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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:

FINLAND

CONTENT

INTRODUCTION

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.

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).

This report covers the stage 3 centralised reviews of the UNECE LRTAP Convention and EU NEC Directive inventories of Finland, 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)

The review was coordinated by Justin Goodwin 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

Finland has reported emissions for its protocol base years and a full time series up to 2007 (the latest year) for its protocol pollutants in the NFR flat file format. In addition, Finland provided 2007 emission data in the standard NFR format. Finland reported 2007 gridded emissions (Finland sends gridded data annually). Finland also submitted a detailed informative inventory report (IIR).

The CLRTAP inventory submitted by Finland is of good quality with most sectors generally well documented in the IIR.

KEY CATEGORIES

Finland has compiled and presented in its IIR a "Tier 1" Key Category Analysis (KCA) for the level assessment. The results of the analysis are used for inventory improvement. The results are consistent with the calculations carried out by the CEIP.

Finland does not yet compile a KCA using the trend assessment due to pending recalculations for the earlier parts of some time series. The ERT encourages Finland to perform these recalculations as soon as possible and to compile the level assessment in the next submission. In its response to the review Finland noted that trend assessments would be added to the IIR when the time series recalculation is completed.

QUALITY

Transparency

The ERT recognises the level of effort undertaken by Finland in providing an inventory with a significant level of detail to undertake a detailed review. Finland's IIR is generally well presented with all occurrences of the notation key "IE" in some small source categories explained in the report. However, the methodology descriptions are too general in the energy, solvents, industrial processes and waste sectors, preventing a detailed analysis of emission methodologies and data sources by the ERT. The ERT noted that the description of the timeseries could be more detailed and that a number of methodology descriptions could be improved or added (e.g. 1.B fugitive emissions, assumptions on solvent content of paints, corrections of small errors on Waste for industrial waste water). The ERT encourages Finland to compliment the excellent work done on the inventory with more details for the solvents, energy, IP and waste sectors and to include more detailed descriptions of the timeseries of emissions for Key Categories. In its response to the review Finland noted that it has not carried out major recalculations for air pollutants and that descriptions of time series will be

more detailed when a recalculation of the time series has been carried out. In addition, Finland indicated that more detailed descriptions of the reporting obligations of plants and development of country-specific emission factors would be provided in the IIR 2010.

Completeness

The ERT acknowledges the effort to which Finland has gone to provide estimates of emissions for all sub-sectors and all pollutants reviewed.

Finland's inventory for the pollutants reviewed is generally complete. The IIR provides comprehensive information on completeness and justifies omissions where they occur. For more detailed information on gaps please refer to the sector specific chapters in the second part of this report.

Finland reports some emissions as zero (0) in its data submission (e.g. NH_3 in NFR 1A, some Heavy metals in NFR 2 and PM in NFR 4). Finland indicated that the (0) are the result of rounding in the database systems for a number of activities where emissions exist but are very small. The ERT encourages Finland to continue to report these emissions and to explain in its IIR why it appears to use (0)s and not NO notation keys for these sectors.

Consistency, including recalculations and time-series

Finland has not undertaken any recalculations for their 2009 submission. Finland recognises, in its IIR, that some recalculations are necessary, but were not performed due to lacking resources. The recalculations are mainly needed for the years before 2000. The ERT encourages Finland to submit a consistent timeseries in its next submission. In its response to the review Finland indicated that, due to resource constraints, Finland was unable to develop a consistent timeseries or to perform a recalculation of the inventory.

Comparability

The ERT notes that the inventory of Finland is comparable with those of other reporting Parties. The allocation of source categories follows that of the EMEP/UNECE reporting Guidelines and NFR categories with minimal use of notation keys. The ERT encourages Finland to continue with this approach to national inventory calculation.

CLRTAP/NECD comparability

The ERT notes that there are some minor differences between the estimates provided by Finland under LRTAP and NECD. The differences occur mainly in agriculture and affect the national totals. The ERT encourages Finland to resolve these issues but notes that Finland has mentioned difficulties in meeting the reporting deadlines for CLRTAP and NECD and the

fact that Finland has raised these issues when the reporting guidelines were reviewed in the past years.

