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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:

BULGARIA

CONTENT

INTRODUCTION

1.   The mandate and overall objectives for the emission inventory review process under the LRTAP Convention are given by the UNECE document 'Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols' (1) – hereafter referred to as the 'Methods and Procedures' document.

2.   This annual review has concentrated on SO_x, NO_x, NMVOC, NH_3, plus PM_{10} & $PM_{2.5}$ with optional review of Cd, Pb and Hg for the time series years 1990 – 2007 reflecting current priorities from the EMEP Steering Body and the Task Force on Emission Inventories and Projections (TFEIP).

3.   This report covers the stage 3 centralised review of the UNECE LRTAP Convention and EU NEC Directive inventories of Bulgaria, coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 22nd June 2009 to 25th June 2009 in Copenhagen, Denmark, and was hosted by the European Environment Agency (EEA). The following team of nominated experts from the roster of experts performed the review: Lead Reviewer – Justin Goodwin (EC) generalist – Kevin Hausmann (Germany), Energy – Laettitia Serveau (France), Mobile – Morten Winther (Denmark), Industry and Waste – Hans Wradhe (Sweden) and Leif Hoffman (Denmark), Solvents – Nadine Allemand (France), Agriculture + Nature – Jim Webb (UK).

4.   The review was coordinated by Justin Goodwin and Katarina Marečková, (EMEP Centre on Emission Inventories and Projections – CEIP).

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[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

5.   In its 2009 submission, Bulgaria reported 2007 data only. Earlier years were analysed using former submissions and considered for this review. Bulgaria reported 2005 gridded emissions for Gothenburg protocol pollutants. Bulgaria also provided an informative inventory report (IIR).

6.   Whilst the ERT commends Bulgaria for its efforts in compiling and reporting its emissions inventory in the NFR08 format, both Bulgaria's IIR and data submission are incomplete. This made it difficult for the ERT to fully assess the inventory accuracy. Details on missing (particularly for transport, industrial processes, and solvents) or un-transparent sectors follow in the specific sections below. Most importantly, the ERT noted the lack of complete and consistent time series and the absence of activity data to provide transparency to the emissions data. The ERT put detailed recommendations in part B of this report.

KEY CATEGORIES

7.   Bulgaria presents a "tier 1" key category analysis (KCA) based on level assessment in its IIR. The ERT encourages Bulgaria to use its timeseries data to also perform a tier 1 trend assessment.

8.   The KCA taken from Bulgaria's IIR differs from the KCA as presented by CEIP's analysis of the data submitted. This is due to the fact that some of the data reported in Bulgaria's IIR KCA does not match the actual values in the NFR submission. As an example, 1A3e is a key category for NO_x in the IIR but reported as "NE" in the NFR tables. The ERT encourages Bulgaria to review its Key Category Analysis and to improve consistency between the IIR and the reported NFR tables by defining the key sources using the lowest NFR level.

9.   The ERT notes that Bulgaria does not split emissions from road transport into the different road transport categories and therefore cannot identify key road transport categories. The ERT encourages Bulgaria to develop its key analysis and use it for inventory improvement prioritisation.

QUALITY

Transparency

10.   The ERT commends Bulgaria for using country specific emission factors and emission estimates in most Sectors. However, the IIR does not describe these factors and estimates in a sufficient way for the ERT to be able to determine the validity of the underlying data or methods. The ERT encourages Bulgaria to provide more detailed descriptions of the methods, data sources and assumptions used in making its estimates in future IIRs. The ERT

recommends that, where resources are limited, Bulgaria focus on detailed explanations for Key Categories first.

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

12.   Bulgaria's IIR mentions a project currently under way for the establishment of QA/QC procedures (see also below) in a "new national inventory system". The ERT welcomes this initiative and encourages Bulgaria to also improve the inventory transparency (reducing IEs and providing better descriptions of methods, assumptions and data sources) at the same time.

Completeness

13.   The Bulgarian inventory lacks completeness. In particular, a number of subsectors in transport, industrial processes, and solvents are not estimated. Further details of the sectors that are missing are included in the specific sections in part B of this report. The ERT encourages Bulgaria to assess the gaps in the inventory and to try to make estimates of all sources of emissions. Where resources are limited, the ERT encourages Bulgaria prioritise Key Categories and categories highlighted later in this report.

Consistency, including recalculations and time-series

14.   Bulgaria has recently updated their inventory 2007 year with revised methods and emission factors. Currently these revisions have only been applied to the year 2007 for most but not all of the categories. Bulgaria has not submitted recalculations of previously submitted timeseries of emissions. Bulgaria plans to apply the new methods for the full timeseries by the 2011 reporting year (for the 2009 inventory). The ERT commends Bulgaria for this work and encourages it to deliver a consistent timeseries as soon as possible and to document any interim inconsistencies in its 2010 IIR.

Comparability

15.   Due to the lack of transparency in the methods, lack of activity data, the relatively high usage of "IE", and significant usage of country specific emission factors, it was difficult for the ERT to assess the comparability of the inventory. The ERT encourages Bulgaria to use its IIR to present clear details of the methods, data sources (including activity data and emission factors) and assumptions.

