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**Report for the Stage 3 in-depth review of emission
inventories submitted under the UNECE LRTAP
Convention and EU National Emissions Ceilings
Directive for:**

**STAGE 3 REVIEW REPORT
GERMANY**

CONTENT

INTRODUCTION	3
PART A: KEY REVIEW FINDINGS.....	4
Inventory Submission	4
Key categories.....	4
Quality.....	5
Transparency	5
Completeness	6
Consistency, including recalculations and time series.....	7
Comparability	7
CLRTAP/NECD comparability	7
Accuracy and uncertainties	8
Verification and quality assurance/quality control approaches	8
Follow-up to previous reviews	9
Areas for improvements identified by GERMANY	9
PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY	11
Sector specific recommendations for improvements identified by ERT	12
Energy	12
Transport.....	16
Industrial Processes	20
Solvents	24
Agriculture.....	27
Waste.....	31
List of additional materials provided by the Country during the Review.....	34

INTRODUCTION

1. The mandate and overall objectives for the emission inventory review process under the LRTAP Convention is given by the UNECE document '*Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols*'⁽¹⁾ – hereafter referred to as the 'Methods and Procedures' document.
2. This annual review has concentrated on SO₂, NO_x, NMVOC, NH₃, plus PM₁₀ & PM_{2.5} for the time series years 1990 – 2012, reflecting current priorities from the EMEP Steering Body and the Task Force on Emission Inventories and Projections (TFEIP). HMs and POPs have been reviewed to the extent possible.
3. This report covers the Stage 3 centralised reviews of the UNECE LRTAP Convention and EU NEC Directive inventories of Denmark coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 23rd June 2014 to 27th June 2014 in Copenhagen, Denmark, and was hosted by the European Environment Agency (EEA). The following team of nominated experts from the roster of experts performed the review: generalist – Kristina Saarinen (Finland), Energy – Garmt Jans Venhuis (the Netherlands), Transport - Yvonne Pang (UK), Industry – Guillaume Jacquier (France), Solvents – David Knight (Belgium), Agriculture + Nature – Michael Anderl (Austria), Waste – Intars Cakars (Latvia).
4. Kristina Saarinen was the lead reviewer. The review was coordinated by Katarina Marečková (EMEP Centre on Emission Inventories and Projections - CEIP).

¹ Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols. Note by the Task Force on Emission Inventories and Projections. ECE/EB.AIR/GE.1/2007/16 <http://www.unece.org/env/documents/2007/eb/ge1/ece.eb.air.ge.1.2007.16.e.pdf>

PART A: KEY REVIEW FINDINGS

5. The German inventory is in line with the EMEP EEA Inventory Guidebook and the UNECE Reporting Guidelines. Transport emissions are calculated on the basis of fuels sold. The ERT found the German inventory to be sufficiently detailed and notes that national methodologies have been used where possible.
6. The ERT recognises the level of effort undertaken by Germany in providing an inventory with a significant level of detail so as to enable an in-depth review.
7. The ERT notes that recalculations have been applied consistently throughout the entire time series and that justifications for the recalculations are provided in the IIR.
8. According to the results of the Stage 2 review, the German submissions under the CLRTAP, the NECD and the UNFCCC are consistent.
9. The 2014 submission shows improvements for a number of issues since the last review in 2009 and the last submission in 2013 and the ERT commends Germany for the work done. The ERT also notes that there is some need for further improvements, some of which are listed in Part B of this report and in the cross-cutting recommendations below.

INVENTORY SUBMISSION

10. Germany submitted the inventory under the NECD on 17th December 2013, before the deadline of 31st December. The inventory was submitted in NFR09 (Version 2009-1) for the years 1990 - 2012 (the most recent year) for NO_x, SO_x, NMVOC and NH₃. The Informative Inventory Report (IIR) was submitted on 16th December 2013. The submission included projections with measures for NO_x, NMVOC, SO_x, NH₃, PM₁₀ and PM_{2.5} for 2015, 2020 and 2030. Germany submitted the inventory under the UNECE CLRTAP on 11th February 2014, before the deadline of 15th February. The inventory was submitted in NFR09 (Version 2009-1) for the years 1990 to 2012 (the most recent year) for all pollutants except HCH. The submission also included also projections for NO_x, NMVOC, SO_x, NH₃, PM₁₀ and PM_{2.5} for the years 2015, 2020 and 2030. A detailed Informative Inventory Report (IIR) was submitted on 11th February 2014, before the deadline of 15th March. The submission also included an application for adjustments for NO_x. Germany included gridded data for 2000, 2005 and 2010 in the 2012 submission. However, the submission did not include LPS data.
11. The ERT found the inventory submitted by Germany to be of good quality and in general well documented in the Informative Inventory Report (IIR). Thanks to the good quality of the IIR and the Party's responsiveness, the ERT was able to review the inventory in detail and to provide a number of detailed recommendations.

KEY CATEGORIES

12. Germany has compiled and reported in its IIR a key category analyses (KCA) for the latest inventory year 2012 for the following pollutants: NO_x, CO, NMVOC,

SO_x, NH₃, TSP, PM₁₀ and PM_{2.5}, the main heavy metals (Cd, Hg and Pb), PCDD/F, PAHs and HCBs including all sectors. The analysis was carried out for both emission levels and emission trends. According to the IIR, the Tier 1 key category was performed instead of a higher Tier analysis due to missing information on uncertainties. The results of the German key category analysis (KCA) are equal to the KCA performed by the CEIP.

13. According to the UNECE Reporting Guidelines, Parties should identify in their IIR national key categories as described in the Guidebook for the base year and the most recent inventory year. Germany has, however, not presented a KCA for the base years of the pollutants in the IIR. The ERT recommends that Germany adds the KCA for the base years of the pollutants in the IIR of the next submission. In response to the draft of the review report, Germany indicated that they would include a KCA for the base years in the next submission.

14. Germany does not specify in the IIR that the results of the KCA are used to identify priorities in resource allocation for data collection, QA/QC and higher-tier methodologies in the inventory. The ERT commends Germany for providing both the level and trend KCAs and recommends that Germany uses the results to prioritise improvements in the inventory.

QUALITY

Transparency

15. The ERT recognises the level of effort undertaken by Germany in providing an inventory with a significant level of detail to enable a detailed review.

16. The ERT found the IIR to be generally comprehensive and transparent. To improve the usability of the IIR in inventory reviews, the ERT recommends that Germany follows the Recommended Structure for Informative Inventory Reports (IIR)² more closely by including currently missing information, for instance chapters on sector-specific QA/QC and improvements, in each sector.

17. Germany publishes the IIR on the website <http://iir-de.wikidot.com/> using an online web based system. The information provided in the IIR or through the links and references is generally detailed enough including information on EFs, activity time series and justifications for the methods applied and the assumptions made in the calculations, as well as references. However, the ERT found the usability of the German IIR for the purpose of a review not to be ideal for two reasons: (1) information is scattered across different websites and the links and references to the documentation available are not always easy to find, and, (2) the format of the IIR sometimes complicates searches in the document. The ERT notes that in the previous review report some adaptations of the online presentation of the IIR were also recommended to solve problems of version tracking and off-line access to materials, and that a snapshot of the wiki to be taken as a PDF file for official records and for off-line working was proposed. The ERT repeats the recommendations of the

² Annex VI of the Reporting Guidelines (ECE/EB.AIR/97)

previous ERT and encourages Germany to improve the user friendliness of the IIR to better support inventory review activities, e.g. by publishing a single document for each submission.