Accuracy and uncertainties

Finland compiled a quantitative uncertainty analysis and presents this clearly in its IIR. The outcome of the analysis is taken into account for inventory improvement.

Verification and quality assurance/quality control approaches

Finland has elaborated and implemented a quality assurance/quality control (QA/QC) plan in accordance with the EMEP/CORIANIR Guidebook (Inventory Management Chapter). This includes general QC procedures (tier 1) and sector specific procedures. Finland also defined roles and responsibilities for inventory preparation, improvement, and QA/QC.

Although having QA/QC measures in place, some errors occurred in Finland's 2009 submission. These mistakes led to a resubmission of the inventory data. The ERT encourages Finland to provide the necessary resources to enable it to follow its QA/QC rules strictly and to thoroughly check future submissions before delivery. In its response to the review Finland acknowledged that resource constraints make it difficult for it carry out all of the QC activities and fully check its inventory data and IIR prior to submission.

FOLLOW-UP TO PREVIOUS REVIEWS

Finland did not resolve many of the questions identified in the stage 2 review 2008 due to a lack of resources and back-up experts available to deal with the questions. The ERT also noted that, due to other commitments, Finland was unable to respond to many of the stage 3 questions during the review week. The ERT encourages Finland to improve the availability of staff to respond to the CEIP to resolve stage 2, and to the ERT for stage 3 questions.

AREAS FOR IMPROVEMENTS IDENTIFIED BY FINLAND

Finland's IIR identifies several areas for improvement (section 14.3). The ERT agrees with the goals set out, particularly emphasizing:

- Perform recalculations pending for 1990–1999 in the energy sector.
- Check the inventory for completeness regarding “non-main” pollutants.
- Check the inventory for the appropriate use of notation keys.
- The ERT adds its own recommendations and actions to this list, as laid out in part B of this report.

In its response to the review Finland indicated that it would:

- Update its IIR trend analysis and provide more detail for Key Category trends once it has completed its full recalculations.
- Provide the rationale and explanation for recalculations and their implication for trends once it has completed its full recalculations
- Provide more details of methods, data sources and assumptions for the sub categories in the energy (including for 1.B fugitive emissions), solvents (assumptions on solvent content of paints), industrial process and waste sectors once it has completed its full recalculations
- Provide sub category level chapters to its IIR to aid navigation in the document.
- Include revised estimates in its submission and detailed descriptions in its IIR for a new calculation model on agricultural nitrogen emissions and EFs (Grönroos et al. 2008).

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

The ERT encourages Finland to perform pending recalculations as soon as possible to ensure the accuracy and timeseries consistency of the inventory and to offer a key source analysis including trend assessment in the next submission.

The ERT encourages Finland to elaborate on the rationale and explanation for the recalculations and their implication for trends in some sectors of the IIR.

The ERT encourages Finland to focus more distinctly on following its well defined checking routines before submitting its inventory so as to avoid errors in the reporting tables.

The ERT encourages Finland to continue to report these emissions and to explain in its IIR why it appears to use (0)s and not NO notation keys for these sectors and to improve the transparency of its NIR by describing emissions that are included in other categories (e.g. cremation, sludge spreading).

The ERT encourages Finland to resolve or to highlight any methodological differences between their NECD and CLRTAP submissions and the reasons for these differences.

The ERT urges Finland to address future issues from its stage 2 & 3 review questions in a timely manner noting that, due to other commitments, Finland was unable to respond to many of the questions at stage 2 before, or stage 3 during the review week.

The ERT encourages Finland to provide more details of methods, data sources and assumptions for the sub categories in the energy (including for 1.B fugitive emissions), solvents (assumptions of solvent content of paints), industrial process and waste sectors.

The ERT encourages Finland to provide more detailed descriptions of the time series of key sources in the IIR.

The ERT encourages Finland to provide sub category level chapters to aid navigation in the document.

