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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:**

POLAND

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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 – 2011, 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 Poland coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 17th June 2013 to 21st June 2013 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 – Emilia Hanley (Ireland), Transport – Nina Holmengen (Norway), Industry – Kees Peek (Netherlands), Solvents – Ardi Link (Estonia), Agriculture & Nature – Michael Anderl (Austria), Waste – Katja Hjelgaard (Denmark).
4. Kevin Hausmann 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. Poland's inventory is generally in line with the EMEP EEA Inventory Guidebook and the UNECE Reporting Guidelines. Emissions reported under the CLRTAP and the NECD are consistent.
6. The ERT notes that the transparency of the inventory could be greatly improved by including more detailed descriptions of the methodologies used to estimate emissions as well as the factors affecting the emission trends.
7. The submission only includes NFR tables for the years 2000-2012 and information in the IIR on the last two years (2010-2012), which did not enable the ERT to review the complete time series.
8. Emissions for a number of key categories are reported as IE or NE.
9. The ERT notes substantial improvements in the inventory and commends Poland for implementing most of the recommendations of the last review in 2009. The ERT also notes a need for further improvements, some of which are listed in Part B of this report and in the source specific recommendations below.

INVENTORY SUBMISSION

10. Poland submitted its inventory under the NECD on 18.12.2012 with resubmissions on 28.3.2013 and on 3.4.2013; the original submission was within the deadline of 31.12.2012. The first two submissions included NFR tables for 2010 and 2011 (the latest year) for the NECD pollutants NO_x, SO₂, NH₃ and NMVOC. The resubmission under the NECD on 3.4.2013 included NFR tables for 2000-2011 and projections for these pollutants.
11. Poland submitted its inventory under the CLRTAP on 15.02.2013. The submissions were within the deadline of 15.2.2013 and included NFR tables for 2010 and 2011 (the latest year) for the main pollutants NO_x, SO₂, NH₃, NMVOC, as well as for the following heavy metals: As, Cd, Cr, Cu, Hg, Ni, Pb, Se and Zn and POPs: HCB, PCDD/F, PAH-4 and PCB, and for CO, TSP, PM₁₀, and PM_{2.5}, including projections. Poland provided an IIR on 15.3.2013, which included data from 2000-2011. In 2012, Poland also provided gridded data but no LPS data.
12. The ERT notes that substantial improvements have been made since the last review in 2009 and considers the inventory to be of good quality and well documented in the Informative Inventory Report (IIR). Due to the availability 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

13. Poland has performed and presented in its IIR a Tier 1 key category level analysis for the latest inventory year for the following pollutants: NO_x, CO, NMVOC, SO₂, NH₃, TSP, PM₁₀ and PM_{2.5}, As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn, PCDD/F and

PAH-4 including all sectors. The KCA performed by the Party and the CEIP produced similar results.

14. 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 latest inventory year. Poland has, however, not presented a KCA of the pollutants for the base years. The ERT recommends that Poland adds a KCA for the base year(s) in its next submission.

15. To the question raised by the ERT on priorities in inventory improvement, Poland replied that the results of the KCA would be taken into account, as well as recommendations from reviews and requirements arising from obligations under international conventions. The ERT commends Poland for this information and recommends that Poland documents these issues in the IIR.

QUALITY

Transparency

16. The ERT recognises the level of effort undertaken by Poland in providing a detailed inventory. In general, the ERT considered the inventory and the IIR to be of good quality.

17. To further improve the transparency of the inventory the ERT recommends that Poland provides additional details in the IIR on the methodologies used in the preparation of the inventory, for instance in the transport and industrial processes sectors.

18. The ERT also recommends that Poland adds emissions from the whole time series to the presentation of emission trends, accompanied by information on factors affecting the trends, such as technical and economic development, to enable a better understanding of the development of emissions.

19. The ERT commends Poland for providing information on where the sources reported as included elsewhere (IE) are included in the NFR table "Additional info" sheet. The ERT encourages Poland to try and find ways to report these emissions separately under the proper NFR categories. The ERT also found some incorrect use of the notation keys "NA" and "IE", e.g. in the transport sector.

20. To the question raised by the ERT on an IIR statement regarding difficulties in the appropriate disaggregation of activity data, Poland provided a table of explanations for the notation keys. The ERT thanks Poland for this and refers to the comments on the use of notation keys discussed below in the sector specific chapters.

Completeness

21. The ERT acknowledges the effort Poland put into providing estimates of emissions for all sectors and all pollutants reviewed. Poland's inventory is in general complete for the years submitted and as regards geographical coverage.

22. In the IIR, Poland provides justifications for “not estimated” (NE) sources, e.g. that there is lack of verified emission factors or activity data, and states that efforts are made to gather additional data for the next inventory submission. The ERT commends Poland for providing this information in the IIR and encourages Poland to finalise the inclusion of not estimated emissions. For sources that might remain NE, the ERT recommends that Poland assesses the quantitative importance of the sources currently not estimated and provides a plan for when such estimates could be prepared. Completeness of the inventory is essential for reviewing compliance under the NECD and the relevant UNFCCC CLRTAP Protocols.

23. In 2012 Poland provided data on large point sources (LPS) but no gridded data. The ERT recommends that Poland also provides gridded data in the next submission where gridded data is due.

Consistency, including recalculations and time series

24. The ERT notes the extensive work on recalculations undertaken by Poland in the last years. During the preparation of the current submission Poland carried out recalculations for the period 2000-2011, removing earlier inconsistencies by including recent corrections in the statistics, methodology changes, and additional emission sources missing in earlier inventories. The IIR provides justifications for the recalculations and explains that further recalculations are needed for the years before 2000 to have a fully consistent time series. To the questions raised by the ERT, Poland replied that recalculations for 1995-99 would be included in the next submission and that recalculations for the earlier years were a challenge given the structure of public statistics. The ERT commends Poland for its work and recommends that Poland finalises the recalculations for the earlier years and includes them in its next submission.

Comparability

25. The ERT notes that the inventory of Poland is comparable with those of other reporting parties. The allocation of source categories follows that of the EMEP/UNECE Reporting Guidelines. The ERT encourages Poland to continue with this approach to national inventory calculation.

CLRTAP/NECD comparability

26. The ERT notes that the inventories by Poland submitted under the NECD and the CLRTAP include no differences between the estimates. The ERT commends Poland for achieving consistency of its inventories.

Accuracy and uncertainties

27. Poland has not yet provided an uncertainty analysis which is in line with the EMEP/EEA Guidebook 2009. In the IIR, it is stated that Poland plans to implement a Monte Carlo uncertainty analysis for the next submissions, with the NECD substances being the highest priority. The ERT commends Poland on this plan.

Verification and quality assurance/quality control approaches

28. Poland has elaborated and implemented a quality assurance/quality control (QA/QC) programme for the air pollutant inventory in accordance with the QA/QC system used in the Polish greenhouse gas inventory. In the IIR, details on the programme are not included and the ERT recommends that Poland provides further details in the IIR or references to other documentation of the work. To the questions raised by the ERT during the review, Poland replied that it would use the results of the key source analysis in prioritising inventory improvements.

