UNITED NATIONS

Distr.
GENERAL

CEIP/S3.RR/2014/Hungary
10/09/2014

ENGLISH ONLY

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
HUNGARY

CONTENT

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 SO_2, NO_x, NMVOC, NH_3, plus PM_{10} & $PM_{2.5}$ for the time series years 1990 – 2012, reflecting current priorities of 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 Hungary coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 23 June 2014 to 27 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 – J Webb (UK), Energy - Jeroen Kuenen (Netherlands), Transport - Jean-Marc Andre (France), Industry – Elo Mandel (Estonia), Solvents - Kees Peek (Netherlands), Agriculture +Nature - Mette Mikelsen (Denmark), Waste – Dirk Wever (Netherlands).

4. Anne Misra 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 ERT recognises the level of effort undertaken by Hungary in providing an inventory with a significant level of detail to allow a detailed review.

6. The inventory is generally in line with the EMEP/EEA Inventory Guidebook and UNECE Reporting Guidelines. Emissions of $PM_{2.5}$, PM_{10} and TSP are reported for the years 2000 to 2012. The ERT encourages Hungary to report PM emissions from 1990 onwards but acknowledges the fact that the provision of PM emissions prior to the year 2000 is voluntary.

7. The ERT also notes that recalculations have been applied consistently through the entire time series.

8. Hungary reports that Tier 1 methods (referred to as 'Approach 1 in the IIR) are used to calculate key categories. The ERT encourages Hungary to adopt higher Tier methodologies to calculate key categories and to explicitly refer to the method as a Tier method rather than an approach.

9. The Party participated actively in the Stage 3 review process providing further information and data when requested, with fast turnaround times. Based on the additional information provided by Hungary, the ERT was able to review the inventory within the given time period.

INVENTORY SUBMISSION

10. In their 2012 submission, the Party provided emissions for its Protocol base years (1990) and a full time series up to 2012 (the most recent year) for all pollutants other than $PM_{2.5}$, PM_{10} and TSP in the NFR format.

11. The CLRTAP inventory submitted by the Party is of good quality and is in general well documented in the informative inventory report (IIR).

KEY CATEGORIES

12. The Party has compiled and presented in its IIR a level key source category analysis using NFR categories for the following pollutants: NO_x, NMVOC, SO_2, NH_3, $PM_{2.5}$, PM_{10}, CO, priority heavy metals and dioxins (included as PCDD/F). No key category analysis has been presented for TSP, PAHs or PCBs. Key categories are reported with level assessments but as yet not with trends. The IIR indicates that as soon as consistent time series are available, a trend assessment will be generated as well. The ERT welcomes the provision of key category analysis by NFR category and encourages Hungary to develop consistent time series data to enable a Tier 1 trend assessment.

QUALITY

Transparency

13. The ERT recognises the level of effort undertaken by the Party in reducing the number of emissions reported as NE (Not Estimated), IE (Included Elsewhere) and NO (Not Occurring). The Party's IIR is detailed and well presented. EFs and

activity time series are almost always presented (NFR level), assumptions are usually indicated and references are given. The ERT enquired if Hungary could cite references for country-specific EFs in the IIR. Hungary replied that most of these country-specific EFs had been derived from plant level emission data. The factors are not published elsewhere, so the only reference is the IIR. The ERT recommends that this be made clear in the revised IIR.

Completeness

14. Hungary has submitted a complete series of inventories for the years 1990 to 2012. There are no significant gaps with regard to the sectors included or in the descriptions and sections in the IIR. Hungary has listed the sources not estimated (NE) in the inventory and given a qualitative assessment of their importance, together with an account of the measures taken to determine if these sources can be calculated in the future. The ERT acknowledges the effort which Hungary has undertaken to provide estimates of emissions for all sub-sectors and all the pollutants reviewed.

15. Hungary provides an explanation (Table 1.7) of the reasons for the use of the notation key 'NE'. The ERT acknowledges the efforts Hungary has made to estimate emissions and to minimise the use of NE.

Consistency, including recalculations and time series

16. Hungary has recalculated time series for all years between 1990-2012 (2000-2012 in the case of TSP, PM_{10} and $PM_{2.5}$), using the same methods consistently. Time series are mostly presented graphically in the IIR. It would be easier to read them if they were presented in tabular form as well. The ERT recommends that Hungary provides time series for emissions in its future IIR submissions.

Comparability

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

CLRTAP/NECD comparability

18. The ERT notes that there are some differences between the estimates of emission totals provided by Hungary under LRTAP and NECD:

- NO_x: 122.41 and 116.19 Gg in the in the LRTAP and the NECD spreadsheets respectively;
- NMVOC: 103.56 and 99.15 Gg in the in the LRTAP and the NECD spreadsheets respectively;
- SO_2: 31.84 and 31.55 Gg in the in the LRTAP and the NECD spreadsheets respectively;
- NH_3: 65.93 and 58.90 Gg in the in the LRTAP and the NECD spreadsheets respectively;
- Energy as a result of the recalculations of the later LRTAP submission.