CLRTAP/NECD comparability

16.   The ERT identified some differences between the CLRTAP and NECD inventories for all sectors. Bulgaria, in their response to the review questions, indicated that these differences have been the result of submitting different data to NECD and then to CLRTAP and indicated that the data would be consistent in their next submission.

Accuracy and uncertainties

17.   Bulgaria did not provide any information on uncertainties. The ERT encourages Bulgaria to undertake some initial uncertainty assessments while improving its inventory over the next few years.

18.   The ERT commends Bulgaria for developing new methodologies in 2008, using the Third Edition of the EMEP/CORINAIR Atmospheric Emission Inventory Guidebook, to improve its inventory under CLRTAP to eliminate some of the previous data gaps and to take into account country specific factors including technologies and equipment.

19.   The ERT is conscious that the full implementation of the requirements of the new methodology will take time. The ERT encourages Bulgaria to continue this implementation for all years in the timeseries.

Verification and quality assurance/quality control approaches

20.   Bulgaria states in its IIR that QA/QC procedures will be part of the new national inventory system currently under development. The ERT looks forward to the improvements introduced by the new system in future inventory submissions. The ERT encourages Bulgaria to fully document the QA/QC and provide verification in future IIRs with a focus on how of the actual in-house inventory production and checking processes take place. Descriptions should focus on input data handling/storage, calculation, set up of the inventory in report format, and the check of correct transfer of data between the individual working steps of the inventory.

FOLLOW-UP TO PREVIOUS REVIEWS

21.   Bulgaria provided detailed responses to the questions identified in stage 2 on outliers of implied emission factors. The ERT encourages Bulgaria to continue cooperation with the CEIP and to make sure stage 2 and 3 issues are addressed in future emission inventory submissions.

AREAS FOR IMPROVEMENTS IDENTIFIED BY BULGARIA

22. The ERT notes Bulgaria's intention to recalculate emissions for the full time series and to set up a project to improve the inventory in terms of accuracy, transparency, comparability. The ERT highly supports this improvement plan.

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

24. The ERT sets out a number of specific recommendations in part B of this report. These are detailed in both their cross-cutting and their sector specific nature below.

25. In its response to the review Bulgaria has indicated that all recommendations from the review team concerning technical mistakes, the improvement of key category analysis, methodology descriptions for key categories in the IIR, the full implementation of general and sector specific QA/QC, and the examination and verification of some of the emission factors (e.g. using EUETS and plant specific data) will be taken into consideration during the preparation of the next report under the UNECE LRTAP Convention and EU National Emissions Ceilings Directive.

26. The ERT also notes that Bulgaria has ministerial approval for a 14 month Recalculation project that will address the timeseries' consistency of the inventory, the transparency of the IIR and the data used for the inventory estimates and its uncertainty assessments. The ERT recommends that Bulgaria continue with the implementation of this project and ensure that key categories and missing or categories with high uncertainty are addressed as a priority.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

27.   The ERT encourages Bulgaria to report complete and consistent time series in the NFR08 format.

28.   The ERT encourages Bulgaria to check the importance of sources that are not estimates and to estimate emissions where possible, to document the checks and methods used and provide the rationale for categories not estimated in future IIRs.

29.   For improved transparency, the ERT encourages Bulgaria to extend the description of its methods, assumptions and data sources in the IIR. The ERT encourages Bulgaria to provide in its IIR detailed activity data and emission factors at the required NFR level of detail (at least for Key Categories) and splitting currently aggregated estimates into the required NFR categories, thus reducing the use of "IE" and where this is not possible provide documentation of "IE" use in its reporting tables.

30.   The ERT encourages Bulgaria to reassess the confidentiality issue for activity data. The ERT encourages Bulgaria to consider the reporting of publicly available activity data for the energy sector a minimum requirement as it is unlikely to be confidential and is reported by Bulgaria UNFCCC.

31.   The ERT encourages greater cooperation with the Bulgarian GHG inventory team to ensure that activity data and other assumptions are consistent between the two inventories.

32.   The ERT encourages the use of the key source analysis for inventory improvement and documentation of this in the IIR.

33.   The ERT encourages the use the appropriate notation keys (e.g. NO where emissions are "Not Occurring", NE where emissions are "Not Estimates" and IE where emissions are "Included Elsewhere".

34.   The ERT encourages Bulgaria to assess the uncertainty of the emission estimation.

35.   Recommended improvements relating to specific source categories are presented in the relevant sector chapters of this report.

