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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:**

SLOVAKIA

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INTRODUCTION

1. The mandate and overall objectives for the emission inventory review process under the LRTAP Convention is given by the UNECE document 'Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols' (1) – hereafter referred to as the 'Methods and Procedures' document.
2. This annual review has concentrated on SO₂, NO_x, NMVOC, NH₃, plus PM₁₀ & PM_{2.5} for the time series years 1990 – 2008 reflecting current priorities from the EMEP Steering Body and the Task Force on Emission Inventories and Projections (TFEIP). HMs and POPs have been reviewed to the extent possible.
3. This report covers the stage 3 centralised reviews of the UNECE LRTAP Convention and EU NEC Directive inventories of Slovakia coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 21 June 2010 to 25 June 2010 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 - Jean Pierre Chang (France), Energy - Laetitia Serveau (France), Energy / mobile - Emilia Hanley (Ireland), Industry - Kees Peek (Netherlands), Agriculture + Nature - Rocio Danica Condor (Italy), Waste - Sophie Hoehn (Switzerland). For resource constraint reasons in the ERT the Solvents estimates were not reviewed.
- 4.
5. Justin Goodwin 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

INVENTORY SUBMISSION

6. In the 2010 submission, the years 2000 to 2008 are reported within the NFR tables. However, for the years 1990 to 1999 only national totals are reported. Slovakia submitted an IIR report. Also, the report does not follow the recommended template (AnnexVI_IIR_300909.doc). IIR does not include all of the recommended material, making it difficult to find information. The methods, assumptions and data sources are not presented clearly.
7. Emissions and activity data (for the years 2000 to 2008) are reported using the NFR09 categories. And explanations of notation key, NE and IE are provided in the IIR but the NFR sheet "Additional info" on notation keys and other information is not complete.
8. According to descriptions in the IIR, transport emissions are based on fuel used (IIR p23) which does not correspond to the primary requirements from the reporting CLRTAP Guidelines (ECE/EB.AIR/97, point 15) i.e. the requirements for emissions based on fuel sold. Furthermore, the modification in these last Guidelines concerning the source coverage specifications are not yet implemented in the inventory. Indeed, according to the last Guidelines, emissions concerning civil aviation, domestic LTO and international LTO should be included in the national totals, whereas domestic and international cruises should be reported as memo items (this is not the case in Slovakia's inventory, especially the international LTO emissions are not reported). In its response to the ERT, Slovakia provided details on COPERT comparisons (and ratios) of fuel used / fuel sold used for verifications showing that the differences are quite small. The ERT recommends that Slovakia use the national fuel sold data to correct the traffic variables in COPERT and to balance results between calculated fuel used and fuel sold. The ERT also recommends that Slovakia document in the IIR that the road transport status is then "fuel sold" based as required, and provide a detailed description of this methodology. Concerning civil aviation, the ERT recommends that Slovakia complete the civil aviation emissions estimates (possibly with Eurocontrol or ETS data) and include these in its reporting with international LTO emissions.
9. ERT also notes that recalculations have not been applied consistently through the entire time series. Only the years 2000 to 2007 have been recalculated. .
10. The 2008 submission shows improvement with respect to the level of detail of the IIR for transport and projection data (emissions and activities) for all possible years and three different scenarios. However, the ERT identified a number of issues in need for further improvement in the transparency of the IIR.
11. The quality of the CLRTAP inventory submission 2010 needs to be further improved to provide missing sources, minimise the use of IE and elaborate, in the IIR, on descriptions of methods, assumptions and data sources.

KEY CATEGORIES

12. The key category analysis (KCA) provided by Slovakia is comparable with the one made by CEIP, it is performed consistently with the EMEP/EEA Guidebook. The KCA is made for the level analysis, but not for the key category trend analysis. During the review, Slovakia explained that key source category trend analysis is difficult to provide because of the currently inconsistent time series before 2000. Slovakia has indicated that this issue will be included in improvements planned for the next submissions.

QUALITY

Transparency

13. ERT recognises the effort of Slovakia in providing an inventory with data and emission factors in its IIR and the improvements already made to the level of detail of the emission factors and activity data in the IIR. However, the IIR still lacks enough detail for a fully transparent submission and does not include the specific chapters on key trends, QA/QC, uncertainty, or sufficiently detailed sectoral methodology chapters for all sectors. During the review Slovakia informed the ERT that more effort will be put into the IIR for the next submissions. The ERT encourages Slovakia to follow the IIR template and include more details in the description of the methods / assumptions and activity data for stationary energy, IP, (solvents were not reviewed) Agriculture, and Waste, a description of trends for the emissions provided, QA/QC, uncertainty, an improvement plan, and to provide the predefined Annexes 1-4 as recommended in the IIR template.

14. In the NFR tables many "NA" notation keys have been added by the Party. The ERT notes that in these cases the added "NA" cells should be NE, IE or NO. (For example 1A3ai(i) international aviation LTO for all pollutants should not be NA (since the 2009 Reporting Guidelines, it has been included in the national totals, and domestic cruise excluded). Similarly, some sub-sectors within the energy sector for HM are reported as "NA" when there should be "NE" (cf. sectoral review part). The ERT recommends that all the "NA" notation keys used should be reviewed for the next submission and the appropriate notation key used or that notation keys should be replaced by emission estimates where appropriate.

15. The ERT also notes that most emissions of the main pollutants NO_x, SO₂, NH₃, TSP, PM₁₀, PM_{2,5} and CO for 2.A.1, 2.A.2, 2.A.5, 2.B.1, 2.B.4, 2.C are included in the Energy sector 1A2 and represent the sum of "combustion" and "process" emissions. After consultation, Slovakia has informed the ERT that the splitting into technological and energy emission is complicated and that due to a current lack of capacity there are not enough resources to address this problem. The ERT encourages Slovakia to split the combustion and process emissions in the next submissions. During the review Slovakia indicated that it would try to include this item in an improvement plan for the next submissions.

16. The ERT notes that Slovakia only presents emissions for national totals for 1990 – 1999. This represents a lack of transparency as no sectoral breakdown is provided. The ERT recommends that Slovakia include a sectoral breakdown by NFR in future submissions for the full time series since 1990.

Completeness

17. Slovakia provided national inventories for the years 2000 to 2008 in its 2010 submission, for the different NFR09 categories and only national totals for the years 1990 – 1999. Slovakia does not provide any estimates for the years 1980-1989. In addition, estimates for all years are incomplete for Agriculture (non-NH₃ and NMVOC) and Waste (6A, 6B, 6Ca, 6Cb, 6Cc, 6Cd and 6Ce). During the review Slovakia explained that the official base year for CLRTAP of Slovakia was 1990 (except 1980 for the Sulphur Protocol) and that before 2000 it was very difficult to obtain data at an appropriate level of detail because the Slovak Statistical Office did not archive data in a suitable form for these previous years. The ERT recommends that Slovakia estimates emissions for the NEs, as well as tries to develop estimates of emissions for the years 1980 -1989 and provides a consistent breakdown of emissions by NFR for 1990 – 1999.