29. According to the IIR, the inventory is peer reviewed and officially approved before final submission.

FOLLOW-UP TO PREVIOUS REVIEWS

30. Poland has not provided answers to the Stage 2 review reports.

31. The ERT notes that the Party has implemented most of the recommendations given by the previous ERT in 2009. However, there are remaining issues which need to be clarified, for instance the use of notation keys in the transport and industrial processes sectors. The ERT commends Poland for these efforts and recommends that Poland completes the remaining work.

AREAS FOR IMPROVEMENTS IDENTIFIED BY POLAND

32. Poland identified the following further improvement needs in the IIR, and in its replies to questions raised by the ERT during the review:

- (a) Verification of NMVOC emissions from the solvents use sector,
- (b) Collection of additional activity data to include new emission sources (e.g. venting and flaring; use of fireworks),
- (c) Development of an uncertainty assessment,
- (d) Development of higher tier methods and country-specific emission factors especially for key categories,
- (e) Inclusion of LPS reporting at plant level for 2014.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS-CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

33. The ERT has identified the following cross-cutting issues for improvement:
- (a) Add KCA for the base years of the pollutants in the IIR for the next submission.
 - (b) Assess the quantitative importance of the sources currently not estimated and provide a plan for when such estimates could be prepared.
 - (c) Finalise the recalculations for the years before 2000 and provide information in the IIR on time series consistency, reasons for variations in emissions and impacts of the recalculations on emission trends.
 - (d) Prepare an uncertainty analysis.
 - (e) Provide further details in the IIR on QA/QC activities.

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , CO, PMs, HMs, POPs		
Years		2000 – 2011		
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		x
1.A.2.c	chemicals	x		
1.A.2.d	pulp, paper and print	x		x
1.A.2.e	food processing, beverages and tobacco	x		x
1.A.2.f.i	Stationary Combustion in Manufacturing Industries and Construction: Other (Please specify in your IIR)	x		x
1.A.2.f.ii	Mobile Combustion in Manufacturing Industries and Construction: (Please specify in your IIR)		x	
1 A 3 e	Pipeline compressors	x		x
1.A.4.a.i	commercial / institutional: stationary	x		
1.A.4.a.ii	commercial / institutional: mobile		x	
1.A.4.b.i	residential plants	x		x
1.A.4.b.ii	household and gardening (mobile)		x	
1.A.4.c.i	Agriculture/forestry/fishing. stationary	x		x
1.A.4.c.ii	Off-road vehicles and other machinery?		x	
1.A.4.c.iii	National fishing?		x	
1.A.5.a	other, stationary (including military)	x		x
1.A.5.b	other, mobile (including military, land based and recreational boats)?		x	
1.B.1.a	coal mining and handling	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		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		x
1 B 3	Other fugitive emissions from geothermal energy production , peat and other energy		x	

	extraction not included in 1 B 2			
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.

34. Poland's submission is generally in line with the EMEP / EEA Inventory Guidebook and the UNECE Reporting Guidelines. The IIR authors have acknowledged a few shortcomings, which will be dealt with in subsequent IIRs. In 2013, broad recalculations of data from 2000 were completed which enabled the preparation of inventory files (Annex IV) for the whole trend 2000-2011, which is a major improvement as all previous IIR reports were limited to the last two reported years in each submission (i.e. 2007-2008 in the 2010 submission).

35. The ERT commends the Party for making those improvements and encourages Poland to further enhance and refine the information presented in its already well structured IIR, i.e. to include more detailed methodology descriptions, broader sector specific trend analyses (dips and jumps explanations), more information on recalculations of pollutant emission trends, as well as calculations and the rationale for uncertainties, a key category analysis for the whole trend (Poland presents a very good key category level analysis for the last two years separately, a more textual description of the tabular analyses would be most welcome).

Transparency:

36. Poland's IIR is generally well presented and includes all relevant information. More descriptions on methodologies and the rationale behind the choice of emission factors (country-specific and default emission factors as specified in the Guidelines) would be welcome as there are currently references to external sources of information but only a few descriptions taken from the source and included in the IIR itself. The ERT encourages Poland to derive the relevant information from reference documents/guidelines and include it in detail in its IIR for improved transparency and accuracy.

Completeness:

37. The ERT considers the energy sector to be generally complete and comprehensive. There are a few pollutants in energy sources that were identified during the review as not estimated (NE) where activity data is present, or zero values instead of notation keys, and these will be detailed in the following section of this report (see sector-specific recommendations below). Emission factors for sectors and pollutants plus activity data in the national energy balance are well presented and referenced in separate tables included in the IIR.

Consistency including recalculation and time series:

38. The ERT notes that extensive recalculations of data from 2000 onwards have been completed, which resulted in producing the 2000 - 2011 time series for the first time in Poland's 2013 inventory (previous inventories consisted only of two reported

years). This constitutes a major improvement and the reasons for these recalculations are mentioned in the IIR. However, more supporting information for methodologies and the underlying rationale, as well as the steps taken to perform these recalculations would be of benefit for future submissions. The trends presented are generally consistent, short textual analyses of dips and jumps are included in the IIR. The ERT encourages Poland to elaborate on already existing trend analyses and on the impacts of the separate sub-sectors on those trends over the years.

Comparability:

39. Poland's inventory is comparable with those of other countries as defined in the EMEP/EEA Guidebook for the years 2000-2011 (a pre-2000 time series is yet to be included in the Party's inventory). The allocation of source categories follows the split recommended in the EMEP/UNECE Reporting Guidelines. For CLRTAP/NECD comparability, a comparison between estimates reported under CLRTAP and under the National Emissions Ceilings Directive (undertaken during the Stage 2 review) showed very good agreements.

Accuracy and uncertainties:

40. Poland included a partial uncertainty analysis by providing a few number values and a short description of the rationale behind the estimates. Yet there is no methodology, calculation or other scientific evidence supporting those values. A qualitative analysis gives an overview of Poland's difficulties in producing those values. Poland plans to develop a Monte Carlo uncertainty analysis for its inventories in future. The ERT notes the effort undertaken to calculate the uncertainties and encourages the Party to include more background information on those estimates in future.

Improvement:

41. The Party's IIR reported in 2013 shows substantial improvements, and the structure and content are generally in line with best practice examples.

42. The ERT commends Poland for its improvements, especially with regard to reporting additional years in time series after the previous Stage 3 review (in 2009): from reporting only the two last years (2006 and 2007) in the 2009 reporting round to reporting on the years 2000-2011 as currently achieved in the 2013 reporting round. The ERT encourages Poland to further enhance its time series and include emissions for 1990-1999 in future submissions.

Sub-sector Specific Recommendations.

Category issue 1: 1 A 1 a Public electricity and heat production (key category for pollutants in this paragraph) - SO_x, Hg, PCB

43. The ERT noted that the implied emission factors (IEF) for the above pollutants (SO_x, Hg, PCB) in their key category 1A1a seemed to be very high (disproportionately high) compared to other Parties:

44. Poland responded that the SO₂ EFs resulted from district heating plants which are equipped with very limited emission control installations and that were derived from the LPS reporting system (National Database). The ERT concludes that the EF value is adequate, taking into account the limited abatement system in Polish district heating plants.

45. Poland also informed the ERT that Hg emission estimates from the public power sector were country-specific and based on a new study carried out by the Polish Energy Group PGE; they were specific to the national circumstances. In fact, based on that study, EFs in other subcategories also needed further examination. An analysis of the EFs would be performed and the results included in the next submission. The ERT welcomes this explanation and recommends that Poland elaborates on the national circumstances and includes a follow up study supporting the country-specific EFs in its next IIR.