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

Energy

<u>*Review scope*</u>

Pollutants Reviewed		SO_x, NO_x, NMVOC, CO, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990–2007 + (Protocol Years)		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not reviewed**	**Recommendation provided**
1.A.1	Energy industries	x		x
1.A.2	Manufacturing industries and construction	x		x
1.A.4	Commercial, residential, agriculture & forestry	x		x
1.A.5	Other	x		x
1.B.1	Fugitive emissions from solid fuels	x		
1.B.2	Fugitive emissions from oil and natural gas	x		
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

<u>*General recommendations on cross cutting issues*</u>

36.   Completeness: The ERT encourages Bulgaria to provide emission estimates or at least an explanation in its IIR of the categories reported as "NE" (e.g. NFR 1A4ciii, 1B1c and 1B2avi) and to identify any other potential sources of emissions.

37.   **Transparency**: The ERT notes that the methodological descriptions used are not detailed enough for the energy sector (particularly for 1A1, 1A2, 1A4 and 1B). The ERT encourages Bulgaria to provide more detailed explanations of data sources, assumptions and methodologies in its IIR and to indicate if the methodology used is the same for all years.

38.   **Uncertainty**: The ERT encourages Bulgaria to undertake uncertainty analysis for the Energy Sector in order to help support the improvement process and to provide an indication of the reliability of the inventory data.

39.   **Comparability and consistency**: The ERT noted some differences between the CLRTAP and NECD submissions for Energy including a significant difference for 1A4bi in 2007 and other differences for 1A1, 1A2 and 1A4 for 2002–2004. The ERT encourages Bulgaria to resolve these differences and to provide a full explanation of any remaining differences in its future IIRs.

40.   **QA/QC procedures:** The ERT encourages Bulgaria to indicate in its future IIRs specific QA/QC procedures developed for the energy sector.

41.   **Recalculations:** The ERT notes that the years before 2007 have not been recalculated for the Energy sector and acknowledges Bulgaria's plan to develop a consistent time series for its 2011 submission.

42.   **Improvement:** Bulgaria's IIR does not include details of improvements planned for the Energy Sector. The ERT encourages Bulgaria to include details of planned improvements in future IIRs.

Sub-sector specific recommendations

1A Energy sector

43.   Activity data for the different codes from NFR 1A and 1B are noted as confidential or "NA". While the ERT acknowledges Bulgaria's statement that the activity data for LCPs are confidential for individual plants, according to the requirements of the NSI, the ERT encourages Bulgaria to make activity data at the national aggregated SNAP/NFR codes level available to improve the transparency of the inventory.

44.   The ERT notes that Bulgaria has not estimated emissions of NH3 for the energy sector; however, emissions may occur from the use of NO_x abatement techniques in the industry. The ERT encourages Bulgaria to investigate whether there is data from industry on measurements or emissions for NH3 emissions and to provide estimates or a rationale as to why emissions are not occurring in its future submissions.

45.   The ERT notes from Bulgaria's response to questions during the review that the statistical data used for the energy sector may be inconsistent between CLRTAP and UNFCCC submissions. The ERT encourages Bulgaria to document any inconsistencies in its IIR and to try to ensure consistency between its submissions under the UNFCCC and UNECE.

1A1a Public electricity and heat production

46.   The ERT notes from Bulgaria's response to the review questions that Bulgaria does not calculate waste incineration because of a lack in the National CORINAIR methodology for waste incineration with energy recovery. The ERT encourages Bulgaria to apply emission factors for waste incineration without energy recovery (SNAP 010106) which is included in the NFR 6Cc (new format N08) and to investigate developing country specific emission factors based on industry or permit information.

47.   The ERT noted a high level of SO_x emissions per capita for Bulgaria. Bulgaria confirmed that there are 3 big industries in Bulgaria (Maritza East region) which are using lignite coal of low quality – with high sulfur, ash (21.8% av.) and wet (47.6% av.) content. The share of these TPP is about 40% of the electricity produced and about 70% of the national total of SO_2. The ERT encourages Bulgaria to provide details of these country specific factors in future IIRs.

1A2 Stationary combustion in manufacturing industries and construction

48.   The ERT noted the use of "IE" notation keys for NFR 1A2c and 1A2e and Bulgaria's response that emissions are included under 1A2a. The ERT encourages Bulgaria to separate future emissions where possible into the appropriate NFR codes (using national statistics or where these are not available proxy data e.g. number of installations per sub-sectors, figure of affair per installation, number of employees per installation). Where this is not possible the ERT encourages Bulgaria to provide a clear explanation in future IIRs of where emissions for NFRs with "IE" are included.

1A2fi Stationary combustion in manufacturing industries and construction: Other

49.   The ERT encourages Bulgaria to describe clearly in its IIR that for the SNAP code 030325, emissions are assessed with less than 1% according to the national methodology and that they are not calculated.

