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

**STAGE 3 REVIEW REPORT
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 – 2013 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 22nd June 2015 to 26th June 2015 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 – Charlotte Vanpoucke (Belgium), Energy - Garnt Jans Venhuis (Netherlands), Transport - Melanie Hobson (EU), Industry - David Kuntze (Germany), Solvents - Kees Peek (Netherlands), Agriculture + Nature - Hakam Al-Hanbali (Sweden), Waste - Dirk Wever (Netherlands).
4. Anne Misra (United Kingdom) was the lead reviewer. The review was coordinated by Katarina Marečková, (EMEP Centre on Emission Inventories and Projections - CEIP).

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

PART A: KEY REVIEW FINDINGS

5. The ERT acknowledges the effort undertaken by Slovakia for providing estimates of emissions for all sub-sectors and all pollutants reviewed.
6. The IIR provided was not detailed enough to support the ERT in undertaking a thorough review, especially on a sector level, because the structure of the IIR does not fully correspond to the template provided in the Guidelines (Annex II)².
7. The Slovakian emission inventory is generally in line with the 2013 EMEP/EEA Inventory Guidebook and the UNECE Reporting Guidelines. Emissions are provided for the full time series 2000-2013, however, for 1990-1999, only national totals were reported. Emissions reported under CLRTAP and NECD are slightly different, but this was explained by the Party during the review.
8. Recalculations were performed for some years when new activity data or new statistics became available. These recalculations are fairly well described in the IIR, but recalculations were not always done in a consistent way across the full time series or for all pollutants. No uncertainty analysis was undertaken and also the implementation of QA/QC procedures is rather limited in Slovakia.
9. Slovakia participated actively in the Stage 3 review process providing further information when requested. Based on the responses provided by the Party, the ERT was able to perform a review of the inventory within the given period of time and provide some recommendations for future submissions.

INVENTORY SUBMISSION

10. In the 2015 submission, Slovakia reported emissions and activity data for 2000-2013 for all pollutants except Black Carbon (BC) in the NFR14 format. For the 1990-1999 time series only national totals are reported. The ERT recommends that Slovakia provides projected emissions in NFR14 categories and associated socio-economic data up to 2030.
11. The IIR submitted by Slovakia does not fully follow the IIR structure as recommended in Annex II of the revised Guidelines. Chapters are structured by pollutant, so assumptions, data sources and methodologies by sector are not presented in a clear way and are sometimes difficult to find. The ERT also notes that recalculations have not always been applied consistently throughout the entire time series.
12. The quality of the Slovakian CLRTAP inventory submission needs to be further improved by providing missing sources, minimising the use of IE (Included Elsewhere) and by elaborating, in the IIR, the descriptions of methods, assumptions and data sources by emission source.

² http://www.ceip.at/ms/ceip_home1/ceip_home/reporting_instructions/annexes_to_guidelines/

KEY CATEGORIES

13. Slovakia has compiled a Key Category Analysis (KCA) consistent with the 2013 EMEP/EEA Guidebook and identical to the CEIP analysis for emissions of all reported pollutants in 2013. The ERT encourages Slovakia to present the key sources also by trend assessment and to use Tier 2 or 3 methods for all key sources in line with the 2013 EMEP/EEA Guidebook.

QUALITY

Transparency

14. The ERT recognises the effort made by Slovakia to improve 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 QA/QC, uncertainty, or sufficiently detailed sectoral methodology chapters for all sectors. The ERT recommends that Slovakia follows the IIR template and includes more details in the description of the methods, assumptions and activity data for stationary energy, transport, Industrial Processes (IP), Agriculture, and Waste, QA/QC, uncertainty analysis and that they add an improvement plan.

15. In the Slovakian inventory contains the notation key 'IE' (Included Elsewhere) has been used a lot. No explanation on the sectors where emissions were allocated was made available in the IIR. During the review, Slovakia provided the ERT with a table explaining 'IE' and 'NE' (Not Estimated) in a detailed and clear way. The ERT commends Slovakia for providing this information and encourages the Party to include this information in the next IIR and to use it to improve the inventory regarding missing sources.

16. Regarding the frequent use of 'IE', Slovakia also indicated during the review process that it is willing to disaggregate emissions and to split them into the relevant sectors in the near future. The ERT warmly welcomes this plan.

17. The ERT noticed an inappropriate use of notation keys, especially 'NA' (Not Applicable). 'NA' should only be used if a pollutant is not being emitted by a certain activity, whereas other pollutants do occur. If a source category does not exist in the country at all, then 'NO' (Not Occurring) should be used for all pollutants. If the emissions could not be estimated, but are likely to occur, 'NE' should be used. The ERT encourages Slovakia to revise its use of notation keys in the next submission. In response to the review, Slovakia indicated that all notation keys would be re-assessed and rationalized for all sectors throughout the time series.

18. By answering particular questions during the review on the off road sectors and international aviation sector and by providing the table with explanations on 'IE' and 'NE', some corrections for notation keys have already been indicated by Slovakia. The ERT recommends investigating these corrections in depth, taking into account the specific recommendations given in the specific sector chapters below, and to implement these corrections in time for the next submission.

19. The ERT also notes that most emissions of the main pollutants NO_x, SO₂, NH₃, TSP, PM₁₀, PM_{2.5} and CO for Industrial Processes are included in the Energy sector and represent the sum of combustion and process emissions. The ERT encourages Slovakia to split the combustion and process emissions in future submissions.

20. The ERT encourages Slovakia to continue the excellent work done on the inventory and the IIR and to implement additional recommendations indicated below.

Completeness

21. Slovakia provided emissions for the time series 2000-2013 for all pollutants except BC in the NFR14 format. The ERT notes that Slovakia only presents emissions for national totals for the 1990-1999 time series. This represents a lack of transparency as no sectoral breakdown is provided. During the review Slovakia responded that it would like to do the sectoral split, but that this would require more effort and capacity, because the current database NEIS, and the old system EAPSI, which it replaced, are comparable merely at the national level. The ERT still recommends that Slovakia includes a sectoral breakdown by NFR in future submissions for the full time series back to 1990.

22. The ERT also encourages Slovakia to include emission estimates for BC in its next submission.

23. The ERT noticed a possible underestimation of the inventory on account of missing estimates from agriculture (NO_x and NMVOC) and waste (wastewater handling, etc). The ERT recommends that Slovakia includes the missing sources/pollutants by implementing the methodologies and emission factors provided in the Guidebook 2013.

24. In addition to the recommended revision of the notation keys, the ERT encourages Slovakia to include a table explaining the use of 'NE, Not Estimated' as provided during the review week, in the next IIR. Furthermore, the ERT encourages Slovakia to provide explanations as to why some sources are currently not reported (e.g. lack of activity data, source does not exist in Slovakia) and whether there are plans to report them in the future, if applicable.

Consistency, including recalculations and time-series

25. Since only national totals are provided for 1990-1999, and recalculations are in general not performed for the years before 2000, there is an inconsistency in the time series between 1990-1999 and 2000-2013.