The ERT encourages Finland to include missing sources (including cremation, sludge spreading) and review estimation methods for Landfill NH3

The ERT encourages Finland to continue to develop projects for incorporating high quality facility level data (e.g. EUETS) into the national estimates and to generate country specific emission factors.

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, 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		
1.A.4	Commercial, residential, agriculture & forestry	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

Completeness: The ERT finds the Energy sector to be complete and including all important sources for the pollutants reviewed.

Transparency: The ERT notes that Finland's IIR explains that the methodology presented in the CORINAIR guidebook has been applied in this inventory and completed by national methods where available, according to the Guidebook principles. However, only the general methodology by code NFR is provided which is not sufficient for the ERT to analyse the underlying methods. The ERT encourages Finland to provide more detailed explanations of the methods, data sources and assumptions applied for each sub category. The ERT also encourages Finland to provide an explanation for the use if "IE" for 1A5b.

Uncertainty: The ERT commends Finland for providing detailed information on uncertainties for the energy sector. Monte Carlo simulation is used to calculate uncertainties and the results of the uncertainty analysis are used to prioritise the improvements especially for the energy sector.

Comparability and consistency: The ERT commends Finland for providing an explanation for the differences between the LRTAP submission and the UNFCCC submission. However, the ERT noted that some minor differences between NECD and LRTAP submissions were not explained in the IIR for the energy sector. The ERT encourages Finland to resolve these

issues and describe any remaining differences in its IIR. In its response to the review Finland indicated that the explanations would be added to the IIR.

QA/QC procedures: In Finland's IIR a specific paragraph explains "information on the QA/QC ". The ERT notes that a specific QA/QC procedure for the ENERGY sector is used and that it is consistent with the Guidebook Corinair.

The ERT also notes that a specific verification has been performed for the Energy sector between the data included in the VAHTI database and the UNFCCC report. The ERT commends Finland for this work and encourages it to continue to develop verification approaches in order to ensure a good quality inventory.

Recalculations: The ERT noted some strange fluctuations between 2006 and 2007 (for example: for NFR code 1A2fi values are reported for the years 2005 and 2006 but not for the year 2007) for some pollutants. Finland explained that it is due to the fact that the recalculation of time series has not been carried out to take account of improved knowledge of the emissions implemented for the year 2007. Finland hopes to report a revised time series in 2010. The ERT encourages Finland to finish and report these recalculated estimates for all years to ensure consistency.

Improvement: Finland's IIR indicates clearly the type of improvements which have been done and which are planned for the energy sector: the recalculation of the time series for 1990-1999 is under way; emission inventories of particulates were checked during 2007; the use of notation keys will be checked and updated for the whole time series when time series has been recalculated. The ERT notes that Finland has identified further development needs in the Finnish LRTAP inventory to be fulfilled when the necessary resources for the improvements are available.

Sub-sector specific recommendations

1A1, 1A2, 1A4 and 1B

For 1A1, 1A2, 1A4 and 1B the IIR only provides very general methodology descriptions making it difficult for the ERT to analyze the individual calculations in detail for each subsector. The ERT encourages Finland to provide more detail in its IIR for the sub-sectors included within each NFR, code as provided by Finland in a table during the review. In its response to the review Finland indicated that the explanations would be added to the IIR.

Finland’s IIR explains the use of bottom-up data in the emission inventory. Good schemes are given in this report to explain the processing of emission data reported by the plants. Finland explains that emissions data reported by the plants has been the basis of its inventory, but that the old data include only a few pollutants, i.e. SO_x, NO_x, TSP and fuel consumption. The ERT recommends that Finland explain in its IIR what methodology is used to calculate the other pollutants for the categories which use a bottom-up (plant data) based approach. In its response to the review Finland indicated that the missing emission estimates from the time series would be completed when the on-going recalculations are finalized.

The ERT notes with interest that Finland has developed a very important database (VAHTI) for industrial sources (approximately 2000 boilers or processes) for consumption and for

emissions. The ERT encourages Finland to maintain this database and use it as the basis for estimating emissions for Finland's inventory.

