FINLAND's INFORMATIVE INVENTORY REPORT 2019

Air Pollutant Emissions 1980-2017

under the UNECE CLRTAP and the EU NECD

Part 1B - General

March 2019

FINNISH ENVIRONMENT INSTITUTE

Centre for Sustainable Consumption and Production

Environmental Management in Industry – Air Emissions Team

PART 1B - GENERAL

8 RECALCULATIONS AND IMPROVEMENTS

Changes in chapter	
Update of text	February 2019 KS

8.1 Summary of recalculations, explanations and justifications

Requested information

According to the Reporting Guidelines this chapter should include information relevant for assessment of compliance with each Protocol including a description of sources that were not included in the base year but have been added since for sources that were included in the base year and are no longer applicable.

As was no obligation to document this information in the early years of reporting air pollutant emission inventories, but the reporting guidelines have much developed since. Therefore it has not been possible to present the requested information for the early years. However, under the sub-chapters “Source specific recalculations” of each Sector Chapter of the IIR, information is presented for those years the documentation item already existed. In addition, a collection of improvements since 2006 is presented in Tables xx-xx

Recalculations prior to the 2018 submission

The first full recalculation of the time series 1980-2016 was carried out to the submission in 2018. The recalculation of the energy sector time series from the 1990’s was initiated in 2002, however, completed first to the 2018 submission. Due to the pending energy sector recalculations, it was not possible to fully recalculate interconnected data due to the complex structure of the inventory as explained in details in Chapter 2.3.2 in Part 1A – General of the IIR. However, individual emission figures and notation keys were corrected in the NFR tables when errors were found, in addition to sources where the activity data did not interfere with data reported by the plants. The ammonia emissions time-series was an exception, and was recalculated because sparce ammonia sources are related to data reported by the operators. The allocation of emissions under consistent reporting categories in the time series was not realized until the full recalculation to the 13 April 2018 resubmission. No impact assessments of the partial recalculations until 2018 were performed due to resource limitations and the fact that the impact on the non-recalculated time series would anyway be highly uncertain.

Recalculations submitted in 2018-2019

15 Feb 2018 Finland submitted the old time series for the years 1990-2015 and new data for 2016. This was because the energy sector data was not finalized by the deadline of the NFR tables.

15 Mar 2018 Finland submitted the first recalculated time series, however, it would not have been mature for submission due to lack of checks that could not be done in the window between the late finalization of the energy sector data and the 4 weeks time frame for resubmissions.

13 Apr 2018 Finland submitted a recalculated time series that had undergone several QA/QC procedures, however, still having remaining reallocation issues. Due to the UNECE CLRTAP S3 Review and the EU NECD Technical Review, both in June 2018, the data

needed to be available.

15 Feb 2019 Finland submitted the recalculated time series which included further harmonized emissions allocations in the time series, however, also some errors were discovered after the submission deadline

15 Mar 2019 Finland submitted additional corrections to the submission of 15 Feb 2019.

The main justifications for recalculations in 2018 and 2019

Detailed information of the recalculations with judgements are presented in Annex 8 to the IIR.

Recalculation for the years 1980-1989

Due to differences in the original reporting obligations for the 1980's, many of the pollutants were not inventoried, or were inventoried but not documented up to the present standards and can be presented only as aggregated data. Errors and gaps found in the data have been corrected where possible and

Recalculation for the years 1990-2015

- The emission and fuel data reported by the plants has been completed and corrected during the years in environmental authorities' database VAHTI. This information has not been taken into the inventories in a regular basis but only case-by- case
- The bottom-up inventory could not be recalculated without fixing the interconnection of data reported by the plants and the data calculated for each boiler/process or each site or for the activity branch, without rearranging the data reported by the plants into the reporting categories that had been revised over the years since the inventory work begun in the middle of the 1990's. This work has now been finalized.
- New sources and pollutant emissions were added to the inventory, where possible, along with the increasing knowledge and updates of the Guidebook versions.

