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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:

BELGIUM

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_2, 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 Belgium, 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).

4. The following team of nominated experts from the roster of experts performed the review:

5. Lead Reviewer – Chris Dore (UK)

6. Generalist – Jean-Pierre Chang (France)

7. Energy – Stephan Poupa (Austria)

8. Mobile – Michael Kotzulla (Germany)

9. Industrial Processes – Kees Peek (Netherlands)

10. Solvents – David Kuntze (Germany)

11. Agriculture & Nature – Hakam Al-Hanbali (Sweden)

12. Waste – Celine Gueguen (France)

13. 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

14. Within the 2009 submission, the Party has reported emissions for pollutants under its Protocols as well as, for CO, the full time series 1990–2007, and also a 2000–2007 time series for TSP, PM_{10} and $PM_{2.5}$. For Protocol reference years before 1990, emissions were not resubmitted in 2009. During the review, Belgium explained that previous years had already been submitted but not yet recalculated because of difficulties associated with recalculations and resources. For the years before 1990 the ERT recommends that Belgium recalculate at least the reference years of the Protocols.

15. Belgium submitted an IIR report according to the previous IIR reporting recommendations and not the new recommended IIR structure. The ERT noted this, and Belgium replied to the ERT during the review, explaining that the use of the new IIR structure is not an obligation, and that it had not yet been implemented because of other priorities and a lack of time. The ERT understands the demands on Parties associated with updating submissions to the most recent formats/structures, and encourages the Party to start implementing the new recommended IIR structure. The ERT also encourages Belgium to provide the datasets in the recommended formats.

16. As a general observation, the ERT believes that the LRTAP inventory submitted by Belgium may be further improved in a number of different areas. The methodological description of the energy sector is poor, the IIR has no chapter on Solvents, no section on food processing (in the Industrial Processes chapter), and only a few lines on the Waste sector. Other areas which could be developed, detailed, or documented in a more thorough way include: QA/QC, time series consistency, planned improvements, uncertainty assessment, and several other aspects detailed in the following sections of this report.

KEY CATEGORIES

17. In their IIR (and additional information), Belgium has compiled a tier 1 Key Category Analysis (KCA) for both levels and trends. These KCAs are the same as those compiled from the CEIP analysis (except that the thresholds are 95% for the Belgium dataset and 80% for the CEIP dataset).

QUALITY

Transparency

18. The IIR report does include information on methodological issues for many of the different NFR sectors. However, there are important sections which are missing from the report e.g. a chapter on Solvent and Other Product Use, for the Energy sector only default

emission factors are presented for NO_x, SO_x and NH_3 with no referencing. The report would also benefit from including more detail, and including information on activity data and references. More detailed comments are included in the later sections of this report.

19. Belgium uses zero-values in a significant number of cases in NFR table - for example, there is an average of 18 "0" entries per pollutant in 2007. The ERT strongly encourages Belgium to replace these zero-values with appropriate notation keys where estimates are not available or necessary, and to then include accompanying explanations in their IIR.

20. Information explaining the notation key IE (Included Elsewhere) is not provided in NFR tables IV 1F nor in the IIR. The ERT encourages Belgium to provide such information for better transparency of the inventory.

Completeness

21. Belgium's inventory for the pollutants covered by this review includes a significant number of notation keys "NE" (Not Estimated) in the NRF tables (an average of 14 "NE" per pollutant in 2007). Explanations on the use of the "Not Estimated" sources are not reported in NFR tables (tables IV 1F) nor in the IIR section on completeness. The ERT strongly encourages Belgium to provide explanations for the use of this notation key in the IIR, and where possible, descriptions of plans to estimate these sources/pollutants in future versions of the inventory.

22. The ERT notes that there is significant variation in completeness across the sectors. The Energy sector is considered to be complete, but the Mobile sources, Industrial Processes and Waste sectors are considered to have some important omissions. The ERT recommend that Belgium focus attention on ensuring completeness as far as is practical in the inventory.

Consistency, including recalculations and time-series

23. Belgium has undertaken recalculations of the time series since 1990 within their 2009 submission. For the national level totals, recalculations are not important (less than 10%) for NO_x, SO_x, CO, Hg, but important (more than 10%) for other pollutants, depending on the year. The ERT notes that for some sectors there is no information provided regarding recalculations. The ERT encourages Belgium to provide information in the IIR on recalculations, to explain the reasons for recalculation, and the changes to the calculation methods, or input dataset, and the resulting impacts on the national totals.

24. According to Belgium's IIR, there are possible inconsistencies across the time series due to changes in methods (e.g. top-down approach for one period, and more or less complete bottom-up approach (plant data) for other periods). During the review, Belgium explained that this only has a small impact. Individual sectors are considered later in this report, where significant time series inconsistencies are commented on.