The ERT notes that in the IIR a specific paragraph for the overview of energy sector describes the timeseries of fuel consumption. The ERT recommends that Finland explains with more detail the timeseries of the energy balance and provides a scheme which shows the evolution of fuel consumption per fuel and per year to improve the transparency of the sector. In its response to the review Finland indicated that detailed explanations would be added to the IIR.

The ERT notes that the number of Finnish energy plants is given in the IIR for the NFR codes 1A1 and 1A2 in the tables 4.1 and 4.13. The ERT encourages Finland to provide, in future IIRs, the list of sub-sectors included in the different NFR codes listed before to improve transparency.

Mobile sources

Review scope

Pollutants reviewed		SO_2, 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		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		
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

Completeness: The ERT considers the Mobile sector to be complete for the latest inventory year (2007). For previous years emission estimates are in some cases made using the earlier NFR aggregation level, and subsequently these emission estimates are included in one related N08 code (e.g. all transport modes before 2000; non road industry and non road commercial./institutional sectors before 2007). In its response to the review Finland indicated that for the next submission the full inventory would be reported using the N08 code nomenclature. The ERT encourages Finland to implement this revision of the inventory.

Transparency: Finland has provided a detailed and generally transparent emissions inventory. Finland uses a country specific methodology and emission factors for all mobile sectors which is in agreement with EMEP/CORINAIR guidelines. A comprehensive methodology description is given on the LIPASTO web site. The ERT recommends that Finland include more details in the IIR/LIPASTO cf. paragraphs 45-50 in order to improve transparency. The missing explanations relate to the fuel balance approach for road transport (1A3b), civil aviation (1A3a) and national navigation (1A3d), the split between domestic and international sea transport (1A3d i & ii), and the implementation of cold start and deterioration emission effects for road transport vehicles (1A3b). In its response to the review Finland indicated that the explanations would be added to the IIR.

Uncertainty: Finland has reported uncertainty estimates for mobile sources, at an aggregated sector level (e.g. 1A2, 1A3 and 1A4). The ERT encourages Finland to make sub sectoral uncertainty estimates for all mobile sources. In its response to the review Finland indicated that sub category analysis would be included for future uncertainty analysis.

QA/QC procedures: The ERT notes a detailed and sound QA/QC plan described by Finland in the IIR.

Recalculations: Finland has not made recalculations for previous years in its latest (2009) submission. The ERT encourages Finland to recalculate the emissions prior to 2007 for mobile sources in order to take account of new methods and assumptions used for the latest year (2007) to obtain complete and consistent time series of emissions in the full inventory provided by Finland. Finland has indicated that it will try to implement revisions of the timeseries and recalculations in its next submission.

Improvement: The ERT notes that Finland indicates in its IIR that it will recalculate the emissions for inventory years prior to 2007. Finland does not provide any further details on planned improvements for the mobile sector. The ERT commends Finland for its commitment to complete a consistent timeseries and encourages it to present details of other improvements needed and planned in its future IIRs.

Sub-sector specific recommendations

The ERT considers that the Finnish inventory for mobile sources is of good quality in general using a detailed and well documented approach. The ERT encourages Finland to continue its work on developing a consistent timeseries and to work on improving the documentation in a few areas (see below).

1.A.3a Air transport

The ERT noted that documentation is missing in the IIR/LIPASTO regarding how the fuel balance is handled between statistical fuel sales and calculated fuel for aviation. The ERT encourages Finland to include more details about what sub sector (LTO/cruise; national/international) estimates are being adjusted in order to obtain the fuel balance necessary to meet the EMEP/CORINAIR requirements. In its response to the review Finland indicated that the explanations would be added to the IIR.

1.A.3.b Road transport

No documentation is given in IIR/LIPASTO of how the fuel balance (sales vs. calculated fuel) has been accounted for in the LIISA model (fuel types, vehicle categories). The ERT encourages Finland to explain this in detail in future IIR/LIPASTO submissions/versions. In its response to the review Finland indicated that the explanations would be added to the IIR.

