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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:**

**HUNGARY**

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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’ <sup>(1)</sup> – hereafter referred to as the ‘Methods and Procedures’ document.
2. This annual review has concentrated on SO<sub>x</sub>, NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, plus PM<sub>10</sub> & PM<sub>2.5</sub> with optional review of Cd, Pb and Hg for the time series years 1990 – 2007 reflecting current priorities from the EMEP Steering Body and the Task Force on Emission Inventories and Projections (TFEIP).
3. This report covers the stage 3 centralised review 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 22nd June 2009 to 25th June 2009 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: Lead Reviewer – Justin Goodwin (EC) generalist – Kevin Hausmann (Germany), Energy – Laetitia Serveau (France) Mobile – Morten Winther (Denmark), Industry and Waste – Hans Wradhe (Sweden) and Leif Hoffman (Denmark), Solvents – Nadine Allemand (France), Agriculture + Nature – Jim Webb (UK).
4. The review was coordinated by Justin Goodwin and Katarina Marečková, (EMEP Centre on Emission Inventories and Projections – CEIP).

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<sup>1</sup> 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**

### **INVENTORY SUBMISSION**

5. In its 2009 submission, Hungary reported 2002–2007 data as well as some aggregated values for 1980, 1985, 1990, 1995, 2000, and 2001. Other years were analysed using former submissions and considered for this review. Hungary did not report 2005 gridded emissions for Gothenburg protocol pollutants. Hungary provided a detailed informative inventory report (IIR).

6. The ERT commends Hungary for its efforts in compiling and reporting its emissions inventory. However, both Hungary's IIR and data submission are incomplete. Most importantly, the ERT noted the lack of complete and consistent time series for the years 1990, 1995, 2000, 2002–2007, including recalculations as well as the absence of detailed descriptions for most source categories, particularly for Agriculture and Waste in the IIR. The ERT put detailed recommendations in part B of this report. The ERT encourages Hungary to implement the recommended structure for Informative Inventory Report (IIR), to improve the detail and transparency of the IIR and to complete the emissions timeseries.

### **KEY CATEGORIES**

7. Hungary presents a “tier 1” key category analysis (KCA) based on level assessment in its IIR. The ERT encourages Hungary to use its time series data to also perform a tier 1 trend assessment.

8. The Hungarian Key Category Analysis does not match the analysis performed by the CEIP, as it is not carried out using NFR categories. The ERT encourages Hungary to follow the EMEP EEA air pollutant emission inventory guidebook by and use the appropriate NFR categories.

9. Hungary's IIR does not clearly state if and how the results of the key source analysis are used for inventory improvement. The ERT encourages Hungary to outline how its Key Category Analysis will help to prioritise planned improvements in its IIR.

## QUALITY

### *Transparency*

10. The ERT recognises the level of effort undertaken by Hungary in providing an inventory with a significant level of detail to undertake a detailed review. However, both Hungary's IIR and its data submission lack sufficient detail for a considerable number of sources. This includes energy and industrial processes categories, which are likely to be key categories in the Hungarian inventory. Please refer to the next paragraph and to part B of this review report for details. The ERT encourages Hungary to improve the description of methods, data sources and assumptions in its IIR.

11. Hungary's data submission uses "IE"s (and other notation keys) for a number of source categories and pollutants (e.g. 1A1a/b/c). The IIR does not provide a detailed explanation for these cases, of where "IE" emissions are included. The ERT encourages Hungary to try to provide the required split in the NFR tables using available statistics or proxy data and to describe these methods in its IIR. Where, through lack of data, this cannot be done, the ERT encourages Hungary to document, in its IIR, where categories indicated with "IE" are included and to provide a plan for producing the required NFR split for key categories in the future.

12. The ERT emphasizes the importance of the use of NFR categories in the IIR as this is the best and easiest way to improve the transparency of the Hungarian submission.

13. Hungary reports a small number of emission estimates as zero (0) in its data submission (e.g. Pb and Cd in 6 C b). The ERT recommends the use of notation keys (NO) instead of zeros.

### *Completeness*

14. The ERT acknowledges the effort to which Hungary has gone to provide estimates of emissions for all sub-sectors and all pollutants reviewed. However, the ERT has some concerns about the completeness of the Hungarian inventory, particularly for "Mobile" and "Solvent use" sources. Please refer to the sector specific chapters in part B of this report for details. Hungary indicated that they are unable to complete these estimates due to a lack of resources. The ERT recommends that Hungary performs additional reviews to identify the most important gaps in its inventory to put a plan in place to make estimates of these and to report on these in its IIR.