25. Belgium's national inventory is the aggregation of three regional inventories, and there are inconsistencies in methodologies between the three regions: e.g. different versions of COPERT (for road transport) used in the different regions. During the review, Belgium confirmed that there are still some inconsistencies in methodologies between the three regions, and that this is linked to the issue of regional responsibilities and historical background. The ERT reminds Belgium that CLRTAP is a national reporting obligation. Internal inconsistencies are not good practice in emission inventory compilation. The ERT encourages the national WG "CCIEP" to co-ordinate the three regions, with the aim of addressing inconsistencies. The ERT notes that other countries have similar issues, but are still able to ensure a good level of consistency within their national emissions inventory.

26. From the Stage 2 review results in the S&A time series analysis, large dips/jumps and sectors with large fluctuations were flagged. During the review, Belgium explained that they typically require additional time to investigate and explain these issues, due to the regional nature of the emissions inventory. The ERT strongly encourages Belgium to target improvement in consistency for future versions of their inventory. These improvements will then result in fewer issues being flagged by the S&A process.

Comparability

27. The ERT would like to commend Belgium for using the most recent version of the NFR format (NFR08), especially given the very short time available to make the change. The ERT understands that Belgium intends to use NFR08 reporting for their activity data as part of their next inventory submission. The ERT welcomes this improvement.

CLRTAP/NECD comparability

28. The LRTAP versus NECD comparison (as part of the S&A) indicates that there are small differences between LRTAP totals and NECD totals. During the review, Belgium explained that this is due to some improvements applied to the LRTAP dataset after the submission of the NECD dataset. The ERT understands the difficulties associated with including improvements, but still submitting consistent datasets. However, the ERT does recommend that the NECD and LRTAP datasets are submitted as consistent datasets, as far as is practical.

Accuracy and uncertainties

29. The time series consistency issues, and regional consistency issues, result in some parts of the inventory requiring improvements of accuracy. The ERT encourages Belgium to prioritise improvements to address these issues. Quantitative estimations of uncertainties are not yet made by Belgium. The ERT encourages Belgium to compile uncertainty assessments when possible, especially as this provides a tool to prioritise improvements for key categories.

Verification and quality assurance/quality control approaches

30. Information on QA/QC is not included in the IIR. Belgium informed the ERT that they have developed a QA/QC plan for GHG emissions and that many issues of this QA/QC plan are also relevant for LRTAP inventories. The ERT encourages Belgium to develop a QA/QC plan specifically for LRTAP/NECD inventories. This could be based on the same GHG QA/QC plan, with specific extensions for LRTAP/NECD sources/pollutants. The ERT strongly encourages Belgium to report this information in their IIR.

FOLLOW-UP TO PREVIOUS REVIEWS

31. Belgium's 2009 inventory submission (NFR tables and IIR), and their responses to the ERT questions (which were rather delayed), have enabled the ERT to implement the stage 3 review and to provide a number of detailed recommendations.

AREAS FOR IMPROVEMENTS IDENTIFIED BY PARTY

32. The IIR does not include information on planned improvements. The ERT strongly encourages Belgium to compile an improvement plan, and report this in the IIR. The ERT believes that strong and clear planning is of particular importance for Belgium because their inventory is comprised of three regional inventories.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

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

(a) Extending the existing QA/QC plan for LRTAP/NECD inventories and reporting in the IIR.

(b) Recalculating the different reference years of Protocols, including those before 1990, and providing explanations in the IIR.

(c) Explaining the use of notation keys (in particular IE, NE, etc.) in both the NFR tables and the IIR. Replacing the zero-values with data or appropriate notation keys.

(d) Starting to implement the new recommended IIR structure and provide the different recommended information as far as possible according to defined priorities.

(e) Explaining, in the IIR, at a sufficiently detailed level the issues associated with time series consistency. Including more detailed information on recalculation, and the impacts of recalculations on the national totals and trends. Specific examples of areas which require improvement are included in the source specific sections later in this report.

(f) Using the results from the S&A time series analysis to target improvements on time series consistency in future inventories.

(g) Significantly improved co-ordination on methodological issues between the three regions. This should result in improved consistency. Reporting an improvement plan in the IIR would also provide input into prioritising future improvements and inventory development.

(h) To continue to incorporate high quality facility level data into the national estimates and to generate country specific emission factors.

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

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

Energy

Review scope

Pollutants reviewed		SO_2, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990–2007		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not reviewed**	**Recommendation provided**
1.A.1	Energy industries	x	NMVOC, PM_{10}, $PM_{2.5}$	x
1.A.2	Manufacturing industries and construction	x	NMVOC, PM_{10}, $PM_{2.5}$	x
1.A.4	Commercial, residential, agriculture & forestry	x	NMVOC, PM_{10}, $PM_{2.5}$	x
1.A.5	Other	x		
1.B.1	Fugitive emissions from solid fuels		x	
1.B.2	Fugitive emissions from oil and natural gas		x	
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

35. **Completeness:** The ERT considers the Energy sector to be complete and comprehensive with good levels of detail in the methodology descriptions.