Recalculation for the year 2016

There were some remaining misallocations of emissions and some other errors that were either identified already during the CLRTAP/NECD reviews in June 2018, or later during the preparation of the 2017 inventory.

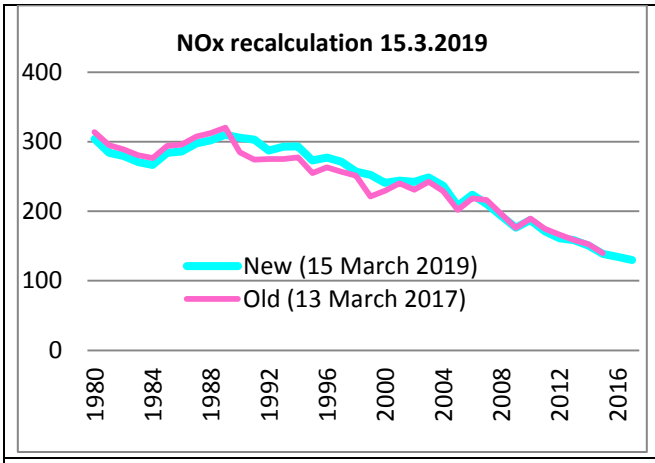
Impacts of recalculations

Major impacts of the recalculations on emission levels by pollutant are presented in the table and figures below. Detailed explanations of the recalculations are collected in Annex 9 "Recalculations in the 2019 submission to the 2017 submission"

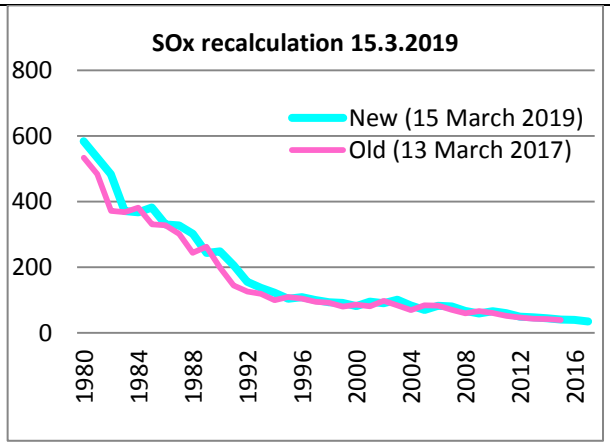
Summary of recalculations in 2018 and 2019

A short summary of the combined impacts and the main justifications for recalculations carried out in 2018 and in 2019 as reported on 15 March 2019 to the non-recalculated time series submitted on 13 March 2017 are presented Figure 1.01 .

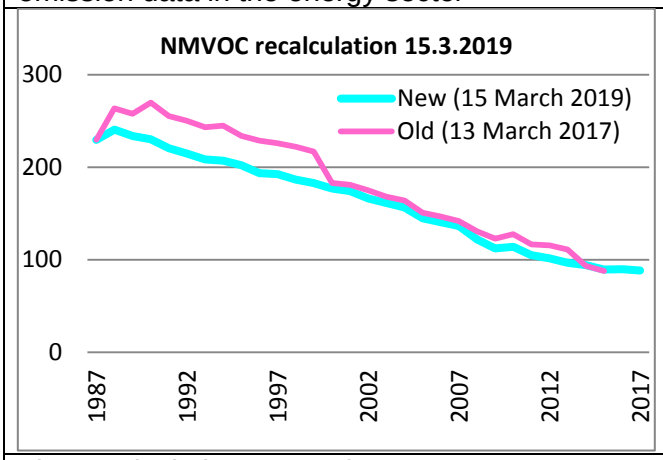
Detailed information of the recalculations with judgements are presented in Annex 9 to the IIR.