Mobile sources

Review scope

Pollutants reviewed		SO_x, NO_x, NMVOC, CO, NH_3, PM_{10} & $PM_{2.5}$, Cd, Hg, Pb		
Years		1990–2007 + (Protocol Years)		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not reviewed**	**Recommendation provided**
1.A.2	Manufacturing industries and construction mobile sources	x		
1.A.3	Transport	x		x
1.A.4	Commercial, residential, agriculture & forestry mobile sources	x		x
1.A.5	Other mobile sources	x		x
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

50.   **Completeness**: The ERT notes that a number of sectors (1A3b vi & vii (road transport tyre and brake wear and road abrasion, and 1A4c iii national fishing) are missing from Bulgaria's inventory for the full time series to 2007 as indicated below. Emission estimates are missing for all mobile sub sectors before 2000. After 2000, for some sub sectors pollutants/year combinations are missing in the time series (1A3a ii (i/ii, domestic aviation LTO/Cruise), 1A3b i (passenger cars)), for years 2000 onwards as indicated below. The ERT encourages Bulgaria to complete the time series of emissions.

51.   **Transparency**: The ERT notes that Bulgaria uses "IE" for a number of source categories including 1A3b (road transport) 1A2f ii (manufacturing industries and construction mobile), 1A3c (railways), 1A3d ii (national navigation), 1A4a ii (Commercial and institutional mobile), 1A4b ii (Household and gardening mobile) and 1A4c ii (Agriculture and Forestry mobile). In order to improve the transparency of the inventory for mobile sources the ERT encourages Bulgaria present these emissions separately in the NFR tables and to provide the detailed energy data and emission factors used in the IIR.

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

53.   **QA/QC procedures:** Bulgaria has not provided any documentation of mobile source specific QA/QC in its IIR. The ERT encourages Bulgaria to implement sector specific QA/QC and to document these activities in its future IIRs.

54.   **Recalculations:** Bulgaria has made no recalculations in the inventory for mobile sources.

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

Sub-Sector Specific Recommendations.

1.A.3.b Road transport

56.   Bulgaria uses a fuel based methodology and emission factors for all mobile sectors, which is in agreement with a tier 1 EMEP/CORINAIR methodology. The ERT encourages Bulgaria to use more detailed tier 2 or 3 based methods for Key Categories such as road transport in order to estimate emissions of PM, NO_x, NMVOC and CO more accurately and to take account of country specific vehicle fleet and mileage data.

57.   The emission estimates for all subsectors of 1A3b (road transport) are included in the 1A3b i (passenger cars) sector, and the IE notation key is given in each case. The ERT encourages Bulgaria to make separate emission estimates for these sectors in its future submissions using national statistical data or, where this is unavailable, using proxy data.

1.A.3.b Road transport passenger cars

58.   For 1A3b I (passenger cars) emission estimates of TSP and $PM_{2.5}$ are missing for all years, and for PM_{10} estimates are missing for 2001–2006. The ERT encourages Bulgaria to make separate estimates for these sectors too.

1.A.3.vi Road transport tyre and brake wear and road abrasion

59.   The ERT notes that estimates are missing for 1A3b vi and vii (tyre and brake wear; road abrasion), although emissions arising from activities in these sectors may be expected and calculation methods and emission factors for these sectors are available in the EMEP/CORINAIR guidebook. The ERT encourages Bulgaria to collect activity data for these sectors and calculate estimates in order to make the inventory more complete.

1A3a ii (i & ii, domestic aviation LTO and cruise

60.   For 1A3a ii (i & ii, domestic aviation LTO and cruise), emission estimates of PM10 and PM2.5 are missing for all years. For 1A3a ii (I, domestic aviation LTO), CO, NMVOC and NOx emission estimates are missing for 2003–2006. For 1A3a ii (i, domestic aviation cruise), SOx emission estimates are missing for 2001–2006. The ERT recommends that Bulgaria make separate estimates for these sectors too.

1A4c iii (National Fishing)

61.   The ERT notes that estimates are missing for 1A4c iii (National Fishing) although emissions arising from activities in these sectors may be expected and calculation methods and emission factors for these sectors are available in the EMEP/CORINAIR guidebook. The ERT

encourages Bulgaria to collect activity data for these sectors and calculate estimates in order to make the inventory more complete.

1A5b (Other) sector

62.   For the subsectors 1A2f ii (manufacturing industries and construction mobile), 1A3c (railways), 1A3d ii (national navigation), 1A4a ii (Commercial and institutional mobile), 1A4b ii (Household and gardening mobile) and 1A4c ii (Agriculture and Forestry mobile) the emission estimates are included in the 1A5b (Other) sector, and the IE notation key is given in each case. The ERT encourages Bulgaria to make separate emission estimates for these sectors in its future submissions using national statistical data or, where this is unavailable, using proxy data.