No documentation is given in IIR/LIPASTO of how the effects of cold start and deterioration (catalyst vehicles) on emissions are implemented in the LIISA model. The ERT encourages Finland to include more details regarding the model approach for deterioration and cold start in future IIR/LIPASTO submissions/versions. In its response to the review Finland indicated that the explanations would be added to the IIR.

1.A.3.d ii National navigation

No documentation is given in IIR/LIPASTO of how the split is made between domestic and international sea transport in the MEERI model. Finland is encouraged to explain this aspect of the methodology in the future IIR/LIPASTO versions. In its response to the review Finland indicated that the explanations would be added to the IIR.

No documentation is given in IIR/LIPASTO of how fuel sales statistics are treated in relation to calculated figures for national navigation. The ERT encourages Finland to describe the adjustment of calculated results, the sector transferral of fuel consumption to other fuel consuming sectors in the future IIR/LIPASTO versions. In its response to the review Finland indicated that the explanations would be added to the IIR.

1A2f ii, 1A4a ii, 1A4b ii, 1A4c ii, (non road mobile machinery)

For non road machinery, a Finnish documentation report is available from the LIPASTO website. A short description in English is also available. The ERT encourages Finland to provide more detail on the methods, assumptions and data used, a translation of this report into English or to summarise the main details of the methodology, assumptions and data sources in its IIR.

Industrial Processes

Review scope

Pollutants reviewed		SO_2, NO_x, NMVOC, NH_3, TSP, PM_{10}, $PM_{2.5}$, HM		
Years		1990–2007		
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	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)			
2.B.2	Nitric acid production	x		x
2.B.3	Adipic acid production			
2.B.4	Carbide production			
2.B.5	Other (please specify in a covering note)			
2.C.1	Iron and steel production	x		x
2.C.2	Ferroalloys production	x		x
2.C.3	Aluminium production		x	
2.C.4	SF_6 used in aluminium and magnesium foundries		x	
2.C.5	Other (please specify)		x	
2.D.1	Pulp and paper	x		x
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

Completeness: The inventory is complete with respect to the most important sources of emissions. However, The timeseries for emission of NH_3 from the chemical industry is only presented from 1999-2007. The ERT encourage The Party to complete the timeseries or to provide an explanation. Finland has indicated that it will try to implement revisions of the timeseries when the recalculations have been updated and provide updates in its next submission.

QA/QC procedures: The IIR states that a general QA/QC plan has been implemented and, for IP, statistical quality checking has been carried out. However, no QA/QC has been described for the specific source-sector emissions in the IP sector. The ERT encourages the Party to describe and implement sector specific QA/QC procedures. In its response to the review Finland indicated that the explanations would be added to the IIR.

Recalculations: The ERT encourages Finland to implement its recalculations as identified in its IIR. For Industrial Processes, the ERT encourages Finland to focus on recalculations for Cd, CO, Hg, NMVOC, NO_x, Pb, and SO_2 in order to allocate the emissions to relevant sectors rather than 2G Other production. Finland has indicated that the sources under 2G will be checked and the sources allocated to other sectors if possible. However, there may be sources not belonging to any of the specified sectors and therefore reasonably allocated to 2G.

Uncertainty: A detailed sector specific uncertainty analyses has been performed.

Transparency: The description of the applied methodology is very brief. Finland refers to The Compliance Monitoring Data system – VAHTI (http://www.ymparisto.fi/default.asp?contentid=142451&lan=EN) for IP. This data system contains information on the environmental permits of clients and on their wastes generated, discharges into water and emissions to air. The content of the database is checked and approved by the authorities before inclusion of the emission data in the inventory (IIR p. 132; footnote). The data reported to VAHTI may be of good quality but it is not possible to evaluate the data. According to the above mentioned webpage the database contains a lot of information on the individual sources. The ERT encourages Finland to provide more detailed explanations of the methods, data sources – i.e. the VAHTI database – and assumptions applied for each sub category. In its response to the review Finland indicated that the explanations would be added to the IIR.

