Cyprus										5	5	9	- 3.0		0.1
Czech Republic										66	63	80	- 3.4		1.7
Denmark	109	97	89	82	78	78	76	73	73	72	71	69	- 1.6	- 34.8	1.9
Estonia	25	11	10	10	10	10	11	10	10	10	11	29	4.5	- 55.9	0.3
Finland	39	36	36	38	38	38	38	37	38	37	37	31	- 1.1	- 5.4	1.0
France	706	684	725	686	684	686	715	700	691	721	679	780	- 5.8	- 3.8	18.6
Germany	697	598	600	572	568	566	567	574	549	560	545	550	- 2.6	- 21.8	14.9
Greece										62	61	73	- 0.6		1.7
Hungary										61	59	90	- 3.1		1.6
Ireland	107	112	113	110	110	107	108	109	108	104	105	116	0.9	- 2.5	2.9
Italy										382	405	419	5.9		11.1
Latvia	48	18	15	17	17	18	18	18	19	18	19	44	4.9	- 60.1	0.5
Lithuania									38	37	38	84	3.7		1.0
Luxembourg										4	4	7	- 0.1		0.1
Malta			2	2	2	2	2	2	2	2	2	3	- 0.6		0.0
Netherlands	355	208	162	143	144	143	131	129	127	125	120	128	- 4.0	- 66.1	3.3
Poland		316	284	272	287	291	286	274	271	271	263	468	- 3.0		7.2
Portugal	65	60	62	51	49	50	48	48	48	48	48	90	0.0	- 26.1	1.3
Romania										159	159	210	- 0.4		4.3
Slovakia			32	29	27	27	25	25	25	24	25	39	4.1		0.7
Slovenia										18	18	20	- 1.6		0.5
Spain	333	315	397	376	394	398	367	376	388	378	377	353	- 0.2	13.4	10.3
Sweden	55	64	59	56	55	53	52	50	52	52	51	57	- 0.7	- 6.5	1.4
United Kingdom						292	279	279	281	282	277	297	- 1.7		7.6
EU-27										3 667	3 611	4 294	- 1.5		100
Croatia	51	38	39	40	40	40	38	37	38	38	37	30	- 0.8	- 26.6	

Appendix 2 Data sources

Below is an overview of the emission data sources used for Tables A1.1, A1.2, A1.3 and A1.4, as of 1 February 2014.

Table A2.1 Inventory submissions

Member State	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012
Austria	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Belgium	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Bulgaria									SUBM12	SUBM13	SUBM13
Croatia	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Cyprus									SUBM12	SUBM13	SUBM13
Czech Republic									SUBM12	SUBM13	SUBM13
Denmark	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Estonia	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Finland	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
France	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Germany	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Greece									SUBM12	SUBM13	SUBM13
Hungary									SUBM12	SUBM13	SUBM13
Ireland	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Italy									SUBM12	SUBM13	SUBM13
Latvia	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Lithuania									SUBM13	SUBM13	SUBM13
Luxembourg									SUBM12	SUBM13	SUBM13
Malta			SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Netherlands	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Poland		SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Portugal	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Romania									SUBM12	SUBM13	SUBM13
Slovakia			SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Slovenia									SUBM12	SUBM13	SUBM13
Spain	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
Sweden	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13
United Kingdom						SUBM13	SUBM13	SUBM13	SUBM13	SUBM13	SUBM13

Note: SUBM12 = inventory submission with the reporting deadline of 31 December 2012.

SUBM13 = inventory submission with the reporting deadline of 31 December 2013.

Appendix 3 Reporting status of NECD emissions

The status of reporting NECD emissions (2013 reporting round) as of 1 April 2014 is shown in Table A3.1 below.