Industrial Processes

Review Scope

NFR Code	CRF_NFR Name	Reviewed	Not reviewed	Recommendation provided
Pollutants reviewed		SO$_2$, NO$_x$, NMVOC, NH$_3$, PM$_{10}$ & PM$_{2.5}$		
Years		1990–2007 + (Protocol Years)		
2.A.1	Cement production	X		X
2.A.2	Lime production	X		X
2.A.3	Limestone and dolomite use	X		X
2.A.4	Soda ash production and use	X		X
2.A.5	Asphalt roofing	X		X
2.A.6	Road paving with asphalt	X		X
2.A.7	Other including non fuel mining & construction (please specify in a covering note)	X		X
2.B.2	Nitric acid production	X		X
2.B.3	Adipic acid production			
2.B.4	Carbide production	X		X
2.B.5	Other (please specify in a covering note)	X		X
2.C.1	Iron and steel production	X		X
2.C.2	Ferroalloys production	X		X
2.C.3	Aluminium production	X		X
2.C.4	SF$_6$ used in aluminium and magnesium foundries		X	
2.C.5	Other (please specify)	X		X
2.D.1	Pulp and paper	X		X
2.D.2	Food and drink	X		X
2.D.3	Wood processing	X		X
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

63. **Completeness**: The ERT does not consider the industrial processes sector to be fully complete, neither concerning reported emissions nor regarding the provision of activity data. The ERT encourages Bulgaria to provide activity data and to estimate emissions for all sources and years.

64. The ERT identified that for some surather than bsectors and pollutants (e.g. NMVOC for 2A5 and 2A6, NH$_3$ and NO$_x$ for 2B1, NMVOC for 2C5e), NA or NE was reported for 2007

emissions but figures for 2005 and 2006. Bulgaria indicated in its response to the review that some are mistakes that will be corrected, and that some minor emissions have been replaced with NA. The ERT encourages Bulgaria to carry out the corrections and encourages Bulgaria to report the calculated or estimated emissions even if insignificant, rather than reporting NA or NE in future IIRs.

65.   The ERT noted that Bulgaria, in its IIR, gave the reason **"data gaps"** (lack of activity data or EFs) for not reporting emissions from several subsectors. The ERT encourages Bulgaria to make efforts to identify the activity data and to at least use Tier 1 emission factors from the Guidebook.

66.   The ERT notes that some emissions e.g. subsectors 2.A.5, 2.A.6 and 2.B.1. are not reported by Bulgaria though activity data is present (UNFCCC reporting) and Tier 1 emission factors exist in the Guidebook. The ERT encourages Bulgaria to use available data sources in order to make the best possible emission estimates.

67.   QA/QC procedures: The ERT noted that Bulgaria has some basic general QA/QC checks. The ERT encourages Bulgaria to implement sector specific OA/QC procedures for the sector.

68.   **Recalculations:** No recalculations have been performed for the Industrial Processes sector. Bulgaria indicated that these would be undertaken between now and 2011. The ERT encourages Bulgaria to establish such procedures.

69.   **Uncertainty**: The ERT encourages Bulgaria to undertake uncertainty analysis for the industrial processes in order to help support the improvement process and to provide an indication of the reliability of the inventory data.

70.   Transparency: The ERT encourages Bulgaria to use the appropriate notation keys for "A1 and 2A2. The IIR is not completely transparent. The ERT encourages Bulgaria to include more detail in the IIR for the Industrial Processes categories covering methods, assumptions and data sources including emission factors and activity data. The ERT also encourages Bulgaria to provide sector specific information on **uncertainties and planned improvements of the inventory.**

71.   Comparability: The ERT noted that the same data were used by Bulgaria for CLRTAP and NECD reporting. However, The ERT notes that the emission figures in Bulgaria's emission report to the UNFCCC differs significantly from the figures in the report to CLRTAP for the emissions of NO_x, SO_2 and NMVOC. For most of the subsectors (excl. Metal production) the activity data is reported by Bulgaria to the UNFCCC but not to CLRTAP/NECD. Bulgaria has responded that the calculations have been carried out by two different institutions with a lack of communication between them. Bulgaria is planning to implement a common methodology which will reduce the differences in data reported to both conventions. The ERT encourages Bulgaria to coordinate the reporting of emissions and activity data between the different conventions and directives.

72.   **Improvement**: Bulgaria's IIR does not include details of improvements planned for the Industrial Processes Sector. The ERT encourages Bulgaria to include details of planned improvements in future IIRs.

Sector specific recommendations

2A2 Cement and lime particulates (PM)

73.   The ERT noted that Bulgaria used NA for particulates from cement and lime production, 2A1 and 2A2. Bulgaria responded that there has been a mistake and that it should have been reported as IE (included in 1A2f). The ERT encourages Bulgaria to correct the mistake and encourages Bulgaria to separate the industrial process emissions for 2A1 and 2A2 from 1A2f where possible and where not, to describe where the emissions are included in future IIRs.

2A5 Asphalt roofing and 2A6 road paving with asphalt NMVOC

74.   The ERT notes that emissions of NMVOC and $PM_{2.5}$ emissions from 2.A.5 and 2.A.6 are not reported by Bulgaria. The ERT encourages Bulgaria to calculate these emissions by using at least Tier 1 methodologies and to provide details of the estimates in future IIRs.

2B1 Ammonia production

75.   The ERT notes that NO_x and NH_3 emissions from 2.B.1. are not reported. The ERT encourages Bulgaria to calculate and report these emissions, preferably using Tier 2 method and to provide details of the estimates in future IIRs.