36. **Transparency:** Belgium does not use any zero-values in the reporting tables and is in line with the reporting guidelines.

37. Belgium has provided a detailed and generally transparent emissions inventory. Estimates are provided at the most detailed level for all energy sectors. Belgium's methodology and emission factors in the IIR are considered by the ERT to be fairly transparent and partly described for the Energy Sector. The ERT encourages the Party to include more detail in the IIR including EFs and references. The ERT would also encourage the Party to include a more comprehensive description of the selected methodologies in the IIR at the national level.

38. Uncertainty: The ERT encourages Belgium 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. QA/QC procedures: The IIR does not include any descriptions of QA/QC. During the review Belgium responded that large point source data is collected according to the E-PRTR regulation and measurements are made according to generally approved methods. The ERT encourages Belgium to implement sector specific QA/QC procedures, and describe these in the IIR.

40. **Recalculations:** Belgium has recalculated its inventory for almost all sectors in the year 2006. The IIR includes explanations of recalculations for each of the 3 regions. The ERT encourages Belgium to provide information in the IR on the reasons for recalculations, the impacts on the sector and the implication for trends in the Energy sector.

41. **Improvement:** The ERT commends Belgium for its improvement in time series consistency and sectoral accuracy. However, the ERT strongly urges Belgium to report planned improvements in the IIR.

Sub-Sector Specific Recommendations.

1.A – stationary combustion – emission factors

42. The ERT noted that default emission factors for SO_x, NO_x and NH_3 are provided in the IIR, and encourages Belgium in its plan to continuously improve its inventory report. During the review the ERT asked for emission factors for the remaining main pollutants and Belgium provided emission factors for CO, PM_{10}, $PM_{2.5}$ and NMVOC for each of the 3 regions. The ERT recommends that Belgium includes this information in future versions of their IIR.

1.A.1 & 1.A.2 – large point sources

43. During the review the ERT asked Belgium how power plants and industrial plants are considered in the inventory. For example, how double counting is avoided between point and area sources, and which QA/QC procedures are applied to measurement data. Belgium provided a general description of LPS data collection and methodology for each of the 3 regions with different levels of detail. The ERT recommends that this should be included in future IIRs.

1.A.4.b.i residential combustion

44. During the review the ERT asked Belgium to provide the methodology used to estimate emissions from residential combustion. Belgium provided a general description of data collection and methodology for each of the 3 regions with different levels of detail. The ERT suggest that this should be included in future IIRs.

Mobile Sources

Review scope

Pollutants Reviewed		SO_2, NO_x, NMVOC, NH_3, CO, TSP, PM_{10} & $PM_{2.5}$		
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		1.A.3.a, 1.A.3.b, 1.A.3.c, 1.A.3.e
1.A.4	Commercial, residential, agriculture & forestry mobile sources	x		1.A.4.a ii, 1.A.4.b ii
1.A.5	Other mobile sources	x		1.A.5.b
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

45. **Completeness:** The ERT consider the Transport sector and the other sectors including mobile sources to be nearly complete, with some gaps to be filled. Likewise, the levels of detail in the methodology descriptions, explanation of notation keys and recalculations as well as QA/QC need further improvement.

46. Within the NFR tables, sectors 1.A.2.f ii, 1.A.3.d i (ii), 1.A.5.b include zeros instead of values or notation keys. The ERT encouraged the Party to check this issue and to provide notation keys where no data is available not only for the cases mentioned but wherever necessary. Following the Belgian response, the ERT encourages Belgium to address this issue in time for the next submission.

47. In some cases the NFR tables also include cells without any content. The ERT recommends filling these gaps with either data or appropriate notation keys.

The Party does not yet provide any activity data within the NFR tables. The ERT welcomes Belgium's plan to provide activity data with the next submission.

48. **Transparency:** Belgium provided a detailed and generally transparent emissions inventory. Estimates are provided at the most detailed level for all energy sectors. However, the descriptions of methodologies used by the Party in the IIR, as well as the descriptions of the emission factors, need to be more transparent in future submissions. In particular, the comparability between the three Belgian regions needs further improvement. The ERT commends Belgium's intention to improve the inventory by providing more detailed information about the implemented methodologies.

49. For some sub-sectors there is a change in the use of notation keys within the time series, without it being explained sufficiently in the IIR. This needs to be corrected for future submissions.