Accuracy and uncertainties

19. Hungary has not compiled quantitative uncertainty estimates for their UNECE submission. However, section 1.8 in the IIR indicates that this is planned as an improvement. The ERT recommends that Hungary compiles at least Tier 1 estimates for future submissions.

Verification and quality assurance/quality control approaches

20. Hungary has adopted ISO procedures for QA/QC in UNFCCC reporting. General elements of this QA/QC plan have been updated in 2014 in order to extend the provisions applied to CLRTAP reporting. In addition, a specific QA/QC plan for CLRTAP reporting is listed as a planned improvement.

21. The ERT recommends that Hungary reports existing internal review procedures, as described in its responses to ERT questions during the review, in the next IIR submission. The ERT also encourages Hungary to provide information on sector-specific QA/QC procedures in future submissions.

FOLLOW-UP TO PREVIOUS REVIEWS

22. In the 2009 Stage 3 review the ERT encouraged Hungary to make the following cross-cutting improvements:

23. The ERT noted that Hungary's resource constraints restricted its ability to keep inventory time series and documentation up-to-date. *Hungary has supplied a list of improvements in the current IIR.*

24. To set a plan for prioritising improvements and developing the capacity and resources of the inventory team. *An improvement plan has been included in the current IIR.*

25. To improve the completeness of the inventory particularly for the Mobile, Solvent and Agricultural sectors. *This has been done.*

26. To develop its IIR and include more detailed descriptions of methods, assumptions and data sources (including emission factors and activity data) for all sectors and particularly for the IP, Solvents, Agriculture and Waste sectors. *This has been done.*

27. To report complete and consistent time series in the latest NFR format (NFR08). A time series has been reported for 1990, 1995, 2000, 2005, 2007 and each year thereafter.

28. To perform a key source analysis in accordance with the EMEP/EEA air pollutant emission inventory guidebook by using the appropriate NFR categories. *Key sources have been reported for the NFR categories.*

29. To use the NFR categories as a structure for the inventory description included in the IIR. *This has been done.*

30. The ERT recommended that Hungary reviewed the inventory and provides a description of the gaps in the inventory for all sectors but particularly for the Mobile and Solvent sectors. *This has been done*.

31. To assess and document the differences between the submissions to the CLRTAP and under the NECD. *This has not been done and differences between LRTAP and NECD submissions were found during the 2014 Review.*

32. To work with CEIP on solving the issues identified in the Stage 2 reviews. *There is no report of this in the IIR but it may have been reported earlier.*

33. To check for the use of appropriate notation keys (e.g. NO where emissions are "Not Occurring", NE where emissions are "Not Estimated" and IE where emissions are "Included Elsewhere". *This seems to have been carried out but not explicitly reported in the current IIR.*

AREAS FOR IMPROVEMENTS IDENTIFIED BY HUNGARY

34. In its response to previous reviews and review stages this year, Hungary indicated that it was working on the following improvements:

35. Carry out a general uncertainty evaluation.

36. Further improve coordination with E-PRTR reporting and within the LAIR reporting process.

37. Improve QA/QC actions by applying the same processes as for UNFCCC annual emission inventory reporting.

38. Application of emission calculation routines as recommended by the updated 2013 EMEP/EEA Guidebook.

PART B: RECOMMENDATIONS FOR IMPROVEMENT TO THE PARTY

CROSS-CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

39. The ERT identifies the following cross-cutting issues for improvement:

(a) The ERT encourages Hungary to adopt higher Tier methodologies to calculate key source categories and to explicitly refer to the method as a Tier method rather than an approach.

(b) The ERT encourages Hungary to complete the consistent time series by recalculating $PM_{2.5}$, PM_{10} and TSP for 1990 - 1999 where possible.

(c) The ERT encourages Hungary to generate a trend assessment as soon as consistent time series are available.

(d) The ERT encourages Hungary to present time series in tabular form as well as in graphs.

(e) The ERT recommends that Hungary compiles at least Tier 1 estimates of uncertainty for future submissions.

(f) The ERT encourages Hungary to cite references for all country-specific EFs, e.g. Tables 3.1, 3.2, 3.3.

(g) The ERT encourages Hungary to report existing internal review procedures, as described in its responses to ERT questions during the review, in the next IIR submission.

(h) The ERT also encourages Hungary to provide information on sector-specific information on QA/QC procedures in future submissions.

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, Pb, Cd, Hg		
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		
1.A.1.c	Manufacture of solid fuels and other energy industries	X		
1.A.2.a	iron and steel	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		IE	
1.A.4.a.i	commercial / institutional: stationary	X		X
1.A.4.b.i	residential plants	X		X
1.A.4.c.i	Agriculture/forestry/fishing. stationary	X		X
1.A.5.a	other, stationary (including military)		IE	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)		NO	
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		NO	
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:

40. The ERT commends Hungary for providing a detailed and generally transparent emission inventory. Generally, the estimates are well described in the IIR with enough sectoral detail.