### *Consistency, including recalculations and time-series*

15. Both the Hungarian IIR and the CEIP analysis report recalculations in the inventory to be minor. The ERT notes that this may be because Hungary does not update the full timeseries of emissions when methods are improved for the latest year of the inventory. The ERT identified a number of other consistency issues. These are detailed in the second part of this review report. Particular care should be taken in regard to the consistency of time series in the

sectors of “Agriculture” and “Waste”. The ERT encourages Hungary to update previous years of the inventory and report these updated estimates to ensure that the latest timeseries presented is consistent.

### ***Comparability***

16. Due to the absence of complete and consistent time series and to the lack of transparency in the methods used in some sectors, it was difficult for the ERT to assess the comparability of the inventory. The ERT encourages Hungary to take the ERT's recommendations – as laid out in part B of this document – into account, thus ensuring the submission of comparable inventories in the future.

### ***CLRTAP/NECD comparability***

17. The ERT noted that there are major differences (across the sectors and pollutants) between the estimates provided by Hungary under the CLRTAP and the NECD. These differences affect the national totals. The ERT recommends that Hungary checks the comparability of both inventories and ensures that consistent methods and reporting are used for future submissions.

### ***Accuracy and uncertainties***

18. Hungary compiled a qualitative uncertainty analysis. The ERT welcomes this analysis and encourages Hungary to add to its IIR information on a) whether the uncertainties decreased over time and b) whether the uncertainties are taken into account for inventory improvement.

19. For future submissions, the ERT recommends that Hungary evaluates the option of a quantitative uncertainty analysis.

### ***Verification and quality assurance/quality control approaches***

20. The QA/QC plan described by the Party in the IIR is given as a broadly outlined description only. The ERT encourages Hungary to add further detail to this description, in particular on the roles and processes of QA/QC to demonstrate the ability of the inventory to function efficiently. The ERT also encourages Hungary to expand the QA/QC plan further with a focus on how the actual in-house inventory production process takes place. Such a description could focus on input data handling/storage, calculation, set-up of the inventory in report format, and checking of the correct transfer of data between the individual working steps of the inventory.

## **FOLLOW-UP TO PREVIOUS REVIEWS**

21. Hungary did not resolve all issues identified by the 2008 CEIP stage 2 review. The ERT encourages Hungary to cooperate with the CEIP in order to solve the pending issues as well as the outcome of the current 2009 stage 2 and 3 reviews.

## **AREAS FOR IMPROVEMENTS IDENTIFIED BY HUNGARY**

22. Hungary does not provide information on any specific improvements planned in its IIR. The ERT encourages Hungary to list, in its future IIRs, specific improvements planned and to outline other improvements needed to improve the quality of the inventory.

## **PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY**

### **CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT**

23. The ERT notes Hungary's resource constraints restrict its ability to keep the inventory timeseries and documentation up-to-date. The ERT encourages Hungary to set a plan for prioritising improvements and developing the capacity and resources of the inventory team.
24. The ERT encourages Hungary to improve the completeness of the inventory particularly for the Mobile, Solvent and Agriculture sectors.
25. The ERT encourages Hungary 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.
26. The ERT encourages Hungary to report complete and consistent time series in the latest NFR format (NFR08).
27. The ERT also encourages Hungary to perform its key source analysis in accordance with the EMEP EEA air pollutant emission inventory guidebook by using the appropriate NFR categories.
28. The ERT also encourages Hungary to use the NFR categories as the structure for the inventory description laid out in the IIR.
29. The ERT recommends that Hungary reviews the inventory and provides a description of the gaps in the inventory for all sectors but particularly for the Mobile and Solvents sectors.
30. The ERT encourages Hungary to assess and document the differences between its submissions to the CLRTAP and to the NECD.
31. The ERT encourages Hungary to work with the CEIP on solving the issues from the stage 2 reviews.
32. The ERT encourages Hungary to check for the use of appropriate notation keys (e.g. NO where emissions are "Not Occurring", NE where emissions are "Not Estimates" and IE where emissions are "Included Elsewhere").
33. The ERT sets out a number of specific recommendations in part B of this report. These are detailed in both their cross-cutting and their sector specific nature below.

## SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

### *Energy*

#### Review scope

Pollutants reviewed		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, CO, NH <sub>3</sub> , PM <sub>10</sub> & PM <sub>2.5</sub>		
Years		1990, 1995, 2000, 2002–2007		
NFR Code	CRF_NFR Name	Reviewed	Not reviewed	Recommendation provided
1.A.1	Energy industries	x		x
1.A.2	Manufacturing industries and construction	x		x
1.A.4	Commercial, residential, agriculture & forestry	x		x
1.A.5	Other	x		
1.B.1	Fugitive emissions from solid fuels	x		
1.B.2	Fugitive emissions from oil and natural gas	x		

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

#### General recommendations on cross cutting issues

34. **Completeness:** For the energy sector, no sub-sector is identified with the notation key “NE”. Hungary has not stated whether the inventory is complete or not. The ERT encourages Hungary to provide some description about the completeness of the inventory for the Energy Sector.

35. **Transparency:** Some NFR codes have been identified with the notation keys “IE” but the table “additional info” describing where emissions have been included has not been completed by Hungary. The ERT encourages Hungary to explain for all years where emissions are included that have “IE” notations and the reason for this choice in the table “Additional info” and in its IIR.

36. Some Energy categories have been combined by Hungary for its 2009 submission. The ERT encourages Hungary to present 1A1b (oil refineries) separately from the chemical industry and to present briquetting separately from the mining industry as indicated in its response to the ERT.

37. The ERT commends Hungary for its clear description of the energy balance in Hungary’s IIR and the evolution between years too. However, the ERT notes that the descriptions for all Energy sub-sectors require further detailed descriptions including the description of methods, data sources and assumptions. The ERT encourages Hungary to

explain in future IIRs the methodology, assumptions and data sources used for each sub-sector including the changes to activity data and emission factors over the timeseries.

38. **Uncertainty:** For the energy sector the uncertainty evaluation is qualitative. The ERT encourages Hungary to continue to investigate quantitative uncertainties and to include these in future submissions.

39. **Comparability and consistency:** The ERT recommends that Hungary describes in its IIR if the methodology used for each sub-sectors is the same for all years studies in order to justify the time series consistency and to give, if possible, the different methodologies used.

40. **QA/QC procedures:** The ERT notes that there are no specific QA/QC procedures for the energy sector. The ERT encourages Hungary to develop and document QA/QC procedures used for the Energy sector.

41. **Recalculations:** The ERT encourages Hungary to indicate in its IIR the main modifications between the last submission and the previous submission and to provide justification for changes.

42. **Improvement:** The ERT finds that no planned improvement is given in the IIR. The ERT encourages Hungary to list planned and desired improvements in its IIR to help to provide transparency on future improvements and to support improvement prioritisation.

#### Sub-sector specific recommendations

43. Hungary's IIR indicates that for all sectors the Tier 1 methodology is used. Although the ERT notes the use of tier 2 methods for 1A1a, the ERT has been unable to determine the full details of methods used for other energy sub sectors. The ERT encourages Hungary to use the Tier 2 methodology for other key categories.

44. The ERT encourages Hungary to develop and increase the accessibility of activity input data for the energy sector and to improve its engagement with institutions collecting and holding national energy data.

#### **1A1a Public electricity and heat production**

45. For the NFR code 1A1a the consumption for other fuels is noted as "IE" due to confidential data (only one public power plant uses coke oven gas and blast furnace gas). The consumption is included in the gas consumption. The ERT encourages Hungary to provide further explanation in future IIRs, in line with its response given to the ERT explaining the methods used to estimate emissions using point source data.

#### **1A1c Other energy producing industries & 1B1b Fugitive emissions**

46. For the NFR code 1A1c the notation key "IE" is used. The ERT encourages Hungary to include coking and the coke oven furnace emissions under 1A1c. The ERT also encourages Hungary to include emissions from coke oven door leakage and extinction in the NFR code 1B1b instead of under 1A2 metallurgy as indicated in its response to the ERT.

**1A4a Residential and commercial combustion**

47. No emission factors are given for emissions from the service sectors in the IIR. The ERT encourages Hungary to explain in its IIR which type of emission factors are used (statistical average value for the Tier 1 method or specific emission factor for the Tier 2 method) and to give these emission factors in its IIR

**1 A 4 bi and 1A4ci**

48. For the NFR code 1 A 4 bi and 1A4ci, Hungary quotes that the EFs are “from handbooks and for each homogeneous consumer group the emission factor must be regarded as a statistical average value”. As these sources are likely to be key categories for a number of pollutants, the ERT encourages Hungary to use a Tier 2 approach in using specific Hungary emission factors which take into account the abatement and fuel sulphur content.

