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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:**

DENMARK

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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 SO₂, NO_x, NMVOC, NH₃, plus PM₁₀ & 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 Denmark, 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: Lead Reviewer – Chris Dore (UK), Generalist – Jean-Pierre Chang , France) ,Energy – Stephan Poupa (Austria), Mobile – Michael Kotzulla (Germany), Industrial Processes – Kees Peek (Netherlands), Solvents – David Kuntze (Germany), Agriculture & Nature – Hakam Al-Hanbali (Sweden), Waste – Celine Gueguen (France)
5. The review was coordinated by Chris Dore and Katarina Marečková, (EMEP Centre on Emission Inventories and Projections – CEIP).

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

PART A: KEY REVIEW FINDINGS

INVENTORY SUBMISSION

6. Denmark has reported emissions for its Protocol base years and a full time series since 1980/1985/1990 (accordingly to pollutant) up to 2007 (the latest year) in the NFR 2002 format. In addition, Denmark has also provided a full NFR 1985–2007 time series for CO and a 2000–2007 time series for PM₁₀ and PM_{2.5}. Denmark also submitted a detailed IIR. Denmark informed the Expert Review Team (ERT) that the plan is to implement – as far as possible – the new NFR 2008 nomenclature for the 2010 submission.

7. The CLRTAP inventory submitted by Denmark is of good quality and is in general well documented in the informative inventory report (IIR) which generally follows closely the new guidelines on IIR structure. Denmark informed the ERT that they will also consider, prior to the 2010 submission, updating their IIR report annex structure in line with the recommended IIR structure.

KEY CATEGORIES

8. Denmark has compiled and presented in its IIR specific sector Key Category Analysis (KCA), but not across all sources together (e.g. the IIR includes a detailed KCA for stationary combustion plants). So this KCA is not comparable to the CEIP KCA. Furthermore, for stationary combustion plants, the chosen NFR level for the KCA is not the same as CEIP: e.g. CEIP vs Denmark: 1A2x (NFR level 4) versus 1A2. The ERT recommends that Denmark complete a KCA across all sectors together, and report this in the IIR.

QUALITY

Transparency

9. The ERT recognises the level of effort required by Denmark to provide an inventory with a significant level of detail. Denmark's IIR is detailed and well presented. The IIR report includes specific detailed chapters for the different NFR sectors (NFR sectors 1 to 6) including information on EF and activity data and references. The ERT consider the detail of the inventory to be well presented in the IIR (with a few small exceptions, which are explained in the sector specific sections of this report).

10. Denmark uses zero-values in very few cases (e.g. 2B2) in the reporting tables. The ERT recommends that Denmark replaces the few remaining 0s with appropriate notation keys where estimates are not available or necessary.

11. Information which explains the used notation key IE (Included Elsewhere) is not provided in NFR tables IV 1F nor in IIR. The ERT recommends that Denmark provides such information for better transparency of the inventory.

Completeness

12. The ERT acknowledges the effort to which Denmark has gone to provide estimates of emissions for all sub-sectors and all pollutants reviewed. For waste sectors, improvements of the completeness (by including NFR 6A and 6B and compost production, and by estimating other pollutants for included sectors) are already planned.

13. Denmark's inventory for the pollutants reviewed is generally complete. There are not many "NE" (Not Estimated) notation keys used in NFR tables. However, explanations for the "Not Estimated" sources are not reported in NFR tables (tables IV 1F) nor in the relevant IIR section on completeness. The ERT recommends that Denmark provides explanations for using this notation key, and/or descriptions of plans to estimate these sources/pollutants in future submissions.

Consistency, including recalculations and time-series

14. Denmark has undertaken a recalculation of the complete time series since 1985 within their 2009 submission. Recalculations are not particularly large considering total emissions: most pollutants have recalculations of less than 2.5%, with 3 pollutants (NMVOC, NH₃, CO) having recalculations of less than about 10%. These recalculations are generally well explained in the IIR, but the ERT encourages Denmark to provide estimated impacts of the changes on the national estimates and time series.

15. The largest jumps, dips or fluctuations flagged from the S&A trend analysis are either explained within IIR, or with complementary explanations given by Denmark during the review week. The ERT recommends that the explanations on time series consistency issues which were provided during the review week are included in the next IIR, as is appropriate.