41. In case country-specific emission factors are derived the ERT encourages Hungary to explain these in more detail. The ERT finds that some of the trends in

activity data (e.g. 1.A.1.c gas coke distillation, 1.A.4.b.i residential combustion) are not easy to understand and encourages Hungary to verify these trends in the IEA annual questionnaires with other datasets (e.g. Eurostat, national data) and try to find an explanation.

42. For those source categories where “IE” (Included Elsewhere) is reported it is not clear where these emissions are included. The ERT encourages the country to include, for its next submission, a section on each individual source category, even if no actual emissions are reported.

Completeness:

43. The ERT considers the Energy sector to be generally complete and comprehensive with a good level of detail in the methodology descriptions. “NE” (Not estimated) has not been used in the Energy sector.

Consistency including recalculation and time series:

44. Hungary has provided an inventory for all sectors for the years 1990 to 2012.

45. A recalculation has improved time series consistency. Some of the variations in trends which were not completely understood were attributed to the trend in activity data. The ERT encourages Hungary to check trends in activity data with the data suppliers (e.g. national energy statistics) to ensure that there are no mistakes in the data, and to report the findings in the next submission of the IIR.

46. The ERT welcomes the use of country-specific emission factors. In cases where country-specific factors are not available for the full time series and other factors are used to fill the gap, the ERT encourages Hungary to check whether different sets of emission factors have been used. In case there is a large jump, an alternative option may be to extrapolate country-specific factors back to earlier years.

Comparability:

47. Hungary has, in general, applied methods that are consistent with those in the EMEP/EEA Guidebook. However, in cases where country-specific methodologies are used, the ERT encourages Hungary to describe in more detail how the country-specific emission factors are derived and how they are used.

Accuracy and uncertainties:

48. Hungary has not provided an analysis of uncertainties in its submission. The IIR lists an uncertainty evaluation as one of the planned improvements. The ERT welcomes this and encourages Hungary to undertake such an uncertainty analysis for the Energy sector as it will help inform the improvement process and provide an indication of the reliability of the data.

49. Hungary has provided limited information on the QA/QC procedures applied. For the Energy sector, some specific NFRs comparisons have been made but these have not been described in detail. The ERT encourages Hungary to perform QA/QC for all sectors and to describe the findings in more detail.

50. The ERT has identified several typos and other errors in the NFR and in the IIR, which have partly been discussed with Hungary. The ERT encourages Hungary to implement improved QA/QC procedures, including a thorough check of the NFR submission (Excel file) and of the IIR for possible errors and typos, formatting of tables and graphs, etc.

Improvement:

51. The ERT appreciates that Hungary has included, in the IIR, for each source category a specific section on source-specific planned improvements. The ERT welcomes the improvements planned by the Party and encourages the Party to implement these planned improvements.

Sub-sector Specific Recommendations.

Category issue 1: 1.A.1.a Country specific emission factors

52. The ERT welcomes the use of country-specific emission factors for the main pollutants in NFR 1.A.1.a. When discussing this issue with Hungary, the ERT understood that the country-specific emission factors were calculated for each individual year based on plant-specific data. To enhance the transparency of the description, Hungary is encouraged to include the IEF for each individual pollutant and year in the IIR, and also which measurement data were taken into account for deriving the IEF. It should be mentioned that metals and PCDD/F emissions from waste incinerators with energy recovery have been measured as well, but that the resulting emission factors are not provided in the IIR.

Category issue 2: 1.A.4 Chapter

53. Chapter 3.6 on small combustion includes the three sub-sectors listed in the NFR. NFR 1.A.5.a is listed as “IE” but it is not clear if it is included. The ERT encourages Hungary to specify in the IIR where 1.A.5.a emissions are included.

54. The ERT welcomes the improvements planned for this sector (i.e. moving towards a Tier 2 methodology).

TRANSPORT

Review Scope

Pollutants Reviewed		ALL		
Years		1990 – 2012		
NFRCode	CRF_NFRName	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		X
1.A.3.a.ii.(i)	civil aviation (domestic, LTO)	X		X
1.A.3.a.ii.(ii)	civil aviation (domestic, cruise)	X		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		X
1.A.3.c	railways	X		
1.A.3.d.i (ii)	international inland navigation	X		
1.A.3.d.ii	national navigation	X		
1.A.4.a.ii	commercial / institutional: mobile	X		
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		
1 A 3 d i (i)	International maritime navigation	X		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.

Transparency:

55. Hungary has provided a detailed and generally transparent emissions inventory for mobile sources. Hungary uses a fuel based methodology and emission factors for all mobile sectors which are in agreement with the EMEP/EEA guidelines. The fuel activity data per fuel type are shown in the Party's IIR together with a general reference to emission factor sources. In order to improve transparency the ERT encourages Hungary to provide more details on the emission factors actually used in the inventory for mobile sources, and also to explain the motivation behind the selection of these factors.

56. The ERT finds it is difficult to see which sub-sectors are included in the estimates of other sub sectors (noted reported as IE) in the "Additional info" sheet in the NFR tables. But the ERT notes that the IIR has all the available information. The

ERT encourages Hungary to specify in the NFR table which mobile sub-sectors are reported as IE, and to which sub-sectors these emissions have been allocated.