Improvement: The IIR indicates that improvements are planned for production of glass as NMVOC is planned to be included in the inventory. The ERT encourages Finland to implement these improvements and to continue to document planned and possible improvements in its IIR.

Sector Specific Recommendations

The ERT encourages Finland allocate the emissions to specific sectors rather than 2G Other production. Finland has indicated that the sources under 2G will be checked and the sources allocated to other sectors if possible. However, there may be sources not belonging to any of the specified sectors and therefore reasonably allocated to 2G.

- In general the Finnish inventory is based on the VAHTI database as mentioned above. As the description of the content of the database is brief the ERT has been unable to review many of the individual sector methodologies. Finland has indicated that they will check the descriptions in the IIR and improve these if possible.

SOLVENTS

Review scope

Pollutants Reviewed		NMVOC		
Years		1990–2006 + (Protocol Years)		
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	**3B**		x
3.B.2	Dry cleaning	**3B**		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

The Finnish solvent emissions inventory is of good quality. However the ERT recommends that Finland improve the transparency of the activity data and EFs for categories derived from using bottom up approaches.

Completeness: The ERT considers the solvent use sector almost complete. The application of glues and adhesives (SNAP 060405) is not considered due to lack of data. The ERT encourages Finland to consider this activity.

QA/QC procedures: According to information provided, QA/QC procedures are set up for the solvents sector. However no verification is carried out for the specific sources included under each NFR source. The ERT recommend that Finland investigate the development of checks to ensure that all activities are included in the inventory. The ERT supports the projects set up with the Nordic countries since 2002 to check, compare and harmonize inventories where possible.

Recalculations: Recalculations are planned in the months to come. The ERT highly supports this work and encourages Finland to recalculate all the time series from 1990.

Uncertainty: Uncertainties are quantitatively assessed and the work carried out is robust.

Transparency: Methodologies used in Finland, for solvent uses, are mainly based on a bottom up approach using NMVOC emissions reported by the plants that have a monitoring obligation for their NMVOC emissions from solvent use and where calculation is based on the amount of solvents in the products used and the volatilization rates of the solvents. Emissions are collected but no information is provided on activity levels. It is, consequently, difficult to analyse if the reduction of emissions is due to a decrease of activities or to a real decrease of the emission levels, or to assess the impact of regulations aiming at reducing emissions. Finland is encouraged to improve the transparency of the IIR report. The description of methodologies used for the solvent sectors could be improved by adding emission factors and information on activity levels. Finland is also encouraged by the ERT to distinguish categories for which confidentiality problems are encountered from categories for which activity data can be provided.

Improvement: Finland plans to re-assess the EF used for degreasing and dry cleaning. The ERT supports this improvement as well as the re-allocation of each of these activities under NFR 3B1 and NFR 3B2 respectively. Finland does not provide any further details on planned improvements for the solvents sector. The ERT commends Finland for its commitment to complete a consistent timeseries and encourages it to present details of other improvements needed and planned in its future IIRs.

Sector specific recommendations

3.A.1 Paints – NMVOC

Emissions are derived from industry expert opinions and data from sales and imports. The method is consistent with those proposed by the Guidebook. The ERT encourages Finland to present activity data more transparently per activity considered under the NFR 3A1. This could then provide an average emission factor which can be used to analyse trends across the time series and improve transparency. In its response to the review Finland indicated that the explanations and detailed data would be added to the IIR.

3.A.2 Coatings – NMVOC

Emission estimations are based on a bottom up approach through mandatory emission reporting and additional questionnaires for plants not concerned by mandatory reporting. The overall methodology is robust. However, activity data are not provided. The ERT encourages Finland to present activity data more transparently per activity considered under the NFR 3A2. This could permit the deriving of an average emission factor which can be used to analyse trends across the time series. In its response to the review Finland indicated that the explanations and detailed data would be added to the IIR.