Comparability

16. Because of the timing of the change to the NFR format for 2009 (Decision on Dec. 2008), Denmark did not have time to implement the new NFR 2008 format. This was also the case for many other Parties. Nevertheless, during the review, Denmark improved their plan as far as possible by implementing the new NFR08 nomenclature for the 2010 submission. The ERT recommends implementing the NFR08 format as completely as possible, including the submission of activity data, and commends Denmark on their intention to undertake this improvement.

CLRTAP/NECD comparability

17. From the LRTAP versus NECD comparison in the S&A, there are no differences observed for NO_x and SO_x. However, there are differences for NMVOC and NH₃. During the review, Denmark explained that in the original computations for NECD, the emissions from straw treatment and NMVOCs evaporated from soils were not included. These sources were included in the LRTAP dataset. Explanations on this issue will be included in the next IIR.

Accuracy and uncertainties

18. Denmark provided quantitative information on uncertainties in the IIR, based on the Guidebook guidance (tier 1 approach). For illustrating the use of tier 1 approach a tier 1 Excel calculation file was provided to the ERT. The ERT would like to thank Denmark for providing this information. The ERT recognises that moving to a Tier 2 approach will require development to both the input data and the uncertainty calculation, but encourages the Party to investigate the use of a Tier 2 approach as part of their continuous improvement.

Verification and quality assurance/quality control approaches

19. Denmark has elaborated and implemented a quality assurance/quality control (QA/QC) plan which includes general QC procedures (tier 1) as well as source category-specific procedures (tier 2). For some sector specific QA/QC plans are still under development. The ERT recommends that Denmark details furthermore the general description of QA/QC in IIR (point 1.5) and clarifies the last sentence of IIR point 1.5 (“The plan also, to some extent, includes the gases reported to the UNECE-LRTAP Convention”).

FOLLOW-UP TO PREVIOUS REVIEWS

20. Due to the quality of the IIR and Denmark’s responsiveness, the ERT were able to review the inventory in detail and provide a number of detailed recommendations. The ERT would especially like to thank Denmark for their help through the review process, and in particular for the speed with which they replied to questions.

AREAS FOR IMPROVEMENTS IDENTIFIED BY THE PARTY

21. The IIR includes a chapter on recalculations and improvements (cf. IIR chapter 9) which identifies the different areas of improvement for the different sectors.

22. During the review, Denmark identified some areas for improvement: the new NFR 2008 format to be implemented in the future, restructuring of the IIR to better follow the published guidance, the inclusion of more explanations within IIR (e.g. on the specific differences between LRTAP and NECD emissions).

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

23. The ERT identifies the following cross-cutting issues for improvement:
24. To implement the new NFR 2008 format, including the reporting of activity data and explanations on notation keys.
25. To apply as closely as possible the new recommended structure for the IIR, in particular: the structure of the annexes, separately identifying the improvement plan and notation keys to be explained in the completeness chapter.
26. Explanations in IIR to cover: the specific reasons for differences between LRTAP and NECD emissions and explanations of time series consistency (as provided to the ERT during the review week).
27. More detailed information in the IIR on: the QA/QC plan (both the general approach, and sector specific details); more information on the implications that recalculations have on trends.
28. A global Key Category Analysis of all sectors to allow comparison with CEIP analysis, and results from other Parties.
29. The use of uncertainty analysis results as a tool to focus planned improvements to the key categories.
30. To continue to incorporate high quality facility level data (e.g. EUETS) into the national estimates and to generate country specific emission factors.
31. Detailed recommended improvements relating to specific source categories are presented below, 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		
NFRCode	CRF_NFR Name	Reviewed	Not reviewed	Recommendation provided
1.A.1	Energy industries	x		
1.A.2	Manufacturing industries and construction	x		
1.A.4	Commercial, residential, agriculture & forestry	x		x
1.A.5	Other	x		
1.B.1	Fugitive emissions from solid fuels	x		
1.B.2	Fugitive emissions from oil and natural gas		x	
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

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

33. Transparency: Denmark uses notation keys in the reporting tables in an appropriate way but no description is provided about the “IE” notation keys. The ERT strongly urges Denmark to provide explanations in the IIR of where these emissions are included.

34. Denmark has provided a detailed and generally transparent emissions inventory. Estimates are provided at detailed level for all energy sectors except for 1.A.2 Manufacturing Industry where all combustion emissions are reported under category 1.A.2.f.i -other. Denmark’s methodology and emission factors in the IIR are considered by the ERT to be very transparent and well described for the Energy Sector. The ERT recommends that Denmark includes more detail in the IIR, specifically:

35. Source description (number and type of installations, capacities) of sector 1.A subcategories

36. Installed abatement technologies and efficiency of public electricity and heat and industrial facilities.

37. Uncertainty: Denmark provides uncertainty of emission factors for the SNAP sectors 01, 02 and 03. The ERT encourages Denmark to undertake uncertainty analysis also for activity data by sector in order to provide the uncertainty estimates by sector.