Completeness:

57. Emission estimates for memo items are missing for the whole time series. During the review the Party explained that this topic was part of the improvement plan and would be submitted in the next submission. The ERT encourages Hungary to complete the time series of emissions.

Consistency including recalculation and time series:

58. The ERT noted during the review week that the time series were not consistent (use of many IE and NE notation keys). The Party provided information about the improvement plan, and explained that they would continue to improve consistency in the time series of emissions. The ERT encourages Hungary to continue to improve the Hungarian inventory.

Comparability:

59. The ERT estimates that the methodology used is in general consistent with the EMEP/EEA Guidebook. But due to the number of IE and NE notations keys used in the times series, it was difficult for the ERT to compare the inventory with other inventories. The ERT encourages Hungary to continue to improve the Hungarian inventory to allow for the possibility of comparing it with other inventories.

Accuracy and uncertainties:

60. The Party did not provide uncertainty estimates for mobile sources but the ERT was informed that they were planning to do so. The ERT encourages the Party to make uncertainty estimates for all mobile sources at a sub-sector level in order to prioritise improvements.

Improvement:

61. The Party has been planning general and sector specific improvements in the IIR. The ERT encourages the Party to continue to improve the consistency of the time series and to perform quantitative uncertainty analyses for all mobile sub-sectors.

Sub-sector Specific Recommendations.

Category issue 1: 1 A 3 a ii (i) Civil aviation (Domestic, LTO) / All pollutants

62. The ERT notes that the Party has included the emissions of this sector in the road transport sector. The ERT estimates that that could imply an under/or overestimation of emissions due to the difference in emissions factors. The ERT encourages the Party to improve the inventory.

Category issue 2: 1 A 3 b i Road transport: Passenger cars, 1 A 3 b ii Road transport: Light duty vehicles, 1 A 3 b iii Road transport: Heavy duty vehicles, 1 A 3 b iv Road transport: Mopeds & motorcycles, 1 A 3 b v Road transport: Gasoline evaporation, 1 A 3 b vi Road transport: Automobile tyre and brake wear, 1 A 3 b vii Road transport: Automobile road abrasion / All pollutants

63. During the review, the ERT noted that there was a problem with the consistency of activity data and emissions prior to 2005. The Party answered that they were following a step-wise approach to increase the consistency of the time series. For the last submissions, the Party had made significant improvements to consistency for the years from 2005 onwards. The Party plans to continue this work, whenever their resources permit. The ERT encourages the Party to improve the consistency of the time series for the whole period (i.e. from 1990 onwards).

Category issue 3: 1 A 3 b vii Road transport: Automobile road abrasion / particulates

64. The ERT has noted that the emissions estimated for 1A3bvi (tyres and break wear emissions) are missing. The EMEP/EEA Guidebook provides a methodology for estimating 1A3bvii emissions similar to the 1A3bvi methodology. The Party answered that it might be able to include emissions from road surface wear in next year's submission. The ERT encourages the Party to improve the inventory.

Category issue 4: 1 A 3 a ii (ii) Civil aviation (Domestic, Cruise), 1 A 3 a i (ii) International aviation (Cruise), 1 A 3 d i (i) International maritime navigation / All pollutants

65. The ERT noted that the Party had not estimated emissions for these memo sub-sectors (NE notation keys used). The Party answered that it intended to include emissions from international aviation (cruising) as a memo item in next year's submission. The ERT encourages the Party to improve the inventory and to complete the emissions for all these sub-sectors.

Category issue 5: All Mobile sources / TSP

66. During the review week, the ERT detected a potential problem in the NFR tables concerning TSP emissions. It seems that the emissions of 1A2fii up to the last NFR code (7A) are not allocated to the correct sub-sector. The problem appears from the year 2000 onwards. The Party agreed and announced that it would correct this problem. The ERT encourages the Party to improve the quality checks.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		NO_x, NMVOC, SO_2, NH_3, $PM_{2.5}$, PM_{10}, TSP, CO, Cd, Hg, Pb, POPs		
Years		1990 – 2012		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2.A.1	cement production	x		
2.A.2	lime production	x		
2.A.3	limestone and dolomite use		NA/NE	
2.A.4	soda ash production and use		NA/NO	
2.A.5	asphalt roofing	x		
2.A.6	road paving with asphalt	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		NA/IE	
2.A.7.d	Other Mineral products (Please specify the sources included/excluded in the notes column to the right)	x		
2.B.1	ammonia production	x		
2.B.2	nitric acid production	x		
2.B.3	adipic acid production		NA/NO	
2.B.4	carbide production		NO	
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)		NA	
2.C.1	iron and steel production	x		x
2.C.2	ferroalloys production		NO	
2.C.3	aluminium production	x		x
2.C.5.a	Copper Production	x		x
2.C.5.b	Lead Production		NO	
2.C.5.c	Nickel Production		NO	
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)		NO	
2.C.5.f	Storage, handling and transport of metal products (Please specify the sources included/excluded in the notes column to the right)		NA/IE	
2.D.1	pulp and paper	x		
2.D.2	food and drink	x		
2.D.3	Wood processing	x		
2.E	production of POPs		NA/NE/NO	
2.F	consumption of HM and POPs (e,g. Electrical and scientific equipment)		NA/NE	
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)		NO	
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:

67. The Hungarian Industrial Processes inventory is generally transparent, well organised, and comprehensive with a good level of detail in its methodology descriptions.