Consistency, including recalculations and time series

18. The ERT notes from the submitted data that Slovakia has undertaken recalculations for the years 2000 to 2007 for a number of sectors. However, explanations for recalculations provided in the IIR refer to other recalculations not apparent in the data comparison between the 2009 and 2010 submissions (e.g. 1990 for NMVOC from solid waste disposal) with the years 1990 to 1999 exactly the same in the two submissions, having had no recalculations applied. The ERT recommends that Slovakia applies recalculations consistently across the full time series and provides detailed explanations for recalculations. In cases where recalculations cannot be applied consistently across the full time series, a clear description should be provided of existing time series inconsistencies for estimates from 1990 up to the latest year, and how Slovakia intends to address these inconsistencies in the future.

19. The ERT commends Slovakia for providing projection data (emissions and activities) for all possible years and three different scenarios. The ERT note that there are some small differences between the "the most recent historical year (2007)" in the projection tables and the related 2007 emissions in the NFR "Annex IV-Table1" for NMVOC " (small difference: 68.293 Gg vs 68.315). Slovakia explained during the review that this was due to the fact that the inventory submission had been updated since the calculation of projections prepared for the NECD deadline (31 Dec.) and other obligations (preparation of the 5th National Communication on Climate Change)..

20. The ERT notes the difficulties with deadlines for the NECD and other emission projection activities as well as the resource requirements for making and updating projections and recommends that Slovakia include a clear description of any small difference occurring in its IIR. In the IIR "5.7 Important notes", it is explained that: "The total NMVOC emissions from forest ecosystems are included in sector 5E Other", but the NFR item 5E no longer exists in the NFR09 reporting table. During the review, Slovakia informed the ERT that this note was from older versions of the IIR and should be assigned to NO_x, CO and POPs emissions from forest fires, as there are no emissions of NMVOC from forest ecosystems. The ERT acknowledges Slovakia's intention to correct this for the next submission.

Comparability

21. The ERT notes that for the 2000-2008 time series, the allocation of source categories follows that of the EMEP/UNECE Reporting Guidelines within the NFR09 reporting format. However, for prior years only national totals are presented with no NFR breakdown. During the review Slovakia informed the ERT that when working on further recalculations they would investigate the feasibility of providing a full NFR breakdown for the years before 2000. ERT welcomes this commitment and encourages Slovakia to prioritise this in its improvement plan.

CLRTAP/NECD comparability

22. ERT notes that national totals from LRTAP and NECD for the submitted years (2000-2008) are fully consistent. But this means that international LTO aviation is missing also for the NECD total emissions (cf. also point 9).

Accuracy and uncertainties

23. The ERT commends Slovakia for using tier 2 or 3 methods for most of the important energy, transport and industrial processes sectors for the 2000 – 2008 estimates. However, the ERT notes that for the agriculture and waste sectors only tier 1 methods are used. ERT encourages Slovakia to estimate key sources at tier 2 or higher, where possible, for agriculture and waste.

24. Slovakia does not estimate uncertainty relating to its LRTAP/NECD inventories. During the review Slovakia explained that due to the lack of capacity, uncertainty analysis is not available at the moment but that this issue will be included in improvement plans for the next submissions. The ERT encourages Slovakia to start working with tier 1 uncertainty assessments for the main pollutants and PM for future submissions.

Verification and quality assurance/quality control approaches

25. Slovakia did not provide information on QA/QC in its IIR. During the review, Slovakia informed the ERT that the complete QA/QC plan and QMS were not available, and provided a list of internal and external designated experts responsible for the preparation of the emission inventory, indicating that some elements were implemented for 2010. The ERT recommends that Slovakia document these elements and the list of designated experts in future IIRs and complete its development of QA/QC following the Guidebook chapter on inventory management.

FOLLOW-UP TO PREVIOUS REVIEWS

26. The current stage 3 centralised review has used outputs from the stage 1 and stage 2 review processes. ERT invites Slovakia to also refer to these previous reviews when examining this review report, and also when updating its improvement plans and developing future submissions.

27. ERT thanks Slovakia for responding to the ERT during the centralised review for all sectors. The ERT noted that Slovakia's responsiveness during the review week was limited by other commitments and resource constraints on staff. The ERT

encourages Slovakia to prioritise the availability of its experts during the review week to answer questions for future reviews.

AREAS FOR IMPROVEMENTS IDENTIFIED BY SLOVAKIA

28. The IIR does not include an improvement plan. However, during the centralised review and exchanges with ERT, many improvements were identified by Slovakia for the next or further submissions. These include:

29. In general terms:

- (a) Improve the structure and transparency of and complete the IIR for the next submissions.
- (b) Consider the key category trend analysis in future.
- (c) Include an improvement plan in the next IIR based on improvements identified during this review and any other improvements identified from the uncertainty and key category analysis.

30. Improvements planned for the submission 2011:

- (a) the reviewing of notation keys using in the NFR categories based on EMEP/CORINAIR methodology and completing the "Additional info" table on explanations of notation keys and other issues.
- (b) the correction of units for natural gas in Table 2 of the IIR,
- (c) the splitting of emissions from ferroalloys production and aluminium production from the NFR category 2C1 into the NFR categories 2C2 and 2C3,
- (d) the reallocation of emissions from forest fire in memo items,
- (e) the completion of additional info in Annex IV.

31. Improvements planned for the mid-term period (2012-2013):

- (a) further recalculations to the base year in road transportation and aviation categories,
- (b) the disaggregation of emissions from waste incineration into energy and non-energy use,
- (c) the improvement of a QA/QC plan and verification process, uncertainty estimation.

32. Improvements planned for the long-term period (until 2016):

- (a) Improve the completeness of the NFR templates for the 1990-1999 according to the appropriate NFR sectors and categories. by development of a methodology for gap filling of NE categories.

33. The ERT welcomes Slovakia's willingness to improve the quality of the national emission inventory.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS-CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

34. The ERT identifies the following cross-cutting issues for improvement:
35. Implementing in the national inventory the last CLRTAP Reporting Guidelines (ECE/EB.AIR/97), especially point 15 requesting transport emissions to be based on fuel sold, and point 17 for aviation specifications etc.
36. Recalculation and resubmission of a full time series, as appropriate, at NFR category level.
37. Improving the use of the IIR template and provision of information for all the chapters in the IIR template.
38. Improving the transparency of the inventory by providing in the IIR: more detailed information in the description on the methods / assumptions and activity data, information on / explanation of key trends and related drivers.
39. Improving and reducing the use of notation keys in the NFR emission tables, and filling in the NFR sheet "Additional info" on notation keys and other issues.
40. Reviews and/or further investigations to identify sources which are not estimated and planning to estimate and report them in future.
41. Completing the key category analysis in level with the KCA for trends.
42. Starting to develop uncertainty assessments and using these results to prioritise improvements for key categories. A priority may be set for the main pollutants and PM.
43. Developing a national QA/QC plan and procedures for the national emissions inventories and describing them in the IIR in the future.
44. Presenting in the inventory report, an improvement plan for the prioritised tasks to be investigated or implemented for the next inventory submissions.
45. Recommended improvements relating to specific source categories are presented in the relevant sector sections of this report.