26. Recalculations were performed for some years when new activity data or new statistics became available. These recalculations are fairly well described in the IIR, but recalculations were not always done in a consistent way across the full time series or for all pollutants. Furthermore, some recalculations performed (NH₃ in 2012, PM_{2.5} and PM₁₀ in 2004, 2010-2012) are not explained in the IIR.

27. To get full transparency on the consistency of the emission estimates across the time series, the ERT recommends that Slovakia documents where recalculations were made across the full time series, and if not, provides a reason.

28. The ERT commends Slovakia for including documentation on key trends in the 2015 IIR. Explanations on fluctuations, dips and jumps could, however, be further elaborated by providing detailed information on which legislation/measures in which sectors are responsible for the trend and how the contributions of the key sectors to the National Totals evolve over time. Slovakia indicated that they plan to include a better description of emission trends by particular sectors, to include description of measures which influence emissions and to explain and provide reasons for the trends and changes supported by measures or legislation. The ERT encourages this improvement plan.

Comparability

29. The ERT notes that the inventory of Slovakia is comparable with those of other reporting parties. The allocation of source categories follows that of the EMEP/UNECE reporting Guidelines for inventories for the time series starting from 2000. The ERT encourages Slovakia to continue with this approach for national inventory calculations and recommends that this approach is extended to all years before 2000.

CLRTAP/NECD comparability

30. The ERT noted that there are small differences between the estimates provided by Slovakia under LRTAP and NECD. Slovakia responded that this is due to an update of the activity data for the transport sector after the NECD submission.

Accuracy and uncertainties

31. Slovakia did not undertake an uncertainty analysis as part of the 2015 submission. During the review week Slovakia pointed out that they plan to perform an uncertainty analysis in future, but that there are some more important issues for Slovakia, which it would like to address first. The ERT encourages Slovakia to provide a quantitative uncertainty analysis of the emission estimates, especially for key sources in future submissions.

Verification and quality assurance/quality control approaches

32. The quality control and quality assurance (QA/QC) procedures carried out by Slovakia are not documented in the IIR. In response to questions about the QA/QC conducted, Slovakia indicated that its QA/QC process has not been fully developed yet. Slovakia is planning to review key categories and the preparation of the inventory along with the improvement of the QA/QC process. The ERT commends Slovakia for this plan and encourages the Party to implement it for future submissions.

33. The ERT encourages Slovakia to provide information on sector specific QA/QC procedures in future submissions.

FOLLOW-UP TO PREVIOUS REVIEWS

34. The current Stage 3 review has used outputs from the Stage 1 and Stage 2 review processes. The ERT invites Slovakia to also refer to these previous reviews when examining this review report and when updating its improvement plans.
35. The ERT thanks Slovakia for responding to the ERT during the centralised review for all sectors.
36. The ERT commends Slovakia for the improvement of its inventory by implementing some of its improvement plans as well as some recommendations made in the previous Stage 3 report and encourages the Party to continue improving its inventory by implementing the plans and recommendations indicated below.

AREAS FOR IMPROVEMENTS IDENTIFIED BY SLOVAKIA

37. The IIR does not include an improvement plan. However, during the centralised review, several priorities were pointed out by Slovakia. These include:
 38. Eliminate the underestimate in the inventory.
 39. Perform a disaggregation of emissions where possible.
 40. Re-assess the use of the Notation keys.
 41. Focus on transparency and explanation of methodological procedures and detailed explanation of recalculations in the IIR
 42. Set priorities for future submissions.
 43. Adapt the structure of IIR in the division of sectors.
 44. To perform the re-calculations of the times series from 1990 - 2000 Slovakia does not have all necessary activity data, only parts thereof, but they will try to provide some results.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

45. The ERT has identified the following cross-cutting issues for improvement:
46. The ERT recommends that Slovakia performs a sectoral breakdown by NFR categories for the full time series from 1990 onwards in future submissions.
47. To improve the transparency of the inventory, the ERT recommends Slovakia to follow the IIR template and include more details in the description of the methods, assumptions and activity data per emission source, and to add documentation on QA/QC, uncertainty analysis and improvement plans.
48. The ERT recommends that Slovakia provides explanations on the use of IE 'Included Elsewhere' and NE 'Not Estimated' in the next IIR. The ERT encourages Slovakia to explain the reason for aggregation in the IIR and to investigate and report whether it is possible for future submissions to report these emissions in the appropriate NFR categories.
49. The ERT encourages Slovakia to include a table explaining the use of 'NE, Not Estimated' as provided during the review week, in the next IIR. Furthermore, the ERT encourages Slovakia to identify sources which are not estimated and give more information on whether there are plans to estimate them in the future.
50. The ERT encourages Slovakia to review its use of notation keys in the next submission.
51. The ERT encourages Slovakia to include emission estimates for BC in its next submission.
52. The ERT encourages Slovakia to complete the key source analysis by a trend assessment.
53. The ERT encourages Slovakia to split the combustion and process emissions in the next submission.
54. The ERT recommends that Slovakia applies recalculations consistently across the full time series and provides detailed explanations of the 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.

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, CO, TSP, PM ₁₀ , PM _{2.5} , Pb, Hg, Cd		
Years		1990 – 2013		
NFR Co	CRF_NFR Name	Reviewed	Not Reviewed	Recommendations Provided
1A1a	Public electricity and heat production	X		X
1A1b	Petroleum refining	X		X
1A1c	Manufacture of solid fuels and other energy industries	X		X
1A2a	Iron and steel	X		
1A2b	Non-ferrous metals	X		
1A2c	Chemicals	X		X
1A2d	Pulp, Paper and Print	X		X
1A2e	Food processing, beverages and tobacco	X		X
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	X		
1A2gviii	Stationary combustion in manufacturing industries and construction: Other (please specify in the IIR)	X		X
1A3ei	Pipeline transport	X		
1A3eii	Other (please specify in the IIR)		NA, IE	
1A4ai	Commercial/institutional: Stationary	X		
1A4bi	Residential: Stationary	X		X
1A4ci	Agriculture/Forestry/Fishing: Stationary	X		
1A5a	Other stationary (including military)	X		
1B1a	Fugitive emission from solid fuels: Coal mining and handling		NA, IE	
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	X		
1B1c	Other fugitive emissions from solid fuels		NA	X
1B2ai	Fugitive emissions oil: Exploration, production, transport	X		
1B2aiv	Fugitive emissions oil: Refining / storage	X		
1B2av	Distribution of oil products	X		
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)		NA	X
1B2c	Venting and flaring (oil, gas, combined oil and gas)		NA	X
1B2d	Other fugitive emissions from energy production		NA	X

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

General recommendations on cross-cutting issues.

Transparency:

55. Slovakia has provided a detailed and generally transparent emissions inventory. Estimates are provided at a detailed level for all energy sectors. The Party's methodology and emission factors (EFs) in the IIR are considered by the ERT to be well described for the Energy Sector.

56. However, Slovakia describes methodologies by pollutant and not by NFR codes. To improve transparency of the IIR the ERT encourages Slovakia to describe the methodology in detail by NFR code instead.