18. For the Solvent and other product use sector the ERT was not able to give any specific sub-sector recommendations because the documentation of the methodology in the IIR for sub-sector specific emissions is not transparent; therefore only general recommendations have been made for this sector.

19. Germany reports each year of the time series in a separate file and includes information on the use of notation keys on the NFR table sheets "Additional Info", which - according to Germany - is updated annually. The ERT noted some inaccuracies in the use of the notation keys as explained in the relevant sector chapters below and recommends that Germany checks the use of these notation keys. The ERT also finds that, for the purpose of the review, it is more user friendly to provide in the IIR (for each relevant NFR sector) information and justifications related to the use of the notation keys for that particular sector in the relevant submission.

20. The ERT notes that from the IIR it is not always clear which specific activities are included in the inventory, especially in the Industrial Processes and Solvent use sectors, and encourages Germany to provide this information in the IIR and to describe the evolution of the emissions at activity level over time.

21. The IIR provides an analysis of emission trends. While information is provided on the main drivers of the trends by pollutant, the ERT could not find explanations for annual fluctuations and discontinuities of emissions. The ERT recommends that Germany further improves its explanations of emission trends by adding this kind of information to the IIR.

Completeness

22. The ERT acknowledges the effort to which Germany has gone to provide estimates of emissions for all sub-sectors and all pollutants reviewed. The inventory is generally complete in terms of years, sectors, pollutants and geographical coverage. However, the ERT found some inventory completeness-related questions as listed below.

23. Germany reports a number of sources for all pollutants throughout the time series as not estimated (NE), for instance in the Transport and Waste sectors. The IIR does not provide information on justifications for the not estimated values other than the statement in the "Additional Info" sheet that no information is yet available. The ERT notes that also the previous ERT encouraged Germany to estimate emissions which had been reported as NE. The ERT recommends that Germany (1) assesses the importance of these sources to German emissions and estimates emissions where the emission levels are not considered to be negligible; and to (2) improve the transparency of reporting by including a summary of the "not estimated" (NE) sources with justifications in the IIR.

24. Germany does not report emissions before 1990, the reason being, according to the previous S3 report, the former division of the country. The ERT repeats the encouragement of the previous ERT to explore possibilities for estimating emissions also for these years and to consider the inventory requirements for the base years before 1990 of Protocols that Germany has ratified. The ERT also recommends that Germany includes information on all missing years in the IIR in the chapter “General assessment of completeness” to explain the reasons why they are not included in the inventory.

Consistency, including recalculations and time series

25. The ERT found the inventory to be generally consistent over the time series.

26. Germany has recalculated emissions in the Energy and Transport sectors since the last submission for the whole time series. The recalculations are justified and the impacts of the recalculations explained for the years 1990 and 2011 in the IIR. The ERT notes that Germany includes detailed information on the recalculations in the sector chapters. The impacts of the recalculations reported by the country and identified by the CEIP are consistent. For NO_x, Pb, Ni and Se the recalculations lead to minor decreases in the emissions throughout the years, while resulting in an increase in emissions of particles, Cd, Hg, As, Cr, Cu, Zn, PCDD/F, PAH-4, HCBs and PCBs.

27. The ERT commends Germany on the documentation and justifications for the recalculations provided in the IIR, and recommends that Germany includes justifications for and an assessment of the recalculations also for the other years – in addition to 1990 the most recent year - where they deviate from these two years in order to increase the transparency of the emission trends.

Comparability

28. The ERT notes that the inventory of Germany is comparable with those of other reporting parties. The methodologies used in the inventory are consistent with the EMEP/EEA Guidebook and the allocation of source categories follows that of the EMEP/UNECE Reporting Guidelines. The ERT encourages Germany to continue providing comparable inventory data.

CLRTAP/NECD comparability

29. According to the results of the Synthesis and Assessment (Stage 2 review) process, there are some minor inconsistencies between the German air pollutant emissions inventories submitted under the UNECE CLRTAP, the EU NECD and the UNFCCC due to differences in the required allocation of aviation emissions under the conventions. The ERT did not identify any additional differences.

Accuracy and uncertainties

30. The German inventory is sufficiently detailed and mainly calculated at Tier 2 level using the top-down approach. The ERT noted the extensive use of country-specific methods in the calculation of emissions from several source categories. The ERT commends Germany for this. The ERT did not identify any systematic under- or over-estimations.

31. To a question raised by the ERT about the possible use of bottom-up data Germany replied that due to the country's size and the abundance of economic activities, the German inventory does not use any point source data ("bottom-up data") directly. However, point source data (EU ETS, EPRT, LCP) is used for the verification and correction of the inventory and to improve national emission factors. The ERT commends Germany for this effort and encourages Germany to continue improving the inventory by including point source data where possible.

32. Germany has not yet performed an uncertainty analysis for the air pollutant emissions inventory as a whole. However, uncertainties have been estimated for some pollutants in earlier projects as well as in some sectors, e.g. agriculture. In its response to a question raised by the ERT about the schedule, Germany stated that work to expand the GHG UC analysis to include air pollutants was underway and that the results were expected to be part of the next submission. The ERT welcomes this development and recommends that Germany implements a Tier 2 uncertainty analysis and uses the results to prioritise improvements to the inventory.

33. The ERT noted some minor errors in the Transport and Industrial Processes sectors of the inventory as explained in the relevant sector chapters below, and recommends that Germany corrects these errors in the next inventory.

34. Germany includes information about source category-specific planned improvements in some of the NFR sector-specific chapters of the IIR. The ERT commends Germany for providing this information and recommends that Germany includes a chapter with such information under each source category to indicate the need for any foreseen improvements of the inventory.

Verification and quality assurance/quality control approaches

35. Germany describes QA/QC procedures in the IIR on a general level and by including information on how the different parameters are assessed and where possible cross checks with other data are performed. The ERT considers these procedures appropriate and consistent with good practice. However, further information is needed as explained below.

36. According to the IIR, the implementation of a QA/QC system for the German GHG inventory under the UNFCCC and the EU is under way but not yet fully in place for the air pollutant emission inventories, except for the Agriculture sector and for activity data, when it is the same as the one used for the GHG inventory.

37. To the question raised by the ERT about QA/QC procedures for data not included in the GHG inventory, Germany replied that the same quality checks, although not with the same specific sign-off procedures, as those for the data included in the GHG inventory are carried out. The ERT commends Germany on the thorough quality work for these sections of the inventory, and repeats the recommendation made by the previous ERT that the QA/QC system should be fully implemented for the air pollutant emissions inventory. The ERT also recommends that Germany includes information on current QA/QC practices for data not included in the GHG inventory in the IIR and describes source sector-specific QA/QC procedures separately for each source category.

38. The ERT notes that Germany does not describe possible verification procedures in the IIR other than making a short mention of verifying AD against statistics. As information on verification and validation is crucial for an assessment of the reliability of the inventory, the ERT recommends that Germany includes details about these procedures in the IIR.

FOLLOW-UP TO PREVIOUS REVIEWS

39. The ERT notes that Germany has implemented some of the recommended improvements since the last Stage 3 review in 2009, including improvements to the recalculations in the Energy sector, presentation of information on recalculations at sector level in the IIR and by reporting projections for measures in the 2010 - 2012 submissions (however, without an additional measures scenario as indicated in the 2009 Review Report). The ERT commends Germany for implementing these improvements and also notes the improvements indicated in the IIR since the last inventory submission.