The ERT also encourages Finland to check whether emissions from vehicles dewaxing (SNAP 060409), underseal treatment and conservation of vehicles (SNAP 060407) are included in emissions reported by car manufacturers to avoid any risk of double counting.

3.B Dry cleaning and degreasing – NMVOC

3B1 and 3B2: the methodology used for degreasing and dry cleaning is based on a mix of bottom up approach and top down approach. Solvent consumption is determined from a balance between input and known outputs of solvent in wastes. The emission factor used for area sources is 0.7 kg VOC/kg solvent. This EF is valid both for the degreasing activity and dry cleaning. Finland plans to re-assess this EF. The ERT supports this re-assessment and would suggest that Finland differentiate metal degreasing emissions and dry cleaning emissions. In its response to the review Finland indicated that this improvement would be considered and carried out when resources available.

The ERT also recommends that Finland provide the consumption of solvents at the activity level in its IIR. This could be used to provide transparency of the trends across the time series.

- For data reported by the plants this information is not possible to receive as the plants are obliged to report only the emissions which are QA/QC checked by the supervising authority.
- For sources calculated the activity data used will be added to the IIR.

3.C Chemical products, manufacture & processing – NMVOC

The inventory is complete for 3C. Emission estimations are based on a bottom up approach through mandatory emissions reporting and additional questionnaires for plants not concerned by mandatory reporting. The overall methodology is robust. However, activity data are not provided. The ERT encourages Finland to present activity data more transparently in its IIR to provide transparency on the trends across the time series to avoid any risk of double counting.

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

3D1 to 3D3. The inventory is almost complete for 3D. The ERT recommends that Finland consider estimating NMVOC emissions from glue and adhesive application. In its response to the review Finland indicated that this improvement is currently not possible due to a lack of activity data.

Emission estimations are based on a bottom up approach through mandatory emissions reporting and additional questionnaires for plants not concerned by mandatory reporting. The overall methodology is robust. However, activity data are not provided. The ERT encourages Finland to present activity data more transparently per activity considered under NFR 3D1, 3D2 and 3D4. This could permit the deriving of an average emission factor which can be used to analyse trends across the time series and understand them for each activity considered under the NFR 3D1, 3D2 and 3D3. In its response to the review Finland indicated that the explanations and detailed data would be added to the IIR where confidentiality constraints permit.

Agriculture

Review scope

Pollutants Reviewed		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, PM_{10} & $PM_{2.5}$		Yes
4.D1	Direct soil emissions	NH_3, PM_{10} & $PM_{2.5}$		Yes
4.F	Field burning of agricultural wastes	NH_3, CO		
5E	Other	NR	N	
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

The ERT encourages Finland to recalculate emissions from years prior to 2007 using the current methodology.

Completeness: The inventory is complete with respect to the most important sources of emissions.

QA/QC procedures: The Party has implemented detailed QA/QC procedures in the inventory since 2005. So far the programme has included studies in the agriculture sector and resulted in updating or developing several emission factors. The studies also examined the applicability of the default methods presented in the Guidebook for conditions in Finland.

Recalculations: The ERT notes that recalculations using the corrected EFs have not been carried out. The ERT acknowledges the effort needed for this revision but encourages Finland to carry out recalculation of previous years' emissions using the consistent methodology EFs. In its response to the review Finland indicated that the estimates would be made for the next submission.

Uncertainty: A detailed level and trend uncertainty analysis for 2007 emission data was carried out at NFR 3 level for the actual emission sources. The results of the uncertainty analysis have been used to prioritise further improvements.

Transparency: Finland provides a very transparent Inventory for the Agriculture sector, including useful details of livestock numbers and EFs, in the IIR. The ERT commends Finland for the thorough presentation of the methods for the agricultural inventory.

Improvement: Finland states that no source-specific improvements are planned for the agriculture sector. The ERT commends Finland for its commitment to complete a consistent timeseries and encourages it to continue to consider if other improvements are needed in its future IIRs.

Sector specific recommendations

For all other sectors the ERT commends Finland for the thorough approach to inventory preparation and has confidence that the QA/QC procedures instigated will lead to further improvements as far as the information allows.