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , particulates, heavy metals and CO		
Years		1990 – 2008		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
1.A.1.a	public electricity and heat production	X		X
1.A.1.b	petroleum refining	X		X
1.A.1.c	Manufacture of solid fuels and other energy industries	X		X
1.A.2.a	iron and steel	X		X
1.A.2.b	non-ferrous metals	X		X
1.A.2.c	chemicals	X		X
1.A.2.d	pulp, paper and print	X		X
1.A.2.e	food processing, beverages and tobacco	X		X
1.A.2.f.i	Stationary Combustion in Manufacturing Industries and Construction: Other (Please specify in your IIR)	X		X
1.A.2.f.ii	Mobile Combustion in Manufacturing Industries and Construction: (Please specify in your IIR)		X	
1 A 3 e	Pipeline compressors?		X	
1.A.4.a.i	commercial / institutional: stationary	X		X
1.A.4.a.ii	commercial / institutional: mobile?		X	
1.A.4.b.i	residential plants	X		X
1.A.4.b.ii	household and gardening (mobile)		X	
1.A.4.c.i	Agriculture/forestry/fishing. stationary	X		X
1.A.4.c.ii	off-road vehicles and other machinery?		X	
1.A.4.c.iii	national fishing?		X	
1.A.5.a	other, stationary (including military)	X		X
1.A.5.b	other, mobile (including military, land-based and recreational boats)?		X	
1.B.1.a	coal mining and handling	X		
1.B.1.b	solid fuel transformation	X		
1.B.1.c	other fugitive emissions from solid fuels	X		
1 B 2 a i	Exploration, production, transport	X		
1 B 2 a iv	Refining / storage	X		
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			

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

General recommendations on cross-cutting issues.

Completeness:

46. The ERT notes that for the NFR codes 1A1b, 1A1c, 1A5a, 1A2c, 1A2d and 1A2e the notation key "NA" is used for heavy metals. The ERT recommends that Slovakia estimates the heavy metals emissions for these three NFR codes by using for example the EFs given in the EMEP Guidebook (method tier 1 or tier 2). Where emissions cannot be estimated the ERT recommends that Slovakia corrects "NA" and puts "NE" instead.

Transparency:

47. Slovakia's IIR describes methodologies by pollutant but not by NFR codes. Slovakia indicates that estimates are compiled at the most detailed level for all stationary energy sectors (bottom-up approach). Emission factors in the IIR are considered by the ERT to be transparent and well described (especially part 1.2.4 concerning PM10 and PM2,5) however the IIR provides a general methodology for some pollutants but the methodology is not described by NFR code for 1A1a, 1A1b, 1A2a, 1A2b, 1A2c, 1A2d, 1A2e, 1A2fi, 1A4ai, 1A4bi, 1A4ci and 1A5a. The ERT recommends that Slovakia describes in detail, in its IIR, the methodology used by NFR codes. To further improve the transparency, the ERT recommends that Slovakia provide the list of sub-sectors included in each NFR code and indicate in the IIR the number of plants included in the estimates for each sub-sector to help explain emissions trends, while at the same time including the detailed response to the ERT's questions in the IIR.

48. - The ERT recommends that Slovakia gives in the IIR the trends of EFs over some years in order to show the impact of the implementation of abatement technologies.

49. The ERT notes that a substantial part of the emission estimates are based on bottom-up data from reporting installations. The energy balance/statistics of Slovakia are used for comparison, with the bottom-up approach (summing fuel used in individual plants). The ERT recommends that Slovakia investigate this balance to ensure that all fuel consumption is included and that small combustion plants (not reporting emissions or energy use) are included in the inventory. The ERT recommends that Slovakia provides a fuller explanation of these comparisons between bottom-up and national statistics in the IIR.

50. The ERT commends Slovakia for its clear presentation of the sources reported as "NE" and "IE". For the sources reported as "IE", and for each NFR code, the other NFR code where the relevant NFR code is included is clearly defined. The ERT encourages Slovakia to add to these lists the reason for reporting "IE" as well as to provide specific descriptions for NEs as identified in the IIR – table 11. The ERT notes that in some cases Slovakia use NA. The ERT recommends that all the "NA" notation keys used should be reviewed for the next submission and the appropriate notation key used, or that notation keys should be replaced with emission estimates where appropriate.

Accuracy:

51. The ERT notes the good quality of the estimates (for 2000 – 2008) for some categories using tier 2 or 3 methods, including the use of data on emissions (for the pollutants SO₂, CO, NO_x and TSP) and fuel consumption reported by over 11,000 plants with “bottom-up” (tier 3) estimates of emissions for all NFR codes in the stationary energy sector. The IIR also includes detailed information on EFs used for NMVOCs, HMs, POPs and the sources/references for these EFs.

52. The ERT encourages Slovakia to undertake uncertainty analysis for the Energy Sector in order to help inform the improvement process and to provide an indication of the reliability of the inventory data.

53. The ERT notes that Slovakia has implemented some QA/QC procedures. However, these procedures and the QA/QC plan are not explained in the IIR. The ERT recommends that Slovakia elaborates on the description of its QA/QC building on the general procedures described in Slovakia’s answers to the ERT during the review in the IIR and develops a full QA/QC programme to support future submissions.

Consistency:

54. The IIR does not provide a clear explanation of the consistency across the time series for each energy NFR code. In response to the draft review report Slovakia provided additional explanations for the time series and trends. The ERT recommends that Slovakia provide this explanation in its future IIR and describes how the consistency across the time series (1990-2008) is maintained and how the NEIS (used for the years 2000-2008) and the EAPSI (used for the years 1990-1999) are reconciled to provide a consistent 1990 – 2008 time series. In addition, the ERT recommends that Slovakia tries to calculate emissions by NFR codes for the years 1990-1999.

Comparability:

55. The ERT commends the Slovakia for following the recommendations of the Guidebook for the energy chapter and for providing completed NFR tables with minimal use of notation keys.

Recalculations:

56. The ERT notes that the reasons for some recalculations for the energy sector for the years 2000 to 2007 are presented in the IIR (part 5). However, the ERT encourages Slovakia to present recalculation by NFR codes.

Improvement:

57. The ERT notes that planned improvements are not described in the IIR. The ERT encourages Slovakia to include in the IIR the list of planned improvements and to implement these in the next submission.

Sub-Sector Specific Recommendations

Category issue 1: 1.A.1.a MSW – All pollutants

58. The ERT recommends that Slovakia includes MSW with energy recovery in the NFR code 1A1a instead of the NFR code 6C, as it is the case for this submission. The ERT recommends that Slovakia explains in the next IIR that MSW with energy recovery is included in the NFR code 1A1a and gives the methodology used for this sub-sector for each pollutant.