38. QA/QC procedures: Denmark has sector specific QA/QC checks, for example on: time series consistency, tracking recalculations, emission factor checks and large point source emission trends as well as external expert reviews. The ERT would like to commend Denmark on this good work and encourages the party to extend the QA/QC checks to all country specific emission factors.

39. Recalculations: Denmark has recalculated its inventory for all sectors in the year 2006. The IIR does include comprehensive explanations and rationales. However, the ERT encourages Denmark also to provide an explanation of why energy statistics have been changed, and to assess the impact on the sector and implication to trends for the Energy sector. These findings should then be presented in the IIR.

40. The ERT notes Denmark's intention to continuously improve the inventory in order to better reflect Danish conditions and circumstances, and commends them on this initiative.

Sub-sector specific recommendations

1.A.4.b Residential biomass combustion: PM₁₀, PM_{2.5}:

41. The ERT noted that the weighted PM₁₀ emission factor for residential biomass combustion of Denmark in 2007 is 649 g/GJ which is rather high. During the review Denmark provided a detailed table of TSP, PM₁₀ and PM_{2.5} emission factors by combustion technologies and references to studies from which the emission factors are taken. The ERT encourages Denmark to include this information in its future IIR to increase transparency of this most important key source of PM₁₀ and PM_{2.5}. The ERT also noted that, according to the IIR, TSP emission factors of SNAP 02 have an uncertainty of 500% and encourages Denmark to undertake efforts in order to reduce uncertainty to a minimum extent as possible.

MOBILE SOURCES

Review scope

Pollutants reviewed		SO ₂ , NO _x , NMVOC, CO, NH ₃ , TSP, PM ₁₀ & PM _{2.5}		
Years		1990–2006 + (Protocol Years)		
NFR Code	CRF_NFR Name	Reviewed	Not reviewed	Recommendation provided
1.A.2	Manufacturing industries and construction Mobile Sources	x		1A2fii
1.A.3		x		1A3a, 1A3bvi & vii, 1A3d(i) and 1A3e(i)
1.A.4	Commercial, residential, agriculture & forestry mobile sources	x		
1.A.5	Other mobile sources	x		
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

42. **Completeness:** The ERT consider the Transport Sector, and other sub-sectors which include mobile sources, to be complete and comprehensive with good levels of detail in the methodology descriptions.

43. **Completeness/Correctness/Transparency:** The ERT notes that only stationary combustion sectors are included in the key source analysis. Some Road Transport sub-sectors are key sources for PM emissions, CO or even Pb (Domestic Aviation, LTO). The ERT therefore recommends that in future calculation, all sectors be included in the key source analysis.

44. **Transparency/Correctness:** ERT note that Denmark has not fully implemented the NFR08 nomenclature yet. The ERT therefore recommend that this update be implemented for the next submission. Denmark have indicated that this is planned for the 2010 submission as far as is possible. The ERT welcomes Denmark's understanding and willingness to undertake this.

45. **Uncertainty:** The ERT commends Denmark's detailed information on uncertainties and wants to warmly encourage the party to continue to build on this strong platform. The ERT, in addition, suggest that Denmark implement a Tier 2 methodology.

46. **QA/QC procedures:** The Party has implemented a QA/QC system and publishes a sectoral report for Transport and all other mobile sources every 2nd year, which is used to target improvements within the inventory. The ERT commends this and encourages Denmark to continue improving its inventory wherever necessary, and particularly by presenting whether QA/QC checks are sector specific.

47. **Recalculations:** Denmark has carried out some recalculation within the Transport Sector as well as other mobile sources. The necessary explanations have been provided in the IIR in both sectoral chapters and a special recalculations chapter. The ERT welcomes this information.

48. The ERT commends the Party for its improvement in Road Transport and National Sea Transport, and commends the intention to further improve the mobile sources sector of the inventory.

Sub-sector specific recommendations

1.A.2.f ii – Mobile sources in manufacturing and construction

49. The ERT note that Denmark has not yet completely implemented the new NFR08 nomenclature, giving sector 1.A.2.f as a total without dividing it into stationary (1.A.2.f i) and mobile (1.A.2.f ii). The Party plans to implement the new NFR08 nomenclature for the 2010 submission and to carry out the necessary split. The ERT welcomes this decision.