40. The ERT has found that the following recommendations from the previous review in 2009 are still pending: implementation of a unified system of QA/QC procedures for CLRTAP and UNFCCC reporting (the QA/QC system currently covers only emissions reported under the UNFCCC), qualitative and quantitative uncertainty analyses and a clearer description of the use of notation keys. The ERT recommends that Germany carries out these improvements to further improve the accuracy and transparency of the inventory.

41. The ERT also noted a number of improvements in the 2014 submission since the 2013 submission, including a revision of the emission factors for combustion plants, Hg emissions from chemical industry, and improvements in fuel use and updates of heavy metal emissions for off-road emissions. The ERT commends Germany on these improvements. Nevertheless, the ERT identified some areas for further improvements regarding the transparency and completeness of the inventory as described below.

AREAS FOR IMPROVEMENTS IDENTIFIED BY GERMANY

42. The IIR includes dedicated paragraphs for planned improvements in the Energy and Transport sectors. However, such paragraphs are not included under the other NFR categories. In the general IIR Chapter 11.2 Improvements, a list of

improvements since the last submission is presented, as well as a compilation list of planned improvements in the Energy and Transport sub-sections. The ERT recommends that Germany includes paragraphs dedicated to planned improvements in each source category chapter of the IIR, according to recommended structure of the IIR³

43. The areas for improvement identified by Germany include stationary combustion emission factors and activity data, QA/QC with PRTR and ETS data, improvements for liquid biomass and biogas use emission calculation. For mobile combustion, inclusion of running losses, particle emissions from mopeds and motorcycles, off-road and navigation emissions, and heavy metals from tyre and brake wear and road abrasion are listed for improvements. The ERT welcomes these improvements.

³ Annex VI of the Reporting Guidelines (ECE/EB.AIR/97)

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

Cross-cutting improvements identified by the ERT

44. The ERT has identified the following cross-cutting issues for improvement:
- (a) Assess the importance of sources reported as NE for German emissions and estimate emissions where the emission levels are not considered to be negligible, document reasons why they are reported as NE.
 - (b) Further improve the transparency of reporting by including (1) more detailed information on activities included in the source categories (e.g. Solvent sector), (2) explanations for annual fluctuations and discontinuities in emission time series, (3) explanations for the use of notation keys (para 55), as well as (4) a summary of the “not estimated” (NE) sources with justifications in the IIR.
 - (c) Further improve the transparency of the IIR by (1) following more closely the recommended structure for the IIR; (2) adding information of planned improvements and QA/QC to all NFR categories and (3) providing a more transparent description of the methodology used to make estimates in the Energy (paras 58, 59), Transport (paras 60, 72), Industrial Processes (paras 77, 78, 88), Solvent and other product use (paras 96, 97, 98, 100, 106) and Agriculture (paras 107, 111, 117, 118, 119, 120, 122, 123, 124) sectors.
 - (d) Correct the use of notation keys and errors in calculations, estimate missing emissions, review the methodology in the Transport (paras 61, 62, 63, 64, 66, 71, 73, 74, 75, 76), Industrial Processes (paras 80, 89, 90, 91, 93, 94, 95) and Solvent and other product use (paras 101, 103, 104), Agriculture (paras 110, 115, 121) and Waste (paras 127, 134, 135, 136, 139) sectors.
 - (e) Implement a Tier 2 uncertainty analysis and use the results to prioritise improvements in the inventory.
 - (f) Fully implement the QA/QC system (currently covering emissions reported under the UNFCCC) for air pollutants; include information on sector-specific QA/QC practices for data not included in the GHG inventory separately for each source category in the IIR.
 - (g) Include information on possible verification of the inventory in the IIR.

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , TSP, PM ₁₀ & PM _{2.5} , CO, heavy metals		
Years		1990 – 2012		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
1.A.1.a	public electricity and heat production	X		X
1.A.1.b	petroleum refining	X		X
1.A.1.c	Manufacture of solid fuels and other energy industries	X		
1.A.2.a	iron and steel	X		X
1.A.2.b	non-ferrous metals	X		
1.A.2.c	chemicals	X		
1.A.2.d	pulp, paper and print	X		
1.A.2.e	food processing, beverages and tobacco	X		
1.A.2.f.i	Stationary Combustion in Manufacturing Industries and Construction: Other (Please specify in your IIR)	X		
1 A 3 e	Pipeline compressors	X		
1.A.4.a.i	commercial / institutional: stationary	X		X
1.A.4.b.i	residential plants	X		
1.A.4.c.i	Agriculture/forestry/fishing. stationary	X		X
1.A.5.a	other, stationary (including military)	X		X
1.B.1.a	coal mining and handling	X		X
1.B.1.b	solid fuel transformation	X		
1.B.1.c	other fugitive emissions from solid fuels)	X		
1 B 2 a i	Exploration, production, transport	X		
1 B 2 a iv	Refining / storage	X		
1 B 2 a v	Distribution of oil products	X		
1 B 2 b	Natural gas	X		
1 B 2 c	Venting and flaring	X		
1 B 3	Other fugitive emissions from geothermal energy production , peat and other energy extraction not included in 1 B 2	X		X

Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.

General recommendations on cross-cutting issues.

Transparency:

45. Germany has provided a detailed and generally transparent emissions inventory. Estimates are provided at the most detailed level for all Energy sectors. The ERT considers Germany's methodology and emission factors in the IIR to be transparent and well described for the Energy Sector.

46. The ERT encourages Germany to include the answers that were provided to questions raised by the ERT during the review week in future submissions (see Sub-sector Specific Recommendations).

Completeness

47. The ERT considers the Energy sector to be complete in terms of the sources, pollutants and years included in the inventory.

Consistency including recalculation and time series:

48. The ERT commends Germany on the documentation and justifications for the recalculations provided for the Energy Sector, and recommends that Germany includes justifications and an assessment of recalculations also for the other years - in addition to 1990 and the most recent year - where they deviate from these two years in the IIR, in order to increase the transparency of the emission trends.

49. The ERT commends Germany for implementing the recommendations for recalculations of the previous review.

Comparability:

50. The ERT notes that the inventory of Germany is comparable with those of other reporting parties. The ERT commends Germany for using methodologies in accordance with the Guidebook for the Energy sector and for providing completed NFR tables with a minimal use of notation keys. The allocation of source categories follows that of the EMEP/UNECE Reporting Guidelines. The ERT encourages Germany to continue providing comparable inventory data.

Accuracy and uncertainties:

51. Germany describes general QA/QC procedures in its IIR. The ERT encourages Germany to also describe the specific QA/QC procedures carried out in the Energy sector inventory in the IIR.

Improvement:

52. The ERT notes that Germany has provided information on improvements carried out since the last submission as well as on improvements planned for the next submission. The ERT commends Germany for providing this information and encourages Germany to continue describing planned improvements in the next submission.

53. The ERT commends Germany for having implemented (most of) the recommendations of the previous review, or for having them included in the list of future improvements.

Sub-sector Specific Recommendations.

Category issue 1: 1.A.1.a: Public Electricity and Heat Production - All pollutants

54. The ERT notes that Germany describes the methodology used as T2 in the table provided in the IIR but as T2/3 in the text and recommends that Germany corrects this information in order to be consistent.

Category issue 2: 1.A.1.b: Petroleum Refining - All pollutants

55. The ERT notes that Germany refers to other sections of the IIR for implied emission factors. The ERT encourages Germany to include implied emission factors in the text rather than referring to other sections in the IIR.