50. Transparency and Consistency: In the NFR tables, in some rare cases, (Ammonia from 1.A.3.a i (ii) and ii (ii)), different notation keys have been used for two closely related sub-sectors, which are expected to give the same emissions or at least the same notation keys. The ERT encourages the Party to check this issue, and ensure consistent use of notation keys.

51. Uncertainty: The ERT encourages Belgium to undertake uncertainty analysis for the Transport Sector and all other sectors including mobile sources in order to help support the improvement process and to provide an indication of the reliability of the inventory data.

52. QA/QC procedures: The ERT encourages Belgium to implement sector specific QA/QC procedures for the Transport Sector and all other sectors including mobile sources. This would then automatically identify areas within the inventory that need further improvement.

53. **Recalculations:** The time series for emissions from mobile sources have been recalculated against the 2008 submission, but there is only little information on the reasons for these recalculations to be found in the IIR. The ERT strongly recommends providing further detailed information, such as tables showing the main recalculations (absolute and percentage) against former submissions as well as explanations on these recalculations in the IIR.

54. **Improvement:** The ERT commends Belgium for its improvements in reporting emissions from mobile sources, e.g. the continuous enhancements in the models used to estimate emissions from road transport. The ERT also commends the improvements carried out regarding the allocation of emissions on the basis of the NFR nomenclature. Based on the improvements already carried out, the ERT encourages Belgium to implement continuous improvement checks for possible points of improvement, and to then compile an improvement plan to prioritise improvements.

55.

Sub-sector specific recommendations

NOTE: Due to incomplete responses from the Party, the recommendations from the ERT do not cover all sectors.

1.A.3.a i - NH_3 emissions – use of Notation Keys

56. In the NFR tables, 'NA' is used for Ammonia emissions from 1.A.3.a ii Civil Aviation (Domestic, Cruise & LTO) and "NE" for 1.A.3.a i International Aviation (Cruise & LTO). The ERT recommends checking this issue, and reporting the notation keys in a consistent manner.

1.A.3.a i (ii) and 1.A.3.a ii (ii) – main pollutants

57. Within the NFR tables, data are given from 1996 for 1.A.3.a i (ii) and from 1999 for 1.A.3.a ii (ii), respectively. The ERT recommended checking this issue, and requests that data is at least estimated for 1.A.3.a ii (ii) from 1996 onwards. However, it would be preferable for all existing data gaps (as mentioned above) to be addressed, and to provide a time series starting from 1990.

1.A.3.a ii (i) – Recalculations – main pollutants

58. Recalculations lead to very significant reductions of emissions (up to -80% for SO_x and about -50% for the other pollutants). The ERT welcomes the explanation which was provided by the Party.

1.A.3.b i, ii, iv, v – main pollutants

59. The emissions of main pollutants show large changes for 1990. The ERT thanks Belgium for the explanation provided.

1.A.3. b vi & vii

60. The ERT noted that for heavy metal emissions from tyre and brake wear and road abrasion only 'NE' is given in the NFR tables. The ERT encourages Belgium to further check this issue and to upgrade the completeness of the inventory.

1.A.3.c – CO, NO_x, NMVOC and PM/TSP

61. During the centralized review, the ERT noted rather large changes for CO and NMVOC emissions from railways in the 1990s. Particle emissions (reported from 2000) show strong changes between 2000 and 2003. The ERT acknowledges the information provided by the Party and encourages Belgium to provide such information within future IIRs.

1.A.3.e Pipeline Compressors

62. For this sector, from 2002 onwards only notation keys (for main pollutants: NE) are given within the NFR tables, whereas for the years before there are values reported for NO_x and CO. No explanation for this can be found in the IIR. The ERT encouraged the Party to close the existing data gaps and to provide information about the changes to the reported data for this sector in the IIR. The ERT acknowledges the explanation provided by the Party and wants to warmly encourage Belgium to try to improve the transparency of its inventory by replacing the notation keys by data.

1.A.4.a ii and b ii

63. As mentioned in the IIR, there is some data available on the fuel consumption within sector 1.A.4, including 1.A.4a ii and b ii. But in the NFR tables, "NE" is reported for these two sub-sectors without giving any further comment in the IIR. The ERT strongly recommends checking this issue, providing further information in the IIR and investigating ways to estimate the missing emissions for future submissions.

1.A.4.c iii – overall

64. Emissions reported under this sub-sector show an enormous decrease against last year's submission – a decrease of about 93 %. This change results from a change in the allocation of activities of the Belgian fishing fleet, which mostly take place outside the Belgian national area. The ERT thanks the Party for the explanation provided by Belgium, and suggests inclusion in the IIR for future submissions.

1.A.5.b Military transport

65. According to the IIR, within 1.A.5 b only activities and emissions from military aircraft seem to be reported. No data is reported for land based vehicles. The ERT recommended either including emissions estimates, or indicating that these are not estimated, with background information in the IIR. The ERT warmly commends the Party's response, which explained that they would try to improve the inventory. The ERT looks forward to the new data provided with the 2010 submission.