2C1 Iron and steel production

76.   The ERT noted that subsector 2.C.1. Iron and steel production is a key category for CO, heavy metals and dioxins and that the emission calculations are based on tier 1 methods. The ERT encourages Bulgaria to use facility data, from e.g. EPRTR reporting and regulatory returns under IPPC, to develop country specific emission factors and to present details of the methodology in future IIRs.

Solvents

Review Scope

NFR Code	CRF_NFR Name	Reviewed	Not reviewed	Recommendation provided
Pollutants Reviewed		NMVOC		
Years		1990–2006 + (Protocol Years)		
3.A.1	Decorative coating application	**3A1**		x
3.A.2	Industrial coating application	**3A2**		x
3.A.3	Other coating application (please specify the sources included/excluded in the notes column to the right)	**3A3**		
3.B.1	Degreasing	**3B1**		x
3.B.2	Dry cleaning	**3B2**		x
3.C	Chemical products, manufacture & processing	3C		x
3.D.1	Printing	**3D1**		x
3.D.2	Domestic solvent use including fungicides	**3D2**		x
3.D.3	Other product use	**3D3**		x
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

77.   **Completeness**: The ERT notes that the solvents sector is incomplete with no emissions estimated under SNAP 060301 to 060314 in NFR 3C and SNAP 060401 and 060412 in NFR 3D and that Solvent Sector emissions are not reported for the years 1990–2000. Bulgaria plans to improve the completeness for future years and explained that the activities not estimated in 2001–2007 represent less than 1% of NMVOC emissions. The ERT encourages Bulgaria to try to estimate emissions using simple tier 1 methods and to extend the timeseries back to 1990 for all categories.

78.   **QA/QC procedures:** The ERT encourages Bulgaria to indicate in its future IIRs specific QA/QC procedures developed for the Industrial Processes sector.

79.   **Recalculations:** The ERT notes that the years before 2007 have not been recalculated and acknowledges Bulgaria's plan to develop a consistent timeseries for its 2011 submission.

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

81.   **Transparency**: Bulgaria is encouraged to improve the quality of the IIR. The description of the methodologies used for the solvent sectors could be improved by adding

details of the emission factors, activity data, method assumptions and data sources. Bulgaria's lack of reported activity data does not improve the transparency of the inventory.

82.   **Improvement**: Bulgaria's IIR does not include details of improvements planned for the Solvents Sector. The ERT encourages Bulgaria to include details of planned improvements in future IIRs.

Sector specific recommendations

3.A. Paints and coatings – NMVOC

83.   The ERT encourages Bulgaria to improve the description of the methodology used to estimate NMVOC emissions from solvent uses in paint applications in the IIR report.

84.   The ERT encourages Bulgaria to re-allocate SNAP 060103 "Building application of paints" in NFR 3A1 and not under NFR 3A3.

3 A 1   Decorative coating application – NMVOC

85.   The ERT encourages Bulgaria to take into account the different types of paints used (solvent borne and water borne paints) for building and construction applications and domestic uses. Bulgaria is also encouraged to take into account the impact of the EU Directive of 21 April 2004 [2004/42/EC] related to the use of paints for building applications and car repairing which specifies a maximum solvent content for products in the EU Member states.

3 A 2   Industrial coating application – NMVOC

86.   The ERT was unable to determine whether an appropriate tier 3 methodology had been used for estimates of industrial applications of paints due to a lack of transparency in the IIR. The ERT encourages Bulgaria to provide additional information, in its future IIRs, on the share of the activity according to different emission factors, details of plant data used and on verifications made to ensure that 100% of the activity is taken into account in the estimates.

87.   For industrial applications of paints, the ERT noted that the EFs associated with the second set of controls seem quite high, providing only a 50% emission reduction compared to the EF without control. This is not consistent with the EU directive 1999/13/EC implementing ELVs for stack emissions and fugitive emissions which show a > 50% decrease between abated and unabated emissions. Bulgaria explains that the EFs are derived from some investigations that were carried out. The ERT encourages Bulgaria to check this issue and to provide further details in future IIRs.

3 B 1   Degreasing – NMVOC

88.   Bulgaria uses three emission factors for different types of degreasing processes. Two of them are expressed as a mass of VOC per unit independent of the size of the operating unit. The EFs do not take into account the progress made in degreasing operations and do not take into account the impact of EU directive 99/13. The ERT encourages Bulgaria to improve the

EFs for these activities and to better take into account the improvements in the industry and impacts of the EU Directive.

3.B 2. Dry cleaning – NMVOC

89.   The methodology developed for dry cleaning – although correct – is not described clearly in the IIR. The ERT encourages Bulgaria to provide a transparent description of the method, data sources and assumptions used to estimate the share of the different machines and the amount of textiles cleaned in its future IIRs.

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

90.   The ERT encourages Bulgaria to check the existence of emissions from polyester processing, rubber processing, and manufacture of pharmaceutical products. The ERT acknowledges that these sources are unlikely to be key categories. However, the ERT encourages Bulgaria to attempt to estimate or provide some details in its IIR on these categories.