1.A.3a Civil aviation – overall

50. The ERT note that Denmark has not yet completely implemented the new NFR08 nomenclature for this sector (in the national total and memo items). The Party plans to implement the new NFR08 nomenclature for the 2010 submission and to carry out the necessary split. The ERT welcomes this decision.

1.A.3.a ii (i) and (ii) – Civil aviation (Domestic) – Pb

51. 1.A.3.a ii (i) (LTO) is a Key Category for Pb (from leaded AvGas). The ERT asked the party to explain why there is no Pb reported from 1.A.3.a ii (ii) (Cruise) and whether all aviation executed by piston engine aircraft is assumed to take place within the LTO area. The Party confirmed this to be the case and offered to further investigate the possibility of including a split into LTO and cruise as necessary. The ERT welcomed the party's willingness to investigate this issue and to change the inventory if necessary.

1.A.3.b vi Road transport, automobile tyre and vii Road transport, automobile road abrasion

52. The ERT noted that for Heavy Metal emissions from tyre and brake wear and road abrasion, the party reports "NA" within the NFR tables. The ERT recommends further investigation on emissions of Heavy Metals (e.g. Zn, Cu and Cr) from these sources. Denmark acknowledged this recommendation and plans to further investigate this issue. The ERT welcomed the party's willingness to improve this important part of the inventory.

1.A.3.e Other (please specify in a covering note) and e(i) Pipeline compressors

53. ERT noted that 1.A.3.e i is reported as “IE” (included elsewhere) without clear information on where these emissions are reported. The Party indicated that emissions from 1.A.3.e i are included under 1.A.1.c due to lack of information in the energy statistics. The Party will include this information in the IIR submission 2010. The ERT welcomed the explanation, and encourages the Party to try to source information to allow the emissions to be reported in 1.A.3.e i.

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	X		X
2.A.4	Soda ash production and use	X		X
2.A.5	Asphalt roofing	X		
2.A.6	Road paving with asphalt	X		
2.A.7	Other including non fuel mining & construction			
2.A.7.d	Production container glass and glass wool	X		
2.B.2	Nitric acid production	X		
2.B.3	Adipic acid production		X	
2.B.4	Carbide production		X	
2.B.5	Other			
2.B.5.a	Catalysts/fertilizers production	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		
2.D.3	Wood processing			
Note: Where a sector has been partially reviewed (e.g. some of the NFR codes) please indicate which codes have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

54. **Completeness:** The ERT consider the industrial processes sector to be complete and comprehensive with good levels of detail in the methodology descriptions.

55. QA/QC procedures: The ERT noted Denmark has included sub-sector specific QA/QC paragraphs in each sub-sector paragraph, and compliments Denmark for this level of detail.

56. Recalculations: In this submission no source specific recalculations have been performed within the Industrial Processes sector. The ERT noted that Denmark has included sub-sector specific ‘Recalculation’ paragraphs in each sub-sector paragraph in which necessary explanations have been given.

57. Uncertainty: The ERT found no uncertainty analysis at the sub-sector level in the industrial processes chapter, and encourages Denmark to include this in order to help support the improvement process and to provide an indication of the reliability of the inventory data.

58. Transparency: The ERT noted that the Industrial Processes sector is not included in the key source analysis. The ERT recommends that the Industrial Processes sector is included in the key source analysis in the next submission. Furthermore the ERT found the IIR to be generally transparent and well organised. The ERT also noted that Denmark has used a lot of country-specific Emission Factors. The ERT encourages Denmark to continue with this approach.

59. Improvement: Denmark has included sub-sector specific paragraphs on Improvements in each sub-sector paragraph. Source specific improvements are planned for the sub-sectors Mineral products, Metal production and Other production. The ERT commends Denmark on their improvement plans, and encourages them to continue this in the future.

Sector specific recommendations

2A1, 2A2, 2A3, 2A7, and 2C1; NO_x and SO_x

60. The ERT noted that the emissions of NO_x and SO_x from these sources in Industrial Processes are included in the Energy sector, 1A2 and represent the sum of “combustion” and “process” emissions. Denmark responded that this point “*will be investigated further whether it is possible to split these emissions in the future*”. The ERT encourages Denmark to split the combustion and process emissions in the next submission.