Industrial Processes

Review Scope

Pollutants Reviewed		SO_2, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990–2007 + (Protocol Years)		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not reviewed**	**Recommendation provided**
2.A.1	cement production	X		X
2.A.2	lime production	X		X
2.A.3	limestone and dolomite use			
2.A.4	soda ash production and use			
2.A.5	asphalt roofing			
2.A.6	road paving with asphalt			
2.A.7	other including non fuel mining & construction			
2.A.7.a	other including non fuel mining & construction			
2.A.7.b	Construction and demolition			
2.A.7.c	Storage, handling and transport of mineral products			
2.A.7.d	Glass production	X		X
2.B.1	Ammonia production	X		X
2.B.2	nitric acid production	X		x
2.B.3	adipic acid production			
2.B.4	carbide production			
2.B.5	Other – Production of polyvinylchloride, ammonium nitrate, ammonium phosphate and NPK fertilisers	X		X
2.C.1	iron and steel production	X		X
2.C.2	ferroalloys production			
2.C.3	aluminium production			
2.C.4	SF_6 used in aluminium and magnesium foundries			
2.C.5	other (please specify)			
2.D.1	pulp and paper			
2.D.2	food and drink	X		X
2.D.3	Wood processing			
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

66. **Completeness**: The ERT consider the industrial processes sector to be almost complete and comprehensive with good levels of detail in the methodology descriptions. Only a short description of the Food Processing Industry is missing. The ERT recommends that Belgium adds a short description of the Food Processing Industry to the IIR for the next submission.

67. QA/QC procedures: The ERT encourages Belgium to include sector specific QA/QC paragraphs in the next submission.

68. **Recalculations:** Because of changes and improvements in methodologies, the ERT noted that Belgium revised the emissions of the years 1990 to 2006 for all regions and compliments Belgium for this.

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

70. **Transparency**: The ERT noted that the Industrial Processes sector in the Belgium IIR is not well organised. Fragments of the Industrial Processes sector can be found in the "Key source analysis" and "Recalculation of emission data and other changes" chapters. The ERT recommends that Belgium includes these sections in the Industrial processes chapter in a well organized way in the next submission.

71. The ERT also noted that Belgium used emission data from annual reports of individual companies. The ERT encourages Belgium to continue with this approach.

72. **Improvement**: The ERT noted that the regions in Belgium will continue to work together with the aim of further improving the harmonization of their methodologies. The ERT encourages Belgium to continue with these improvements in the future.

Sector Specific Recommendations

Total Industrial sector

73. The ERT noted that it is not entirely clear which sectors of Industrial Processes are key sources and which are non-key sources. The ERT recommends that Belgium makes this clear in the next submission.

74. The ERT also noted that no explanation for major changes in emission trends had been provided. The ERT strongly recommends that Belgium give at least some explanation of the major changes in the emission-trends of the key sources in the next submission.

2A1, 2A2, 2A7 and 2C1

75. The ERT noted that:
- the sum of combustion and process emissions of the production of glass (2.A.7) is included in the Energy sector (1.A.2.a);

- the sum of combustion and process emissions from electric arc furnaces is included in 2.C.1;

Belgium responded with an explanation that in the Flemish region emissions are reported separately in combustion (1A2) and in process (2A or 2C) for all years where detailed information is available (i.e. all years with the exception of 1994, 1997, 1999 and from 2002 on).

The text in the IIR will be corrected for these sectors in the next submission.

76. The ERT has not received answers for some questions, in particular from the Walloon region.

- the cement plant (2A1) and the lime and limestone plant (2A2) represent the sum of combustion and process emissions;

- the sum of combustion and process emissions from the sinter plants is reported in the energy sector (1.A.2.a);

77. The ERT encourages Belgium to split the combustion and process emissions in the future, where this is possible, and provide explanations in the IIR.

Solvents

Review scope

Pollutants Reviewed		NMVOC, PAH, CO, NH_3, NO_x, Pb, SO_x, HCH, As, Cr, Cu		
Years		1990–2007		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not reviewed**	**Recommendation provided**
3.A.1	Decorative coating application	Yes		x
3.A.2	Industrial coating application	Yes		x
3.A.3	Other coating application (Please specify the sources included/excluded in the notes column to the right)	Yes		x
3.B.1	Degreasing	Yes		x
3.B.2	Dry cleaning	Yes		x
3.C	Chemical products, manufacture & processing	Yes		x
3.D.1	Printing	Yes		x
3.D.2	Domestic solvent use including fungicides	Yes		x
3.D.3	Other product use	Yes		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

78. Belgium reports the emissions for the subcategories in 3.A.1-3, 3.B.1-2 and 3.D.1-3. The ERT commends Belgium for this (many other countries still have to achieve this). However, Belgium has no chapter for 3.A-D. The ERT strongly recommends implementing a chapter for 3.A-D in the IIR for the Submission 2010. The ERT also proposes that Belgium should explain the emissions of the other pollutants PAH, CO, NH_3, NO_x, Pb, SO_x, HCH, As, Cr, Cu in the IIR.