46. Regarding PCB, the EF was based on Bulgaria's EF who used a very high EF for PCB in this category. Poland replied that a further survey of EFs applied by other countries would be carried out, then an analysis of new data concerning the mentioned EF would be performed and a modified EF included in the next submission. The ERT welcomes this effort and recommends that Poland revises its PCB emission factors based on other relevant Parties' methods/rationale allowing for lower values of those factors.

Category issue 2: 1 A 1 b Petroleum refining - Activity data fuel: Biomass and Other Fuels

47. The ERT notes that zero values are reported in the NFR table in the activity data (Biomass and Other Fuels) sections of the above sector. Poland explained that the zero values in Biomass fuel and Other Fuels for this sector actually mean that these fuels were not used; hence the notation key "not occurring" (NO) should be inserted. The ERT encourages Poland to correct these errors in its future submission.

Category issue 3: 1 A 2 a Stationary combustion in manufacturing industries and construction: Iron and steel - Activity data fuel: Biomass

48. The ERT notes that zero values are reported in the NFR table in the activity data (Biomass) section of the above sector. Poland explained that the zero values in biomass fuel for this sector actually mean that the given fuel was not used; hence the notation key "not occurring" (NO) should be inserted. The ERT encourages Poland to correct this error in its future submission.

Category issue 4: 1 A 2 a Stationary combustion in manufacturing industries and construction: Iron and steel - HCB

49. The ERT notes that the HCB implied emission factor (IEF) for key category 1A2a seems to be very high (disproportionately high) compared to other Parties. Poland informed the ERT that 1.A.2.a includes iron ore sinter production. A country-specific EF was applied in this category, which is based on measurements in sinter plants, and covers the total emissions from ore sinter production (process emissions

and emissions from fuel used for this particular production). This might be one of the reasons for the EF being higher in comparison with the default EF from the EMEP/EEA Emission Inventory Guidebook 2009 in table 3.2 of Chapter 2.C.1 Iron and steel production. An analysis of new data concerning the HCB EF will be performed and the results included in the next submission. The ERT encourages Poland to exclude process emissions from category 1A2a (and include them in the appropriate sector: 2C1) and choose a more appropriate emission factor for the 1A2a source category.

Category issue 5: 1 A 2 b Stationary Combustion in manufacturing industries and construction: Non-ferrous metals - Activity data fuel: Biomass

50. The ERT notes that zero values are reported in the NFR table in the activity data (Biomass) section of the above sector. Poland explained that the zero values in biomass fuel for this sector actually mean that the given fuel was not used; hence the notation key "not occurring" (NO) should be inserted. The ERT encourages Poland to correct this error in its future submission.

Category issue 6: 1 A 2 b Stationary Combustion in manufacturing industries and construction: Non-ferrous metals - HCB

51. The ERT notes that the HCB implied emission factor (IEF) for key category 1A2b seems to be very high (disproportionately high) compared to other Parties. Poland informed the ERT that 1.A.2.b includes secondary copper production. The HCB EF from [Bailey (2001): Global hexachlorobenzene emission, Chemosphere 43 (2001), 167-182] was applied in the Polish inventory due to the lack of a country-specific or default EF. An analysis of new data concerning the HCB EF will be performed and the results included in the next submission. The ERT welcomes this explanation and encourages Poland to investigate a better choice for a lower value emission factor (based on other Parties' studies on the same sector and pollutant).

Category issue 7: 1 A 2 d Pulp, paper and print – NO_x

52. In its response to the energy expert's findings regarding the rather low NO_x emissions from pulp and paper production during the previous Stage 3 review (2009), Poland indicated that the methodology had to be verified or changed. Following up on the 2009 ERT's recommendation, the ERT review asked the Party during the 2013 if any changes since the last review had been implemented in the methodology as planned. Poland replied that estimates of emissions from this category were based on fuel use data attributed to that sector (which has been harmonised with the GHG inventory). Planned improvements for this category will comprise a switch (in 2014) from estimates based on fuel use to introducing data from individual reporting to the National Database, which will improve emission estimates in the 1A2a-f source categories. The ERT welcomes this effort and is looking forward to seeing those changes in Poland's future submission.

Category issue 8: 1 A 2 e Stationary combustion in manufacturing industries and construction: Food processing, beverages and tobacco- Activity data fuel: Other Fuels

53. The ERT notes that zero values are reported in the NFR table in the activity data (Other Fuels) section of the above sector. Poland explained that the zero values in Other Fuels for this sector actually mean that the given fuel was not used; hence, the notation key "not occurring" (NO) should be inserted. The ERT encourages Poland to correct this error in its future submission.

Category issue 9: 1 A 2 f i Cement industry – NOx

54. During the previous Stage 3 review (2009), the energy expert identified a rather high NOx emission factor of 2380 kg NOx/TJ for this source. Poland indicated in their response at the time that the methodology had to be verified or changed. Following up on the 2009 ERT's recommendation, the ERT (during the 2013 review) asked the Party if any changes since the last review had been implemented in the methodology as planned. Poland replied that the above category also contains emission estimates for industrial CHP plants (SNAP 0301) and combustion processes in industry, not included in categories 1A2a - 1A2e, including cement production. However, planned improvements for this category will comprise a switch (in 2014) from estimates based on fuel use to introducing data from individual reporting to the National Database, which will improve emission estimates in the 1A2a - 1A2f source categories. The ERT welcomes this effort and is looking forward to seeing those improvements in Poland's future submission.

Category issue 10: 1 A 3 e Pipeline compressors - Activity data fuels

55. The ERT notes that the "included elsewhere" (IE) notation key is reported in the NFR table in the activity data (Fuel use) section of the above sector. Poland explained that for this category fuel use is in fact available and therefore the notation key IE should be changed to NE (not estimated). However, estimates of emissions for this category will be reported in the next submission. The ERT recommends that Poland corrects this error in its future submission.

Category issue 11: 1 A 4 b i Residential: Stationary plants - Activity data fuel: Other Fuels

56. The ERT notes that zero values are reported in the NFR table in the activity data (Other Fuels) section of the above sector. Poland explained that the zero values in Other Fuels for this sector actually mean that the given fuel was not used; hence the notation key "not occurring" (NO) should be inserted. The ERT encourages Poland to correct this error in its future submission.

Category issue 12: 1 A 4 c i Agriculture/Forestry/Fishing: Stationary - Activity data fuel: Other Fuels

57. The ERT notes that zero values are reported in the NFR table in the activity data (Other Fuels) section of the above sector. Poland explained that the zero values in Other Fuels for this sector actually mean that the given fuel was not used; hence, the notation key "not occurring" (NO) should be inserted. The ERT encourages Poland to correct this error in its future submission.

Category issue 13: 1 A 4 c i Agriculture/Forestry/Fishing: Stationary - CO, Cd (key) and Pb (non-key) for the category

58. The ERT notes that the implied emission factors (IEF) for the above pollutants in key/non-key category 1A4ci seem to be very high (disproportionately high) compared to other Parties. Poland responded that EFs for this category in fact needed further examination and verification. An analysis of EFs would be performed and the results included in the next submission. The ERT welcomes this effort and is looking forward to seeing those improvements in Poland's future submission.