Category issue 2: 1.A.4a and 1.A.4.b I Residential and commercial - NMVOCs

59. In the table 2, for the NMVOC EFs for natural gas, the unit indicated is not ths.m3 but kg/th.s.m3. The ERT recommends that Slovakia corrects this mistake in the IIR.

TRANSPORT

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM ₁₀ & PM _{2.5}		
Years		1990 – 2008 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
1 A 2 f ii	Other: Off-road construction vehicles and machinery		NA	x
1 A 3 a i (i)	International Civil Aviation - LTO		NA	x
1 A 3 a ii (i)	Domestic Civil Aviation - LTO	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		NA	x
1 A 3 b vi	Road Transport: Automobile tyre and brake wear		NA	x
1 A 3 b vii	Road Transport: Automobile road abrasion	x		x
1 A 3 c	Railways	x		
1 A 3 d i (i)	International maritime navigation		NO	
1 A 3 d i (ii)	International Inland Waterways		NA	
1 A 3 d ii	National Navigation (Shipping)	x		x
1 A 3 e	Pipeline Compressors	x		x
1 A 4 a i & ii	Commercial / institutional: Stationary & Mobile	x	1 A 4 a ii*	x
1 A 4 b i & ii	Residential: Household and gardening (stationary & mobile)	x	1 A 4 b ii*	x
1 A 4 c i & ii	Agriculture/Forestry/Fishing: (Stationary & Off-road vehicles and other machinery)	x	1 A 4 c ii**	x
1 A 4 c iii	Agriculture/Forestry/Fishing: National fishing		NO	
1 A 5 a & b	Other, Stationary & Mobile (including military, land-based and recreational boats)	x	1 A 5 b**	x

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

* Sector reported as NA

** Sector reported as IE

General recommendations on cross-cutting issues

60. The ERT recognises the level of effort undertaken by Slovakia in providing a simply structured but generally transparent inventory for the Transport sector. Slovakia has undertaken major recalculations with a new model (COPERT IV) for all road transport emissions for the years 2000 – 2008. The ERT commends this and encourages the Party to complete the inventory recalculations for all the Protocol years prior to 2000. All questions issued by the ERT were clarified by the Party at a high level of detail. The ERT acknowledges this and encourages Slovakia to complete the inventory by including more detailed descriptions of the key category analysis as well as textual analyses of all trends in the 1990 – 2008 time series for all transport sectors.

Completeness:

61. The ERT considers the Transport sector and the other sectors including mobile sources to be of acceptable completeness, although there are some sectors and certain pollutants within sectors reported as “Not Applicable” (NA) and “Not Estimated” (NE). These have been identified by the ERT (see sub-sector specific recommendations below). The ERT encourages the Party to include its responses to the ERT questions, clarifying the circumstances and reasons for not making the estimates in future IIRs where estimates cannot be made.

Transparency:

62. Slovakia provided a generally transparent emissions inventory for the Transport sector. Estimates were provided in the NFR tables at a good level of detail for all reported sectors including mobile sources (with limited use of IEs). However, the description of methods lacks detailed text describing the methods, assumptions and data sources to support the tables of emission factors and activity data.

63. In addition, The ERT recommends including some details on emissions in all future IIRs (complete with full 1990 – 2008 time series estimates per pollutant and per sector, trend graphs and textual analysis of the activity data throughout the reported period) to improve transparency.

64. The ERT notes a very good textual description of the background for preparing the inventory (national circumstances, process of preparing the inventory, EF application). Clear information was presented in tables regarding the assessment of completeness (for sources reported as NE and IE) and key category analysis. However, the ERT noted that no textual description was included in the IIR to compliment the tables of data. The ERT recommends including further descriptions of completeness (for sources reported as NE and IE) and key category analysis in future IIRs.

65. The ERT noted the use of NA for a number of categories including 1A3ai(i) international aviation LTO which should not be NA (since the 2009 Reporting Guidelines, this has been included in the national totals and domestic cruise excluded). During the review Slovakia explained that sufficient data were not available for emission estimation in international LTO in Slovakia at the time but that preparations were in place in view of the new legislation for the ETS Aviation directive. The ERT recommends that in these cases, and all other cases of NA being used, Slovakia replace NA with the appropriate notation key.

Uncertainty:

66. No quantitative uncertainty assessment for any of the pollutants of Slovakia’s emission inventory has been provided. The ERT encourages the Party to undertake uncertainty analysis for the Transport Sector and other sectors including mobile sources in order to help support the improvement process and to provide an indication of the reliability of the inventory data.

QA/QC Procedures:

67. Slovakia has not implemented any formal QA/QC procedure. The ERT encourages the Party to implement sector-specific QA/QC procedures for the Transport Sector and other sectors including mobile sources.

Recalculations:

68. Since last year's inventory, Slovakia has reported major recalculations applied to road transport sector for all years between 2000 and 2008. Recalculations for road transport emissions prior to 2000 have been reported as negligible and obtaining consistent time series of activity data from 1990 is very complicated as the Statistical Office of Slovakia (or any other statistics institution) does not have enough detailed data on the years before 2000. The ERT encourages Slovakia to investigate methods of improving the time series consistency for this sector.

Consistency:

69. The ERT noted a number of time series variations that were not explained in Slovakia's IIR. These detailed questions were presented to Slovakia during the review and included a number of categories:

- (a) In sector 1.A.3.b ii (Road transport: Light duty vehicles) - a sudden increase of the sector's NO_x emissions in the single year 2003 (as compared to the year 2002).
- (b) In sector 1.A.3.b iii (Road transport: Heavy duty vehicles) – a few fluctuations in reported activity data for NO_x emissions between the years 2000 and 2008.
- (c) In sector 1.A.3.b iii (Road transport: Heavy duty vehicles) – a sudden decrease of the sector's NMVOC emissions in the single year 2003 (as compared to the year 2002).
- (d) In sector 1.A.3.b i (Road transport: Passenger cars) - a sudden decrease of the sector's SO_x emissions since 2003.
- (e) In sector 1.A.4.b i (Small combustion: Residential: Stationary plants) - substantial decrease (by almost 50%) in SO_x emissions between the years 2001 and 2002.
- (f) In sectors 1.A.3.b i – 1.A.3.b iv (Road transport: all types of vehicles) – many fluctuations in reported activity data for CO emissions in reported time series.

70. The ERT commends Slovakia for its response to the above questions on time series consistency (reference document containing answers formulated by experts) and encourages Slovakia to include this information within future IIRs. Furthermore, the ERT recommends that Slovakia improve the consistency of trends for the above mentioned sub-categories in its next submissions.