SOLVENTS

Review scope

Pollutants reviewed		NMVOC, NO _x		
Years		1990–2007		
NFR Code	CRF_NFR Name	Reviewed	Not reviewed	Recommendation provided
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		X
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 codes have been reviewed and which have not in the respective columns.				

General recommendations on cross cutting issues

61. **Completeness:** The ERT considers the solvent sector to be complete and comprehensive. The ERT encourages Denmark to make the planned improvements for the submission 2010, and report the emissions for sub sectors 3.A.1-3.A.3, 3B1-3B2 and 3D1-3D3. The ERT also encourages Denmark to remove the reporting of N₂O, because this is not a pollutant of the CLRTAP.

62. **QA/QC procedures:** The ERT strongly urges Denmark to describe the QA/QC procedures that are used for these source sectors in the IIR.

63. **Recalculations:** The description of the recalculations in the IIR is comprehensive and easily understandable. The ERT encourages Denmark to continue with this good reporting.

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

65. **Transparency:** The reporting is very transparent. But the ERT encourages Denmark to improve the transparency for the reporting of the emission factors, for example by adding a table with the emission factors and information on which are country specific.

66. **Improvement:** The ERT notes the Party's intention to improve the activity data, emission factors and the allocation of activity data to particular source codes with the help of the Nordic project. The ERT encourages Denmark to implement these results in the submission 2010.

AGRICULTURE

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
4.B	Manure management	NH ₃ , PM ₁₀ , PM _{2.5}		X
4.D1	Direct soil emissions	NH ₃ , PM ₁₀ , PM _{2.5}		X
4.F	Field burning of agricultural wastes	NMVOC, CO, PM ₁₀ , PM _{2.5}		
4G	Agriculture other (Sewage sludge used as fertiliser)	NH ₃		X
5E	Other	CO, NMVOC		

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

General recommendations on cross cutting issues

67. **Completeness:** Only minor sources in the inventory are reported as not estimated (emissions of TSP and PM from 4.B.3 Sheep, 4.B.4 Goats and 4.B.13 Other). Emissions from 4.B2 Buffalo and 4.B.7 Mules and Asses are reported as “NO”. Emission of 4.F (Field burning of Agricultural Wastes) is reported until 1989 as burning of plant residue has been prohibited in Denmark since 1990. The ERT commends Denmark on the completeness of the inventory.

68. **Transparency:** The inventory is generally transparent and the IIR explains the methodology used to estimate several pollutants and source combinations. The ERT commends Denmark for its efforts to improve the transparency of the inventory.

69. **Consistency:** The ERT identified large differences (up to 24%) in some activity data for the same subcategories presented in the IIR. Denmark indicated that this error would be corrected in the next inventory submission and also pointed out that the error has no influence on the estimated total PM emission. The ERT recommends that Denmark correct this error before the next submission, and that it should also consider whether QA/QC routines need improving to capture these types of error.

70. **QA/QC:** The IIR explains that the general QA/QC and verification plan for the Agricultural sector is still under development, and some measures have already been formulated as a part of the future work. The ERT encourages Denmark to continue developing and undertaking further QA/QC procedures, and to continue with the process of providing this information in future IIR submissions.

71. **Recalculations:** Denmark carried out recalculations for its estimates of NH₃ and PM emissions. These changes resulted in a decrease in the NH₃ emission (1985–2006) and an increase in the PM emission (2004–2006). A revision of activity data and emission factors within sector 4 Agriculture has also been carried out. The ERT acknowledges the effort undertaken in this regard and encourages Denmark's efforts to continue this process in future submissions.

72. **Improvement:** The ERT welcomes initiatives taken by Denmark to make a number of improvements. In particular improving the activity data for slaughtering bulls, information on the reduction of NH₃ emissions from stables, inclusion of PM emissions from stables and the calculations of the loss of N from livestock for the period from 1985 and onward.

Sector specific recommendations

4.B Manure management: NH₃ and PM

73. The ERT noted that Denmark did not estimate emissions of TSP and PM from 4.B.3 (Sheep), 4.B.4 (Goats) and 4.B.13 (Others), and that these are reported as not estimated "NE". The ERT recommends that Denmark make efforts to complete and include emissions of these pollutants in its future submissions.

4.D.1 Agricultural soils: PM

74. The ERT strongly encourages Denmark to make further efforts to include emissions of PM which are accounted for in emission estimates under 4.D.1 (Direct Soil Emissions) in future submissions.