Category issue 14: 1 A 5 a Other stationary (including military) - Activity data (fuel use)

59. The ERT notes that for all fuels the activity data in the above category are reported as "not occurring" (NO). Poland responded that for this category the notation keys for activity data in the NFR table should be IE, corresponding to the notation keys for emissions (also IEs) in this category. The ERT encourages Poland to correct this error in its future submission.

Category issue 15: 1 B 2 a iv Refining / storage SOx

60. Poland used the NE (Not Estimated) notation key for SOx in the above category in the reporting tables. The ERT encourages Poland to make SOx estimates for fugitive emissions in the crude oil refining sector for its future submission.

Category issue 16: 1 B 2 c Venting and flaring - All relevant pollutants

61. Poland used the NE (Not Estimated) notation key for all pollutants in the above category in the reporting tables. The ERT encourages Poland to make pollutant estimates for fugitive emissions in the natural gas venting and flaring sector for its future submission.

Category issue 17: All Energy sectors - Se

62. Poland used the NE (Not Estimated) notation key for selenium emissions in all sectors in the reporting tables. The ERT encourages Party to make selenium estimates for all source categories for its future submission.

TRANSPORT

Review Scope

Pollutants Reviewed		Main pollutants, particulate matter, HM and CO		
Years		2000 – 2011		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
1.A.3.a.i.(i)	international aviation (LTO)	x		x
1.A.3.a.i.(ii)	international aviation (cruise)		x	
1.A.3.a.ii.(i)	civil aviation (domestic, LTO)	x		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		
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		x
1.A.3.d.i (ii)	international inland navigation		x	
1.A.3.d.ii	national navigation	x		x
1.A.4.b.ii	household and gardening (mobile)	x		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 (fuel used)		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.

63. Mobile sources in the Polish inventory are transparently reported in the NFR, but there is a need for further description of methodologies in the IIR. The ERT would like to thank Poland for providing thorough answers in a timely manner during the review.

Transparency:

64. Poland's IIR contains detailed tables of the emission factors used. However, the ERT notes that the references to the emission factors, as well as the descriptions of activity data and methodologies are not sufficiently detailed to render an assessment of quality and completeness possible. The ERT encourages Poland to

expand the IIR by including additional information on methodologies for all mobile sources, as exemplified with category issue 1.

65. Transparency is reduced due to the use of the notation key "Included elsewhere" for some sources. The ERT encourages Poland to examine the possibilities for a disaggregation of these sources; see category issue 2. During the review the ERT also asked Poland several questions concerning the use of the notation key NA and NO; see category issue 3-5.

66. The trends in the emissions time series are described in the IIR at an aggregated level. The ERT encourages Poland to include source-specific trend descriptions where this is necessary to understand sudden changes or apparent trends.

Completeness:

67. All major mobile sources are included in the Polish inventory. Poland has a limited use of the notation key NE, only Se is reported as not estimated. However, the ERT notes that several sources reported as "included elsewhere" and "not applicable" were actually not estimated (see category issue 6-7). The ERT encourages Poland to review the utilization of the notation keys IE, NE, and NA. For instance, if a pollutant is characterised as not estimated in the emission factor tables in the Guidebook the correct notation key is NE, and not NA (as emissions are expected to occur).

Consistency including recalculation and time series:

68. Poland's time series are consistent from 2000 onwards, and there is good consistency between the reported emissions of the various pollutants and the reported activity data. The ERT has made one specific recommendation concerning the consistency of reported activity data versus emissions; see category issue 8.

Comparability:

69. For many sources the emission estimates are consistent with those proposed in the Guidebook. Tier 1 methodologies are used for many sources. For road transport, a national methodology has been used. The ERT recommends that Poland uses a higher tier method for this key source; see category issue 9. The ERT finds that the current methodology has not been sufficiently described in the IIR, and recommends that the descriptions are elaborated. The same applies for many country-specific emission factors that are not fully documented.

70. Emission factors for some pollutants differ significantly from the default emission factors of the 2009 Guidebook. The ERT encourages Poland to document the emission factors used and to explain the reasons for the large deviations from the default values for important emission sources.

Accuracy and uncertainties:

71. Poland has not performed a quantitative uncertainty analysis. The ERT encourages Poland to use a qualitative uncertainty analysis to pinpoint areas for further improvement.

72. Also, the Polish IIR contains little information on source specific QA/QC procedures. The ERT encourages Poland to elaborate on any specific QA/QC procedures in the next IIR.

Improvement:

73. During the past years, several improvements have been performed for emissions from mobile sources, e.g. the inclusion of NH₃ emissions from fuel used by mobile vehicles and railways. TSP and PM₁₀ emissions from tyre and brake wear have been split into 1A3b vi and 1A3b vii. The ERT commends Poland for the improvements applied. There are no planned improvements in the improvement plan for mobile sources. The ERT recommends that Poland uses this review report and other known issues to elaborate on the improvements planned in the next IIR.

Sub-sector Specific Recommendations.

Category issue 1: 1A3b i-iv - All pollutants

74. Poland's emissions from road transport are calculated using largely country-specific emissions factors and methodologies. The ERT finds that these emission factors and methodologies are only partly referenced and documented in the IIR. During the review, Poland provided additional information concerning the methodologies used. The ERT encourages Poland to include more information about methods and assumptions for calculating emissions from road transport in its IIR.

Category issue 2: 1A2f ii, 1A4a ii, 1A4b ii, 1A5b - All pollutants

75. Emissions from 1A2f ii Mobile Combustion in manufacturing industries and construction, 1A4a ii Commercial / institutional: Mobile, 1A4b ii Residential: Household and gardening (mobile) and 1A5b Other, Mobile are reported as "included elsewhere", in particular 1A3b. The ERT finds that, considering that 1A3b is a key-category for many pollutants, a disaggregation of these emissions would increase the accuracy of the inventory. Poland informed the ERT during the review that there are no data sources available for such disaggregation, but that further possibilities for improvement would be taken into account, with two possible data sources being examined. The ERT encourages Poland to perform these improvements in order to increase the transparency and completeness of the Polish inventory.

Category issue 3: 1A3a i (i) – All pollutants

76. The ERT notes that all pollutants in the NFR sector International Aviation (LTO) were reported as NA, with the note "As memo". In its answer to the corresponding question raised by the ERT, Poland responded that the notation key should be changed to IE (included in 1A3a ii (i) Civil aviation (Domestic, LTO)) for the

current submission, and that LTOs from domestic and international aviation would be reported in separate rows. Poland also informed the ERT that data from Eurocontrol would be evaluated in this respect. The ERT welcomes this improvement of completeness and transparency in reporting, and recommends that Poland thoroughly describes assumptions and the data sources used for this split in its IIR.

Category issue 4: 1A3a ii (i) – SO_x

77. Poland's SO_x emissions from aviation are reported as NO. This is not in accordance with the 2009 Guidebook, which provides default emission factors for jet kerosene. Poland provided a preliminary calculation of SO_x emissions during the review, and will include these emissions in the next reporting round. The ERT welcomes this increase in completeness for the next submission. Also, the ERT would like to stress that the notation key NO should be used only for sources that do not occur within the country, not for emissions of a specific pollutant.