## *Mobile sources*

### Review scope

<b>Pollutants reviewed</b>		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, CO, NH <sub>3</sub> , PM <sub>10</sub> & PM <sub>2.5</sub> , Cd, Hg, Pb		
<b>Years</b>		1990–2007 + (Protocol Years)		
<b>NFR Code</b>	<b>CRF_NFR Name</b>	<b>Reviewed</b>	<b>Not reviewed</b>	<b>Recommendation provided</b>
1.A.2	Manufacturing industries and construction mobile sources	x		x
1.A.3	Transport	x		x
1.A.4	Commercial, residential, agriculture & forestry mobile sources	x		x
1.A.5	Other mobile sources	x		x
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

### General recommendations on cross cutting issues

49. **Completeness:** Apart from a few sectors where emission estimates are missing (see specific sub sector recommendations), the ERT considers the mobile emission inventory to be complete for the year 2007.

50. Emission estimates are missing for all sectors before 2002. Emission estimates of NMVOC, NO<sub>x</sub>, SO<sub>2</sub> and CO are missing for the sub sectors 1A3b iii (heavy duty vehicles), 1A3c (railways), 1A3d ii (national navigation) in 2002. Emission estimates of PM<sub>10</sub> and PM<sub>2.5</sub> are missing for the sub sectors 1A3c (railways) and 1A3d ii (national navigation) in 2002 and 2003, and for the same sub sectors emission estimates of TSP are missing in 2002. The ERT encourages Hungary to complete the time series of emissions.

51. **Transparency:** 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/CORINAIR 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 of the emission factors actually used in the inventory for mobile sources, and also to explain the motivation behind the selection of these factors.

52. The ERT finds it difficult, in the IIR, to get information on which sub sectors are included in the estimates of other sub sectors (noted as IE). The ERT encourages Hungary to specify in the IIR which mobile sub sectors are noted with IE, and to which sub sectors these emissions are allocated.

53. **Uncertainty:** The Party has provided uncertainty estimates for mobile sources on aggregated levels. The ERT encourages the Party to make sub sectoral uncertainty estimates for all mobile sources.

54. **QA/QC procedures:** Hungary provides a short general description of the QA/QC system. However, no sector QA/QC procedures have been described. The ERT encourages the Party to implement and describe mobile sector specific QA/QC procedures in its future IIRs.

55. **Recalculations:** Hungary has made recalculations for the years 2003 and 2004, involving the sectors aviation, road transport, railways and national navigation, for the emission components SO<sub>x</sub>, NO<sub>x</sub> and CO. However, these recalculations are not explained in the IIR. The ERT encourages Hungary to provide explanations for all recalculations (including the justification for the recalculation and details of the change resulting from the recalculation) in the IIR.

56. **Improvement:** The ERT finds that no planned improvement is given in the IIR. The ERT encourages Hungary to list planned and desired improvements in its IIR to help to provide transparency on future improvements and to support improvement prioritisation.

#### Sub-sector specific recommendations

##### **1.A.3.a Air transport**

57. No estimates are made for domestic air transport, and the notation key NA is given in the NFR table. Although the ERT recognises domestic aviation will be a small emission source in the Party's inventory, the ERT encourages the Party to make separate emission estimates for this sector in future inventories. Where estimates cannot be made or separated, the ERT encourages Hungary to document this using the appropriate notation keys and in the IIR.

##### **1.A.3.b Road transport**

58. Hungary uses the NA code for Cd in 1A3bi (passenger cars), although emissions are estimated by the Party. The ERT encourages Hungary to include the Cd estimates in future inventory submissions.

59. No emission estimates are made for 1A3b vi and vii (tyre and brake wear; road abrasion) although emissions are to be expected from these sectors. The ERT encourages the Party to make separate emission estimates for this sector and include these in future inventory submissions.

60. The NH<sub>3</sub> emission estimates for 1A3b i (road transport passenger cars) are included in the 1A3b iii (heavy duty vehicles) sub sector for the years 2003–2007. The NMVOC emission estimates for 1A3b v (evaporation) are included in other road transport sub sectors. The ERT encourages Hungary to present, in the NFR tables submitted, separate emission estimates for these sectors.

61. The road transport exhaust emissions of TSP, PM<sub>10</sub> and PM<sub>2.5</sub> are included in the 1A3b i (passenger cars) sub sector for 2002 and in the 1A3b iii (heavy duty vehicles) sub sector for 2003–2005. The ERT recommends that the Party make separate emission estimates for these sectors and report them at the full level of detail as provided in the NFR tables. Where data is not available, Hungary is encouraged to use proxy data or surveys to estimate a split.