79. **Completeness**: The ERT considers the solvent sector not to be complete. The main reason for this is that the chapter for Solvents and other product use is missing from the IIR. The ERT strongly encourages Belgium to add this chapter in the submission 2010 and to describe the methods of reporting, the sources, the emission factors that are used, the recalculations, the calculation of the uncertainties and the QA/QC process. Belgium is currently not reporting the activity data in the NFR tables, and the ERT suggests that Belgium report this in future submissions.

80. **QA/QC procedures:** There are QA/QC procedures reported in the IIR, but there is no Chapter for NFR3.

81. **Recalculations:** No recalculations are stated in IIR.

82. **Uncertainty**: The ERT encourages Belgium to undertake uncertainty analysis for the solvent sector in order to improve the process of reporting and to provide an indication of the reliability of the inventory data.

83. **Transparency**: Without a chapter for Solvents and other product use in the IIR, transparency is low. The ERT encourages Belgium to add the chapter for 3.A-D in Submission 2010.

84. **Improvement**: The ERT recommends that Belgium add the chapter for 3.A-D, to explain in the IIR the emissions of the other pollutants PAH, CO, NH_3, NO_x, Pb, SO_x, HCH, As, Cr, Cu.

Sector Specific Recommendations

3.A. Paints and Coatings – NMVOC

85. The ERT encourages Belgium to implement the results of the study by the University of Ghent in the submission 2010 for Coating.

86. The ERT recommends that Belgium explain the decrease of the NMVOC emissions of 3.A.1 between 1990 and 1991.

3.B. Dry Cleaning and Degreasing – NMVOC

87. Belgium informed the ERT that they plan to investigate emissions from the dewaxing of automobiles, and to report these estimates in the 2010 submission. The ERT welcomes this improvement and encourages Belgium to undertake these actions as planned.

3.D.2 Domestic solvent use including fungicides – NMVOC, PAH

88. In the 2009 report, Wallonia indicates that they plan to improve the NMVOC emissions inventory of the sector "use of solvents" for the years 2005–2007. The ERT would like to encourage Wallonia to undertake this improvement as planned.

89. PAH emissions in 3.D.2 are a key category. The ERT recommends that Belgium includes reporting of this source in the IIR. In particular, an explanation of the sources of these emissions, the method of calculation and the development of these emissions. The ERT encourages Belgium to use a detailed method for reporting because this source is a key category.

90.

Agriculture

Review scope

Pollutants reviewed		SO_2, NOx, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990–2007 + (Protocol Years)		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not reviewed**	**Recommendation provided**
4.B	Manure Management	NH_3, PM_{10}, $PM_{2.5}$		X
4.D1	Direct Soil Emissions	NH_3		X
4.F	Field burning of agricultural wastes	NMVOC, CO, PM_{10}, $PM_{2.5}$		
5E	Other	CO, NMVOC		
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

91. **Completeness:** The agriculture inventory of Belgium is generally good and covers a wide set of pollutants and source combinations. Estimates of PM are not calculated 4.B.3 (Sheep), 4.B.4 (Goats), 4.B.6 (Horses), 4.B.7 (Mules and Asses), 4.B.13 (Other), 4D2c (N-excretion on pasture …), and 4G (Agriculture other) which are reported as not estimated, "NE".

92. **Transparency:** The inventory is generally transparent and covers several pollutants and source combinations for the Agriculture sector. However, further improvements are needed to be fully transparent. There is a lack of detailed information in the IIR on emission factors for NH_3 emissions from manure management and activity data for synthetic fertilizers. The ERT recommends that Belgium further improve the transparency of the inventory by including more detailed information on EFs used in calculations and activity data for synthetic fertilizers series in its next annual submission.

93. **QA/QC:** Belgium indicated that QA/QC procedures have been undertaken for the Agriculture sector and referred to an external source of information. The ERT recommends that Belgium include a detailed description of QA/QC procedures of the inventory data in the IIR in its next inventory submission.

94. **Recalculations:** The ERT noted that recalculations have been undertaken by Belgium, motivated by changes in methodologies over the years for all regions. The ERT acknowledges the effort undertaken for this revision and encourages Belgium to include revisions in future submissions.

95. **Improvements:** Belgium indicated that a new methodology to estimate NH_3 emissions is currently being developed and will be implemented in the next submission. The ERT welcomes Belgium's effort to make further improvements in emission estimates from the agriculture sector, so that national circumstances can be fully reflected.