Category issue 5: 1A3b vi – Heavy metals

78. Heavy metal emissions from tyre and brake wear are reported as NA. Table 3.10 in the chapter on road vehicle tyre and brake wear and road abrasion in the 2009 Guidebook provides an approximate composition of tyre and brake wear, and some countries report tyre and brake wear as a significant contributor to HM emissions, e.g. Cu, Zn and Pb. The previous review report (from 2009) encouraged Poland to examine possibilities for calculating HM emissions from tyre and brake wear, and the ERT reiterates this encouragement.

Category issue 6: 1A3d ii – All pollutants

79. In 1A3d ii, some heavy metal emissions are reported in 1A3d ii, while others are reported as "included elsewhere", in 1A1c (Manufacture of Solid Fuels and Other Energy Industries). During the review, Poland informed the ERT that the notation key for Pb, Hg, As, Cr, Zn in this source should be NE, and not IE. The ERT encourages Poland to use emission factors from the 2009 Guidebook to calculate the remaining heavy metal emissions.

Category issue 7: 1A3c – Heavy metals

80. HM emissions from 1A3c are reported as "included elsewhere" (in 1A3b), while the main pollutants are reported in 1A3c. The ERT asked Poland about the rationale for this allocation. Poland informed the ERT that the use of notation keys in 1A3c were erroneous; for Pb the notation key NA should be used (no emission factor) and for Cr the notation key NE (no domestic EF but there is an EF in the Guidebook). The ERT encourages Poland to calculate emissions of both Pb and Cr from railways. The emission factor from the Tier 1 methodology for diesel from road transport could be used for Pb.

Category issue 8: 1A3d i (ii) and 1A3d ii - All pollutants

81. Pollutants in 1A3d i (ii) are mainly reported as NO (some NA), while there is a reported use of liquid fuels in the same source category. During the review, Poland explained that this was an error, and that the liquid fuels reported under 1A3d i (ii)

and 1A3d ii should be combined and reported in 1A3d ii. The ERT recommends that this error should be corrected in the next submission.

Category issue 9: 1A3b i-iv – All pollutants

82. Road transport emissions in the Polish inventory are calculated using country-specific fleet composition data based on ITS surveys. During the review, Poland informed the ERT that the ITS report divides vehicles into two technologies; old and new generation, and that in order to increase the accuracy of the inventory more detailed data are being collected and a COPERT model is planned to be implemented. The ERT welcomes these plans. Because road transport is a key source of many pollutants, the ERT recommends that Poland examines possibilities for calculating emissions with a higher tier methodology, for example by using COPERT.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		NO _x , NMVOC, SO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, CO, Cd, Hg, Pb, POPs		
Years		2000 – 2011		
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		x
2.A.4	soda ash production and use	x		x
2.A.5	asphalt roofing	x		x
2.A.6	road paving with asphalt	x		x
2.A.7.a	Quarrying and mining of minerals other than coal	x		x
2.A.7.b	Construction and demolition	x		x
2.A.7.c	Storage, handling and transport of mineral products	x		x
2.A.7.d	Other Mineral products (Please specify the sources included/excluded in the notes column to the right)	x		x
2.B.1	ammonia production	x		x
2.B.2	nitric acid production	x		x
2.B.3	adipic acid production	x		x
2.B.4	carbide production	x		x
2.B.5.a	Other chemical industry (Please specify the sources included/excluded in the notes column to the right)	x		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		x
2.C.1	iron and steel production	x		x
2.C.2	ferroalloys production	x		x
2.C.3	aluminium production	x		x
2.C.5.a	Copper Production	x		x
2.C.5.b	Lead Production	x		x
2.C.5.c	Nickel Production	x		x
2.C.5.d	Zinc Production	x		x
2.C.5.e	Other metal production (Please specify the sources included/excluded in the notes column to the right)	x		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		x
2.D.1	pulp and paper	x		x

2.D.2	food and drink	x		x
2.D.3	Wood processing	x		x
2.E	production of POPs	x		x
2.F	consumption of HM and POPs (e.g. Electrical and scientific equipment)	x		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		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:

83. The ERT considers the industrial processes sector chapter to be of insufficient transparency in the main sources. The ERT notes that while an industrial processes sector chapter with emission factors and activity data tables (in the appendix) has been included in this submission, a general overview and an overview per NFR sector (with a short description of all sources), or details specifying which tier methods have been used are not included in the IIR. The ERT recommends that Poland adds the missing elements, at least for the key sources, to its next submission.

84. In the previous Stage 3 review report (from 2009) the ERT strongly recommended that Poland includes the following missing items in the next submission:

- a) Explanations of major changes in the emission trends
- b) Information on country-specific emission factors and where these are used
- c) A description of notation keys.

85. The ERT notes that items b) and c) have been added to the IIR, but that item a) has not. The ERT recommends that Poland adds explanations of major changes (dips/jumps) in emission trends, at least for the key sources of the industrial processes sector, to its next submission. Additional details and specific recommendations are given below.

86. The ERT notes that Poland used the appropriate notation key IE in the NFR tables and the notation key NE in the IIR for the source categories within the industrial processes sector and commends the Party for this.

Completeness:

87. In the previous Stage 3 review report, Poland informed the ERT that it was planning to implement the new guidelines on the IIR's structure in time for the next submission. In 2009, the ERT welcomed this planned improvement and encouraged

Poland to provide a more detailed IIR report, with separate NFR sectors (for example Industrial Processes).

88. During the current review, the ERT noted that Poland had provided a more detailed IIR with separate NFR sectors, but that the report was - in spite of these improvements - still based on the SNAP structure. When asked, Poland replied that although the current report had been produced according to the SNAP structures, it was still making efforts to prepare a report according to NFR categories and was confident that it would be ready for the next submission. The ERT encourages Poland to prepare its report according to NFR categories.

89. In previous submissions, Poland only submitted the last two reporting years. The ERT notes that the IIR 2013 contains emissions for the period 2000-2011 and encourages Poland to continue in this way.

90. The ERT notes that Poland did not include activity data in the NFR tables. In addition, appendix 3 of the IIR only gives an overview of activity data for the years 2010 and 2011. Upon request, Poland sent an overview of activity data for the period 2000-2009 and the ERT thanks the Party for this. Furthermore, the ERT encourages Poland to include all activity data in both the IIR and the NFR tables in its next submission.

91. To avoid under-estimates, the ERT recommends that Poland includes plans to address missing emissions (NE) in its IIR, either by obtaining data allowing an emission estimate to be made, or by reporting the emissions as not applicable.

Consistency including recalculation and time series:

92. The ERT notes that Poland has performed recalculations for all the source categories within the industrial processes sector for the period 2000-2011 and commends Poland for this.

93. The ERT also notes that both the time series for activity data and the EFs used to calculate emissions for the key sources are consistent.

Comparability:

94. Poland has reported its emissions inventory in accordance with the reporting requirements and submitted it in the requested NFR format. The ERT notes that there are no differences between CLRTAP and NEC emissions.

Accuracy and uncertainties:

95. In the previous Stage 3 review report, the ERT encouraged Poland to include sector-specific QA/QC paragraphs in its next submission. This information is still missing in Poland's 2013 submission. The ERT reiterates its recommendation to include sector-specific QA/QC.

96. In the previous Stage 3 review report, the ERT also encouraged Poland to include an uncertainty analysis in the industrial processes chapter. This will help to support the continuous improvement process and provide an indication of the

reliability of the inventory data. The ERT notes that Poland is planning to implement a complete uncertainty analysis for the CLRTAP inventory in the next submission. The ERT commends Poland for this.