57. Slovakia has indicated that estimates were compiled at the most detailed level for all stationary energy sectors (bottom-up approach). To further improve transparency, the ERT recommends that Slovakia provides the list of sub-sectors included in each NFR code and indicates the number of plants included in the estimates for each sub-sector in the IIR to help explain emissions trends. Furthermore the ERT encourages Slovakia to also include the detailed response to ERT's questions in the IIR.

58. In the IIR there is no description of the use of notation keys ; in particular reference is made to the notation key 'IE' (Included Elsewhere). The Party was asked to provide the ERT with additional information in which other sector and pollutants notation keys are included. Slovakia responded that they are aware of the fact that a revision of the notation keys is essential. During the review week Slovakia provided the table for sectors giving reasons for using the 'NE' (Not Estimated) notation key and explaining the allocation of emissions in case the 'IE' notation key was used. The ERT recommends that these tables are included in the next submission of the IIR.

59. For Key Source categories and pollutants it is not clear if a Tier 2 (or Tier 3) methodology was used. To improve readability and transparency of the Energy sector, please describe methodologies by NFR code. By doing so it will be more transparent for Key Source categories and pollutants which specific Activity Data and Emission Factors were used and why. During the review week the Party responded that *'for the energy sector, the Tier 3 methodology is used for pollutants NO_x, SO₂, NMVOC, NH₃, PM, TSP due to the use of specific facility data and results of measurements for large and medium-size air pollution sources that are obtained from the database NEIS. The emissions are calculated by NEIS and the methodology involves the type of combustion installations, kind of fuel used and abatement technology at the combustion facility and specific EF. Methodological guidance for NEIS is not available in English. In future, we plan to include more detailed methodology description for the energy sector'*. The ERT encourages the Party to improve the transparency of the IIR.

60. The ERT notes that a substantial part of the emission estimates is based on bottom-up data from reporting installations. The ERT recommends that Slovakia provides a more complete explanation of these comparisons between bottom-up and national statistics in the IIR.

Completeness:

61. The ERT considers the Energy sector in general to be complete and comprehensive with a good level of detail in the methodology descriptions, but completeness and transparency can be improved by structuring the IIR by NFR code instead of by pollutant.

62. The ERT noticed that there is no chapter on CO in the IIR. During the review week Slovakia responded that *'the calculation procedure for CO for the energy sector is in principle the same as for NO_x, SO₂, NMVOC, PM, TSP. All data comes from the NEIS that processes the facility data from operators, so it can be considered as Tier 3. Some basic information is provided in Chapter 3.2 of the IIR (Emissions inventory of SO₂ and NO_x). In next IIR we will provide detailed a description related to CO emission.'* The ERT encourages the Party to do so.

63. The ERT notes that for the NFR codes 1A1b, 1A1c, 1A2c, 1A2d and 1A2e the notation key 'NA' (Not Applicable) is used for heavy metals. The ERT recommends that Slovakia estimates heavy metal emissions for these three NFR codes by using, for example, the EFs given in the 2013 EMEP/EEA Guidebook (method Tier 1 or Tier 2). Where emissions cannot be estimated the ERT recommends that Slovakia corrects the notation key 'NA' and uses 'NE' (Not Estimated) instead.

Consistency including recalculation and time series:

64. The ERT commends Slovakia for the general good consistency of time series for the Energy sector. However, the IIR does not include all the necessary explanations. The ERT encourages the Party to provide more detailed explanations of the time series, preferably by NFR code.

65. Slovakia has recalculated its inventory for some pollutants and some years. The IIR contains the necessary explanations per pollutant. The ERT encourages the Party to provide more detailed explanations of recalculations, including the rationale, the impact on the sector and implication on trends for the Energy sector in its IIR, again preferably by NFR code.

Comparability:

66. The ERT commends Slovakia for the comparability between the NECD and CLRTAP tables; the tables were checked against each other for the Energy sector and no differences were found.

67. The ERT commends Slovakia for the detailed description of emission factors and activity data, in tables by pollutant. The ERT noticed that many references are based on reports that are up to 30 years old. The ERT encourages Slovakia to review the applied emission factors and their references in order to establish that they still are the best available.

Accuracy and uncertainties:

68. The ERT noticed that the reviewed IIR does not contain a chapter on QA/QC. The ERT encourages Slovakia to undertake an uncertainty analysis for the Energy Sector in

order to support the improvement process and to provide an indication of the reliability of the inventory data.

Improvement:

69. The ERT noticed that no improvement plan (for the energy sector) is included in the IIR. The Party responded that *'the priority is to focus on a revision of notation keys and improvement of description for trends and used methodology in the sector for better transparency. More detailed revision of the energy sector is not planned for the next submissions because Slovakia would like to focus on more critical issues in the inventory. But in the future, the Party would like to do a more extensive revision and provide data until 1990'*. The ERT encourages Slovakia to include a chapter on planned improvements to improve transparency and completeness of the IIR.

70. The ERT noticed minimal follow-up on recommendations made during the previous review. The ERT encourages Slovakia to improve their submitted IIRs by taking into account the recommendations made.

Sub-sector Specific Recommendations.

Category issue 1: 1A1a – Cd, Pb

71. The time series for the key source pollutants Cd and Pb in sector 1A1a show a substantial increase from 2010 onwards. This specific increase is not described in the IIR. The Party responded that the gradual increase of Pb and Cd emissions from 2010 (and earlier years) is caused by increasing wood combustion in CHP and HP power plants, consistent with the increasing share of biomass use. Wood fuel has a significant impact on these emissions. The ERT encourages the Party to include these responses in the next submission, and to indicate how this relates to Activity Data and Emission Factors.

Category issue 2: 1A2gviii – Cd

72. The time series for the key source pollutant Cd in sector 1A2gviii show a substantial decrease from 2007 onwards. This specific decrease is not described in the IIR. During the review week the Party responded that the significant decrease in this category is caused by a change in the emission factor for Cd emissions from the production of coloured glass (from 100 g/Mg to 0.2 g/Mg). This important change was made following a consultation with the biggest glass producer after their technology had been improved. A more detailed description was provided in Slovakia's IIR 2011 on page 28. The ERT encourages the Party to include this explanation in future submissions of the IIR.

Category issue 3: 1A4b – POP’s

73. In the NFR the notation key ‘NE’ is used for most POP’s. This is not explained in the IIR. If pollutants are present but emissions are insignificant, the notation key ‘NA’ should be used. In addition, the 2013 EMEP/EEA Guidebook can be used to estimate and/or calculate emissions. During the review week the Party responded that *they will require the general revision of NK from our expert who is in charge of POP’s pollutants to be done for the next submission according to GB2013.*

Category issue 4: 1A4bi – PM₁₀, PM_{2.5}

74. In the IIR it is stated that PM₁₀ and PM_{2.5} are calculated automatically in the NEIS database. But it is not clear to the ERT how (specific) this was done, especially for the Energy sector 1A4bi, which is a Key Category for PM₁₀ and PM_{2.5}. During the review week Slovakia responded that *the plant specific data of TSP emissions are taken from NEIS database and PM₁₀ and PM_{2.5} are consequently calculated by multiplying with specific factors that are based on share of PM₁₀ and PM_{2.5} in TSP. The computation principle for 1A4bi Residential sector is the same but activity data are based on fuels sold in the residential sector.* The ERT encourages the Party to include this response in the next submission and to investigate possibilities to upgrade the methodologies to Tier 2 or Tier 3 for all Key Sources and Pollutants.