Sub-sector Specific Recommendations

Category issue 1: 1.A.3.e: Industrial Combustion - Pipeline Compressors , 1.A.4.a i: Small Combustion - Commercial / Institutional - Stationary, 1.A.4.b i: Small combustion – Residential - Stationary plants - 1.A.4.c i - Small Combustion – Agriculture / Forestry / Fishing - Stationary - NH₃ reported as NE

71. No estimates of NH₃ emissions were reported for the sectors: 1.A.3.e (Industrial Combustion: Pipeline Compressors), 1.A.4.a i (Small combustion: Commercial/Institutional: Stationary), 1.A.4.b i (Small combustion: Residential: Stationary plants) and 1.A.4.c i (Small combustion: Agriculture/Forestry/Fishing: Stationary). In a response to the ERT question, the Party explained that the NH₃ emissions in category 1.A.4.b i were not estimated due to a lack of available methodology and that NH₃ emissions in category 1.A.4.a i and 1.A.4.c i were included in category 4.B (Agriculture: Livestock: Animal husbandry). The ERT encourages the Party to continue the efforts to estimate these emissions and to report those that have been estimated in the correct NFR category. Where it is not possible to report emissions in the correct NFR category the ERT recommends that Slovakia use the appropriate notation key IE (Included Elsewhere) instead of the notation key currently used – NE (Not Estimated) for categories 1.A.4.a i and 1.A.4.c i in the NFR tables and document the allocation in its IIR.

Category issue 2: 1.A.2.f ii: Off-road mobile - Mobile Combustion in Manufacturing Industries and Construction, 1.A.3.a i (i): International Aviation (LTO), 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, 1.A.4.a ii: Off-road mobile - Commercial / Institutional - Mobile, 1.A.4.b ii: Off-road mobile – Residential - Household and gardening (mobile) - Main pollutants reported as NA

72. Main pollutant emission estimates were reported as NA (Not Applicable) for the following sectors: 1.A.2.f ii (Off-road mobile: Mobile Combustion in Manufacturing Industries and Construction), 1.A.3.a i(i) (International Aviation (LTO)), 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), 1.A.4.a ii (Off-road mobile: Commercial / Institutional: Mobile), 1.A.4.b ii (Off-road mobile: Residential: Household and gardening (mobile)). Slovakia explained that no activity data were available for the listed categories, but that, however, it would try to obtain missing estimates for categories 1.A.3.a i(i) and 1.A.3.b v – 1.A.3.b vii from other available statistics resources.

73. The ERT encourages the Party to investigate further statistical resources for missing categories estimates and to use the appropriate notation key (Not Estimated) rather than Not Applicable (NA) where estimates cannot be made.

Category issue 3: 1.A.4.c ii: Off-road Mobile – Agriculture / Forestry / Fishing - Off-road vehicles and other machinery, 1.A.5.b: Off-road Mobile - Other, Mobile (including military, land-based and recreational boats) - All pollutants reported as IE

74. For the sub-sectors: 1.A.4.c ii (Off-road Mobile: Agriculture/Forestry/Fishing: Off-road vehicles and other machinery) and 1.A.5.b (Off-road Mobile: Other, Mobile

(including military, land-based and recreational boats)), emission estimates for all the main pollutants were reported as IE in Slovakia's NFR tables. The ERT recommends that Slovakia investigate splitting the data into relevant sub-categories and make estimates separately for each sub-sector.

Category issue 4: 1.A.3.b vi: Road transport - Automobile tyre and brake wear - Particulate Matter reported as IE

75. For the sub-sector 1.A.3.b vi (Road transport: Automobile tyre and brake wear), emission estimates for PM10, PM2.5 and TSP were reported as IE in the NFR tables.

76. The ERT notes the transparency provided by the Party presenting a table of sources reported as IE and indicating the location of all sectors where the categories reported as IE were included. However, the ERT encourages Slovakia to make separate emission estimates for these sectors in future IIR reports and to present clearly the methods, data sources and assumptions used in estimating emissions.

Category issue 5: 1.A.3.d ii: National navigation - Shipping

77. The ERT noted an enormous rise in emissions of CO in a single year in 2007 (by around 10 times more compared to the previous year and average time series for the reported period). The ERT was informed by the Party that the emissions estimated in 2007 (5,411 t) were incorrectly reported (the correct value being 0,541 t) and that this error would be removed in the next submission.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		NO _x , SO ₂ , NMVOC, NH ₃ , CO, TSP, PM ₁₀ & PM _{2.5} , Pb, Cd, Hg, DIOX, PAH, HCB, PCBs		
Years		1990 – 2008 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
2.A.1	cement production	X		X
2.A.2	lime production	X		X
2.A.3	limestone and dolomite use		X	
2.A.4	soda ash production and use		X	
2.A.5	asphalt roofing	X		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		X	
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		X
2.B.2	nitric acid production	X		
2.B.3	adipic acid production		x	
2.B.4	carbide production	X		X
2.B.5.a	Other chemical industry (Please specify the sources included/excluded in the notes column to the right)	x		X
2.B.5.b	Storage, handling and transport of chemical products (Please specify the sources included/excluded in the notes column to the right)	X		
2.C.1	iron and steel production	x		X
2.C.2	ferroalloys production	X		X
2.C.3	aluminium production	X		X
2.C.5.a	Copper Production	X		X
2.C.5.b	Lead Production	X		X
2.C.5.c	Nickel Production	X		X
2.C.5.d	Zinc Production	X		X
2.C.5.e	Other metal production (Please specify the sources included/excluded in the notes column to the right)	X		X
2.C.5.f	Storage, handling and transport of metal products (Please specify the sources included/excluded in the notes column to the right)	X		X
2.D.1	pulp and paper	X		
2.D.2	food and drink	X		
2.D.3	Wood processing	X		
2.E	production of POPs		X	
2.F	consumption of HM and POPs (e.g.		X	

	electrical and scientific equipment)			
2.G	Other production, consumption, storage, transportation or handling of bulk products (Please specify the sources included/excluded in the notes column to the right)	X		

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

General recommendations on cross-cutting issues

Completeness:

78. Although there are some sources and a number of pollutants within (key) sources are reported as “NA”, “IE” or “NE”, the ERT considers the Industrial processes sector to be generally complete. The notation key “NE” is used if no methodology or emission factors are available. The ERT encourages Slovakia to use the notation key “NE” instead of “NA” where estimates cannot be made and “NO” where sources not occur. Additional details and specific recommendations are given in the sector section.

Transparency:

79. The ERT notes that for the Industrial processes sector Slovakia has provided detailed information for key source analysis, emission factors and notation keys but insufficient information on activity data, methodologies, explanations of major changes in emission trends, QA/QC, uncertainties and improvements in the IIR. The ERT also noted that for NO_x, SO₂, NH₃, TSP, PM₁₀, PM_{2,5} and CO for 2.A.1, 2.A.2, 2.A.5, 2.B.1, 2.B.4, 2.C, Pb, Cd, Hg and DIOX for 2.C.5.a and DIOX, PAH, HCB and PCB for 2.C.5 e are included in the Energy sector 1A2 and represent the sum of “combustion” and “process” emissions. After consultation Slovakia informed the ERT that the splitting into technological and energy emission is complicated and depends on the pollutant and that due to a current lack of capacity there are no resources to address this problem. The ERT encourages Slovakia to split the combustion and process emissions in the next submissions. During the review Slovakia indicated that it would try to include this item into an improvement plan for the next submissions.