Category issue 4: 1.A.2.a, 1.A.4.a.i, 1.A.4.c.i, 1.A.5.a – Heavy metals

56. The ERT notes that Germany uses for NFR codes 1.A.2.a, 1.A.4.a.i, 1.A.4.c.i, 1.A.5.a the notation key "NE" in the NFR table for (many) heavy metals. The ERT notes that heavy metal emission factors for these activities are provided in the EMEP Guidebook. During the review week the ERT asked Germany why the emission factors from the Guidebook were not used to estimate emissions. Germany answered that HM emissions from NFR 1.A.2.a had been reported under NFR 2.C.1 from 1995 onwards.

57. According to Germany, Tier 1 emission factors of the Guidebook are not consistent with the emission factors used in the German inventory from 1995 onwards and the HM emission factors for small combustion plants (NFRs 1.A.4.a.i, 1.A.4.c.i, 1.A.5.a) in the Guidebook are very uncertain. In such cases it is more transparent to report nothing than to report a wrong value. Germany states that all the other HM emission factors for stationary combustion plants are derived from monitoring data and that a mix of monitoring data and default values (especially in the case of HMs and POPs) would lead to the wrong results in the key category analyses. According to Germany, there are currently three fuel analysis projects under way and flue gas measurements are also planned. The ERT recommends that Germany includes this information in the IIR (indicating the project schedules) and estimates emissions using default EFs from the Guidebook in the meantime, or that it provides an estimate of the level of emissions currently reported as "NE".

Category issue 5: 1.B.1.a coal mining and handling

58. For NFR 1.B.1.a the notation key "NE" is used for NMVOC. The ERT notes that the emissions depend on the nature of the activity (open cast mining or underground mining) and that there are default EFs in the Guidebook, and also that the previous ERT had already recommended an estimation of these emissions. To the question raised by the ERT Germany provided the answer that the emissions not reported as a fraction of NMVOC in pit gas were significantly below 1% and had thus been assumed to be negligible. The ERT recommends that Germany includes this clarification in the IIR.

Category issue 6: 1.A.3: Other fugitive emissions from geothermal energy production, peat and other energy extraction not included in 1.B.2 – All pollutants

59. According to the IIR, there are no methodologies to estimate emissions from drilling for tapping geothermal energy (both near-surface and deep energy) but from a geo-scientific viewpoint it is clear that virtually any drilling will lead to releases of gases bound in underground layers such as H₂, CH₄, CO₂, H₂S and Rn. To the question raised by the ERT about possible research on the subject Germany provided the answer that they were considering the emissions from drilling to be insignificant. In a study GHG emissions were estimated in kilograms. Emissions of non-GHGs are considered to be within the same or an even lower range. The ERT recommends that Germany includes this information in the IIR.

TRANSPORT

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM ₁₀ & PM _{2.5} , Pb, Cd, Hg, DIOX, PAHs		
Years		1990 – 2012		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
1.A.2.f.ii	Mobile Combustion in Manufacturing Industries and Construction: (Please specify in your IIR)	x		
1.A.3.a.i.(i)	international aviation (LTO)	x		
1.A.3.a.i.(ii)	international aviation (cruise)		x	
1.A.3.a.ii.(i)	civil aviation (domestic, LTO)	x		
1.A.3.a.ii.(ii)	civil aviation (domestic, cruise)		x	
1.A.3.b.i	road transport, passenger cars	x		x
1.A.3.b.ii	road transport, light duty vehicles	x		x
1.A.3.b.iii	road transport, heavy duty vehicles	x		x
1.A.3.b.iv	road transport, mopeds & motorcycles	x		x
1.A.3.b.v	road transport, gasoline evaporation	x		x
1.A.3.b.vi	road transport, automobile tyre and brake wear	x		x
1.A.3.b.vii	road transport, automobile road abrasion	x		
1.A.3.c	railways	x		
1.A.3.d.i (ii)	international inland navigation		IE	
1.A.3.d.ii	national navigation	x		x
1.A.4.a.ii	commercial / institutional: mobile		IE	
1.A.4.b.ii	household and gardening (mobile)	x		
1.A.4.c	agriculture / forestry / fishing	x		
1.A.4.c.ii	off-road vehicles and other machinery	x		
1.A.4.c.iii	national fishing	x		
1.A.5.b	other, mobile (including military, land based and recreational boats)	x		x
1 A 3 d i (i)	International maritime navigation		x	
1 A 3	Transport (fuels used)		not reviewed	

Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.

General recommendations on cross-cutting issues.

Transparency:

60. The ERT considers the presentation of the methods used to estimate emissions to be generally transparent in the Transport sector. The ERT commends Germany on the provision of summary tables of (implied) emission factors with their corresponding reference sources for other mobile sources in the IIR and encourages the Party to continue using this approach. The ERT also encourages the Party to further improve the IIR by including more information on road transport emission factors and on the methodology for estimating evaporative emissions.

Completeness:

61. The ERT considers the inventory for the Transport sector and other mobile sources to be complete for sources and years, except for a few pollutants (PM, Pb, Cd, Hg, DIOX and PAHs) which are currently reported as “NE” (Not Estimated) in several sub-sectors.

62. Heavy metal emissions from 1.A.3.a.i.(i) and 1.A.3.a.ii.(i) are currently not estimated (except for Pb for 1.A.3.a.ii.(i)). The ERT recommends that the Party estimates these emissions, using the methodology in the 2013 Guidebook.

63. PM₁₀ and PM_{2.5} emissions are reported as “NE” for NFR 1.A.3.b.iv (Motorcycles) and NFR 1.A.4.b.ii (Household and gardening (mobile)). For motorcycles, the Party explained that such emissions were currently not estimated as no reliable data was available to the TREMOD⁴ developers. However, the Party has indicated that they are working with the TREMOD experts to close this gap in Germany’s emissions inventory. The ERT also notes the Party’s intention to consider exhaust PM emissions from gasoline off-road mobile sources for the next submission and recommends that Germany completes the inventory by estimating these emissions.

64. Pb and Hg emissions are currently not estimated for NFR 1.A.3.d.ii. The ERT recommends that the Party considers the emission factors available in the 2013 Guidebook and reports emissions for the next submission.

Consistency including recalculation and time series:

65. The recalculations for the Transport sector are well presented with tables showing the level of emissions at sub-sector level for each pollutant reported for the current and previous submissions. The reasons for recalculations are also provided (or with links to other sections of the IIR for further details). The ERT commends Germany for this and encourages the Party to continue using this approach in its IIR.

66. The ERT has not identified any apparent outliers in the trend of implied emission factors for Germany; however, implied NO_x emission factors for NFR 1.A.4.b.ii and NFR1.A.4.c.ii are at the high end of the range when compared with a selected group of countries (AT, BE, DK, ES, FI, FR, GB, IE, IT, NL, NO). The ERT recommends that the Party reviews the emission factors for these two sources and includes an explanation for this issue in the IIR.

Comparability:

67. The methods used are consistent with those proposed in the Guidebook. Germany reports emissions from the Transport sector on the basis of fuels sold.

Accuracy and uncertainties:

68. The IIR refers to a report on a research project in which the uncertainty estimates for activity data of mobile sources were considered but the report is only

⁴ TREMOD = Transport Emission Estimation Model,
https://www.ifeu.de/english/index.php?bereich=ver&seite=projekt_tremod

available in German. The IIR also states that uncertainty estimates for emission factors were compiled for a national programme on particle reduction strategies (PAREST) and that the final report is yet to be published.