Category issue 5: 1B1c, 1B2b, 1B2c, 1B2d – All pollutants

75. In the NFR, the notation key ‘NA’ is used for all pollutants. These sectors are not described in the IIR, nor is it clear whether these sectors are present in Slovakia at all. If the latter is the case, the notation key ‘NO’ (Not Occurring) should be used. During the review week the Party responded that *they realize that there is a need to do a general review of the use of notation keys. The Category 1B1c will be changed to NO in the next submission. Category 1B2b - Natural gas - fugitive emissions are included in Pipeline transport (1A3ei). Category 1B2c - Venting and flaring - fugitive emissions from flaring in refinery, technological losses and storage are included in different categories (1A1c, 1A1b - because they are part of already categorized sources in NEIS). Category 1B2d - Geothermal energy is not developed in the Slovak Republic, most of the sources are used for recreational purposes, and considered as negligible.* The ERT encourages the Party to include these responses in the next submission.

TRANSPORT

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM ₁₀ & PM _{2.5}		
Years		2000 – 2013		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendations Provided
1A2gvii	Mobile Combustion in manufacturing industries and construction: (please specify in the IIR)		NA	
1A3ai(i)	International aviation LTO (civil)		NE	x
1A3ai(ii)	International aviation cruise (civil)		NA	x
1A3aii(i)	Domestic aviation LTO (civil)	x		
1A3aii(ii)	Domestic aviation cruise (civil)		NA	x
1A3bi	Road transport: Passenger cars	x		
1A3bii	Road transport: Light duty vehicles	x		
1A3biii	Road transport: Heavy duty vehicles and buses	x		
1A3biv	Road transport: Mopeds & motorcycles	x		
1A3bv	Road transport: Gasoline evaporation	x		x
1A3bvi	Road transport: Automobile tyre and brake wear	x		
1A3bvii	Road transport: Automobile road abrasion	x		
1A3c	Railways	x		x
1A3di(ii)	International inland waterways		NO	
1A3dii	National navigation (shipping)		NE	
1A4aii	Commercial/institutional: Mobile	x		
1A4bii	Residential: Household and gardening (mobile)		X	
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery		NA	x
1A4ciii	Agriculture/Forestry/Fishing: National fish		NA	x
1A5b	Other, Mobile (including military, land based and recreational boats)		IE	x
1A3di(i)	International maritime navigation		NO	x
1A3	Transport (fuel used)		IE	

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

General recommendations on cross cutting issues.

76. Slovakia has provided information on how emissions have been estimated from the road transport sector, which is welcomed. The Party answered all questions issued by the ERT during the review week. The ERT welcomed this and encourages Slovakia to improve their inventory by reviewing the notation keys used and by amending them accordingly where appropriate and by including information on all transport sectors in the IIR.

Transparency:

77. Taking into account the information provided during the review week, Slovakia provided a generally transparent emission inventory for the Transport sector. However, the description of methods lacks detail, especially when it comes to describing the methods, assumptions and data sources to support the tables of emission factors and activity data.

78. The ERT noted that the notation keys used in the NFR were not always the most appropriate ones. To improve transparency, the Party is encouraged to review all notation keys used and amend them where appropriate.

Completeness:

79. The ERT considers the Transport sector and the other sectors including mobile sources to be generally complete, although there are some sectors and certain pollutants within sectors reported as 'NA' (Not Applicable) and 'NE' (Not Estimated). These have been identified by the ERT (see sub-sector specific recommendations below).

Consistency:

80. The ERT noted a number of time series variations that were not explained in Slovakia's IIR. 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).

81. 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 in future IIRs. Furthermore, the ERT recommends that Slovakia improves the consistency of trends for the above mentioned sub-categories in its next submissions.

Uncertainties:

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

QA/QC Procedures:

83. Some information on the QA/QC undertaken for the transport sector has been provided in the IIR. The ERT encourages the Party to provide more detailed information on OA/QC procedures for the Transport Sector and other sectors including mobile sources.

Improvement:

84. No information on planned improvements has been provided. The ERT encourages the Party to include information on planned improvements in future IIRs.

85. Furthermore, the ERT encourages the Party to produce an inventory improvement time table to schedule issues for further improvement and to be able to monitor progress.

Sub-sector Specific Recommendations.

Category issue 1: 1 A 3 Aviation (domestic and international): All pollutants

86. The notation key 'NA' is provided for all pollutants for International and Domestic cruise. 'NA' should be used where a source exists but relevant emissions are considered never to occur. For this sector, emissions will occur and therefore Slovakia is encouraged to provide emission estimates for this source or, if this is not possible, the notation key 'NE' (Not Estimated) or 'IE' (Included Elsewhere) (see below) should be used.

87. The notation key 'NE' is provided for 1 A 3 a i (i) International aviation LTO. During the review week, Slovakia provided further information on estimating emissions from the aviation sector and emissions are currently not split into domestic and international. Therefore, it is thought that the notation key 'IE' should be used for 1A3ai(i). However, the ERT strongly encourages emissions to be reported separately for domestic and international aviation, if possible.

Category issue 2: 1.A.3.b.v Road Transport - Gasoline evaporation: NMVOCs

88. NMVOC emissions have been estimated from gasoline evaporation for the years 2011, 2012 and 2013. No estimates are provided prior to this date and the notation key 'NA' is provided. The ERT strongly encourages Slovakia to provide estimates for these earlier years or, if this is not possible, then the correct notation key 'NE' should be used.

Category issue 3: 1.A.3.c Railways: All pollutants

89. Limited information is provided in the IIR on the methodology used to calculate emissions from the rail sector. During the review week, the Party provided some further information. However, the ERT strongly encourages Slovakia to provide further details in their future IIRs.

Category issue 4: 1.A.3.d.i (ii) International Inland Waterways and 1.A.3.d.ii National Navigation: All pollutants

90. No information is provided in the IIR on the methodology used to calculate emissions from International Inland Waterways or National Navigation. During the review week, the Party provided some further information. Slovakia uses a Tier 1 methodology for estimating emissions from this sector and the emissions arise from boats on the Danube River. No distinction is made between international and domestic boats. In the 2013 inventory, the notation key 'NE' is used for international inland waterways. It is thought that this should be 'IE' (Included Elsewhere). The ERT strongly encourages Slovakia to provide separate estimates for international and domestic navigation if possible. Should this not be possible then the notation key 'IE' should be used for international inland waterways (1.A.3.d.i(ii)).