Improvement:

97. In the previous Stage 3 review report, the ERT encouraged Poland to complete its recalculation of PM emissions for the period 1990-1999 in the near future. Up now, this has not been done. The ERT encourages Poland to complete its recalculation of PM emissions for the period 1990-1999 as soon as possible.

98. The ERT also notes that Poland has planned a programme for improvement. One of the tasks specified in this programme is to develop and use higher tier methods, especially for key categories, for estimating emissions. The ERT encourages Poland to implement this task.

Sub-sector Specific Recommendations.

Category issue 1: 2B5a - NMVOC

99. The ERT notes that after 2005, NMVOC emissions have almost doubled. Poland responded that the increase in emissions was the effect of increased production numbers (statistical data) for ethylene (SNAP 04 05 01), propylene (SNAP 04 05 02), and polyethylene (SNAP 04 05 06). The ERT thanks Poland for this explanation and encourages Party to include such information in its next submission.

Category issue 2: 2C3 - PAH

100. The ERT notes that after 2008, PAH emissions have dropped sharply. Poland responded that the decrease in emissions was the effect of decreased production volumes (statistical data) for aluminium (SNAP 04 03 01). The ERT thanks Poland for this information and encourages the Party to include such explanations in its next submission.

SOLVENTS

Review Scope

Pollutants Reviewed		NMVOC, NO _x , NH ₃ , PM _{2.5} , PM ₁₀ , TSP, CO, HM, PAHs		
Years		2000 – 2006 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
3.A.1	Decorative coating application	x		x
3.A.2	Industrial coating application	x		x
3.A.3	Other coating application (Please specify the sources included/excluded in the notes column to the right)		x	x
3.B.1	Degreasing	x		x
3.B.2	Dry cleaning	x		x
3.C	Chemical products,	x		x
3.D.1	Printing		x	x
3.D.2	Domestic solvent use including fungicides	x		x
3.D.3	Other product use	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:

101. The ERT recommends that Poland includes its activity data for the whole time series for all the solvent sub-sectors in its IIR (currently given as "NA"). The ERT also encourages Poland to describe the used methodology in more detail and explain the changes in the time series.

102. The ERT notes that the emission factors used for the solvent sector are country-specific and that they are properly included and referenced in the IIR.

Completeness:

103. The ERT considers the solvent sector to be complete, with the notable exception of missing data in the printing sector (NFR 3.D.1). Further explanations can be found in the detailed sub-sector recommendations section below.

Consistency including recalculation and time series:

104. The ERT considers the solvent sector to be consistent, but Poland does not report any emissions before 2000. Poland explained that the NMVOC emission estimates for the period of 1990-1999 was prepared a long time ago by the previous inventory team, and that these estimates are now partly inconsistent with the present methodology.

105. The ERT notes Poland's intention to recalculate emission data for the period of 1995-1999 for the next submission and acknowledges the possible problems that might arise when recalculating emission data for the period of 1990-1995, due to the changes that have taken place in the structure of the public statistics data. Still, the ERT hopes that these problems can be overcome and that emission estimates for the period 1990-1994 can also be presented in the future IIRs.

106. Poland has recalculated its solvent sector inventory for some of the sub-sectors in the year 2013. However, the IIR does not include all the necessary explanations. The ERT encourages Poland to provide more detailed explanations on the recalculations, including the rationale behind them, their impact on the sector, and implications for trends in its IIR.

Comparability:

107. Poland uses the general equation for its emission estimations, where the activity rate of a specific source category is multiplied by the emission factor for a specific pollutant. The used emission factors are country-specific, but it is not specified what kind of aspects have been taken into account when the EFs are derived. The ERT encourages Poland to describe the used methodology in the IIR, in particular regarding its consistency with the proposed methodology in the EMEP/CORINAIR Guidebook 2009.

Accuracy and uncertainties:

108. The ERT recognises the Polish inventory team's efforts to implement a larger scope of uncertainty analysis for the CLRTAP inventory in its next submission and recommends that Poland includes the solvent sector in the planned uncertainty analysis.

109. The same basic QA/QC rules that apply to the Polish annual greenhouse gas inventory are also applied to the emissions inventory prepared for the CLRTAP inventory. The ERT acknowledges Poland's plans to update the QA/QC programme according to the EMEP/CORINAIR Emission Inventory Guidebook 2009 guidelines.

Improvement:

110. The ERT notes Poland's intention to improve its inventory by verifying NMVOC emissions from solvent use, also from new emission sources, and to develop a broader uncertainty evaluation for air emission pollutants. The ERT particularly encourages further methodology development by applying higher tier estimation methodologies, especially for key categories.

Sub-sector Specific Recommendations.

Category issue 1: 3.A Paint application - NMVOC

111. The ERT encourages Poland to describe in the IIR why only water based paints are included in NFR 3.A.1 and only solvent based paints in NFR 3.A.2. Following the review, Poland explained that it is assumed that the majority of paints used in construction and buildings (especially for decorating purposes) are

waterborne and that the majority of paints used for industrial purposes are based on conventional solvents.

112. The ERT encourages Poland to explain the dips and jumps of NMVOC emissions and activity data in its IIR. Following the review, Poland explained that the trend depends only on input activity data, derived from national statistics. The ERT recommends that Poland presents some (socio-economic) reasons for the changes in emission and activity data trends.

113. The ERT encourages Poland to describe what kinds of solvents, including chemicals, are taken into account when calculating the emissions from paint applications in the IIR. Following the review, Poland explained that paints are included only as a total mass. Solvents, hardeners, stains, varnishes etc. are not included separately, due to a lack of relevant activity data.

Category issue 2: 3.B Degreasing and dry cleaning - NMVOC

114. The ERT encourages Poland to explain what kinds of solvents are taken into account when calculating emissions for NFR 3.B.1 and also to explain emission trends for the time series in the IIR. Following the review, Poland explained that the trend depends only on the input activity data, derived from national statistics, i.e. the production of solvents.

Category issue 3: 3.C Chemical products - NMVOC

115. The ERT encourages Poland to explain the increasing NMVOC emission trend in the IIR. Following the review, Poland explained that NFR sector 3.C is an aggregation of emissions from several industrial processes and that the emission trend is a result of the trends in particular activity data. The ERT also encourages Poland to include the activity data and emissions from the industrial processes that have been aggregated.

Category issue 4: 3.D Other product use - NMVOC

116. The ERT encourages Poland to include the emissions and activity data from the printing sector (NFR 3.D.1) in the IIR. Following the review, Poland explained that there is no suitable activity data available for the printing sector at the moment. However, the Party is planning to include that category with the use of emission data from the newly developed National Database once the necessary verification processes are finished. The ERT commends Poland on these plans.

117. The ERT also encourages Poland to explain why there is an increasing NMVOC emission trend for 2005-2008 in NFR sector 3.D.3. Following the review, Poland explained that the calculation of emissions of NMVOC from category 3.D.3 are based on a mass of extracted oils (SNAP 060404), derived from national statistics; the emission trend follows the trend in this activity.