69. The IIR outlines the general QA/QC procedures in accordance with IPCC Good Practice Guidance. The ERT encourages the Party to provide more details on the sector-specific OA/QC procedures that have been applied to the mobile sources in future IIRs.

70. The ERT identified a few potential underestimations as explained in the sub-sector specific recommendations below.

Improvement:

71. Germany indicates an intention in the IIR to make model improvements to the Non-Road Mobile Machinery (NRMM) and maritime transport inventories. Moreover, the Party is also planning to revise its estimations and reporting of POP emissions for all off-road mobile sources based on the 2013 Guidebook. The ERT encourages the Party to carry out these improvement plans.

Sub-sector Specific Recommendations.

Category issue 1: 1.A.3.b Road Transport – All Pollutants

72. The ERT found the following statement for the road transport sector in the IIR not to be transparent: “The majority of emissions factors for exhaust emissions from road transport are taken from the 'Handbook Emission Factors for Road Transport' (HBEFA, version 3.1) where they are mostly provided on a Tier 3 level and processed within the TREMOD software used by the Party. Therefore, it is not possible to display them in a clear and comprehensible table”. In response to the ERT question the Party indicated that they would work with their external experts in charge of the model to provide more details of the emission factors in the next IIR. The ERT welcomes this development.

Category issue 2: 1.A.3.b.v Gasoline evaporation – NMVOCs

73. From the information provided in the IIR it was not clear to the ERT if the method used to estimate emissions was consistent with 2013 Guidebook. To a question about this issue Germany responded that the information on the tier methodology applied was not correct, and that the IIR would be amended accordingly. The Party provided further details on the methodology based on HBEFA version 3.1⁵ and its consistency with the 2013 Guidebook/COPERT 4 approach. The ERT further asked the Party whether evaporative emissions from running losses (i.e. vapour generated in the fuel tank during vehicle operation) had been estimated. The Party confirmed that there was a gap: even though a methodology was available in the HBEFA, this methodology was yet to be considered in the TREMOD model, and that emissions from this component would be included in the next submission. The ERT recommends that Germany carries out these improvements.

⁵ HBEFA = Handbook Emission Factors for Road Transport <http://www.hbefa.net/e/index.html>

Category issue 3: 1.A.3.b.vi Road vehicle tyre and brake wear – Pb

74. The IIR states that the Tier 1 emission factors used to estimate tyre and brake wear emissions were derived from a literature study in 2006 but the reference is not provided. This source is a key category for Pb and the ERT has noted that the emission factor for brake wear used by the Party was higher than the maximum range quoted by the 2013 Guidebook. The Party explained that the literature study mentioned only consisted of an elaborate list of literature findings and derived average values and had never been published. However, they also acknowledged that there was a lack of transparency regarding this source of knowledge. The Party plans to further examine the heavy metal emission factors and potentially revise them to be consistent with the 2013 Guidebook for the next submission. The ERT recommends that Germany carries out these improvements.

Category issue 4: 1.A.3.d.ii National navigation – Main Pollutants

75. The IIR states that the sources of emission factors for the main pollutants are year-dependent Tier 2 factors computed within the TREMOD model and represent the development of the German railway fleet, fuel quality and mitigation technologies. The ERT asked the Party to clarify whether this approach had been applied to both inland waterway and coastal shipping, and to clarify its appropriateness for the latter component (which is subject to NO_x/SO₂ regulations and fleet turnover rates that are different from those for the railway sector). The Party confirmed that the same approach is currently applied to inland waterway and coastal shipping as the activity data available from the National Energy Balance does not allow for a distinction between specific data for inland waterway and coastal shipping. The Party also indicated that this potential underestimation of national emissions would be resolved for the next submission – as new data would be available from an ongoing research project, which is aimed at broadly revising the emissions inventory for marine navigation. The model implemented with this project will allow an estimation of fuel consumption in national maritime navigation, and different approaches will be applied to inland waterway and coastal shipping from the next submission onwards. The ERT encourages the Party to carry out this improvement plan.

Category issue 5: 1.A.5.b Military (shipping) – All Pollutants

76. The IIR does not mention the inclusion of emissions from military shipping activities. To a question raised by the ERT Germany responded that during an ongoing research project aimed at broadly revising the emissions inventory for marine navigation, consumption data for military navigation proved to be included in the annual statistical amounts for international maritime navigation for taxation reasons. This means that emissions from military shipping are currently not included in the national totals. The Party indicated that as fuel consumption in national maritime navigation (also including military activities) would be estimated mainly based upon ship movement data from the submission 2015 onwards and as this data would allow for a separation of military shipping activities from the overall amount, fuel consumption in national military navigation would then be estimated. Emissions estimated from this fuel consumption data would then be included in NFR sub-sector 1.A.5.b. The ERT encourages the Party to carry out this improvement plan.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		All		
Years		1990 – 2012 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
2.A.1	cement production	x		x
2.A.2	lime production	x		x
2.A.3	limestone and dolomite use	x		
2.A.4	soda ash production and use	x		
2.A.5	asphalt roofing	x		
2.A.6	road paving with asphalt	x		x
2.A.7.a	Quarrying and mining of minerals other than coal	x		
2.A.7.b	Construction and demolition	x		
2.A.7.c	Storage, handling and transport of mineral products	x		
2.A.7.d	Other Mineral products (Please specify the sources included/excluded in the notes column to the right)	x		
2.Bb.1	ammonia production	x		
2.B.2	nitric acid production	x		
2.B.3	adipic acid production	x		
2.B.4	carbide production	x		
2.B.5.a	Other chemical industry (Please specify the sources included/excluded in the notes column to the right)	x		
2.B.5.b	Storage, handling and transport of chemical products (Please specify the sources included/excluded in the notes column to the right)	x		
2.C.1	iron and steel production	x		x
2.C.2	ferroalloys production	x		
2.C.3	aluminium production	x		
2.C.5.a	Copper Production	x		
2.C.5.b	Lead Production	x		
2.C.5.c	Nickel Production	x		
2.C.5.d	Zinc Production	x		
2.C.5.e	Other metal production (Please specify the sources included/excluded in the notes column to the right)	x		
2.C.5.f	Storage, handling and transport of metal products (Please specify the sources included/excluded in the notes column to the right)	x		
2.D.1	pulp and paper	x		x
2.D.2	food and drink	x		
2.D.3	Wood processing	x		
2.E	production of POPs	x		
2.F	consumption of HM and POPs (e.g. electrical and scientific equipment)	x		
2.G	Other production, consumption, storage, transportation or handling of bulk products (Please specify the sources included/excluded in the notes column to the right)	x		

Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.

General recommendations on cross-cutting issues

Transparency

77. The ERT found the inventory submitted by Germany to be generally transparent and well-documented, with a bibliography in several sub-sector sections. The ERT commends Germany for the good documentation and recommends that Germany includes a bibliography for all sub-sectors.

78. The ERT noted that the trends for emissions factors are presented in the sub-sector sections and commends Germany for this. However, these trends are not always discussed in the inventory report. During the review, Germany provided explanations for those trends. The ERT encourages Germany to include these explanations in its next inventory report.

Completeness

79. The ERT considers the Industry sector to be complete in terms of the sources, pollutants and years that are covered. The ERT commends Germany for the thorough work.