96. **Consistency:** Belgium responded during the review process on the dissimilarity of N-excretion factors from animals in different regions. The ERT encourages Belgium to review the data that is used, and to include detailed and clearer descriptions and information in the IIR on emission factors for NH_3 emissions from manure management for the different regions within the country.

97. **Time Series Trends:** Belgium responded during the review week on the reason for the steep decrease in NH_3 emissions from 4.B.1a, 4.B.1b and 4.B.8 between 1999 and 2000. This was due to the implementation of the Manure Action Plans in Flanders, which took place in 2000. The ERT recommends that Belgium includes detailed information on this issue in the IIR in its next inventory submission.

Sector specific recommendations

4.B Manure management:- NH_3 and PM

98. The information on methodologies regarding manure management is split according to the different regions of the country (mainly Flanders and Wallonia) and this has an impact on the transparency of the IIR. The ERT noted that different methodologies have been used to estimate NH_3 emissions from 4B (Manure Management). The ERT strongly encourages Belgium to continue its efforts to harmonize the methodologies used in the inventory in order to improve consistency, transparency, and to assist the review of its inventory development.

99. Emissions of NH_3 from 4.B.4 (Goats), and emission of PM from 4.B3 (Sheep), 4.B.4 (Goats), 4.B.6 (Horses), 4.B.7 (Mules and Asses), and 4.B.13 (Others) are not estimated "NE". The ERT suggests that these subcategories should be accounted for in the inventory. The ERT recommends that Belgium completes estimates of these emissions in its next submission.

100. The ERT noted that Belgium used the notation key "IE" for NH_3 emission from 4.B.7. (Mules and Asses). No explanation was given in the IIR or the NFR tables where this emission was included. Belgium responded during the review process and indicated that 4.B.7 (Mules and Asses) are included under 4.B.6 (Horses). The ERT recommends that for their next submission Belgium include information to explain the use of the "IE" notation key, both in the NFR reporting templates and the IIR.

4.D.1 Agricultural Soils:- NH_3

101. The ERT noted that different methodologies were implemented (in Wallonia and Flanders) in order to estimate NH_3 emission from 4.D.1a (Synthetic N fertilizers). The ERT strongly encourages Belgium to harmonize the methodologies in order to improve the consistency of the inventory, as well as assist the transparency.

Waste

Review scope

Pollutants reviewed		SO_2, NO_x, NMVOC, NH_3, PM_{10} & $PM_{2.5}$		
Years		1990–2006 + (Protocol Years)		
NFR Code	**CRF_NFR Name**	**Reviewed**	**Not reviewed**	**Recommendation provided**
6.A	solid waste disposal on land	x		x
6.B	waste-water handling	x		x
6.Ca	Hospital waste incineration	x		x
6.Cb	Hazardous waste incineration	x		x
6.Cc	Municipal waste incineration	x		x
6.Cd	Cremation	x		No (see general recommendations)
6.Ce	Open burning	x		No (see general recommendations)
6.D	other waste (e)	x		x
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

Transparency and completeness

102. The ERT noted some null values in the data submission (0 for main pollutants, TSP and HM generally considered as emitted during incineration processes i.e. 6Ca, 6Ce, 6Cb). The ERT encourages Belgium to check if null values are relevant, or whether the "NE" notation key should be used, with an explanation of the use of this notation key included in the IIR.

Transparency

103. In the IIR, almost no methodological information is presented concerning the waste sector (except 3 lines concerning NFR 6B). The ERT strongly recommends that Belgium improve the explanation included in the IIR concerning the waste sector by providing a detailed description of the methodology applied for each NFR6 sector and sub-sector where relevant. This should also include activity data, EF time series data and associated references.

104. The ERT noted that different methodologies seem to be applied in each region (i.e.; emissions from the use of tobacco calculated only by the Flemish region, allocation of emissions from waste incineration with energy recovery only done for the Flemish region, compost production is only included in the Flemish inventory…). The ERT encourages Belgium to specify in its report where methodologies applied in the 3 regions are different, in

terms of the sub-sectors considered, EF and NFR allocation. Belgium indicated during the review that this issue will be taken into account in the IIR during the coming years. Moreover, the ERT strongly encourages the 3 regions to apply coherent methodologies.