62. For road transport the emissions are calculated using a simple fuel based method. The ERT encourages Hungary, when implementing future improvements, to improve the inventory by using the fleet and mileage based COPERT methodology.

#### **1.A.3.c Railways**

63. Hungary includes the NA code for NH<sub>3</sub> for 1A3c (railways). Recognising railways as a small source of NH<sub>3</sub> emissions in the Party's inventory, the ERT still encourages the Party to include the NH<sub>3</sub> estimates in future inventory submissions

#### **1.A.4.c iii National fishing**

64. No estimates are made for national fishing. In a response from Hungary to ERT questions, Hungary explains that this source of emission is very small and may be neglected. The ERT recommends that this explanation be reflected in Hungary's next IIR. Further, the ERT recommends that Hungary should ensure that the small fuel amount used by fishing boats is included in other relevant inventory sectors.

#### **1A2f ii (manufacturing industries and construction mobile), 1A3b ii & iv (road transport vans and 2-wheelers), 1A4b ii (Household and gardening mobile), 1A4c ii (Agriculture and Forestry mobile), and 1A5b (Other) emission estimate**

65. For the subsectors 1A2f ii (manufacturing industries and construction mobile), 1A3b ii & iv (road transport vans and 2-wheelers), 1A4b ii (Household and gardening mobile), 1A4c ii (Agriculture and Forestry mobile), and 1A5b (Other) emission estimates are noted with IE in the Party's inventory report for all years. The ERT encourages Hungary to make separate emission estimates for these sectors and to apply the appropriate mobile machinery emission factors from the EMEP/EEA Guidebook.

## ***Industrial Processes***

### Review scope

<b>Pollutants reviewed</b>		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , HM, PM <sub>10</sub> & PM <sub>2.5</sub>		
<b>Years</b>		1990, 1995, 2000, 2002–2007		
<b>NFR Code</b>	<b>CRF_NFR Name</b>	<b>Reviewed</b>	<b>Not reviewed</b>	<b>Recommendation provided</b>
2.A.1	Cement production	x		*
2.A.2	Lime production		x	*
2.A.3	Limestone and dolomite use		x	*
2.A.4	Soda ash production and use		x	*
2.A.5	Asphalt roofing	x		*
2.A.6	Road paving with asphalt	x		*
2.A.7	Other including non fuel mining & construction (please specify in a covering note)		x	*
2.B.1	Ammonia production	x		*
2.B.2	Nitric acid production	x		*
2.B.3	Adipic acid production		x	*
2.B.4	Carbide production		x	*
2.B.5	Other (please specify in a covering note)	x		x *
2.C.1	Iron and steel production	x		*
2.C.2	Ferroalloys production		x	*
2.C.3	Aluminium production		x	*
2.C.4	SF <sub>6</sub> used in aluminium and magnesium foundries		x	*
2.C.5	Other (please specify)		x	x *
2.D.1	Pulp and paper	x		*
2.D.2	Food and drink	x		*
2.D.3	Wood processing		x	*

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

\* Hungary is encouraged to improve the description of methods, data sources and assumptions for all categories reported. The lack of transparency in the report meant that the ERT was unable to fully assess the accuracy or appropriateness of the methods.

### General recommendations on cross cutting issues

66. **Completeness:** The ERT encourages the Party to elaborate on the description in the IIR of the sectors “other chemical products” and “other metal production” as e.g. timeseries are incomplete for some substances (e.g. SO<sub>2</sub>).

67. **QA/QC procedures:** Hungary provides a short description of the QA/QC system. However no sector QA/QC procedures have been described for IP. The ERT encourage the Party to implement and describe sector specific QA/QC procedures.

68. **Recalculations:** The IIR does not give any information on recalculations since the last submission. The ERT encourages Hungary to provide explanations for all recalculations (including the justification for the recalculation and details of the change resulting from the recalculation) in the IIR.

69. **Uncertainty:** Uncertainties are reported qualitatively. The ERT encourages Hungary to undertake qualitative uncertainty analysis for the industry sector in order to facilitate the improvement process and to provide an indication of the reliability of the inventory data.

70. **Transparency:** The description of the applied methodology is very brief. The ERT encourages Hungary to improve the description, in the IIR, of the methodology including details of data sources, assumptions and methods used to make the estimates. The ERT also encourages Hungary to provide a description of the trends and reasons for the trends in the Industrial processes sector and to report a complete timeseries of emissions in the NFR version 2008.