Consistency including recalculation and time series

80. The ERT identified some inconsistencies in the time series of TSP emissions between 1990 and the later years. During the review Germany explained that for 1990, emissions of TSP had been estimated for the German regions "new Länder" as a sum for all industrial processes and reported in NFR 2.A.7.d for the mineral industry, in NFR 2.C.1 for the metal industry and in NFR 2.D.1 for other industries. The ERT encourages Germany to continue investigating the feasibility of estimating emissions separately for each sub-sector in order to ensure time series consistency. The ERT also recommends that Germany provides an explanation in the IIR for the differences, and justifications explaining why consistent reporting has not been possible.

81. The ERT noted that Germany included sub-sector specific "Recalculation" paragraphs under each sector chapter and documented the justifications for and impacts of the recalculations. The ERT commends Germany for this.

Comparability

82. The ERT found the methods used to estimate emissions consistent with those in the Guidebook, with the results comparable to those of others Parties, and commends Germany for this.

Accuracy and uncertainties:

83. Emissions from Industrial Processes are estimated mainly at Tier 2 level.

84. Germany does not provide information on QA/QC procedures carried out for the Industrial Processes sector. The ERT encourages Germany to include a description of the QA/QC procedures carried out for each of the Industrial Process sectors in a sector-specific paragraph.

85. The ERT notes that Germany provides uncertainty estimates for SO_x, NO_x, NH₃, and NMVOC emissions from the Industrial Processes sector as a whole. To enable a better focus on the prioritisation of improvements on the basis of the results of the uncertainty analysis, the ERT encourages Germany to develop its uncertainty analysis at source category level.

Improvement:

86. Germany has included mercury emissions from the chemical industry in the inventory since the last submission. The ERT commends Germany on this development.

87. The ERT notes that Germany does not always include a paragraph dedicated to improvements in the source sector-specific descriptions. The ERT encourages Germany to complete the source sector-specific chapters with specific paragraphs on improvements.

Sub-sector Specific Recommendations.

2A1 Cement production

88. Cement production is a key source of Hg. The IIR states that emissions factors are based on emission data reported by individual plants, and on research projects as well as expert judgments. The IIR indicates that the methodology corresponds to a Tier 1 methodology. However, it is not clear how these sources are used for the different pollutants and if a higher tier method is applied for some of them or not. During the review, Germany confirmed that a Tier 1 methodology had been used for all pollutants. In the previous review report, Germany was encouraged to develop a Tier 2 or 3 methodology for cement production and to document this in its IIR. The ERT recommends that Germany provide more information in the IIR on how these different sources are used to calculate emission factors and encourages it to continue investigating the feasibility of implementing a higher tier methodology.

89. The ERT noted that no emissions of Pb and Cd had been reported for the period 1990-1994 (notation key "NE"). During the review, Germany explained that until 1994 not all the data needed to estimate all pollutants had been available. For the purpose of time series consistency, Germany intends to estimate these emissions. The ERT commends Germany on this planned improvement.

2A1 / 2A2 Cement and lime production

90. Germany reports emissions of NO_x, SO_x, NMVOC and NH₃ for cement and lime production under NFR 1.A.2.fi for the period of 1990-1994. During the review, Germany indicated that for the purpose of time series consistency, it intended to

allocate these emissions separately under NFR 2.A.1 and 2.A.2. The ERT welcomes the planned improvement.

2A6 Road paving

91. Germany reports emissions of NO_x and SO_x for road paving under NFR 1.A.2.fi for the period of 1990-1994. During the review, Germany indicated that for the purpose of time series consistency, it intended to allocate these emissions under NFR 2A6. The ERT welcomes the planned improvement.

2C1 Iron and steel production

92. Iron and steel production is a key source of SO_x, TSP, PM_{2.5}, PCB, CO, Pb, Cd, Hg, and PCDD/F emissions.

93. The ERT identified inconsistencies in the time series for NO_x and SO_x between 1990-1999 and 2000-2012. During the review, Germany explained that for 1990 – 1999, NO_x and SO_x emissions from rolling mills, sinter plants and foundries had been reported under NFR 1.A.2.a due to a different reporting structure for emissions, and due to the complex situation in Germany in the years 1990 – 1994 resulting from the reunification of the country. For this reason a provision of consistent time series is difficult. The ERT encourages Germany to continue investigating the feasibility of harmonising the time series in the future.

94. Germany reports emissions of NH₃ from iron and steel production under NFR 1.A.2.fi for the period of 1990-1994. During the review, Germany indicated that for the purpose of time series consistency it intended to allocate these under NFR 2.C.1. The ERT welcomes the planned improvement.

2D1 Pulp and paper

95. The ERT found a gap in emission factors for PM₁₀ and PM_{2.5} between the 1995-1999 emission factors and the 2000-2012 emission factors. During the review Germany provided an explanation. Until 1990 default emission factors were used and since 2005, the total suspended and fine particle emission factors have been revised and emission factors from the German pulp and paper association have been used. Germany has indicated that for this sub-sector a revision of the emission factors is foreseen in 2014 for the 2015 submission. The ERT welcomes the planned improvement.

SOLVENTS

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM ₁₀ & PM _{2.5}		
Years		1990 – 2006 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed *)	Not Reviewed *)	Recommendation Provided
3.A.1	Decorative coating application			x
3.A.2	Industrial coating application			
3.A.3	Other coating application (Please specify the sources included/excluded in the notes column to the right)			
3.B.1	Degreasing			x
3.B.2	Dry cleaning			
3.C	Chemical products,			
3.D.1	Printing			x
3.D.2	Domestic solvent use including fungicides			
3.D.3	Other product use			
<p>Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.</p> <p>*) The ERT was not able to review the German Solvent inventory by NFR categories due to the methodology not being transparent as explained below, and therefore only general recommendations are given.</p>				

General recommendations on cross-cutting issues

Transparency:

96. The ERT finds the documentation of the methods used to estimate emissions from solvent use partly transparent and well-presented for all sub-sectors. The ERT encourages Germany to include more detailed documentation of activity data, emission factors, a description of the applied methodology and the data sources, where possible, to improve the transparency of the IIR.

97. Germany provides information on the method used, on AD collection and on the legislative measures implemented and on the reductions caused by these measures. Germany established 37 sub-categories of solvent use. As Germany does not include any information on activity data, solvent contents, emission factors or implementation rates of emission abatement measures in its IIR, it is not possible to understand how these parameters evolve over time. Germany replied to the question raised by the ERT that these activity data were confidential and therefore also the associated emission factors were confidential. The ERT, however, encourages Germany to provide information on at least those parameters that are not confidential and to find ways to give more information on those that are. For example, for the

sources with the highest contributions to the 37 sub-categories, Germany could explain the evolution of the activities, solvent contents and emission factors without mentioning absolute numbers. Also, providing more information on the used EFs without giving the implementation rate is a possible way around this issue.

98. The ERT further notes that it is not clear which specific activities are included in the inventory and the ERT therefore encourages Germany to insert a selected list of all of the 37 sub-categories from which emissions are estimated. Also, a description of the evolution of emissions from those sources which make the highest contributions to emissions would improve transparency.

Completeness:

99. The ERT notes that all important sources for the Solvent sector have been included in the inventory. The ERT commends Germany on the fact that 37 source categories (in a manner similar to that used for CORINIR SNAP Level 3) have been estimated separately and aggregated at the most detailed reporting level since 2005.

100. The ERT notes that emissions for the period of 1990 – 2005 are reported on a more aggregated level, using the notation key “IE” for the NFR categories 3.A.1, 3.A.2, 2.B.2, 3.D.1 and 3.D.2. The ERT recommends that Germany explains why these categories have not been estimated separately and that it provides information on whether it intends to do so in the future. The ERT also recommends that Germany clearly documents in the IIR under which NFR categories the emissions from these categories are included.