Category issue 5: 1.A.4 Non Road Mobile Machinery: All pollutants

91. The notation key 'NA' is provided for Commercial and Institutional Mobile (1.A.4.a.ii) and Residential household and garden machinery (mobile) (1.A.4.b.ii). During the review week it was confirmed by the Party that 'IE' would be more appropriate as emissions arising from this sector are currently included in the road transport sector. The ERT welcomes the update that will be made for the next inventory submission.

92. The notation key 'IE' is used for agriculture, forestry and fishing (1.A.4.c.ii) and "NO" for national fishing. The ERT encourages Slovakia to provide information in their next IIR on the methodology used to compile emissions arising from these sectors and to provide a reason for why fishing emissions do not occur.

93. No information is provided in the IIR on the methodology used to estimate emissions arising from non road mobile machinery. The ERT strongly encourages Slovakia to provide information in future reports and to check and amend the notation keys used if applicable.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM ₁₀ & PM _{2.5}		
Years		1990 – 2013 + (Protocol Years)		
NFR Co	CRF_NFR Name	Reviewed	Not Review	Recommendati Provided
2A1	Cement production	X		X
2A2	Lime production	X		
2A3	Glass production	X		
2A5a	Quarrying and mining of minerals other than coal	X		
2A5b	Construction and demolition	X		X
2A5c	Storage, handling and transport of mineral products	X		X
2A6	Other mineral products (please specify in the IIR)	X		
2B1	Ammonia production	X		
2B2	Nitric acid production	X		
2B3	Adipic acid production	X		
2B5	Carbide production	X		
2B6	Titanium dioxide production	X		
2B7	Soda ash production	X		
2B10a	Chemical industry: Other (please specify in the IIR)	X		
2B10b	Storage, handling and transport of chemical products (please specify in the IIR)	X		
2C1	Iron and steel production	X		
2C2	Ferroalloys production	X		
2C3	Aluminium production	X		
2C4	Magnesium production	X		
2C5	Lead production	X		
2C6	Zinc production	X		
2C7a	Copper production	X		
2C7b	Nickel production	X		
2C7c	Other metal production (please specify in the IIR)	X		
2C7d	Storage, handling and transport of metal products (please specify in the IIR)	X		
2H1	Pulp and paper industry	X		
2H2	Food and beverages industry	X		
2H3	Other industrial processes (please specify in the IIR)	X		
2I	Wood processing	X		
2J	Production of POPs	X		
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	X		
2L	Other production, consumption, storage, transportation or handling of bulk products (please specify in the IIR)	X		

General recommendations on cross-cutting issues

Transparency:

94. The IIR of Slovakia is only structured in chapters by pollutants. There are no chapters by NFR sectors. Hence, there is also no chapter for industrial processes. This is why it has proven difficult to carry out a review of the methods, sources of activity data, emission factors and emissions from industrial processes. Slovakia informed the ERT that the system NEIS compiles the emissions data for combustion and process emissions for the inventory. Some emissions from technological processes are inseparable from the combustion processes. These are reported in the energy sector. Furthermore, Slovakia informed the ERT of its intention to deliver more explanations about the methods used in the IIR in the next submission. The ERT encourages Slovakia to do so and recommends reporting all categories, which have separated data for process and energy emissions in both sections. However, as recommended in the last review in 2010 and as planned by Slovakia after the review in 2010, the ERT reiterates and strongly recommends improving the transparency by implementing in the next IIR a chapter on industrial processes, including all information about activity data, emissions factors, emissions and methods relevant for each subsector.

Completeness:

95. Slovakia reports the notation key 'IE' for most subsectors. The information where these emissions are allocated is missing in the NFR tables and the IIR. Since the IIR does not contain any information about the methods and data sources, the reviewers were not able to carry out a quality control. The ERT assumes potential underestimates and recommends replacing the notation key 'IE' by emissions data in the subsectors of the industrial processes sector and reporting the background data in the IIR.

Consistency including recalculation and time series:

96. Slovakia delivered emissions data in the NFR tables for the years 2000 to 2013, but not for the years 1990 to 1999. The ERT encourages Slovakia to deliver emissions data also for the years 1990 to 1999.

Comparability:

97. Slovakia has reported its NFR tables in accordance with the reporting requirements and submitted them in the requested NFR format. As already remarked the IIR is not transparent enough to check comparability.

Improvement:

98. There are no sector specific planned improvements reported in the IIR.

Sub-sector Specific Recommendations.

Category issue 1: 2A1 Cement production, HCB

99. The ERT noted that emission factors are provided in the IIR for HCB from cement production (table 9, p.34) whereas 'IE' is reported in NFR 2A1 and NFR 1A2f. The ERT recommends providing the information made available during the review week, namely that the emissions are very small and thus reported under 1A2gviii, in the next submission.

Category issue 2: 2A5b Construction and Demolition, TSP and PM

100. For emissions of TSP and PM Slovakia reports 'NO'. The ERT recommends to replace the Notation key and to deliver the emissions data.

Category issue 3: 2A5c Storage, Handling and Transport of Mineral products, TSP, PM

101. For emissions of TSP and PM from Storage, Handling and Transport of Mineral products, the Party reports 'NO'. The ERT recommends replacing the Notation key, to identify a new data source and to calculate and report the emissions data.

SOLVENTS

Review Scope

Pollutants Reviewed		NMVOC		
Years		1990 – 2013 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendation Provided
2D3a	Domestic solvent use including fungicides	X		X
2D3b	Road paving with asphalt	X		X
2D3c	Asphalt roofing	X		X
2D3d	Coating applications	X		X
2D3e	Degreasing	X		X
2D3f	Dry cleaning	X		X
2D3g	Chemical products	X		X
2D3h	Printing	X		X
2D3i	Other solvent use (please specify in the IIR)	X		X
2G	Other product use (please specify in the IIR)	X		X

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

General recommendations on cross-cutting issues

Transparency:

102. The Solvents and Other Product Use sector inventory of the Slovak Republic is not completely transparent. The ERT notes that the explanations for the use of the notation keys 'NE' and 'IE' are missing. After consulting with the Party, they provided the ERT with an overview giving the reasons for using the 'NE' and 'IE' notation keys. The ERT recommends that the Slovak Republic includes an overview with explanations for the use of the notation keys 'NE' and 'IE' in the next submission.

103. The ERT also notes that information on the Tier methods used to calculate the emissions of the key sources is missing. During the review week the Party replied to the ERT that the Slovak Republic uses a simplified Tier 2 methodology for 2D3d and the Tier 1 methodology for the key sources 2D3e and 2D3g. The simplified Tier 2 methodology is based on VOC specific content of solvents used in industry and not on the default EF. The ERT recommends that the Slovak Republic includes this information in the next submission.

104. The ERT also notes that the Slovak Republic uses the appropriate notation keys in the NFR tables for all the source categories of the Solvents and Other Product Use sector and commends the Slovak Republic for this.

105. Furthermore, the ERT notes that explanations for some major changes (dips/jumps) in emission trend are missing. The ERT recommends that the Slovak Republic provides the missing explanations for major changes (dips/jumps) in emission trends, at least for the key sources, in its next submission.