71. **Improvement:** No sector-specific improvements have been described in Hungary's IIR. The ERT encourages Hungary to list planned and desired improvements in its IIR to help to provide transparency on future improvements and to support improvement prioritisation.

#### Sector specific recommendations

72. The description of the applied methodology is in general very brief. The lack of transparency in the report meant that the ERT was unable to fully assess the accuracy or appropriateness of the methods. The ERT encourages Hungary to improve the description of the methodology in the IIR, including details of data sources, assumptions and methods used to make the estimates. The Party is also encouraged to implement the recommended template for IIR (see: [www.ceip.at](http://www.ceip.at)) in order to facilitate the evaluation of the applied methodologies etc.

#### **2C Metal production**

73. The ERT encourages Hungary to include heavy metals in general under metal production (2C).

74. The ERT encourages Hungary to perform consistent allocation of emissions (CO, NMVOC, NO<sub>x</sub>, and SO<sub>2</sub>) to either iron and steel or other metal production.

## Solvents

### Review scope

Pollutants reviewed		NMVOC		
Years		1990–2006 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not reviewed	Recommendation provided
3.A.1	Decorative coating application	In 3A3		x
3.A.2	Industrial coating application	In 3A3		x
3.A.3	Other coating application (please specify the sources included/excluded in the notes column to the right)	In 3A3		x
3.B.1	Degreasing	3B1		x
3.B.2	Dry cleaning	3B2		
3.C	Chemical products, manufacture & processing	3C		x
3.D.1	Printing	3D		x
3.D.2	Domestic solvent use including fungicides	3D		x
3.D.3	Other product use	3D		x
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

### General recommendations on cross cutting issues

75. **Completeness:** The ERT considers the solvent sector to be incomplete. No emissions under NFR 3C and NFR 3D have been estimated. NMVOCs emissions are consequently underestimated. These activities are for example under 3C: polyester processing, polystyrene processing, rubber processing, and asphalt blowing. For 3D, they are: domestic uses of products, production of pharmaceutical products, uses of glues and adhesives, wood preservation. The ERT recommends that Hungary performs additional reviews to identify the most important gaps in its inventory and puts a plan in place to make estimates of these.

76. **QA/QC procedures:** According to the information provided, QA/QC procedures are not set up for the Solvent sector. The ERT encourages Hungary to implement sector specific QA/QC procedures for the next submission and to document these in its future IRs.

77. **Recalculations:** Hungary has not provided details of recalculations as methodologies have not been changed from year to year. The ERT encourages Hungary to update all years of the timeseries where methods or datasets have been improved or corrected to ensure a consistent timeseries.

78. **Uncertainty:** The ERT encourages Hungary to undertake quantitative uncertainty analysis for the solvent sector in order to help support the improvement process and to provide an indication of the reliability of the inventory data.

79. **Transparency:** Hungary is encouraged to improve the quality of the IIR report. The description of methodologies used for the solvent sectors could be improved by adding emission factors and information on activity data and data sources.

80. **Improvement:** No sector-specific improvements have been described in Hungary's IIR. The ERT encourages Hungary to list planned and desired improvements in its IIR to help to provide transparency on future improvements and to support improvement prioritisation.

### Sector specific recommendations

81. Improvements of emission estimation methodologies are necessary for NFR3A and NFR 3B. For 3C and 3D, the ERT notes the low emissions of all activities included under these NFR codes and encourages Hungary to reassess these methodologies. The ERT encourages Hungary to set up a plan for including activities such as printing, use of domestic solvents and production of pharmaceutical products in its inventory.

### **3.A. Paints and coatings – NMVOC**

82. The ERT encourages Hungary to improve the description of the methodology used to estimate NMVOC emissions from solvent uses in paint application in the IIR report by providing emission factors and activity levels.

83. All emissions from paint uses are reported under 3A3. Emissions are provided by an expert from the paint industry. The shares of the activity between 3A1, 3A2 and 3A3 are not yet estimated or provided in the tables or the IIR. The ERT encourages Hungary to set up a methodology enabling the allocation of the emissions to 3A1, 3A2 and 3A3 and to provide checks to ensure that all emissions are included.

84. 3A1: Hungary is encouraged to take into account the impact of the EU Directive of 21 April 2004 [2004/42/EC] related to the use of paints for building applications and car repairing which sets up a maximum solvent content for products in the EU Member states. In addition, the ERT encourages Hungary to report the evolution of the share of solvent-borne paints and water-borne paints across the time series in the IIR.