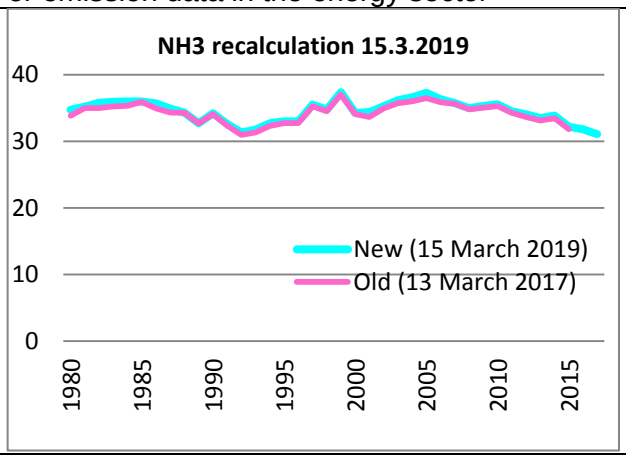
The recalculations were due to correcting fuel or emission data in the energy sector



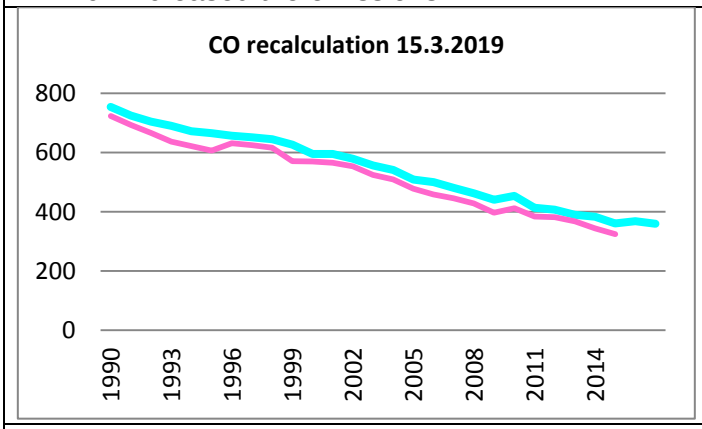
The recalculations were due to correcting fuel or emission data in the energy sector



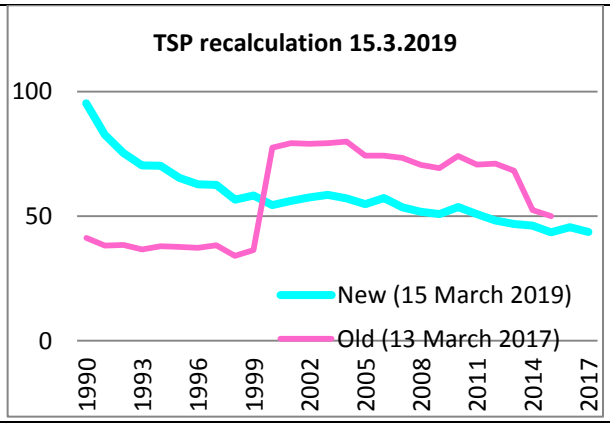
The recalculations were due to
- recalculation of small scale combustion emissions with the technique specific methodology earlier implemented to the later years, which decreased the emissions
- inclusion of NMVOC emissions from agriculture, which increased the emissions



An error in the calculation of manure spreading was corrected and resulted in increase of emissions.



Explanation in Annex 9 by 1 May 2019



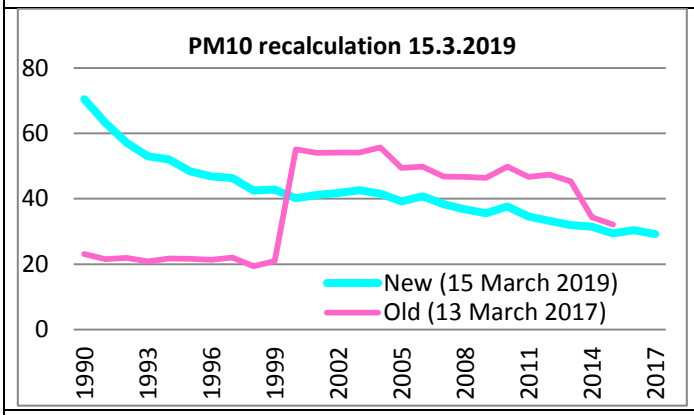
Explanation in Annex 9 by 1 May 2019.