80. The ERT notes that there are no sectoral chapters included in Slovakia’s IIR, resulting in the information being fragmented and difficult to review. The ERT considered the level of detail for the Industrial Processes sector in Slovakia’s IIR to be insufficient. The ERT recommends that Slovakia includes an Industrial Processes chapter with a description of information on activity data, methodologies, explanations of major changes in the emission trends, QA/QC, uncertainties and improvements in the next IIR.

Accuracy:

81. The ERT notes that Slovakia has used country-specific Emission Factors and activity data from facility operators and compliments the Party on this approach. Detailed information can be found in the sector section.

82. The ERT notes that Slovakia does not provide information on sector-specific QA/QC in its IIR. The ERT encourages Slovakia to include sector-specific QA/QC checks in the next submission and to document these in its IIR.

83. After consultation Slovakia informed the ERT that it had not undertaken quantitative uncertainty analysis for the IP sector. The ERT encourages Slovakia to undertake uncertainty analysis, to document it in the industrial processes chapter of the IIR and to use it to help support the improvement process and to provide an indication of the reliability of the inventory data.

Comparability:

84. The IIR notes that for the estimation of the emissions from the Industrial processes sector, Slovakia has followed the recommendations from the EMEP/EEA Emission Inventory Guidebook and reported data in the NFR for the years 2000 - 2008. The ERT notes that Slovakia has not provided a NFR level category breakdown of emissions for 1990 -1999 and encourages it to address this issue in the future.

Recalculations:

85. Compared to other sectors, the ERT notices that the Slovak Republic has not performed recalculations for the Industrial Processes sector. There are no differences between the 2010 and 2009 submissions.

Improvement:

86. The ERT has found that there are no planned improvements specified in the IIR. The ERT encourages the Slovak Republic to list desired improvements (e.g. uncertainty analysis) in its IIR.

87.

Sector-specific Recommendations

Category issue 1: 2.B.5 a Other chemical industry

88. The Hg emissions from "other chemical industry" increased from 30 tonnes in 2000 to 369 tonnes in 2001, while the NMVOC and total PAH emissions remained almost constant. The ERT encourages Slovakia to explain such changes in emissions in next submissions.

Category issue 2: 2.C.1 Steel production

89. The ERT noted that for the calculations of DIOX and PAH emissions from the key source Steel production (2.C.1) Slovakia used country-specific Emission Factors from a national study. After consultation Slovakia provided the ERT with a copy of the study "Methodical inventory of persistent organic pollutants (K. Magulova, November 2003)". The ERT compliments Slovakia on this approach and encourages it to include details of this in its IIR.

Category issue 3: 2.C.2 and 2.C.3: Ferroalloys production, Aluminium production

90. The ERT notes that the heavy metals, DIOX and PCB emissions from these sources are included in 2.C.1. The ERT encourages Slovakia to include these emissions in 2.C.2 and 2.C.3 in its next submissions.

SOLVENTS (NO CHAPTER).

AGRICULTURE

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM ₁₀ & PM _{2.5}		
Years		1990 – 2006 + (Protocol Years)		
NFRCode	CRF_NFRName	Reviewed	Not Reviewed	Recommendation Provided
4 B 1 a	Cattle dairy	a	-	Yes
4 B 1 b	Cattle non-dairy	a	-	Yes
4 B 2	Buffalo	a	-	Yes
4 B 3	Sheep	a	-	Yes
4 B 4	Goats	a	-	Yes
4 B 6	Horses	a	-	Yes
4 B 7	Mules and asses	a	-	Yes
4 B 8	Swine	a	-	Yes
4 B 9 a	Laying hens	a	-	Yes
4 B 9 b	Broilers	a	-	Yes
4 B 9 c	Turkeys	a	-	Yes
4 B 9 d	Other poultry	a	-	Yes
4 B 13	4 B 13 Other	a	-	Yes
4 D 1 a	Synthetic N fertilizers	a	b	Yes
4 D 2 a	Farm-level agricultural operations including storage, handling and transport of agricultural products	a	-	No
4 D 2 a	Off-farm storage, handling and transport of bulk agricultural products	a	-	No
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)	a	-	Yes
4 F	Field burning of agricultural wastes	a	-	No
4 G	Agriculture other(c)	a	-	Yes
11 A	(11 08 Volcanoes)	a	-	No
11 B	Forest fires	a	-	No
11C	Other natural emissions	a	-	No

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

(a) reviewed main pollutants, PM₁₀ and PM_{2.5}

(b) not reviewed POPs, dioxins, furans, HM

General recommendations on cross-cutting issues

91. The CLRTAP submission included emissions from 1990, 1995, 2000 to 2008. The emission inventory estimates only NH₃ emissions from 4B, 4D and 4G. In the IIR Slovakia provides general information on pollutants and there is no specific chapter for the agriculture sector with no information on the methodologies which have been used for estimations. Information was provided in Slovak during the review process; therefore, there was no possibility to verify methodologies. Natural sources are reported as "NA". The ERT recommends that Slovakia prepare a chapter for the agriculture sector where information on the activity data used for emission estimations (number of animals, fertiliser use), emission drivers, recalculations and improvements is given. The ERT encourages Slovakia to estimate key sources at tier

2 or a higher level where possible. Before and during the review process no feedback was received from Slovakia for the clarification questions. Clarifications were received during the first week of July.

Completeness:

92. The agriculture inventory is not complete. Slovakia's NFR submission includes only NH₃ emissions estimated for 4B, 4D and 4G and NMVOC emissions for 4G for 1990, 1995, 2000 to 2008. In its response to the ERT Slovakia has explained that emissions of NH₃ were available for all time series 1990 to 2008 with data from 1990 to 1999 as national only and emissions from the year 2000 to 2008 in the NFR categories. The ERT recommends that Slovakia provide this complete time series of agricultural emissions in future NFR submissions, as well as full NFR tables for the years 1990 – 1999 and that it estimate missing pollutants following the EMEP/EEA 2009 Guidebook.

Transparency:

93. In the IIR Slovakia provides general information on pollutants and does not make proper use of notation keys (NA). Slovakia has sent a report in Slovak which refers to the estimations of agricultural emissions. The ERT recommends that the Party use the notation keys properly, replacing NA in the NFR template with NE. The ERT also encourages the Party to provide a specific chapter on agriculture with information on EFs, methodologies, emission drivers, and explanations of notation keys, recalculations and improvements.