85. 3A2 and 3A3: Hungary is encouraged to improve the transparency of its methodology. The share of solvent-borne paint, water-borne paints and powder should be provided in the IIR. Hungary is encouraged to better consider the impact of EU Directive 1999/13/EC relating to the use of paints in some industrial activities.

### **3.B. Dry cleaning and degreasing – NMVOC**

86. 3B1: There is a lack of transparency in the description of the methodology used to estimate emissions. The ERT encourages Hungary to consolidate the presentation of details on the activity levels as well as the EF. In addition, the ERT encourages Hungary to report the assumptions or industry data on solvent recovery in the IIR.

87. The methodology developed for dry cleaning is not clearly described in the IIR. The ERT encourages Hungary to provide a description of the methodology used to estimate emissions from this sector in the next submission.

### **3.C. Chemical products, manufacture & processing – NMVOC**

88. Hungary does not estimate emissions from 3.C. Chemical Products, Manufacture & Processing. The ERT encourages Hungary to set up methodologies to provide emissions from activities under 3C for future submissions.

### **3.D. Other solvent uses (including products containing HMs and POPs) – NMVOC**

89. Hungary does not estimate emissions from 3.d. 3.D. Other solvent uses. The ERT encourages Hungary to set up methodologies to provide emissions from activities under 3D for future submissions.

## *Agriculture*

### Review Scope

Pollutants reviewed		NH <sub>3</sub>		
Years		1990–2006 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not reviewed	Recommendation provided
4.B	Manure Management	NH <sub>3</sub>		Yes
4.D1	Direct Soil Emissions	NH <sub>3</sub>		Yes
4.F	Field burning of agricultural wastes	NR	NR	Yes
5E	Other	NR	NR	No
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

*NR...not reported*

### General recommendations on cross cutting issues

90. The ERT suggests that the agricultural inventory of Hungary would be improved by greater transparency of the IIR report, the inclusion of emissions of PM from sectors 4B and 4D, by providing estimates of emissions from laying hens under 4B and by calculating emissions from sector 4F.

91. **Completeness:** The inventory is complete for NH<sub>3</sub> with respect to most of the important sources of emissions (4.B and 4. D1). However, laying hens are not included. Prior to 2007 only other poultry (4B 9d) were reported and this, presumably, included layers, broilers and all other types. In 2007 there is a separate entry for broilers (4B 9b), for which the total is less than the other poultry total cited in 2006. There are no entries for layers or other poultry in 2007, which suggests an omission. There are no estimates of any emissions under 4F and NO<sub>x</sub>, NMVOCs and PM are not reported for any source. While these latter emissions may not be key sources, their omission means the inventory is incomplete.

92. **QA/QC procedures:** The Party has some basic QA/QC checks but acknowledges the considerable uncertainty of their estimates for this sector. The ERT recommends that specific QA/QC checks be made for the Agriculture sector.

93. **Recalculations:** Hungary has not provided details of recalculations as the methodologies have not been changed from year to year. The ERT encourages Hungary to update all years of the timeseries if methods or datasets are improved or corrected to ensure a consistent timeseries.

94. **Uncertainty:** Qualitative uncertainty analysis has been undertaken for the agriculture sector which provides an indication of the reliability of the inventory data. Hungary considers its estimation of livestock numbers to be very uncertain. The ERT encourages Hungary to undertake quantitative uncertainty analysis according to the EMEP/EEA Guidebook

95. **Transparency:** The IIR is not transparent, neither EFs nor livestock numbers are cited, nor is any general information provided on aspects of animal husbandry, such as the amount of time in the year when livestock are housed indoors in relation to the time spent outdoors, the EFs used and the numbers of animal places for each livestock class which have significant impacts on annual emissions of NH<sub>3</sub>. The IIR is also unclear about what emission factors are used. The ERT encourages Hungary to describe clearly in its IIR the EFs that have been modified to take account of results obtained within the country and the revised EFs as cited, and to provide details of data sources and assumptions. Also, since the EMEP/CORINAIR guidebook is updated from time-to-time, the ERT encourages Hungary to cite the year and version of the Guidebook when default EFs are used.

96. **Improvement:** No sector-specific improvements have been described in Hungary's IIR. The ERT encourages Hungary to list planned and desired improvements in its IIR to help to provide transparency on future improvements and to support improvement prioritisation.