Completeness:

106. As already mentioned in the general part of the review report, the Slovak Republic has not included a chapter on the Solvent and Other Product Use sector in its IIR. Furthermore, some activity data are missing. For more information on the activity data see the relevant sector section. The ERT strongly recommends that the Slovak Republic includes a chapter on Solvents and Other Product Use (including Activity Data) in the next submission.

107. To avoid underestimations, the ERT recommends that the Slovak Republic includes plans to address the missing emissions, reported as 'NE' in its IIR, either by obtaining data allowing an emission estimate to be made, or by reporting the emissions as 'NA' (not applicable).

Consistency including recalculation and time series:

108. The ERT notes that the Slovak Republic has performed negligible methodological changes with NMVOC emissions estimates for the category 2G - Other Product Use.

109. The ERT notes that both the time series for the activity data and the EFs used to calculate emissions of the key source are consistent.

Comparability:

110. The Slovak Republic has provided its emissions inventory in accordance with the reporting requirements and submitted it in the requested NFR format.

111. Furthermore, the ERT notes that there are differences between the CLRTAP and NECD emissions in the Solvents and Other Product Use sector, affecting all NFR codes. The ERT recommends that the Slovak Republic explains the reason for this or corrects the figures in the next submission.

Accuracy and uncertainties:

112. The ERT notes that no uncertainty analysis has been undertaken for the Solvent sector in order to improve the process of reporting and to provide an indication of the reliability of the inventory data.

113. The ERT encourages the Slovak Republic to undertake an uncertainty analysis for the Solvents and Other Product Use sector.

114. The ERT notes that the emissions of key sources are not all calculated based on Tier 2 methodology and recommends that the Party calculates all key sources based on Tier 2 methodology.

Improvement:

115. The ERT notes that no improvements for the Solvents and Other Product Use sector are planned. The ERT encourages the Slovak Republic to list planned and desired sector-specific improvements in its IIR to help provide transparency for future improvements and to support improvement prioritisation.

Sub-sector Specific Recommendations.

Category issue 1: 2D3d - NMVOC

116. The ERT notes that in both the 2013 NFR table and the IIR no activity data of this key source is included. Following a consultation, the Party provided the ERT with the following information: "*Paint consumption in Slovakia was 36 950 t in 2013. These data are from the Statistical Office of The Slovak Republic. Activity data are based on the balance of produced, imported and exported amount of solvents and not on the use of solvents in industry.*" The ERT encourages the Slovak Republic to include these activity data in the next submission

Category issue 2: 2D3g and 2G - NMVOC

117. The ERT finds that an emission factor of 1.55 kg/inhabitant has been used to calculate the NMVOC emissions of 2G, Other and 2D3g, Chemical products.

118. From the reply of the Party it is still not clear to the ERT why the Slovak Republic has used this emission factor for these categories. The ERT recommends that the Slovak Republic includes a clear description of the use of emission factors in these categories in the next submission.

AGRICULTURE

Review Scope:

Pollutants Reviewed		NO _x , NMVOC, NH ₃ , PM ₁₀ & PM _{2.5} , NMVOCs, and HCB.		
Years		1990 – 2013 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendations Provided
3B1a	Dairy cattle	X		X
3B1b	Non-dairy cattle	X		X
3B2	Sheep	X		X
3B3	Swine	X		X
3B4a	Buffalo	X		
3B4d	Goats	X		X
3B4e	Horses	X		X
3B4f	Mules and asses	X		
3B4gi	Laying hens	X		X
3B4gii	Broilers	X		X
3B4giii	Turkeys	X		X
3B4giv	Other poultry	X		X
3B4h	Other animals (please specify in IIR)	X		
3Da1	Inorganic N-fertilizers (includes also urea application)	X		X
3Da2a	Animal manure applied to soils	X		X
3Da2b	Sewage sludge applied to soils	X		
3Da2c	Other organic fertilisers applied to soils (including compost)	X		
3Da3	Urine and dung deposited by grazing animals	X		X
3Da4	Crop residues applied to soils	X		
3Db	Indirect emissions from managed soils	X		
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	X		
3Dd	Off-farm storage, handling and transport of biological agricultural products	X		
3De	Cultivated crops	X		
3Df	Use of pesticides	X		X
3F	Field burning of agricultural residues	X		X
3I	Agriculture other (please specify in the IIR)	X		
11A	Volcanoes			
11B	Forest fires			

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

General recommendations on cross-cutting issues

119. Slovakia's emission inventory of the Agriculture sector includes only estimates of NH₃ emission from 3B Manure management and 3D Inorganic N-fertilizers. Emission of NMVOC are reported in 3I Agriculture other. Emissions from 3Df Use of pesticides are

reported as 'NO' (Not Occurring) and 'NE' (Not Estimated) for 3F Burning of agricultural wastes.

120. Slovakia's IIR provides general information on emission pollutants including key category analysis, but there is no specific chapter for the Agriculture sector. Ammonia emissions from this sector are estimated according to the 2013 EMEP/EEA Emission Inventory Guidebook. The emission factors were estimated according to productive parameters of domestic livestock categories, while the EFs for fertilizer use were applied according to the default methodologies available for Central Europe. The ERT commends Slovakia for undertaking key category analysis for NH₃ emissions. The ERT recommends that Slovakia includes more information regarding the EFs used for estimating emissions and prepares a separate chapter for the Agriculture sector in which relevant information is given in future submissions.

Transparency:

121. The IIR provides general information on the emission inventory of the Agriculture sector. The key category analysis for NH₃ was given along with the emission trend (2000-2013). The ERT commends Slovakia for improving the transparency of its emission inventory.

122. The ERT has noted that Slovakia reported emissions using notation keys, such as 'NA' instead of 'NE' for sub-categories with potential emissions of NO_x, NMVOC and PM. The ERT also noted that no explanations were provided on the rationale for the use of the notation keys. The ERT recommends that Slovakia uses the notation keys as stipulated in the 2013 EMEP/EEA Guidebook in future submissions to enhance the transparency of the Agriculture sector.

123. The ERT also recommends that the Party prepares a separate chapter on the Agriculture sector, in which information of the activity data used for emission estimation, emission drivers and trends, recalculations and improvements are given.

Completeness:

124. The emission inventory of the Agriculture sector is not complete, as only estimates of NH₃ emission are reported from 3B manure management and 3D Inorganic N-fertilizers and there is just one entry for NMVOC emissions under 3I Agriculture other. Other relevant air pollutants from agriculture, e.g., NO_x, NMVOC and PM are reported as 'NO' (Not Occurring), 'NA' (Not Applicable) or 'NE' (Not Estimated) in the NFR tables.

125. The ERT reminds the Party that the 2013 EMEP/EAA Guidebook provides methodologies for estimating emissions of NO_x, NMVOC and PM from the Agriculture sector. The ERT recommends that the Party estimates the emissions of these pollutants in order to enhance the completeness of the Agriculture sector in future submissions.