Particles:
- The reporting obligation for particles starts from 2000.

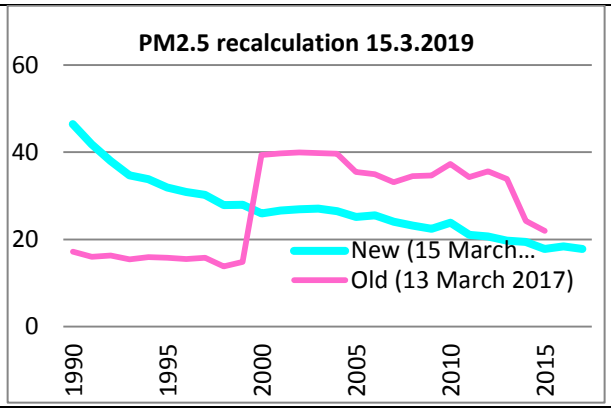
The basis of calculation of emissions in the energy, IPPU and waste sectors is TSP data reported by the plants. Due to the complexity of the bottom-up inventory, particles were not recalculated earlier for the 1990's. Also, emissions from small scale combustion were not earlier calculated with the

technology based method, which has a decreasing impact on emissions.

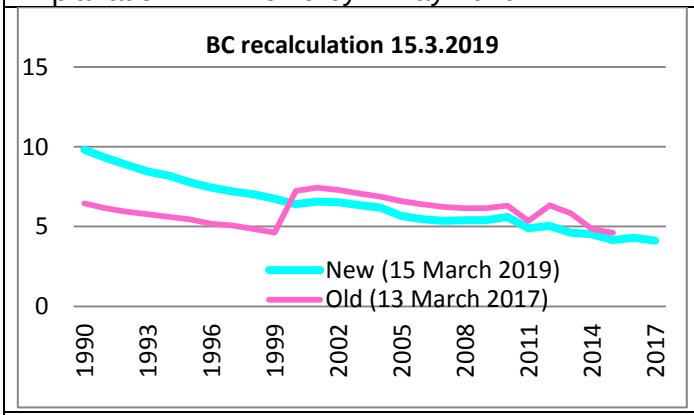
- The impact of the recalculation on PM2.5 and PM10 emissions is because the fraction factors from the Guidebook 2016 were implemented for the transport sector emissions. For instance, in the road transport sector the Guidebook 2016 advices to use the ration 1:1:1 for TSP.PM10:PM2.5 while smaller ratios were earlier used for small particles.
- For BC the recalculations increased the emissions in the 1990's due to inclusion of small scale combustion.