Accuracy:

94. In the IIR, no information is provided on methodologies and emission factors. During the review, Slovakia provided the ERT with a methodological report for NH₃ emission estimations in Slovak. In the next IIR submission, Slovakia will translate and include into the Agriculture chapter information on the tier 2 approach. The ERT commends Slovakia for this effort and looks forward to seeing full details of methods, data sources and assumptions in future NIRs and undertaking a fuller review of the tier 2 methods. No uncertainty analysis or QA/QC checks are described in the IIR. The ERT encourages the Party to undertake uncertainty analysis and to implement QA/QC checks to help guard against errors, inform the improvement process and provide an indication of the reliability of the inventory data.

Comparability:

95. Slovakia has reported its emissions inventory in accordance with the reporting requirements and submitted in the requested NFR format for 2000 – 2008 using the NFR codes, the Emission Inventory Guidebook and reported data in NFR for the years 2000 - 2008. The ERT notes that Slovakia has not provided a NFR level category breakdown of emissions for 1990 -1999 and encourages it to address this issue in the future.

Recalculations:

96. In the IIR recalculations of NH₃ emissions are reported for the 4D1a synthetic N fertilisers following revision of activity data. The ERT encourages the Party to adequately describe and justify future recalculations in the IIR in future.

Improvement:

97. No specific improvements were reported in the IIR. In its response to the ERT during the review, Slovakia indicated that it was not planning any improvements for the agriculture sector other than revising the use of notation keys.

Sector-specific recommendations

98. No information on methodologies or EFs for the agriculture sector is provided in the IIR. The ERT encourages the Party to provide complete and consistent time series of agricultural emissions following the recommendations provided in the EMEP/EEA Guidebook. Key sources were identified for NH₃ emissions (4B1a, 4B1b, 4D1a, 4B9a, 4B8).

Category issue 1: 4.B Manure management

99. Slovakia estimated only NH₃ emissions. In response to the review, Slovakia provided a description of methodology² and indicated that a partial tier 2 approach was used to estimate NH₃ emissions from 4B.. No estimations are provided for NO, NMVOC, PM₁₀ and PM_{2.5} emissions. The Party also explained that PM was not estimated due to a lack of appropriate methodology. The ERT encourages Slovakia to provide a complete and consistent time series for all pollutants suggested in the EMEP/EEA Guidebook to document the methods, data sources and assumptions in a specific chapter for agriculture in the IIR and to use the appropriate notation key for 4B.

Category issue 2: 4.D Agricultural Soils

100. Slovakia estimates emissions for NH₃. No estimations are provided for NO, NMVOC, PM₁₀ and PM_{2.5} emissions. No pollutants are reported for the 4 D 2 c N excretion on pasture range and paddock source. In response to the ERT, Slovakia explained that the EFs for fertiliser use were applied according to the default methodology available for Central Europe Group III (moderate climatic zone of Central Europe). The ERT recommends using the EMEP/EEA guidebook to estimate missing emissions, using an appropriate notation key for 4D and describing the methods, data sources and assumptions fully in a specific chapter on agriculture in the IIR.

Category issue 3: 4.G Agriculture other

101. The Party has estimated NMVOC and NH₃ emissions from the 4G source (pesticides and limestone use). The ERT recommends that Slovakia describe the

² EFs were estimated according to the productive parameters of domestic livestock categories, and the nitrogen inputs were harmonised both for NH₃ and N₂O inventory calculations. Slovakia provides the information that activity data is harmonised with the activity data used for the GHG inventory and that the main sources are: Green Report (published annually), Statistical Office of the Slovak Republic and the Annual Census of domestic livestock on December 31st (since 2007).

methods, data sources and assumptions fully in a specific chapter on agriculture in the IIR.

Category issue 5: 11 Natural sources

102. Slovakia uses the NA notation key for natural sources. Slovakia has explained that emissions from NO_x are estimated only from forest fire in category 7A. The ERT encourages the Party to consider reporting forest fire emissions in the 11B category.

WASTE

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM ₁₀ & PM _{2.5} , TSP, DIOX, PAH, Hg, Pb, CO		
Years		1990 – 2008 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
6.A	solid waste disposal on land	x		Yes
6.B	waste-water handling	x		Yes
6 C a	6 C a Clinical waste incineration (d)	x		Yes
6 C b	Industrial waste incineration (d)	x		Yes
6 C c	Municipal waste incineration (d)	x		Yes
6 C d	Cremation	x		Yes
6 C e	Small scale waste burning	x		Yes
6.D	other waste (e)	x		Yes
7	Other	x		Yes

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

General recommendations on cross-cutting issues

Completeness:

103. The inventory for Waste is not complete. However, improvements were identified by Slovakia during the review process. The ERT also encourages Slovakia to improve the completeness of the inventory by estimating emissions for the missing sources of 6A, 6B, 6Ca, 6Cb, 6Cc, 6Cd and 6Ce.

Transparency:

104. Slovakia IIR provides some information about the emission sources for Waste. However, descriptions of the methodologies, data sources and assumptions are missing. The ERT encourages Slovakia to continue developing chapter 6 with elaborated explanations about activity data and methodologies, as well as AD tables and to mention clearly processes included or not included in each category and sub-category of the chapter. The ERT also encourages Slovakia to improve explanations for "IE" in the subchapters.

Accuracy:

105. Slovakia has provided tier 2 & 3 methods for the estimated waste categories.

Comparability:

106. The emission estimates presented by Slovakia are comparable to other Parties in terms of detail and use of categories.

Recalculations:

107. All recalculations and improvements made in the 2010 submission are explained for each pollutant but not clearly presented for each sector in the IIR. The ERT encourages Slovakia to include more detail on the recalculations, their impacts on emissions and justifications in future IIRs.

Improvement:

108. No specific improvements were reported in the IIR for waste. However, Slovakia has indicated a number of improvements planned following questions from the ERT (i.e further studies for waste water, investigation of EFs for composting). The ERT encourages Slovakia to implement these improvements and to provide additional information on activity data, explanations for emission methodologies and drivers and to include documentation of the planned and expected improvements in the IIR.

*Sector-specific recommendations***Category issue 1: 6.A Solid waste disposal on land - NH₃**

109. Only NMVOC emissions are reported in category 6A. The ERT recommends that Slovakia estimate NH₃ emissions following information of the EMEP/EEA Guidebook 2009. In addition, SO_x and NO_x from flaring or from open burning at landfill sites are not reported and no information is provided in the IIR. As those emissions do occur, the ERT recommends that Slovakia estimate them for the purpose of the report's completeness. The ERT also recommends that Slovakia use the appropriate notation key (NE instead of NA) where emissions occur but are not estimated.

Category issue 2: 6.B Wastewater handling - All pollutants

110. No emissions are reported in category 6B (the notation key NA is used). Following questions from the ERT, Slovakia mentioned the presence of waste water handling in the country but due to a lack of methodology and emissions estimation further studies are needed before estimates of emissions can be provided.