126. The ERT noted that Slovakia reported emissions for the period 2000-2013 in the NFR tables, while the national totals for the complete time series (1990-2013) are given in the IIR, page 42 (Table 1). The ERT reiterates the recommendation made in the previous review in 2010 to provide a complete time series of the air pollutant emissions from the Agriculture sector in future submissions.

Consistency including recalculation and time series:

127. There is no reference to any recalculation in the Agriculture sector in the IIR. The ERT recommends that Slovakia undertakes recalculations using the methodologies provided in the 2013 EMEP/EEA Emission Inventory Guidebook and includes the recalculated emissions in future submissions.

Comparability:

128. Slovakia estimated its emission inventory for the Agriculture sector in accordance with the reporting requirements using the 2013 EMEP/EEA Emission Inventory Guidebook and reported emission estimates for 2000-2013 using the updated NFR tables. The emission factors for manure management were estimated according to productive parameters of domestic livestock categories while the EFs for fertilizers use were applied according to the default methodologies available for Central Europe. The ERT recommends that Slovakia explains and includes more information regarding EFs used for estimating NH₃ emissions in its next submission.

Accuracy and uncertainties:

129. The IIR provides no reference regarding QA/QC procedures for the emission inventory of the Agriculture sector, especially the uncertainty analysis of activity data of livestock. The ERT asked whether Slovakia would apply the QA/QC procedures for NH₃ emission calculations in future submissions. The Party responded to the ERT during the review week that a simple QA/QC procedure will be undertaken in the IIR future submissions. The ERT commends the Party for undertaking the QA/QC procedures in future submissions to enhance the reliability and the quality of the inventory data.

Improvement:

130. The ERT noted that there was no reference to any future improvements of the emission inventory for the Agriculture sector. The ERT encourages the Party to make some improvements to its inventory in future submissions. The ERT reminds the Party that the 2013 EMEP/EEA Guidebook provides methodologies for estimating emissions of NO_x, NMVOC and PM for such future improvements of the emission inventory of the Agriculture sector.

Sub-sector Specific Recommendations..

Category issue 1: 3B Manure management and 3D1 Inorganic N-fertilizer - NO_x, NMVOC, PM_{2.5} and PM₁₀

131. The ERT noted that NO_x, NMVOC, PM₁₀ and PM_{2.5} emissions from 3B Manure management and 3D1 Inorganic N-fertilizer are reported using the notation key 'NA' (Not Applicable), while the activity data for these categories is reported in the NFR tables. The ERT asked whether Slovakia would consider calculating emission of these air pollutants, considering that the 2013 EMEP/EEA Guidebook provides methodologies for estimating emissions of NO_x, NMVOC and PM from these categories. Slovakia informed the ERT during the review week that it will complete the emission inventory and provide the data in the next submission using Tier 1.

Category issue 2: 3b Manure management - NH₃

132. The ERT noted that in the IIR (page 13) it is stated that: *“The decrease of emission during the previous years until 2006 was mainly due to reduction of numbers in the livestock. After 2006 the decrease has a moderate tendency mainly due to technical improvements in the sector.”* The ERT asked the Party to elaborate on what was meant by the technical improvement in the sector. Slovakia responded during the review week that: *“The legislation in Slovakia: Decree of The Ministry of Environment No. 356/2010 Coll. that was repealed by Decree of The Ministry of Environment No. 410/2012 Coll., determines the obligation for ammonia reduction from animal production. The Decree requires introduction of low-emission systems and techniques in livestock production. Decree also provides incomplete list of these measures that can be applicable for particular processes. In the bulletin of The Ministry of Environment, the values which can be achieved by application of low-emission techniques are provided. The emission reduction of ammonia is assessed individually”*. The ERT thanks Slovakia for the speedy reply and recommends that Slovakia includes detailed information regarding the technical improvements that have been implemented in this sector to better understand NH₃ emission trends in the next submission.

Category issue 3: 3Da2a Animal manure applied to soil - NH₃

133. The ERT asked whether the Party would estimate NH₃ emissions from 3Da2a (Animal manure applied to soil) in future submissions. Slovakia responded to the ERT during the review week that it will hopefully estimate emission of NH₃ from this source in the next submission. The ERT commends the Party for its willingness to estimate and report emissions of NH₃ from 3Da2a in future submissions.

Category issue 4: 3Da3 Urine and dung deposited by grazing animals - NH₃

134. The ERT noted that the Party used the notation key ‘NA’ (Not Applicable) to report emission of NH₃ from 3Da3 (Urine and dung deposited by grazing animals). Using the notation key ‘NA’ in the NFR to report this activity would mean that urine and dung deposited by grazing animals is occurring but does not result in emission of NH₃. The ERT raised a question on this issue. Slovakia responded to the ERT during the review week that it will revise the use of the notation keys in the next submission. The ERT commends Slovakia for its willingness to revise the notation keys in the next submission to enhance the transparency of the emission inventory of the Agriculture sector.

Category issue 5: 3I Agriculture other - NMVOC

135. The ERT noted that the emission of NMVOC from 3I Agriculture other (0,438 kt) was reported in the NFR tables. However, in the IIR, page 22, Table 2 (under sector Agriculture) neither an EF nor a unit are given for NMVOC. The ERT raised a question on this issue. Slovakia responded to the ERT during the review week that the main source of NMVOC emission in 3I Agriculture other is the use of pesticides. The ERT thanks Slovakia for the speedy reply and recommends that Slovakia includes this information in the next submission in order to enhance the transparency of the emission inventory of the agriculture sector.

Category issue 6: 3F Field burning of agricultural residues - Notation keys

136. The ERT noted that Slovakia reported emissions of air pollutants from 3F (Field burning of agricultural residues) using the notation key 'NE' (Not Estimated) in the NFR tables. In the National Inventory Report for emissions of GHG (NIR submission 2014 to UNFCCC, page 238) it is stated that "this activity is strictly prohibited by law in the Slovak Republic". The emission of this activity was reported as 'NO' in the CRF Tables. According to Guidelines for reporting emissions data under CLRTAP, using the notation key 'NE' indicates that the activity may occur with a Party, but emissions by sources of air pollutants have not been estimated. The ERT recommends that Slovakia harmonizes reporting between the UNFCCC and CLRTAP in future submissions.

WASTE

Review Scope:

Pollutants Reviewed		SO ₂ , NO _x , NMVOC, NH ₃ , PM, heavy metals and POP's		
Years		1990 – 2013 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not Reviewed	Recommendations Provided
5A	Biological treatment of waste - Solid waste disposal on land	X		X
5B1	Biological treatment of waste - Composting	X		X
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities		X	
5C1a	Municipal waste incineration	X		X
5C1bi	Industrial waste incineration	X		X
5C1bii	Hazardous waste incineration	X		X
5C1biii	Clinical waste incineration	X		
5C1biv	Sewage sludge incineration	X		X
5C1bv	Cremation	X		X
5C1bvi	Other waste incineration (please specify the IIR)		X	
5C2	Open burning of waste		X	
5D1	Domestic wastewater handling	X		X
5D2	Industrial wastewater handling	X		X
5D3	Other wastewater handling	X		X
5E	Other waste (please specify in IIR)	X		X

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

General recommendations on cross-cutting issues.