#### Sector specific recommendations

#### **4.B Manure management:- NH<sub>3</sub>**

97. The ERT notes that the methodology description for NH<sub>3</sub> emissions from 4B Manure Management was not presented transparently in Hungary's IIR. The methodologies appear to follow the EMEP/CORINAIR Guidebook, but the lack of transparency makes it difficult for the ERT to perform a review. The ERT encourages Hungary to undertake a revision of the description of the methodology for future submissions and to include activity data-specific EFs, the livestock numbers used and relevant husbandry practices.

98. The ERT also encourages Hungary to make efforts to include estimates of emissions of PM from 4B in its future submissions.

99. The ERT encourages Hungary to consider clarifying the reporting of NH<sub>3</sub> emissions from poultry under 4B 9 and reporting emissions from laying hens.

100. Hungary is encouraged by the ERT to provide information in its next IIR submission on relevant livestock husbandry for 4B Manure Management.

#### **4.D.1 Agricultural soils:- NH<sub>3</sub>**

101. The ERT encourages Hungary to clarify the reporting of NH<sub>3</sub> emissions from soils which appear to have been moved from 4D1 Direct Soil Emissions to 4G, Pesticides.

102. The ERT also encourages Hungary to make efforts to include estimates of emissions of PM from 4D.

#### **4.F Field burning of agricultural wastes**

103. The ERT also encourages Hungary to make efforts to include estimates of NH<sub>3</sub>, NO<sub>x</sub> and NMVOC emissions for 4F.

## Waste

### Review scope

Pollutants reviewed		SO <sub>2</sub> , NO <sub>x</sub> , NMVOC, NH <sub>3</sub> , HM, PM <sub>10</sub> & PM <sub>2.5</sub>		
Years		1990, 1995, 2000, 2002–2007		
NFR Code	CRF_NFR Name	Reviewed	Not reviewed	Recommendation provided
6.A	Solid waste disposal on land	x		*
6.B	Waste-water handling	x		*
6.C	Waste incineration	x		*
6.D	Other waste (e)		X	no

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

\* Hungary is encouraged to improve the description of methods, data sources and assumptions for all categories reported. The lack of transparency in the report meant that the ERT was unable to fully assess the accuracy or appropriateness of the methods.

### General recommendations on cross cutting issues

104. **Completeness:** The timeseries are incomplete for the years 2002–2007 for e.g. NMVOC, NO<sub>x</sub> and SO<sub>2</sub> and emissions are missing for some of the years 1990, 1995 or 2000. The ERT encourages the Party to complete the timeseries.

105. The ERT noted an inconsistency in the Hg emission from MSW incineration (fig 7.2.7.1) and the emissions reported for e.g. 2005 in the NFR (0.150 ton >> 0.933 ton). Hungary is encouraged to investigate and explain the difference in future IIRs.

106. **QA/QC procedures:** Hungary provides a short description of the QA/QC system but has not described any sector specific QA/QC. The ERT encourage the Party to implement sector specific QA/QC procedures.

107. **Recalculations:** The IIR does not give any information on recalculations since the last submission.

108. **Uncertainty:** The subject is treated qualitatively. The ERT encourages Hungary to undertake uncertainty analysis for the waste sector in order to facilitate the improvement process and to provide an indication of the reliability of the inventory data.

109. **Transparency:** The description of the applied methodology is unclear and missing for Solid waste disposal on land and Waste-water handling. The ERT encourages Hungary to improve the description of the methodology in the IIR. The transparency can also be improved by presenting the whole timeseries in the NFR version 2008, including the division of incineration into clinical waste, industrial waste and municipal waste.

110. **Improvement:** No sector-specific improvements have been described. The ERT encourages Hungary to provide details of planned and identified improvements in its IIR.

*Sector specific recommendations*

111. The description of the applied methodology is, in general, very brief. The lack of transparency in the report meant that the ERT was unable to fully assess the accuracy or appropriateness of the methods. The ERT encourages Hungary to improve the description, in the IIR, of the methodology, including details of data sources, assumptions and methods used to make the estimates. The Party is also encouraged to implement the recommended template for the IIR (see: [www.ceip.at](http://www.ceip.at)) in order to facilitate the evaluation of the applied methodologies etc.

**LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING  
THE REVIEW**

1. Hungary Stage 2 S&A report
2. Hungary Stage 1 report 2009
3. Hungary's IIR 2009 : IIR 2009 : Informative\_Report\_07\_2009.doc
4. 2009ReviewData-NoLinks-v9.xls
5. [Response to preliminary question raised prior to the review: \(MAR3.doc, Comments to Katarina \(2\).doc\)](#)