Category issue 5: 3.D Other product use – PAHs

118. The ERT encourages Poland to elaborate on why there is an increasing trend for PAHs emissions in the period of 2004-2007 and a sharp drop in 2008 and why there are no changes in PAHs emissions after the year 2008 in its IIR. Following the

review, Poland explained that the sharp drop in 2008 results from a mistake in calculation for the years before 2008. Poland agreed to perform a suitable correction to improve time series consistency. Poland also explained that due to unavailability of statistic data on wood preservation, the inventory team decided to temporarily re-use activity data for the whole period after the year 2008.

Category issue 6: 3.D. Other product use – Heavy Metals, TSP, PM₁₀, PM_{2.5}, CO

119. The ERT encourages Poland to explain the increasing trends in emissions for heavy metals, TSP, PM₁₀, PM_{2.5}, and CO in category 3.D during the period from 2000 to 2005 and the sudden drop of emissions in 2006 in the IIR. Following the review, Poland explained that the sudden drop of emissions in 2006 is the result of a change in estimation methodology. Poland agreed to make suitable corrections for the earlier periods to improve time series consistency.

AGRICULTURE

Review Scope:

Pollutants Reviewed		NO _x , NMVOC, NH ₃ , PM _{2.5} , PM ₁₀ , TSP		
Years		2000 – 2011		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
4 B 1 a	Cattle dairy	x		x
4 B 1 b	Cattle non-dairy	x		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		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-fertilizers	x		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)	x		
11 A	(11 08 Volcanoes)		x	
11 B	Forest fires		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:

120. The ERT notes that Poland improved its documentation in the IIR, but that there is still a lack of transparency. Emission factors are presented but there is no background information on the methodological choice. There are no time series for activity data included in the IIR and in the NFR tables, activity data is reported as "NA". In response to the questions raised by the ERT during the review week, Poland provided answers and additional documentation. The ERT recommends that Poland provides more detailed information on methods and parameters used in the IIR of its

next annual inventory submission. In addition, trends in activity data should be reported and discussed in the IIR.

Completeness:

121. The agriculture inventory of Poland covers all relevant sources of the main pollutants. Buffalos (4.B.2) and 4.B.7 Mules and Asses (4.B.7) are not occurring in Poland (NO), Turkeys (4.B.9.c) are included elsewhere (IE). PM emissions from Sheep (4.B.3), Goats (4.B.4), Farm-level agricultural operations (4.D.2.a) and Off-farm storage, handling (4.D.2.b) are reported as NA. NO_x and CO emissions from field burning are included under Small-scale waste burning (6.C.e). Emissions of heavy metals and POPs are reported as NA for all sources, except HCH which is reported as NO. Emissions from 4.G are reported as "NA".

122. The ERT identifies a need for proper use of notation keys and further improvement of the completeness of inventory estimates. The notation key "not applicable" (NA) should only be used if certain pollutants do not arise from a given source category. If methodologies are available in the EMEP/EEA Guidebook and emissions are not estimated, the key "NE" (not estimated) would be adequate.

Consistency including recalculation and time series:

123. The ERT commends Poland for the efforts undertaken in 2013 resulting in an improved consistency and completeness of its emission inventory. As indicated in the IIR, Poland updated its NECD submission and now reports a consistent data set under both CLRTAP and NECD.

Comparability:

124. Poland applies country-specific NH₃ emission factors for its key sources 4.D.1.a, 4.B.8, 4.B.1.a and 4.B.1.b. The ERT recommends that Poland describes country-specific methods more transparently in the IIR for its next annual submission. This includes information on the methodological choice made for both key and non-key sources if other than the default methods have been chosen (e.g. explanation why 4.B PM EFs are based on CEPMEIP).

Accuracy and uncertainties:

125. Poland has implemented a QA/QC programme which contains tasks, responsibilities and time schedules for the performance of QA/QC procedures. The ERT encourages Poland to describe sector-specific QA/QC procedures in the agriculture chapter of its next IIR. The ERT commends Poland for its plan to implement an uncertainty analyses for its CLRTAP inventory in the next submission.

Improvement:

126. For its 2013 submission, Poland carried out broad recalculations. Default NH₃ emission factors from manure management were replaced by country-specific ones, NO_x emissions from synthetic fertiliser application were estimated, a time series from the year 2000 to 2011 has been generated. The ERT commends Poland for improving the accuracy, completeness and consistency of its emission inventory in

2013 and recommends that Poland continues to work on completeness by including the relevant years before 2000 in future inventory submissions as noted in the IIR. All recalculations should be documented in detail, including tables of recalculation differences.

Sub-sector Specific Recommendations.

Category issue 1: 4.B Manure management - NH₃ and PM

127. Poland generated a consistent time series from 2000 to 2011 by applying country-specific emission factors obtained from a national study Pietrzak (2006). The country-specific emission factor for dairy cows (21.05kg) is much lower than the default value of 39.3kg for slurry systems and 28.7kg for solid systems. The country-specific NH₃ EF for sows (8.64kg) is much lower than the default value of 15.8kg for slurry systems and 18.2kg for solid systems. The country-specific NH₃ emission factors for horses, laying hens, broilers and other poultry are significantly lower than the default values of the EMEP/EEA Emission Inventory Guidebook 2009 (Table3-1) as well. In response to a question raised by the ERT, Poland explained that the emission factors from manure management of livestock had been elaborated by Pietrzak (2006), considering N excretion rates and ammonia losses at the different stages of manure production (in buildings, storage, application and on pastures) following the EMEP/EEA Tier 2 methodology. The assumption was made that 25% of the livestock is held on liquid manure systems and 75% in solid storage systems, based on information contained in the Operational Programme "Development of rural areas in 2007-2013". A table of national N excretion rates was submitted to the ERT. The ERT encourages Poland to provide all this relevant information and parameters regarding the elaboration of national emission factors in the IIR of its next annual submission.

Category issue 2: 4.D.1 Agricultural Soils - NH₃, NO_x, and PM

128. In response to questions raised during the review process, Poland provided additional information on the methodologies used for the calculation of emission factors for NH₃ emission from 4.D.1a (N fertilisers). The ERT recommends that Poland includes this additional information (on the derivation of its national emission factor) in the IIR of its next annual inventory submission.

129. The ERT commends Poland for the inclusion of NO_x emissions from synthetic N fertilisers as recommended in the previous review report. PM emissions from Farm-level agricultural operations (4.D.2.a) are reported as NA. The ERT recommends that Poland makes further efforts to complete its inventory by calculating PM emissions applying the methodologies provided in the EMEP/EEA Guidebook 2009.

WASTE

Review Scope:

Pollutants Reviewed		All		
Years		2000 – 2011		
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	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		x
6 C e	Small-scale waste burning	x		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.

130. The ERT commends Poland for implementing many recommendations from the previous review. However, the ERT notes that some recommendations, e.g. the estimation of NMVOC emissions from solid waste disposal on land, have not been implemented. The ERT recommends that Poland implements all recommendations made in this and the previous review report or lists those issues that have not been implemented in the list of planned improvements.

Transparency:

131. The inventory for the waste sector is generally transparent and includes information on activity data used and emission factors with references. The ERT noted during the review that for some activities the documentation of emission factors could be improved. These instances are documented as sector-specific recommendations below.

Completeness:

132. The inventory for Poland is generally complete. However, during the review, the ERT noted that there were some estimates missing from the inventory. These are also documented in the sector-specific recommendations.

Consistency, including recalculation and time series:

133. Poland has recalculated the time series back to 2000 and has implemented numerous improvements. The ERT commends Poland for the improvements made to the inventory.