Transparency:

137. The ERT notes that Slovakia's IIR provides some information about the emission sources for Waste. However, descriptions of the methodologies, detailed data sources and assumptions are missing. Furthermore, the ERT notes that Slovakia uses the notation key 'IE' for several sources (5C1, 5C1bii, 5C1biv and 5C1bv) without any explanation as to which sources' emissions are included. In response to a question from the ERT, Slovakia provided an explanation. The ERT reiterates its encouragement to Slovakia, from the 2010 review onwards, to continue developing elaborated explanations for activity data and methodologies, as well as AD tables and to mention clearly which processes are included or not included in each category and sub-category in the Waste sector. The ERT also reiterates its encouragement to Slovakia, from the 2010 review, to improve its explanations for using 'IE' in the subchapters.

Completeness:

138. Slovakia has frequently used the notation keys 'NE' and/or 'NA', while default emission factors are available in the Guidebook. The ERT notes that for the same source process emissions are reported so one can assume that also activity data is available. The ERT recommends that Slovakia reports all pollutants when both activity data and either default 2013 EMEP/EEA guidebook emission factors or other emission factors are available. Furthermore, it is recommended to summarise the reasons for not estimating the emissions whenever 'NE' is used in the IIR

139. The ERT notes that Slovakia does not report emissions (all pollutants) for the times series 1990-1999. However, in response to questions from the ERT, Slovakia stated that access had recently been gained to good quality historical data on the waste sector, but that the time series were not yet available in the NFR structure for all pollutants. Furthermore, Slovakia stated that it plans to include this data in future submissions.

Accuracy and uncertainties:

140. The ERT notes that Slovakia does not describe their QA/QC procedures in the IIR. The ERT recommends Slovakia to describe the general and sector specific QA/QC procedures in future submissions.

141. Slovakia does not provide an uncertainty analysis in the IIR. The ERT recommends including an uncertainty analyses in the IIR in future submissions.

Improvement:

142. The ERT notes that only limited follow up was done on the encouragements and recommendations of the review of 2010. Slovakia on request confirms this. The ERT recommends that Slovakia explores possibilities to accelerate the improvement process in future.

Sub-sector Specific Recommendations.

Category issue 1: 5A Solid waste disposal on land – Particulate matter

143. The ERT notes that no emissions of particulate matter (PM) are reported by Slovakia. Furthermore, the ERT notes that Slovakia reports a time series for the amounts of waste deposited in solid waste disposal sites (SWDS) and the 2013 EMEP/EEA Guidebook provides default EFs for PM. The ERT recommends calculating the PM emissions with the EFs from the Guidebook and including them in future submissions.

Category issue 2: 5A Solid waste disposal on land – All pollutants

144. The ERT reiterates the recommendation from the 2010 Review to add information on flaring and the use (energy purposes) of extracted landfill gas in the IIR.

Category issue 3: 5B1 Composting – NH₃ and CO

145. Slovakia reports no emissions from this source. The ERT notes that the Eurostat database reports no estimated amounts of composted waste as of 2002 and estimated amounts as from 1995. In response to a question from the ERT, Slovakia states that emissions from this source will be reported in the next submission.

Category issue 4: 5C1a Municipal waste incineration – All pollutants

146. Slovakia reports emissions from this source for almost all pollutants using the notation key 'IE'. Only for NH₃ the notation key 'NA' is used and for BC an 'NE' is used. In response to a question from the ERT Slovakia explained the use of 'IE'. The ERT notes that it is unclear where the source is included, which EFs were used and why deviating notation keys are used for NH₃ and BC. The ERT recommends that Slovakia to clarify this in the IIR in future submissions.

Category issue 5: 5C1bii Hazardous waste incineration

147. Slovakia reports emissions from this source for almost all pollutants with the notation key 'IE'. Only for NH₃ the notation key 'NA' is used and for NMVOC and BC 'NE' is used. In response to a question of the ERT Slovakia explained the 'IE' used. The ERT notes that it's unclear where the source is included, which EFs and AD are used and why deviating notation keys are used for NMVOC, NH₃ and BC. The ERT recommends that Slovakia clarifies this in the IIR in future submissions.

Category issue 6: 5C1biv Sewage sludge incineration – All pollutants

148. Slovakia reports emissions from this source for almost all pollutants with the notation key 'IE'. Only for NH₃ the notation key 'NA' is used and for NMVOC and BC 'NE' is used. In response to a question of the ERT Slovakia explained the 'IE' was used. The ERT notes that it's unclear where the source is included, which EFs and AD are used and why deviating notation keys are used for NMVOC, NH₃ and BC. The ERT recommends Slovakia to clarify this in the IIR in future submissions.

Category issue 7: 5C1bv Cremation – Main pollutants, Heavy metals and POPs

149. Slovakia reports emissions for several pollutants. However NO_x and SO₂ were reported as 'IE' without any reference in the IIR to which source these pollutants were allocated. Furthermore, Slovakia reports no heavy metals (except Hg) or POPs, while EFs are available in the Guidebook and the AD data is also available. Wherever the notation key 'IE' is used, the ERT recommends explaining this in the IIR, and to include the emissions of all pollutants in the inventory, and to report them in future submissions.

Category issue 8: 5C1bv Cremation – Hg

150. Slovakia uses an emission factor of 0.50 g/corps. The ERT notes that the default emission factor in the Guidebook 2013 is 1.49 g/corps. In response to a question from the ERT, Slovakia explained that they will correct this in the next submission.

Category issue 9: 5C1bv Cremation – All pollutants

151. In response to a question from the ERT regarding the incineration of animal carcasses, Slovakia answered that this process is included in subsector 1A5a. The ERT recommends that Slovakia explains this in the IIR in future submissions.

Category issue 10: 5C2 Open burning of waste – All pollutants

152. In the NFR table, Slovakia uses the notation key 'IE' (PM emissions). The ERT notes that it is unclear to which source these emissions are allocated, and which EFs and AD are used. The ERT reiterates its recommendation from the 2010 review, namely to clarify this in the IIR in future submissions.

Category issue 11: 5D Waste water handling – All pollutants

153. Slovakia reports no emissions in this NFR subcategory. In the 2010 review Slovakia stated that these processes are occurring but that there was a lack of methodology and AD and that further studies were needed. The ERT reiterates its encouragement from the 2010 review to undertake these studies and recommends that Slovakia reports the data from these processes in future submissions.

Category issue 12: 5E Other waste – All pollutants

154. No emissions are reported ('NA') and no explanations have been found in the IIR. The ERT reiterates the encouragement from the 2010 review to provide emission methodology and emission data in the future submissions.

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. REVIEW2015_SK_ANSWERS_v1.xlsx
2. REVIEW2015_SK_ANSWERS_v2.xlsx
3. SK_NK_2015_rev.xlsx