4.G. Agriculture other: NH₃

75. Denmark has indicated that the emission factor used for estimating ammonia emission from sewage sludge used as fertiliser (4.G Agriculture other) is 1.9 kg NH₃-N/kg N. This value, rather than the guidebook default value, is used as it is considered to better reflect the current state of knowledge. The ERT thank Denmark for this information, and suggest that Denmark provide supporting information to the Agriculture and Nature expert panel in the TFEIP, so that the Guidebook can be updated accordingly. The ERT also recommends that Denmark provide a clearer description of their methodological approach in its future IIR submissions.

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.C	Waste incineration	x		
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 codes have been reviewed and which have not in the respective columns.

General recommendations on cross cutting issues

76. **Completeness:** Denmark has included cremation (main pollutants, HM, POPs) and accidental fires (dioxin) in its waste inventory. However, some NRF6 sources, existing within the country, and which are documented in the EMEP/CORINAIR guidelines, are not included in Denmark's estimates. These include waste disposal in landfills, wastewater handling, and compost production. The ERT recommends that Denmark improves the completeness of the inventory by including these sources and other pollutants when relevant and describes in its IIR where sources have not been included.

77. **Comparability and Transparency:** New NFR reporting format for incineration of waste (6Ca to 6Ce) is not applied in the 2009 Danish submission. Denmark has already indicated in the IIR that the new NFR templates will be used in the 2010 submission, and this is welcomed by the ERT.

78. **QA/QC procedures:** Denmark applied general QA/QC checks, but has indicated that a specific QA/QC procedure is under development. The ERT encourages Denmark to finalise the implementation of these sector specific QA/QC procedures, including allocation checks and key source analysis.

79. **Transparency:** This Danish IIR shows a high level of transparency (detailed methodological description, activity data, EF, references are provided) concerning cremation (6Cd). The ERT encourages Denmark to apply such level of detail to other NFR 6 sub-sectors.

80. **Improvement:** The ERT notes Denmark's intention to improve the completeness of the inventory concerning the NFR 6. Implementation of NFR 6A and 6B is already planned in the IIR. Denmark also indicated during the review its intention to estimate emissions from compost production, to improve the IIR documentation for other waste sectors, and to take into account other pollutants within accidental fires estimates. The ERT warmly welcome all of these improvements.

Sector specific recommendations

6A Solid waste disposal on land – NMVOC

81. Denmark doesn't estimate emissions from solid waste land disposal in the 2009 submission. The ERT recommends that Denmark estimate emissions from this source at least for pollutants documented in the 2009 EMEP/Corinair Guidebook. National or bibliographic data on biogas composition (pollutant/CH₄ ratio) could also be used as a first estimate when an EF is not available.

6B Waste-water handling – NH₃

82. As Denmark already plans to estimate NMVOC from latrines in its 2010 submission, the ERT encourages Denmark to implement NH₃ emissions at the same time. When this source is significant within a party, NH₃ appears to be the relevant pollutant.

6D Other waste – DIOX

83. Accidental fires are allocated in the NFR 7 instead of the NFR6D as specified in the EMEP/Corinair Guidebook. Denmark has indicated in its IIR that accidental fires will be reallocated to 6D for the 2010 submission.

84. In order to improve the transparency of the report, the ERT recommends that Denmark describes precisely the methodology applied to estimate dioxin emissions from accidental fires.

6D Other waste – all pollutants

85. The ERT also recommends that Denmark improves the completeness of the accidental fires inventory by calculating emissions for other relevant pollutants. Denmark indicated during the review that it will improve the IIR documentation and consider the 2009 EMEP/EEA Guidebook EFs to improve the completeness of its inventory.

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

1. Response to preliminary question raised prior to the review:

DK_Ind_Proc_Initial_Qns_v1_OKtosend_leh.doc

Dk_Waste_Initial_Qns_v1_OKtosend_NERI.doc

DK_Gen_Initial_Qns_answer_240609_CLEARED_further_answer_inf.doc

IIR, data submission and data analysis transmitted by the CEIP

Review Stage 2: Synthesis and Assessment Country report

2. Response to questions raised during the review: Dk_Waste_Second_Qns_v1(mth).doc

Dk_Mobile_Initial_Qns_v1_MK_NERI_answer.doc

87-7944-297-8.pdf (substance flow analysis for dioxins in Denmark, Hansen &al. 2000)

DK_Uncertainty_LRTAP Total_2008_review.xls