91.   For SNAP 060303 ployurethane, 060304 polystyrene processing and 060310 asphalt blowing. Bulgaria explains that the EF ranges from 6 to 12 kg/t (as examples) and that the average value is used without providing information on the derivation of the EF. The ERT encourages Bulgaria to provide further details on how these emission factors have been derived in the next submission.

92.   In addition to polystyrene processing, the Bulgarian EF is 10 times lower than the EF provided by the Guidebook. Bulgaria is encouraged to check its EF and explain the differences with the default EF in its next submission.

3.D 1   Printing

93.   For NFR 3D1 printing activities, constant EFs are used across the time series. The EFs do not take into account any progress made in printing operations and they do not take into account the impact of the EU directive 99/13. As this is a Key Category the ERT encourages Bulgaria to develop a tier 2 or 3 methodology. The ERT encourages Bulgaria to improve the EFs for these activities and develop a methodology to follow the progress made in solvent emission reduction.

3 D 2   Domestic solvent use including fungicides

94.   Bulgaria does not estimate emissions for 3D2, activities such as domestic uses of products could be large contributors of emissions. The ERT encourages Bulgaria to attempt to estimate or provide some justification for not estimating emissions in the next submission.

95.   The EF for glue and adhesive application is high compared to defaults and to other MS. In addition, this EF only reflects solvent based adhesives. The ERT encourages Bulgaria to investigate the proportion of water borne and solvent free glues to consider developing a

country specific emission factor based on more detailed studies and to include details of new methods or investigations in future IIRs.

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

96.   ERT encourages Bulgaria to check the existence of emissions from pharmaceutical product manufacturing. The ERT acknowledges that these sources are unlikely to be key categories. However, the ERT encourages Bulgaria to attempt to estimate or provide some details in its IIR on these categories.

Agriculture

Review scope

Pollutants reviewed		NMVOC, NH$_3$, PM$_{10}$ & PM$_{2.5}$		
Years		1990–2006 + (Protocol Years)		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not reviewed**	**Recommendation provided**
4.B	Manure management	NH$_3$, NMVOC, PM$_{10}$ & PM$_{2.5}$		X
4.D1	Direct soil emissions	NH$_3$, NMVOC		X
4.F	Field burning of agricultural wastes			X
5E	Other			No
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

97.   **Completeness**: The inventory is complete with respect to the most important sources of emissions, except that NH$_3$ emissions from grazing livestock are not included in 4D and no emissions are calculated for 4F. The inventory does not include estimates for Agriculture for the years 1990 – 2000. The ERT recommends the inclusion of NH$_3$ emissions from grazed livestock and Sector 4F (Field Burning) to increase completeness and to estimate emissions for the years 1990–2000.

98.   QA/QC procedures: The ERT encourages Bulgaria to make use of the national QA/QC system to implement sector specific OA/QC procedures for agriculture.

99.   **Recalculations:** The ERT encourages Bulgaria to recalculate the complete timeseries when introducing new methods.

100.   **Uncertainty**: Bulgaria currently does not undertake quantitative or qualitative uncertainty analysis for the agriculture sector. The ERT encourages Bulgaria to undertake specific uncertainty analysis for the agriculture sector in order to help support the improvement process and to provide an indication of the reliability of the inventory data.

101.   **Comparability**: The ERT noted a discrepancy between the CLRTP and NECD entries for NO8 4B8 in 2007 which was reported as 5.09 kt in the CLRTAP but 5.9% higher in the NECD comparison. There was also a difference for NO8 4B9d in 2007 which was entered as 1.25 kt in the CLRTP entry but did not appear in the NECD. The ERT encourages Bulgaria to investigate the differences between the UNECE and the NECD inventories so as to fix any inconsistencies and to report these in its IIR.

102.   **Transparency**: The IIR is generally transparent for the Agriculture sector. The ERT encourages the Party to include more detail in the IIR including: specific EFs and some description of livestock husbandry and manure management which have an impact on NH$_3$ emissions.

103.   **Improvement**: The ERT notes the Party's intention to improve the estimate of NH_3 emissions by adopting the revised CORINAIR methodology for the full timeseries. The ERT encourages Bulgaria to include relevant information on manure management and the implementation of planned improvements.

Sector specific recommendations

104.   For sectors 4B and 4D the IIR for Bulgaria presents a satisfactory and reasonably transparent Tier 1 methodology. Since sectors 4B and 4D are key sources of NH_3 emissions, the ERT encourages Bulgaria to adopt the Tier 2 approach described in the revised EMEP/CORINAIR guidebook for the calculation of NH_3 emissions from sectors 4B and 4D.

4.B Manure management:- NH_3

105.   The ERT notes that the implied EF for NH_3 emissions from 4B 1a is small compared to defaults and to other MS and it appears to be an underestimate. The ERT asked about the grazing period but Bulgaria was unable to respond during the review period. The ERT encourages Bulgaria to investigate the emission factors and methods used to estimate emissions from 4B1a and to provide more details on these in future IIRs.