111. The ERT encourages Slovakia to undertake these further studies and to document these in the IIR. The ERT also encourages Slovakia to provide activity data and emissions for this sector in the IIR to improve transparency. The ERT also recommends that Slovakia use the appropriate notation key (NE instead of NA) where emissions occur but are not estimated.

Category issue 3: 6.C.a, b, c, d Waste incineration - All pollutants

112. Only NMVOC emissions are reported under 6Ca. NO_x, SO_x, NH₃, TSP, PM₁₀, PM_{2.5}, TSP, CO and PAH are reported under category 1A5a. Emissions of the waste sector can only be allocated to Chapter 1 if energy recovery systems are in place. However, the current allocation to category 1A5 which covers military emissions is likely to be incorrect. The ERT encourages Slovakia to check the presence of energy recovery systems, allocate the emissions to the appropriate category, and provide a relevant explanation in the IIR. In addition, the ERT notes that PAH emissions are

currently allocated to Chapter 7 and encourages Slovakia to allocate these to Chapter 6.

Category issue 4: 6.C.e Small-scale waste burning - All

113. This sub-category is not complete, no emission were reported from Slovakia. It is not clear, following the explanation under point 5.7 in the IIR of Slovakia, if emissions are reported under chapter 7 or not reported at all. The ERT encourages Slovakia to clarify this point and, if necessary, to improve the NFR Tables and the IIR with estimations of these emissions.

Category issue 5: 6.D Other Waste(s) - All pollutants

114. No emissions are reported in category 6D (NA) and no explanations have been found in the IIR. The ERT encourages Slovakia to provide emission calculations and methodology in the IIR and to use the "NE" notation key for reporting emissions that are not estimates and "NO" for emissions that are not occurring.

Category issue 6: 7: Other (new sector from Guidebook 2009) - All pollutants

115. The ERT encourages Slovakia to improve the methodological explanation for emissions reported in Chapter 7. Chapter 7 may be used to report emissions such as for example NH₃ emissions from Cats and Dogs, from Zoo animals, and human ammonia emissions etc. In addition, although the Guidebook has methods for "Car and house fires", it may be more transparent to include these in Chapter 7 as Chapter 6D is more focused on compost and sludge. The ERT encourages Slovakia to consider including some of these emissions in the next submissions.

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

Waste

1. Response to preliminary question raised prior to the review: SVK_Waste.doc
2. Slovakia Stage 2 S&A report
3. Slovakia Stage 1 report 2010
4. Slovakia IIR 2010
5. Additional document: Source_name_SVK.doc

Agriculture

6. Response to preliminary question raised prior to the review: Slovakia q1-q2 (ReviewQ&ATemplate-v2_Slovakia 18_06_2010.doc)
7. Response to questions raised during the review: Slovakia q3-q9 (SVK_AGRI_Response_Final.doc).
8. In July, Slovakia has provided a response to the questions submitted before and during the review process. Additional information was provided in Slovak: "Emissions of ammonia (NH₃) from the agricultural sector in Slovak" (Methodology_Amonia_2010.doc)

Energy

9. Response to preliminary question raised prior to the review: SVK_Energy.doc
10. Document received during the review: Source_name_SVK.doc
11. Slovakia Stage 2 S&A report
12. Slovakia Stage 1 report 2008
13. Slovakia IIR 2008
14. Responses to questions from the generalist reviewer during the stage 3 review: SK-General-02-07-10-Q1.doc

Industrial Processes

15. -Slovak Republic_Industrial processes_11-06-2010Q1_ResponseSVK_22-06-2010
16. -Methodika Inv POPs
17. -Rekalkulacia POPs

Transport

Appendix A - Slovakia's responses to questions - Energy

1. In sector 1.A.3.b ii (Road transport: Light duty vehicles) - a sudden increase of the sector's NO_x emissions in the single year 2003 (as compared to the year 2002).

2. In sector 1.A.3.b iii (Road transport: Heavy duty vehicles) – a few fluctuations in reported activity data for NO_x emissions between the years 2000 and 2008.

Slovakia explained the rise of NO_x emissions in 2003 as a result of fuel price changes as well as increased activity in the construction industry. Fuel prices in 2003 declined relatively rapidly but consumption of gasoline fuels increased as a consequence of the increasing light duty vehicles fleet. Also, the relatively higher share in emissions from construction machinery and heavy duty vehicles/trucks is due to the fact that in general, they belong to older age groups compared to the rest of the fleet.

3. In sector 1.A.3.b iii (Road transport: Heavy duty vehicles) – a sudden decrease of the sector's NMVOC emissions in the single year 2003 (as compared to the year 2002).

The Party has explained that the NMVOC emissions are affected by fuel consumption and modernisation, mainly of heavy duty vehicles, trucks and buses. Since 2001 the number of CNG buses has been gradually increasing (and partly also passenger cars, where the situation is influenced by the competition between CNG and LPG). These buses are used mostly in public transport. The decrease of total NMVOC emissions was caused by a large-scale introduction of CNG busses, whose engines have a lower EF (Emission Factor).

4. In sector 1.A.3.b i (Road transport: Passenger cars) - a sudden decrease of the sector's SO_x emissions from 2003 onwards.

The reason presented by Slovakia to the ERT is that the sudden decrease of SO_x emissions was a result of the implementation (in 2002) of legislative regulations for fuel quality with a lower content of sulphur compared to previous years.

5. In sector 1.A.4.b i (Small combustion: Residential: Stationary plants) - substantial decrease (by almost 50%) in SO_x emissions between the years 2001 and 2002.

Slovakia explained that the above-mentioned decrease in SO_x emissions between 2001 and 2002 in this sector was caused by an increase of coal prices and a decline in the consumption of this fuel (supplied by natural gas) from a value of 696,029 tonnes in 2001 to 347,761 tonnes in 2002.

6. In the sectors 1.A.3.b i – 1.A.3.b iv (Road transport: all types of vehicles) – many fluctuations in reported activity data for CO emissions in reported time series.

The Party explained that these fluctuations as having been caused by changes in fuel price policy followed by fluctuating levels of fuel consumption in Slovakia. Slovakia is a transit country with a high share of heavy-duty vehicle transport and the fuel consumption is a very fluctuating factor due to the pricing policies of

neighbouring countries. The emission factors for CO are very fuel-sensitive and quite different for gasoline and diesel.

7. In sector 1.A.3.d ii (National navigation (Shipping)) - an enormous rise in emissions of CO in a single year (2007; by around 10 times more compared to the previous year and the average time series for the reported period).

The ERT was informed by the Party that the emissions estimated in 2007 (5,411 t) were incorrectly reported (the correct value being 0,541 t) and that this error would be removed in the next submission.

The ERT commends Slovakia for the detailed descriptions in the answers provided, reflecting good practice in supplying many details and enabling the ERT to gain a good insight into the circumstances associated with the issues brought up during the review process. The ERT welcomes all the explanations which were provided by the Party and encourages Slovakia to include such information within future IIRs.