Comparability:

134. The ERT considers the waste sector to be comparable.

Accuracy and uncertainties:

135. The IIR does not report on sector-specific uncertainty analysis nor on sector-specific QA/QC. The ERT encourages Poland to document the sectoral QA/QC activities while also providing a quantitative uncertainty estimation.

Improvement:

136. In its IIR, Poland reports no planned improvements for the waste sector. The ERT recommends that Poland considers adding sector-specific planned improvements, including the recommendations from the review process not yet addressed.

Sub-sector Specific Recommendations

Category issue 1: 6A Solid waste disposal on land – NMVOC

137. During the review the ERT noted that emissions of NMVOC are not estimated under solid waste disposal on land even though there is a default emission factor in the 2009 EMEP/EEA Guidebook. This issue was also raised in the previous review report. During the review, Poland informed the ERT that NMVOC emissions from solid waste disposal on land would be estimated in the 2014 submission. The ERT recommends that Poland carries out this improvement in its next submission.

Category issue 2: 6B Wastewater handling – NMVOC

138. The ERT notes that only NH₃ emissions from latrines are estimated under wastewater handling. No emissions of NMVOC are estimated despite a default emission factor being available in the 2009 EMEP/EEA Guidebook. During the review Poland clarified that the emissions of NMVOC from wastewater handling should have been reported as Not Estimated. Furthermore, Poland indicated that emissions would be estimated for the 2014 submission. The ERT recommends that Poland estimates and reports NMVOC emissions from wastewater handling in the next submission.

Category issue 3: 6Ca Clinical waste incineration, 6Cb Industrial waste incineration & 6Cc Municipal waste incineration – NMVOC

139. The NMVOC emission factors for clinical and municipal waste incineration as well as sludge incineration provided in the IIR (table 3.108) are not consistent with the default emission factors provided in the 2009 EMEP/EEA Guidebook despite this being referenced in the IIR. During the review, Poland responded that the emission factors currently used come from EMEP/CORINAIR Emission Inventory Guidebook – 2007 (Passant (1993) Emissions of Volatile Organic Compounds from Stationary Sources in the UK). Poland also informed the ERT that these emission factors are rather old and would be replaced by newer ones. The ERT agrees with this assessment and recommends that Poland carries out this improvement in its next submission.

Category issue 4: 6Ca Clinical waste incineration, 6Cb Industrial waste incineration & 6Ce Small scale waste burning – heavy metals

140. During the review, the ERT noted that heavy metal emissions from clinical and industrial waste incineration as well as small-scale waste burning were not reported in the NFR despite emission factors being available in the 2009 EMEP/EEA Guidebook. During the review, Poland clarified that the emissions mentioned should have been reported as NE. Furthermore, Poland indicated that emissions would be estimated for the 2014 submission. The ERT recommends that Poland estimates and reports these emissions in the next submission.

Category issue 5: 6Ca Clinical waste incineration, 6Cb Industrial waste incineration & 6Cd Cremation – particles and heavy metals

141. The ERT notes that no particle and heavy metal emissions are reported from clinical waste incineration, no heavy metal emissions from industrial waste incineration and no particle emissions from cremations despite default emission factors being available in the 2009 EMEP/EEA Guidebook. During the review Poland clarified that the emissions mentioned should have been reported as NE. Furthermore, Poland indicated that emissions would be estimated for the 2014 submission. The ERT recommends that Poland estimates and reports these emissions in the next submission.

Category issue 6: 6Ca Clinical waste incineration, 6Cb Industrial waste incineration & 6Cc Municipal waste incineration – CO

142. The ERT notes that emissions of CO are reported from 6Ca, 6Cb and 6Cc. However, no emission factors are presented in table 3.105 of the IIR. During the review Poland responded that the emission factor used was the Tier 1 default EF for industrial waste incineration. The ERT recommends that Poland updates Table 3.105 of the IIR and specifies the precise references for clinical, industrial, sludge and municipal waste incineration.

Category issue 7: 6Cb Industrial waste incineration – SO₂ and NO_x

143. The ERT notes that the NO_x emission factor for sludge incineration is provided in the IIR (Table 3.104) as 0.87 g/GJ with a reference to the 2009 EMEP/EEA Guidebook. However, Table 3-3 of the EMEP/EEA Guidebook provides emission factors specific to sludge incineration and contains an NO_x emission factor of 2.5 g/GJ. Furthermore, the ERT noted that Table 3.103 of the IIR contains no SO₂ emission factor for sludge incineration despite a default emission factor being available in the 2009 EMEP/EEA Guidebook. During the review Poland explained that the NO_x emission factor used was the Tier 1 default EF from the 2009 EMEP/EEA Guidebook rather than the emission factor specific to sludge incineration. Poland also clarified that SO₂ had not been estimated and should have been reported as NE. The ERT recommends that Poland uses the specific emission factors for sludge incineration provided in the 2009 EMEP/EEA Guidebook for all pollutants where there are no country-specific emission factors available.

Category issue 8: 6Cc Municipal waste incineration – heavy metals

144. The ERT notes that the emission factors for Cd and Pb listed in Table 3.109 of the IIR are not consistent with the emission factors in Table 3-1 in chapter 6Cc in the 2009 EMEP/EEA Guidebook. In its response, Poland confirmed this as an error that would be corrected in the next submission. The ERT recommends that Poland updates the emission factors as appropriate, based on country-specific data or the latest EMEP/EEA Guidebook.

Category issue 9: 6D Other waste – All pollutants

145. The ERT notes that, based on the NFR, it seems that emissions from sludge incineration are included in NFR category 6D. According to the 2009 EMEP/EEA Guidebook, emissions from sludge incineration should be included under industrial waste incineration (6Cb). This issue was also noted in the previous review report. During the current review Poland responded that this was a mistake and that the emissions would be reallocated in the 2014 submission. The ERT recommends that Poland implements the reallocation in line with the 2009 EMEP/EEA Guidebook.

Category issue 10: 6D Other waste – All pollutants

146. The ERT questions the estimate for PCDD/F reported under the category "Other Waste". Based on the information in the IIR, it was not clear which activities were covered under this source. In response, Poland informed the ERT that the estimates reported include forest fires, landfill fires, vehicle fires, building fires, and tobacco combustion. The ERT notes that in accordance with the 2009 EMEP/EEA Guidebook emissions from forest fires should be reported as a memo item under category 11B and that emissions from tobacco combustion should be reported under category 3D3 (Other product use). The ERT also notes that Poland does report emissions under category 11B. The ERT recommends that Poland reallocates emissions from forest fires, if applicable, and tobacco combustion, in line with the 2009 EMEP/EEA Guidebook. Furthermore, the ERT recommends that Poland includes emission factors used to estimate emissions from landfill fires, vehicle fires and building fires in the next IIR submission.

Category issue 11: 6D Other waste – All pollutants

147. The ERT notes that emissions from compost production are not estimated or reported despite a methodology and default emission factors being available in the 2009 EMEP/EEA Guidebook. During the review Poland clarified that the emissions mentioned should have been reported as NE. Furthermore, Poland indicated that emissions would be estimated for the 2014 submission. The ERT recommends that Poland estimates and reports these emissions in the next submission.

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, in particular emission factor tables and other detailed information on the energy and the transport sector.
3. Poland's activity data 2000 - 2011