106.   The ERT noted a decrease in NH_3 emissions from horses from 2004 (4.5 kt) –2005 (3.5 kt), which then increase again in 2006 (4.4 kt). The ERT encourages Bulgaria to investigate the emission factors and methods used to estimate emissions from 4B1a and to provide more details on these in future IIRs.

4.D.1 Agricultural Soils:- NH_3

107.   The ERT questioned the omission of a calculation of NH_3 emissions for grazing. During the review Bulgaria indicated that the emissions are not estimated because there are no representative activity data. The ERT encourages Bulgaria to try to obtain activity data on grazing and to document any new methods or a rationale for not estimating emissions in future IIRs.

Waste

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
6.A	Solid waste disposal on land	x		x
6.B	Waste-water handling	x		
6.C	Waste incineration	x		x
6.D	Other waste (e)	x		
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

108.   **Completeness**: The ERT does not consider the waste sector to be fully complete. Emission estimates for waste water handling, cremation and small scale burning are missing. The ERT encourages Bulgaria to consider using Tier 1 methods for the estimation of emissions rather than reporting them as NE to improve the completeness of the inventory.

109.   **QA/QC procedures:** The ERT encourages Bulgaria to implement sector specific OA/QC procedures for the sector and describe them in the IIR.

110.   **Recalculations:** The ERT encourages Bulgaria to estimate emissions for all years using consistent methods and assumptions and to report these to the UNECE.

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

112.   **Transparency**: The IIR is not completely transparent. Emission factors and data source references are not described in detail for the waste sector and the use of notation keys (IE) is not described. The ERT encourages Bulgaria to include details of methods, assumptions and data sources and to include the emission factors and activity data used for estimating emissions for the waste sector.

113.   Comparability: The ERT notes that the emission figures in Bulgaria's emission report to the UNFCCC differ a lot from the figures in the report to CLRTAP. The ERT also noted differences between the CLRTAP and NECD submissions (especially 6A in 2007) for which no explanations have been provided in the IIR. The ERT recommends that Bulgaria coordinate the inventories in order to make it possible to report the same data and where data are not the same to describe the reasons for differences in the IIR.

114.   **Improvement**: The ERT notes the Party's intention to improve the coordination with UNFCCC reporting. The ERT encourages the Party to also carry out other improvements as mentioned above.

Sector specific recommendations

6A Landfill disposal

115.   Landfill disposal has been identified by Bulgaria as a key category for NH_3. The ERT noted that no other Parties identify this sector as a key category for NH_3 and most Parties use the notation key NA. The ERT noted that the new Guidebook states "Small quantities of NMVOCs, NO_x, NH_3 and CO may be emitted, but there are no estimates available on the emission factors for these pollutants." The ERT suspects that Bulgaria has overestimated NH_3 emissions from 6.A. The ERT encourages Bulgaria to reassess the national emission factor for NH_3 from landfills, and to provide a fuller description of the methodology in the IIR.

6B Waste water handling

116.   The ERT noted that Bulgaria reported emission from Waste water handling as NA though activity data is reported and emission factors from the Guidebook could be used for NMVOC. Bulgaria responded that they have made estimations of NH_3 emissions but excluded them from reporting due to their minor importance (0.4% of national emissions). The ERT encourages Bulgaria to report NH_3 emissions and to calculate and report NMVOC emissions for 6.B.

6Ca Clinical waste incineration

117.   The ERT noted that Bulgaria reported emissions of heavy metals and organic pollutants for **Clinical waste incineration** pollutants but reported main pollutants as NA. The ERT encourages Bulgaria to use emission factors from the Guidebook to calculate the emissions of main pollutants for 6.C.a, even if it is a small contribution to the total emissions.

6Cc Municipal waste incineration

118.   The ERT noted that Bulgaria reported NE for emissions from Municipal waste incineration. Bulgaria has responded that the activity not is occurring in the country. The ERT recommends that Bulgaria use the notation key NO for activities that are not present.

6Cd Cremation and 6Ce Small scale waste burning

119.   The ERT noted that Bulgaria gives the reason "data gaps" for not reporting Cremation and Small scale waste burning. Bulgaria stated, in its response to ERT's questions, that they are lacking activity data for these subsectors. The ERT encourages Bulgaria to develop methods for estimating 6.C.d and 6.C.e and to report emissions in future submissions where

possible and, where not documented, describe the rationale for not reporting emissions in their IIR.

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Bulgaria Stage 2 S&A report

2. Bulgaria Stage 1 report 2009

3. Bulgaria's IIR 2009: IIR_2007_BG_final.doc

4. 2009ReviewData-NoLinks-v9.xls

5. Response for the first questions: 06.25_EEA_Bulgaria-Energy-11-06-09-PreReview1.doc

6. Response for the second questions: 06.25_EEA_Bulgaria-Energy-23-06-09-PreReview2[1].doc

7. Response to preliminary question raised prior to the review: (EEA_Bulgaria-Energy-Mobile-11-06-09-PreReview1-OK to send-1.doc)