Consistency including recalculation and time series:

101. The ERT recognises the level of effort undertaken by Germany in establishing a complete and consistent time series for all the 9 NFR sub-categories based on the detailed calculation of 37 Solvent use sub-sectors. The ERT considers the time series to be consistent. However, the ERT recommends that Germany reports emissions at a disaggregated level also for the period 1990 – 2005 to improve transparency (so that it becomes clear which emission sources are included).

Comparability:

102. The ERT notes that the methods used are consistent with those proposed in the EMEP/CORINAIR Guidebook 2013.

Accuracy and uncertainties:

103. Germany describes QA/QC procedures in the IIR only on a general level. For all sub-categories in the Solvent sector Tier 2 methods have been used. Information on the general QA/QC procedures together with the specific measures for the Solvent use sector indicate that a lot of attention is paid to uncertainty issues. For emissions from key categories there is, however, still room for improvement by increasing, for instance, the use of installation-specific information in order to move (gradually) from a Tier 2 to a Tier 3 methodology.

104. During the review the ERT asked Germany if also data at the level of individual installations (Tier 3) is used to reduce the uncertainty of estimates. Germany explained that there was no obligation to provide such data in Germany and that where possible installation information was gathered on a voluntary basis. The ERT encourages Germany to increase the use of information from individual installations that make a high contribution to the key categories, such as car assembly sites and big printing installations.

Improvement:

105. The ERT notes that in the IIR Germany does not provide information on planned improvements for Solvent sector emission estimates and recommends that Germany adds this information in the next submission.

Sub-sector Specific Recommendations

106. The ERT makes no specific sub-sector recommendations for Germany's Solvent sector emission estimates because at the moment, the methodology lacks transparency; therefore, only general recommendations are made.

AGRICULTURE

Review Scope:

Pollutants Reviewed		SO ₂ , NO _x , NH ₃ , PM ₁₀ & PM _{2.5}		
Years		1990 – 2012		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
4 B 1 a	Cattle dairy	X		
4 B 1 b	Cattle non-dairy	X		
4 B 2	Buffalo	X		
4 B 3	Sheep	X		
4 B 4	Goats	X		
4 B 6	Horses	X		
4 B 7	Mules and asses	X		
4 B 8	Swine	X		
4 B 9 a	Laying hens	X		
4 B 9 b	Broilers	X		
4 B 9 c	Turkeys	X		
4 B 9 d	Other poultry	X		
4 B 13	4 B 13 Other	X		
4 D 1 a	Synthetic N fertilisers	X		
4 D 2 a	Farm-level agricultural operations including storage, handling and transport of agricultural products	X		
4 D 2 a	Off-farm storage, handling and transport of bulk agricultural products	X		
4 D 2 c	N excretion on pasture range and paddock unspecified (Please specify the sources included/excluded in the notes column to the right)	X		
4 F	Field burning of agricultural wastes	X		
4 G	Agriculture other(c)			
11 A	(11 08 Volcanoes)			
11 B	Forest fires			

Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.

General recommendations on cross-cutting issues

Transparency:

107. The ERT found the inventory for the Agriculture sector to be generally transparent. It includes the most relevant information. However, for the purpose of the review, more detailed documentation of the complex Tier 3 models for parameters, data sources, emission factors and underlying assumptions is needed. The ERT encourages Germany to provide additional descriptions and explanations on the level of the livestock categories in order to facilitate the assessment of emission trends.

Completeness:

108. The inventory covers all sources, pollutants and years.

Consistency including recalculation and time series:

109. Germany has carried out recalculations since the last submission mainly based on improved calculations of N excretion and changes in animal husbandry. The recalculations chapter of IIR provides detailed information on the quantitative impact of category-specific recalculations. The ERT commends Germany for this.

110. The implementation of the new revised model input data can introduce a bias in the time series, because the estimated emission trend also reflects the pattern of methodological refinements. For example, the significant decrease in NH₃ IEFs for swine from 1993 to 1994 is attributed to changes in underlying RAUMIS model data (see para 122), but it is unlikely that, in reality, agriculture practices changed that rapidly from one year to another (see also para 123). The ERT encourages Germany to further improve the consistency of the time series. In chapter 4 of the EMEP/EEA Guidebook 2013 specific methods are provided.

111. Following the method descriptions in the EMEP/EEA Guidebook, the inventory text should thoroughly explain how the change in farm practices or the implementation of mitigation measures has affected the time series. The ERT encourages Germany to provide additional descriptions and explanations on the level of the livestock categories in order to facilitate the assessment of emission trends.

Comparability:

112. The methods used are consistent with the Guidebook.

Accuracy and uncertainties:

113. Germany has included documentation of source-specific QA/QC procedures for the Agriculture sector in the IIR, as encouraged in the previous review report. The ERT commends Germany for this.

Improvement:

114. The ERT commends Germany for providing improved documentation in its IIR and for the inclusion of estimates for turkeys and other poultry in the inventory, as indicated during the previous review.

115. No specific planned improvements are described in the IIR for the Agriculture sector. During the review Germany indicated that it would correct the sheep numbers in the next submission (see para 108).

Sub-sector Specific Recommendations**Category issue 1: e.g. 4.B Manure management: - NH₃**

116. Germany's emission model is based on the N-flow concept. The calculation addresses both N pools (N excretion and TAN) for the different stages of manure

management (housing, grazing, storage, application). Nitrogen emitted with NH₃ is subtracted from the TAN pool only. NO_x emissions (i. e. NO emissions) have been calculated, proportional to the N₂O emissions. The ERT commends Germany for the development of its scientific Tier 3 model and encourages Germany to continue with this approach.

117. The ERT noted that for the purpose of the review more detailed documentation of the complex Tier 3 models for parameters, data sources, emission factors and underlying assumptions would be needed. In response to a question raised by the ERT, Germany provided the report “Calculations of gaseous and particulate emissions from German agriculture 1990 – 2012 Report on methods and data (RMD) Submission 2014” which includes extensive documentation of the German inventory for agriculture. The ERT found all the needed information in this report, but recommends that Germany provides additional information in the IIR, especially related to: TAN contents, distributions of housing and storage facilities (e.g. for the first and last reporting year), slurry storage systems and the spreading systems applied, corresponding EFs.

118. The ERT asked for a verification of the German emission model. In its answer, Germany explained that for the time being, model data were verified in the context of a project by external experts (Zsolt Lengyel, Verico SCE). First results show that input data are consistent with other data sources (Eurostat, DESTATIS) and that the calculations performed are consistently and correctly applied, in line with the methodological requirements. Furthermore, the GAS-EM model is validated and co-developed annually by another institution and experts (KTBL, Kuratorium für Technik und Bauwesen in der Landwirtschaft, and the EAGER group). The ERT appreciates the efforts undertaken to assure data quality, and recommends that Germany include this information in its sectorial chapter of the IIR. Following the EMEP/EEA Guidebook, documentation, detailing when and where the agricultural emissions inventory has been checked and by whom, should be included. Especially for Tier 3 models, information on model validation is crucial for an assessment of the reliability of model results.

119. The ERT identified a sharp decrease in the animal numbers of sheep from 2007 to 2011. In an answer to a question raised by the ERT, Germany explained that part of the decreasing trend was affected by a change in the reference dates for livestock accounting: until 2009 the reference date for sheep numbers was 3rd May of each year. In 2010 the reference date was 1st March, and in 2011 the reference date was moved to 3rd November (due to EU Regulation No 1165/2008, Article 4). Germany will correct the official sheep numbers for 2010 onwards in the next submission (2015). The ERT recommends that Germany includes this information in the IIR.