4.D.1 Agricultural Soils:- NMVOC

The ERT encourages Finland to implement the planned improvement by including direct soil emissions of NMVOC when the methodology is available under 4D1 Direct Soil Emissions.

Waste

Review scope

Pollutants Reviewed		SO_2, NO_x, NMVOC, NH_3, TSP, PM_{10}, $PM_{2.5}$, HM		
Years		1990–2007		
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		x
6.D	other waste (e)		x	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

Completeness: The inventory is complete with respect to the most important sources of emissions. However, NH3 from landfills is missing from the estimates. The Party is encouraged to investigate whether this source is relevant under Finnish conditions. In its response to the review Finland indicated that NH3 emission from landfills is considered irrelevant under Finnish conditions and that it would add this explanation to its future IIRs.

QA/QC procedures: The IIR states that "no quality checking is applicable for the current method" and "no verification has been carried out for the specific source-sector emissions". The ERT encourages the Party to indicate in its IIR why this is the case and to identify possible methods for QC of the estimates. In its response to the review Finland indicated that this section would be updated and the requested information added to the future IIRs.

Recalculations: The ERT encourages Finland to implement its recalculations as identified in its IIR waste incineration for the years 1990-1999. The ERT also encourages Finland to consider possible recalculations for Solid waste disposal on land, Wastewater handling and Other waste.

Uncertainty: A detailed sector specific uncertainty analyses has been performed.

Transparency: The IIR refers to UNFCCC reporting regarding methodologies applied for Solid waste disposal on land and Wastewater handling as well as the VAHTI database (The Compliance Monitoring Data system). The ERT encourages Finland to present the methodology descriptions in the IIR and specific additional assumptions applied for air pollutants in order to improve transparency. In its response to the review Finland indicated that this section would be updated and the requested information added to the future IIRs.

Improvement: The IIR states that the methodology for emissions of NMVOC from Wastewater handling as well as Waste incineration "should be revised in the future". The ERT encourages Finland to implement the improvements in the coming inventory. No improvements are planned for Solid waste disposal on land and Other waste. In its response to

the review Finland indicated that this section would be updated and the requested information added to the future IIRs.

Sector Specific Recommendations

As the description of the content of the database is brief the ERT has been unable to review many of the individual sector methodologies. Finland is encouraged to present the applied methodology in the IIR rather than referring to UNFCCC reporting, to apply the NRF version 08 for the complete timeseries and to improve the description of the content of the VAHTI database. In its response to the review Finland indicated that this section would be updated and the requested information added to the future IIRs.

LIST OF ADDITIONAL MATERIALS PROVIDED BY THE COUNTRY DURING THE REVIEW

1. Finland Stage 2 S&A report
2. Finland Stage 1 report 2009
3. Finland's IIR 2009 :
4. 2009ReviewData-NoLinks-v9.xls
5. First response to the questions : Finland-Energy-11-06-09-PreReview1-CommentsFromFinland.doc
6. Second response to the questions : Finland-Energy-11-06-09-PreReview1-ReplyFrom Finland response from ERT-18-06-09Finland response.doc
7. A file sent by Finland : FI_N08_2007_CORRECTED_110609.xls
8. FI_CLRTAP_Comments_ReviewStage2.xls
9. A file sent by Finland : TotEnergyConsumption.xls
10. Finland-Waste-16-06-09-PreReview1-Correctedreply_from Finland
11. Questions_on_IP_FinnishReply
12. The Compliance Monitoring Data system – VAHTI (http://www.ymparisto.fi/default.asp?contentid=142451&lan=EN)
13. Finland-Solvents-15.06.09.PreReview1-ReplyFrom Finland.doc
14. Finland Energy-Mobile-11-06-09-PreReview1-ReplyFrom Finland response from ERT 17-07-09.doc
15. Finland-Agriculture-11-06-09-PreReview1-OKtoSend.doc
16. Reply FI_CLRTAP_IEF.xls