68. The ERT notes that clear explanations are given for dips/jumps or other changes in the emission time series for all sub-categories of the Industrial Processes sector. However, the ERT encourages Hungary to include more information about the activity data used in the IIR similar to how it is presented in the submission tables.

69. Explanations for the use of the notation key "NE" are provided for every sector/pollutant combination in the IIR but not completely in the NFR tables. The ERT encourages Hungary to also provide this information in the NFR tables.

Completeness:

70. The ERT considers the Industrial Processes sector to be complete for the main sources and comprehensive with good levels of detail in the methodology descriptions.

71. To avoid under-estimation, the ERT encourages Hungary to include plans to address the missing emissions (reported as NE) in its IIR, either by obtaining data allowing for an emission estimate to be made, or by reporting the emissions as not applicable (NA).

Consistency including recalculation and time series:

72. The ERT notes that Hungary has performed a recalculation of the entire time series in its submission of May 2014 based on the 2009 EMEP/EEA Guidebook and the CLRTAP Reporting Guidelines (ECE/EB.AIR/97). The ERT commends Hungary for this. However, the IIR does not include tables allowing for comparison between the old and new submissions. The ERT encourages Hungary to provide more detailed explanations for the recalculations and comparison tables in the next IIR to improve transparency.

Comparability:

73. Hungary has reported its emissions inventory in accordance with the reporting requirements and submitted it in the requested NFR format.

74. Hungary uses both default emission factors from the EMEP/EEA Guidebook and operator-reported site-specific emission data. These methods are consistent with the guidance provided in the EMEP/EEA Guidebook

Accuracy and uncertainties:

75. The ERT encourages Hungary to undertake an uncertainty analysis for the Industrial Processes sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

76. The ERT notes that as an improvement of its QA/QC actions, Hungary is planning to apply the same processes as those applied for UNFCCC annual emission inventory reporting. The ERT commends Hungary for this.

Improvement:

77. The ERT commends Hungary for the extensive improvements carried out since the last review in 2009.

78. The ERT also notes that it is planned to apply the 2013 EMEP/EEA Guidebook for the next submission. The ERT commends Hungary for the planned improvements.

Sector-specific Recommendations.

Category issue 1: 2C– 2008 heavy metals emissions

79. In the previous Stage 3 Review Report (from 2009) the ERT encouraged Hungary to include heavy metals under metal production (2C). The ERT has noted that Hungary included heavy metals under metal production (2C) and compliments Hungary on this.

Category issue 2: 2C1 – 2008 PAH emissions

80. The ERT notes that the Tier 1 methodology is used for Hg from iron and steel production (2C1). Iron and steel production is a key source of Hg. The ERT encourages Hungary to replace Tier 1 methods by higher Tier methods.

Category issue 3: 2C3 – 2008 PAH emissions

81. The ERT notes that in the aluminium production sector (2C3) the notation key NO (Not Occurring) has been used for PAHs emissions since 2008. However, emissions of other pollutants have been reported for the same period of time. During the review week Hungary explained that the time series data slipped back one year in 2002 (therefore the 2007 data in NFR Table is the 2006 data). The ERT thanks Hungary for this explanation and recommends that the Party corrects the mistakes in its next submission and improves its QAQC procedures, e.g. checks its final output files before submitting them.

Category issue 4: 2C3 – 2008 activity data

82. The ERT also notes that the secondary aluminium production volume sharply increased after 2003 compared to previous years. However, emissions have stayed at the same level. During the review process Hungary explained that in the NFR table activity data column the data for the years before 2003 relates to primary aluminium production, while from 2003 onwards it refers to the volume of secondary aluminium production. The ERT thanks Hungary for this explanation and recommends that the Party corrects the activity data time series in the next submission.

Category issue 5: 2c5a – Pb, Cd, TSP, PM_{10}, $PM_{2.5}$ emissions

83. The ERT notes that in the data submission for the copper production sub-sector (2C5a) the same amount of Pb, Cd, TSP, PM_{10}, $PM_{2.5}$ emissions is provided for the whole period 1994-2004. During the review process Hungary explained that the activity data is the same for the whole period, but that for reasons of confidentiality secondary copper and zinc data is aggregated for sector 2.C.5.a and not visible in the NFR activity data row. The ERT thanks Hungary for this explanation and recommends clarifying the issue of the activity data or inserting the explanation about the confidentiality issue in the next IIR.

SOLVENTS

Review Scope

Pollutants Reviewed		NMVOC		
Years		1990 – 2012		
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:

84. In the previous Stage 3 Review Report (from 2009) the ERT encouraged Hungary to improve the quality of its chapter on the Solvent sector by adding a description of the methodologies, emission factors and information on activity data and data sources. The ERT notes that in this submission the Solvents and Other Product Use sector inventory is generally transparent, well organised, and comprehensive with a good level of detail in its methodology descriptions. The ERT commends Hungary for all the excellent efforts undertaken to significantly improve transparency. Only some activity data are missing. The ERT encourages the Party to add these activity data in its IIR in the next submission.