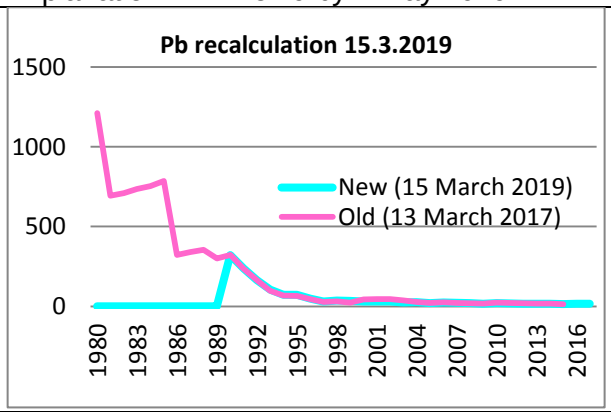
Explanation in Annex 9 by 1 May 2019



Explanation in Annex 9 by 1 May 2019



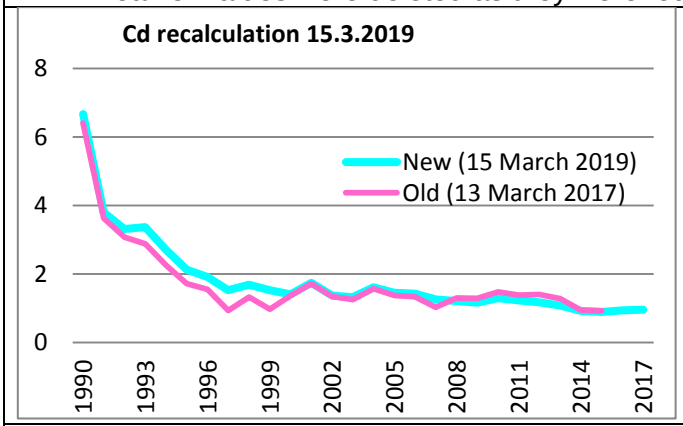
Explanation in Annex 9 by 1 May 2019



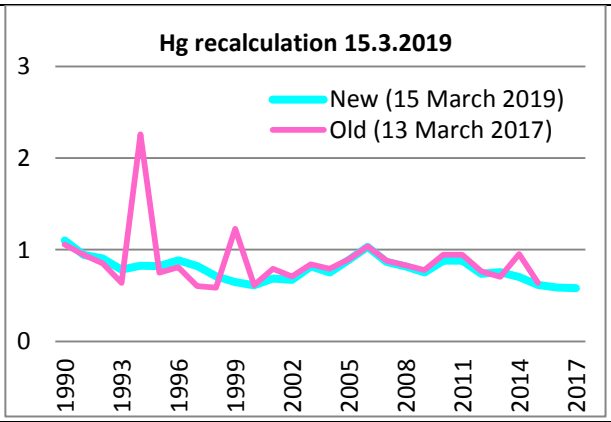
Explanation in Annex 9 by 1 May 2019

Heavy metals:

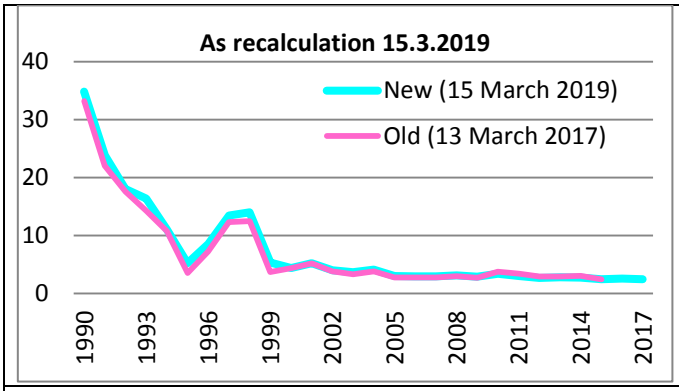
- the emissions from small combustion were not earlier recalculated back to <2010
- The dip in the time series of all heavy metals in 1999 in the 2017 submission was because the earlier values were deleted as they were found erroneous