120. Goat numbers show a peak in 2009 and then a sharp decrease in 2010. Germany explained that in 2010, the total number of goats in Germany was determined for the first time, resulting in markedly lower animal numbers than those provided by the estimates from the Federal Ministry of Food, Agriculture and

Consumer Protection (BMELV) and the Federal Statistical Office for the previous years. The ERT recommends that Germany includes this information in the IIR.

121. The number of horses shows two peaks in 1996 and 2007. Germany explained that the data for these two years was based on official surveys. Anyhow, the reason behind this trend could not be fully explained. The ERT recommends that Germany further checks the correctness of the data and includes an explanation of this issue in the IIR.

122. The ERT questioned the decrease in the NH₃-IEF for dairy cattle from 2011 to 2012 (although the milk yields increased from 7,240kg to 7,280kg and N excretion increased from 116.6kg to 116.9kg). Germany explained that decrease by providing a specification approved of by the Agrarministerkonferenz (Conference of the farming ministers of the federal states) on 1st April 2011 in Jena: from 2011/2012 onwards, a requirement has been in place which states that liquid manure has to be incorporated not later than 4 hours after application on bare arable land. Other reasons are an increase in slurry digestion together with an increase in gas-tight storage of digested slurry and the fact that digested slurry is generally applied with more efficient application technologies. The ERT recommends that Germany includes this information in the IIR.

123. The ERT questioned the significant decrease in IEFs for swine from 1993 to 1994 (from 5.40 to 5.05). Germany explained this by stating that there had been a change in the underlying RAUMIS model data: a decrease of slurry storage in open tanks, a quicker incorporation of slurry after spreading and an extended use of trailing hoses rather than surface broadcasting. The ERT recommends that Germany includes this information in the IIR.

124. The ERT questioned the significant increase in IEFs for laying hens from 2002 to 2004 (from 0.40 to 0.45), for broilers from 2006 onwards (0.21-0.26), and turkeys from 2009 (1.1-1.2) onwards. The increase could be explained by changes in final weights and changes in weight gains. The ERT recommends that Germany includes this information in the IIR.

WASTE

Review Scope:

Pollutants Reviewed		All		
Years		2012		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
6.A	solid waste disposal on land	x		x
6.B	waste-water handling	x		x
6 C a	6 C a Clinical waste incineration (d)	x		x
6 C b	Industrial waste incineration (d)	x		x
6 C c	Municipal waste incineration (d)	x		x
6 C d	Cremation	x		
6 C e	Small scale waste burning	x		
6.D	other waste (e)	x		x

Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.

General recommendations on cross-cutting issues.

Transparency:

125. For the Waste sector, Germany reports emissions aggregated under NFR 6.C.d Cremation for the whole time series 1990-2012. In the IIR Germany explains that emissions from waste incineration have been allocated to the Energy sector due to the energy recovery from waste fuels. The ERT recommends that Germany improves the transparency of the inventory by disaggregating the emissions in the relevant NFR categories.

126. The ERT found the description of the methodologies used for the calculation of emissions clear and transparent.

Completeness:

127. The inventory for the Waste sector is partly complete. Germany reports emissions only from cremation, i.e. one of eight sub-sectors. The ERT recommends that Germany improves the completeness of the inventory by estimating emissions from solid waste disposal and wastewater handling.

Consistency, including recalculation and time series:

128. The time series for the main pollutant emissions presented in the IIR is consistent.

129. Germany has recalculated emissions from cremation since the last submission by updating the methodology according to the Guidebook.

Comparability:

130. The methods used to estimate emissions are in accordance with the 2013 Guidebook and the emissions reported under the NFR09 codes. The ERT finds the inventory comparable as far as the emissions from cremation are concerned, which is the only source reported.

Accuracy and uncertainties:

131. According to information presented in the IIR, QA/QC procedures for the calculation of emissions from the Waste sector are in place.

Improvement:

132. No information on improvements to the Waste sector is presented in the IIR.

133. The ERT recommends that Germany includes emissions from more Waste sector sources in the next submission. Detailed recommendations are given for the relevant sub-sector chapters.

Sub-sector Specific Recommendations

6A - Solid waste disposal on land

134. Germany reports emissions from solid waste disposal on land as “NA” and does not include this source in the IIR. Solid waste disposal on land (SWD) is a source of air pollutants such as NMVOC emissions. However, Germany has estimated CH₄ emissions from SWD and reported them under the UNFCCC. The ERT recommends that Germany uses the activity data from the GHG inventory and calculates NMVOC emissions according to the emissions factor that are available in Guidebook for this source.

6B- Waste-water handling

135. Germany reports emissions from wastewater handling as “NA” and does not include information on this source in the IIR. Wastewater treatment is a source of e.g. However, the ERT notes that Germany estimates CH₄ emissions from wastewater treatment and reports them under the UNFCCC, and that according to the reply from Germany, statistics are available on wastewater volumes. The ERT recommends Germany to use the activity data from the GHG inventory and to calculate NMVOC emissions using the emissions factors that are available in Guidebook for this source.

6Ca, 6Cb, 6Cc – Waste incineration (clinical, industrial, municipal)

136. Germany does not report emissions separately under NFRs 6.C.a, 6.C.b and 6.C.c (notation key “NO”). According to the IIR, emissions from plants incinerating waste with energy recovery are reported under NFR 1. However, no methodological explanations are provided in the IIR. If the emissions from waste incineration are all associated with energy recovery and included under NFR 1, the ERT encourages Germany to add information about the methodology used for different types of waste incineration under NFR 1 and to use the notation key “IE” instead of “NO”, and to explain the use of the notation key in the IIR. The ERT also encourages Germany to

investigate emissions from plants without energy recovery systems and to report and document these in future submissions.

6Cd - Cremation

137. Germany includes emissions from cremation in the inventory. The methodologies used for estimating emissions are based on the Guidebook 2013. The ERT commends Germany for the accuracy of the emission estimates in this sector and the detailed documentation.

6Ce Small-scale waste burning

138. Germany does not report emissions from small-scale waste burning. In the IIR Germany states that small-scale waste burning is prohibited by law. Therefore the notation key "NO" has been used in the NFR table. The ERT commends Germany for this clear documentation.

6D Other wastes

139. Germany does not report emissions in this sector and does not provide an explanation for using the notation key "not estimated" ("NE") in the IIR. The ERT recommends that Germany checks if sources which would have to be included under "Other waste" exist in Germany, such as for instance composting, unintentional fires etc.

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Responses to preliminary question raised prior to the review
2. Responses to questions raised during the review:
3. Germany Stage 2 S&A report 2014
4. Germany Stage 1 report 2014
5. Germany IIR 2014
6. Thünen-Institut (2014): Haenel, H., Rösemann, C.; Dämmgen, U.; Poddey, E.; Freibauer, A.; Wulf, S.; Eurich-Menden, B.; Döhler, H.; Schreiner, C.; Bauer, B.; Osterburg, B.: Calculations of gaseous and particulate emissions from German agriculture 1990 – 2012. Report on methods and data (RMD) Submission 2014. Thünen Report 17. Braunschweig.
7. KTBL - Kuratorium für Landtechnik und Bauwesen in der Landwirtschaft (2014): Arbeitsprogramm. Übersicht über laufende Projekte. Darmstadt.