85. Furthermore, the ERT notes that in most cases Hungary uses the appropriate notation keys in the NFR tables for all the source categories of the Solvents and Other Product Use sector and commends Hungary on this. For more information see the relevant sector section.

86. The ERT notes that the explanations for the use of the notation keys NE and IE are provided in the NFR tables and/or the IIR.

87. The ERT notes that the explanations for dips and jumps are missing. For more information see the relevant sector section.

Completeness:

88. In the previous Stage 3 Review Report (from 2009) the ERT recommended that Hungary performed additional reviews to identify the most important gaps (for 3C and 3D) in its inventory and puts a plan in place to make estimates of these. The

ERT notes that Hungary has included 3C and 3D in the Solvents and Other Product Use chapter in its IIR and compliments Hungary for doing so. The ERT considers this chapter to be almost complete and comprehensive with good levels of detail in the methodology descriptions.

89. To avoid under-estimations, the ERT recommends that Hungary includes plans to address the 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 (NA).

Consistency including recalculation and time series:

90. In the previous Stage 3 Review Report (from 2009) the ERT recommended that Hungary updated all years of the time series where methods or datasets have been improved or corrected to ensure a consistent time series. The ERT notes that fully recalculated time series have been submitted in this submission and compliments the Party on doing so.

91. The ERT notes that the time series of the activity data and the EFs used to calculate emissions of the key sources are consistent.

Comparability:

92. Hungary provides its emissions inventory in accordance with the reporting requirements and has submitted it in the requested NFR format.

93. Furthermore, the ERT notes that there are no differences between CLRTAP and NECD emissions in this sector.

Accuracy and uncertainties:

94. In the previous Stage 3 Review Report (from 2009) the ERT encouraged Hungary to implement sector-specific OA/QC procedures for the next submission and to document these in its future IIRs. The ERT notes that several verification checks have been performed and encourages Party to continue with this.

95. In the previous Stage 3 Review Report (from 2009) the ERT encouraged Hungary to undertake an uncertainty analysis for the Solvent sector in order to improve the process of reporting and to provide an indication of the reliability of the inventory data. The ERT notes that this is still outstanding, but that a general uncertainty evaluation is mentioned under the planned improvements. The ERT reiterates its recommendation that an uncertainty analysis should be undertaken for the Solvent sector in order to improve the process of reporting and to provide an indication of the reliability of the inventory data.

96. The ERT notes that the emissions of the key sources are not all calculated using the Tier 2 methodology and recommends that the Party calculates all key sources using the Tier 2 methodology. For more information see the relevant sector section.

Improvement:

97. In the previous Stage 3 Review Report (from 2009) the ERT encouraged Hungary to list planned and desired sector-specific improvements in its IIR to help to provide transparency for future improvements and to support improvement prioritisation. The ERT notes that it is planned to use the 2013 EMEP/EEA Guidebook for all source categories of this sector in the next submission. For more information see the relevant sector section.

Sub-sector Specific Recommendations.

Category issue 1: 3A3 – NMVOC

98. In the "NMVOC cell" of the NFR tables the notation key “IE” has been used, while in the "Other activity (specified) cell" of the NFR tables the notation key “NA” has been used.

99. After consulting with the Party they responded that IE would be used in the "Other activity (specified) cell", consistent with all other “NMVOC cells” in the NFR tables, in the next submission.

Category issue 2: 3A - NMVOC

100. The ERT notes a sharp decline between 2004 and 2005 in Table 5.1.1, the activity data and NMVOC emissions in the 3A sector, column “SZUM PAINT (import -/- export + production)”.

101. After consulting with the Party they replied that this decline might be due to the decline in the activity data time series provided by HCSO. This is also an issue that needs to be clarified with HCSO in order to ensure that all raw data feeding into inventory compilation are correct and the trends transparent.

Category issue 3: 3A1, 3A2, 3A3 and 3D1 – NMVOC

102. In the previous Stage 3 Review Report (from 2009) the ERT encouraged Hungary to set up a methodology enabling the allocation of emissions in 3A1, 3A2 and 3A3 and to provide checks to ensure that all emissions are included. The ERT notes that this is still outstanding, but that one of the planned improvements is to collect more detailed activity data, so that the Tier 2 method can be applied to the source categories 3A1, 3A2 and 3A3.

103. After consulting with the Party they replied that they also had plans to implement the Tier 2 method for printing, possibly for the next submission, or at least in the medium term. The ERT commends Hungary on this.