Table A3.1 Submission overview

Member State	Submission (uploaded to CDR)	Resubmissions	Years covered	Format
Austria	20.12.2013	14.02.2014	1990–2012	NFR 2009-1
Belgium	23.12.2013	14.01.2014	1990–2012	NFR 2009-1
Bulgaria	30.12.2013	n/a	2011–2012	NFR 2009-1
Croatia	30.12.2013	n/a	1990–2012	NFR 2009-1
Cyprus	17.12.2013	22.01.2014	2011–2012	NFR 2009-1
Czech Republic	31.12.2013	n/a	2011–2012	NFR 2009-1
Denmark	20.12.2013	n/a	1980–2012	NFR 2009-1
Estonia	27.12.2013	n/a	1990–2012	NFR 2009-1
Finland	13.12.2013	01.04.2014	1980–2012	NFR 2009-1
France	20.12.2013	n/a	1980–2012	NFR 2009-1
Germany	17.12.2013	n/a	1990–2012	NFR 2009-1
Greece	16.01.2014	n/a	2011–2012	NFR 2009-1
Hungary	10.01.2014	n/a	2011–2012	NFR 2009-1
Ireland	17.12.2013	n/a	1990–2012	NFR 2009-1
Italy	08.01.2014	n/a	2011–2012	NFR 2008-1
Latvia	31.12.2013	31.03.2014	1990–2012	NFR 2009-1
Lithuania	19.12.2013	n/a	2010–2012	NFR 2009-1
Luxembourg	30.12.2013	n/a	2011–2012	NFR 2009-1
Malta	23.12.2013	n/a	2000–2012	NFR 2009-1
Netherlands	19.12.2013	13.02.2014	1990–2012	NFR 2009-1
Poland	19.12.2013	20.12.2013, 11.03.2014	1995–2012	NFR 2009-1
Portugal	31.12.2013	n/a	1990–2012	NFR 2009-1
Romania	20.12.2013	n/a	2011–2012	NFR 2009-1
Slovakia	31.12.2013	n/a	2000–2012	NFR 2009-1
Slovenia	23.12.2013	n/a	2011–2012	NFR 2009-1
Spain	23.12.2013	01.04.2014	1990–2012	NFR 2009-1
Sweden	16.12.2013	06.02.2014	1990–2012	NFR 2009-1
United Kingdom	19.12.2013	n/a	2007–2012	NFR 2009-1

Table A3.1 Submission overview (cont.)

Member State	NO _x , NMVOC, SO ₂ , NH ₃		Projections table	Updated NECD programmes	Socio-economic data (Table 2B)	IIR
	2011 final	2012 provisional				
Austria	x	x	np	n/a	n/a	20.12.2013, 14.02.2014
Belgium	x	x	2015, 2020, 2030	n/a	n/a	14.01.2014
Bulgaria	x	x	2015, 2020	n/a	n/a	np
Croatia	x	x	2010, 2015, 2020	n/a	n/a	30.12.2013
Cyprus	x	x	np	n/a	n/a	np
Czech Republic	x	x	np	n/a	n/a	np
Denmark	x	x	2010, 2015, 2020, 2030	n/a	n/a	np
Estonia	x	x	2015, 2020	n/a	n/a	np
Finland	x	x	2010, 2015, 2020, 2030, 2050 (NH ₃)	n/a	x	13.12.2013
France	x	x	np	n/a	n/a	np
Germany	x	x	np	n/a	n/a	17.12.2013
Greece	x	x	np	n/a	n/a	np
Hungary	x	x	np	n/a	n/a	np
Ireland	x	x	np	n/a	n/a	np
Italy	x	x	np	n/a	n/a	np
Latvia	x	x	2010, 2015, 2020, 2030	n/a	n/a	31.12.2013
Lithuania	x	x	2015, 2020	n/a	x	np
Luxembourg	x	x	np	n/a	n/a	np
Malta	x	x	np	n/a	n/a	np
Netherlands	x	x	2010, 2020, 2030	n/a	x	14.03.2014
Poland	x	x	2010	n/a	x	19.12.2013, 11.03.2014
Portugal	x	x	np	n/a	n/a	np
Romania	x	x	np	n/a	n/a	20.12.2013
Slovakia	x	x	2010, 2015, 2020, 2030, 2050	n/a	x	31.12.2013
Slovenia	x	x	2015, 2020, 2030	n/a	n/a	np
Spain	x	x	np	n/a	n/a	23.12.2013, 01.04.2014
Sweden	x	x	np	n/a	n/a	np
United Kingdom	x	x	np	n/a	n/a	np

Note: 'np' denotes 'not provided'.

'x' denotes 'provided'.

'NFR' denotes 'nomenclature for reporting' — the sectoral classification system developed by UNECE/EMEP for reporting air emissions.

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European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark

Tel.: +45 33 36 71 00
Fax: +45 33 36 71 99

Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