QA/QC

105. The ERT noted some very surprising emission trends while analysing emissions time series. Some examples are that:

106. 1995 appears to be a dip in the NH_3 time series for 6B;

107. For 6Ca, 1995 appears to be a jump for NH_3, NO_x, SO_x Dioxins/Furans, NMVOC and CO and a dip for various heavy metals such as Cd, Pb, Hg, Cr, Cu, Zn;

108. For 6Cb 1995 appears to be a jump for Pb, Cd, Hg, NO_x;

109. For 6Cc 1995 appears to be a dip for NMVOC, NO_x, SO_x and some HM, whereas 1993 appears as a jump for Pb and Cr although other HM decrease a lot;

110. Belgium indicated that some of these outliers result from a mistake in applying the new format, and that some others will be investigated. The ERT encourages Belgium to develop a QA/QC procedure at the national level, based on an emissions time series analysis at the sub-sector level (including graphics), in order to identify such outliers, to correct mistakes if necessary and to provide explanations in the IIR when relevant. This is of particular importance for Belgium because the inventory is a compilation of regional emission estimates.

Sector specific recommendations

6A- Solid waste disposal on land TSP&PM

111. 6A is a key category for TSP&PM in the Belgium inventory due to the allocation of the smoking of tobacco to this NFR sector. The ERT recommends that Belgium allocate these emissions to the NFR 6D as specified in the 2009 EMEP/EEA Guidebook. In addition, the ERT encourages Belgium to estimate emissions of other pollutants from this source for which EFs are proposed in the Guidebook.

6B- Waste-water handling NH_3

112. NH_3 is a key category for 6B. In its report, Belgium indicated that emissions are estimated by multiplying the EF by the number of inhabitants not connected to a municipal wastewater treatment plant. The ERT would like to inform Belgium that the NH_3 EFs presented in the EMEP/Corinair and EMEP/EEA Guidebooks deal with latrines (i.e. dry systems) and are not appropriate for sceptic tanks (wet systems). No NH_3 EF is proposed for sceptic tanks, and this source does not appear as an NH_3 key source in other countries. The ERT therefore recommends that Belgium make sure that the EF applied is applicable to sceptic tanks, and present the reference of this EF in the IIR if relevant.

6Ca – Hospital waste incineration dioxins

113. In the submission, values for pollutants other than dioxin have been null since 2007 although the activity still exists (as there is a value for dioxin). Belgium indicated that emissions from the only Flemish facility were inconsistently divided between the sectors 6Cb and 6Cc. The ERT encourages Belgium to allocate the emissions to NFR 6a. Belgium indicated that for the next submission, emissions from this facility will be allocated in 6Ca, and the ERT welcomes this planned improvement.

114. In the IIR (p.5) Belgium indicates that dioxin emissions of hazardous waste are allocated to the 6Ca sector. Belgium indicated that in Flanders, it is not possible to make a distinction between emissions from clinical and other hazardous waste. The ERT encourages Belgium to include this information in the IIR.

6Cb – Hazardous waste incineration TSP

115. Belgium provided null values for TSP&PM in its submission concerning NFR 6Cb. The ERT encourages Belgium to use notation keys.

6Cc- Municipal waste incineration all pollutants

116. Emission from municipal solid waste incineration is allocated by Wallonia to the NFR 6Cc although these emissions are associated with energy recovery. The ERT recommends that Wallonia reports these emissions under the energy sector. Belgium indicated that this will be done in the next submission and the ERT welcomes this improvement.

6Ce – Municipal waste incineration TSP&PM

117. Belgium allocated open combustion of municipal waste to the NFR 6Ce. This NFR is dedicated to open burning of agricultural waste (SNAP 0907) as indicated in the 2009 EMEP/EEA Guidebook. The ERT encourages Belgium to allocate open burning of household waste to NFR 6D.

118. The ERT noted that TSP&PM emissions from open burning of municipal waste are allocated to NFR6Ce, but dioxin and PAH emissions are allocated to NFR 1A4bi. The ERT recommends allocating all pollutants from the same source to the same NFR.

6D- Other waste Dioxins

119. 6D is a key category for dioxins in the Belgium inventory. As various sub-sectors belong to this sub-category the ERT encourages Belgium to produce a detailed description of sources considered under this sub-category.

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Response to preliminary question raised prior to the review:
   - BE_Ind_Proc_Initial_Qns.doc
   - BE_Gen_Initial_Qns_1_RBC_answers.doc

2. Response to questions raised during the review:

   Be_Gen_Qns_set2.doc

   Be_Mobile_Initial_Qns_v1_MK_answers.doc

   Be_Mobile_Second_Qns_v1_MK_answers.doc

   BE_Mobile_Third_Qns_v1-Recalculations.doc

   BE_Mobile_Initial_allQnsERT_CLEARED.doc

   Be_Agriculture_Initial_Qns_v1_answers.doc

   Be_ Agriculture _Second_Qns_v1_answers.doc

   The ERT did not receive a response to questions on industrial processes

3 Additional materials provided by the Country during the review

   IIR, data submission and data analysis transmitted by the CEIP

   Review Stage 2: Synthesis and Assessment Country report

   Be_Waste_Initial_Qns.doc (answers to set 1 and 2 of questions)