AGRICULTURE

Review Scope:

Pollutants Reviewed		NO_x, NH_3, $PM_{10,}$ $PM_{2.5,}$ TSP		
Years		1990 – 2012 PM: 2000 -2012		
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		x
4 B 3	Sheep	x		x
4 B 4	Goats	x		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		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 b	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	NO		
4 G	Agriculture other(c)	NO		
11 A	(11 08 Volcanoes)	NO		
11 B	Forest fires	NO		
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

104. The emission inventory is almost complete and Hungary has provided a transparent and well-presented IIR. The ERT appreciates Hungary's efforts to improve completeness and transparency and encourages Hungary to continue this improvement process and provide key source analysis, uncertainty estimates and QA/QC procedures for agricultural emissions. The ERT thanks Hungary for its responsiveness and for providing informative answers during the review process.

Transparency:

105. The ERT commends Hungary for providing a very transparent and well-presented IIR, which includes descriptions of methodology, the use of emission factors, references and time series.

106. The ERT encourages Hungary to continue its excellent improvement process by adding more details to the IIR, in particular comparisons with default values and explanations for differences.

Completeness:

107. The ERT considers the Agricultural sector to be almost complete. The inventory includes emissions of NO_x, NH_3 and PM. The ERT appreciates Hungary's efforts to improve completeness, and welcomes its plan to estimate NMVOC emissions for the 2015 submission and to implement the recommendations from the new 2013 EMEP/EEA Guidebook.

Consistency including recalculation and time series:

108. The IIR states that emissions of NH_3 and PM from 4B have been revised based on a Tier 2 methodology based on the 2009 EMEP/EEA Guidebook. The time series for NO_x for the time period 1990-2012 and PM emissions for the time period 2000-2012 have been completed. Time series for all pollutants are provided and the main drivers for trends are explained.

Comparability:

109. The emission calculations follow the recommendations in the 2009 EMEP/EEA Guidebook. Ammonia emissions are based on a Tier 2 approach for 4B1a+b, 4B8 and 4D1a, while the remaining sectors are based on a Tier 1 approach. A Tier 1 approach is used to calculate NO_x emissions. PM emissions for all animal categories are based on a Tier 2 approach. In general, the Hungarian inventory is comparable. Improvements can be provided in the form of more information regarding the calculation of PM emissions.

Accuracy and uncertainties:

110. The IIR does not include a specific chapter describing the key source analysis specific to agricultural emissions. It is mentioned that NFR categories 4D1a, 4B9a + b are key sources of NH_3. The ERT has encouraged Hungary to provide a key source analysis in the agricultural section.

111. The IIR does not include information regarding uncertainty analysis or QA/QC procedures for agricultural emissions. The ERT encourages the Party to undertake an uncertainty analysis and to implement QA/QC checks to ensure quality assurance for the data and emissions provided in the Hungarian inventory.

Improvement:

112. In the IIR chapter on planned improvements it is mentioned that a recalculation of PM emissions from farm-level agricultural operations is planned based on the 2013 EMEP/EEA Guidebook. An estimation of NMVOC emissions from 4B on the basis of the 2013 EMEP/EEA Guidebook is also planned.

Sub-sector Specific Recommendations.

Category issue 1: 4B8 - PM

113. PM emissions are based on a Tier 2 approach based on the 2009 EMEP/EEA Guidebook. The ERT notes that the IEF for swine seems to be lower than the default IEF. During the review week Hungary explained that emissions from piglets below 20 kg were not included. The number of piglets in Hungary accounts for 24% of the total number of swine. The definition of the swine sub-category in the Guidebook is not clear. In the new 2013 EMEP/EEA Guidebook the sub-categories are extended to three; sows (including piglets up to 8 kg), weaners (8-20 kg) and fattening pigs above 20 kg (Table A3-4 and 3.7). The ERT recommends that Hungary implements the IEF given in the 2013 EMEP/EEA Guidebook, so that the inventory also includes emission from weaners.

Category issue 2: 4B1a - NH_3

114. The ERT identified a discrepancy of the IEF used for NH_3 emissions from dairy cattle in 2012 between the NFR tables and IIR. Hungary confirmed this discrepancy and stated that they would correct this error in the next submission.

Category issue 3: 4B1a - NH_3

115. The ERT notes that until 2007, the trend for milk yield follows the trend for N excretion, but that in 2007-2012 the milk yield continues to rise, while N excretion is starting to decrease. During the review week Hungary explained this trend by the fact that improvements had been achieved in feeding efficiency. A slight decrease in the proportion of forage in the diet has taken place, resulting in lower protein intake and thus lower N excretion.

Category issue 4: 4B1b - NH_3

116. The ERT noticed that the IEF for non-dairy cattle was significantly higher than the default value. During the review week Hungary explained that the higher emission factor was due to more days spent in housing, higher N excretion levels and a greater proportion of manure in storage, compared to assumptions for the default value. The ERT recommends including this explanation in the IIR for the next submission.

Category issue 54: 4B8 - NH_3

117. During the review week Hungary provided information on the IEF for the swine sub-categories. The ERT recommends that the information from the sub-categories is included in next IIR, because it will increase the possibility to compare the emission factor with the default values and emission factors used in other countries' inventories.

Category issue 6: 4B13 - NH_3

118. NFR code 4B13 in the Hungarian inventory includes emissions from rabbits. During the review week Hungary informed the ERT that the emission factor was the one used for fur farming. The ERT recommends that the Party includes this information In the IIR.

Category issue 7: 4B2, 4B3 and 4B4 - PM

119. During the review week Hungary informed the ERT that it was planning to implement the recommendations from the new 2013 EMEP/EEA Guidebook. Table 3-4 in the 2013 EMEP/EEA Guidebook includes IEFs for buffalo, sheep and goats, which opens up possibilities for estimating the emissions from these livestock categories. The ERT encourages Hungary to estimate PM emissions from 4B2, 4B3 and 4B4.

WASTE

Review Scope:

Pollutants Reviewed		SO_2, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$ and Hg		
Years		1990 – 2012		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
6.A	solid waste disposal on land	X		
6.B	waste-water handling			
6 C a	Clinical waste incineration (d)	X		
6 C b	Industrial waste incineration (d)	X		
6 C c	Municipal waste incineration (d)	X		X
6 C d	Cremation	X		X
6 C e	Small scale waste burning			
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:

120. Hungary has improved the IIR since the last Stage 3 review in 2009 with better descriptions of the applied methodology and by presenting the whole time series in the NFR format. However, the ERT notes that for instance for 6Cc (but also others) it is not clear which fractions of waste (with and without energy recovery) are included in the time series. The IIR states that in 2012 only 13% of all waste was burnt without energy recovery. The ERT encourages Hungary to proceed with improving transparency and add activity data tables in the IIR.

121. The ERT notes that the NFR table with additional information is not reflecting the notation keys used in the Annex IV tables. The ERT recommends that Hungary corrects this in the next submission.

Completeness:

122. Hungary reports a general complete time series. The ERT notes that it is not always clear for what reason specific notations keys are used. The ERT recommends explaining this especially for the notation keys IE and NA in the IIR and in the additional NFR info tables.

Uncertainties:

123. Hungary is planning to include a general uncertainty analysis in the next IIR. The ERT notes that having an uncertainty analysis at NFR level will be very helpful for prioritising improvements. The ERT reiterates its encouragement from the 2009 Review Report, i.e. to perform an uncertainty analysis for future submissions.

QA/QC procedures:

124. Hungary provides a short description of the QA/QC system but has not described any sector-specific QA/QC procedures. The ERT reiterates its encouragement from the 2009 Review Report, i.e. to implement - where possible – sector-specific QA/QC procedures.

125. Hungary refers to the ISO quality management system of the Hungarian Meteorological Service and the QA/QC plan included in the National Inventory Report. The ERT recommends including in the IIR an overview of planned QA/QC steps with a reference to the archived documents regarding the realisation of each step.

Improvements and recalculations:

126. Hungary has completed and recalculated several time series. Descriptions of these and of the effect that they have are not included in the relevant IIR chapters. The ERT recommends that Hungary includes information on recalculations in the relevant chapters in future submissions.

127. Hungary is planning several further improvements in the relevant IIR chapters. However, the ERT encourages Hungary to make these more SMART (specific, measurable, agreed upon, relevant, time-based).

Sub-sector Specific Recommendations.

Category issue 1: 6Cc Municipal waste incineration – All pollutants

128. The ERT notes that in the NFR tables for 6Cc the notation key IE is used for all pollutants expect NH_3, Se and HCH, for which NA is used. This is explained neither in the additional NFR info table nor in the IIR. The ERT recommends giving an explanation in the next submission.

129. Hungary uses the notation key IE for most pollutants in this sub-category. Since all MSW incineration is done with energy recovery (1A), there is no emission source in this category. The ERT recommends in such cases the use of the notation key NO.

Category issue 2: 6Cd Cremation – All pollutants

130. This sub-sector has two of the main sources: cremation of human remains and incineration of animal carcasses. Hungary included the cremation of human remains in the inventory for the years 2004-2012 and calculated emissions using the Tier 1 default factor from the 2009 EMEP/EEA Guidebook. The ERT notes that the main source of mercury emissions from the cremation of human remains is amalgam used for dental fillings. As such, the level of dental care will influence the mercury emission factor. The ERT encourages Hungary to extrapolate back to the years 1990-2003 and use a country-specific emission factor for mercury.

131. Hungary does not include the incineration of animal carcasses in this sub-category. The IIR does not indicate a reason as to why. The ERT encourages Hungary to include this source in future submissions.

Category issue 7: e.g. 6.D Other – all relevant pollutants

132. Hungary states that “for the time being” it is reporting only on compost production in this category. Hungary indicates that it will check if any data is available on sludge spreading and building fires. The ERT notes that there are several other potential sources missing and it is not clear from the IIR whether a survey is conducted regarding the potential sources in this sub-category. The ERT encourages Hungary to survey potential sources for this sub-category.

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Response to preliminary questions raised prior to the review
2. Response to questions raised during the review
3. Hungary Stage 2 S&A report
4. Hungary Stage 1 report 2014
5. Hungary IIR 2014
6. Energy (1A, 1B): Energy2406.xlsx, HU_1B_Q7&A_16062014.docx
7. Agriculture: Hungary_answer_190614_AGRI supplementary worksheets.xlsx
8. General: trend_Hungary.xlsx