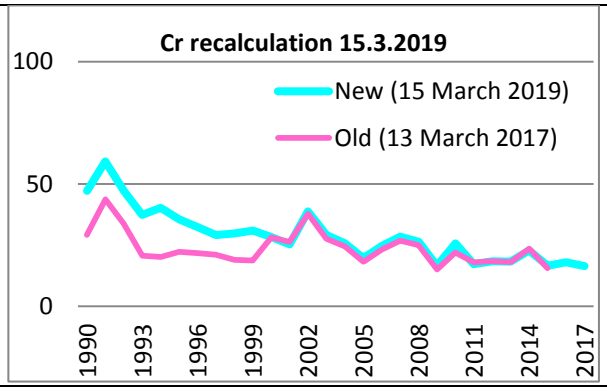
Explanation in Annex 9 by 1 May 2019



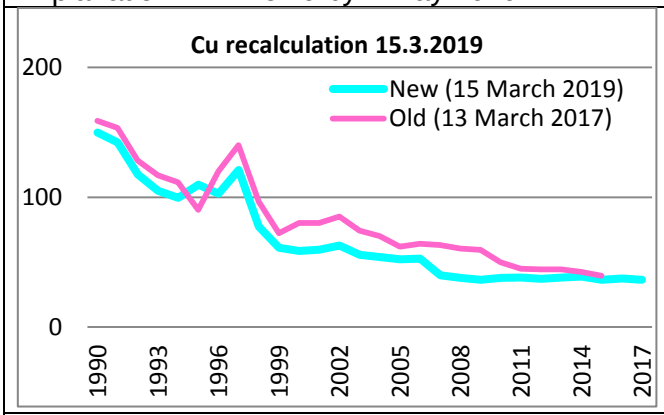
Errors corrected. Detailed explanation in Annex 9 by 1 May 2019



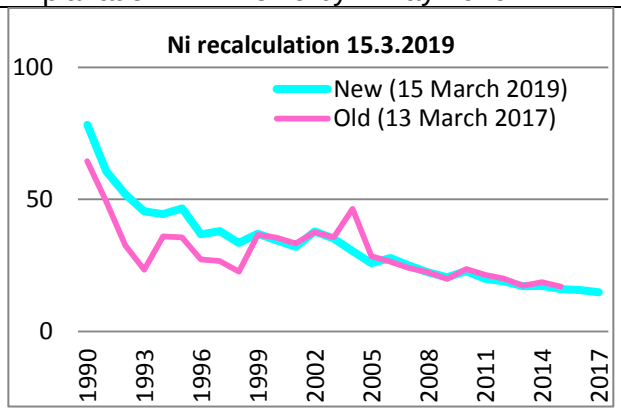
Explanation in Annex 9 by 1 May 2019



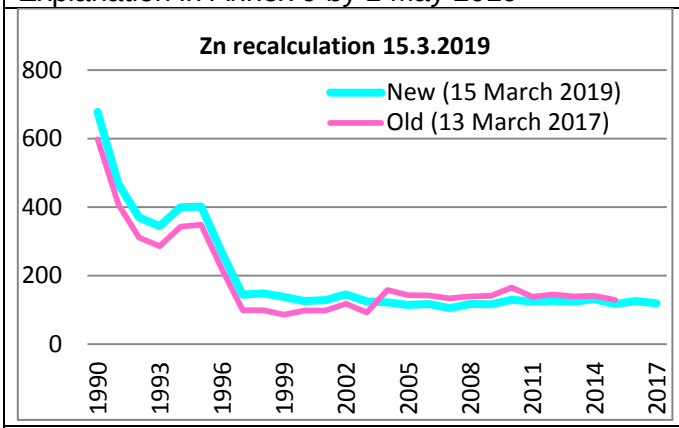
Explanation in Annex 9 by 1 May 2019



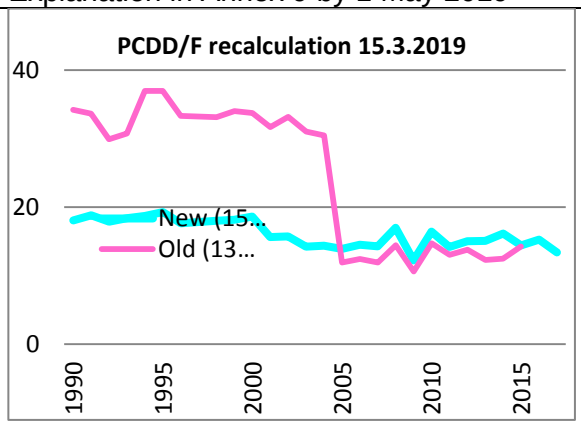
Explanation in Annex 9 by 1 May 2019



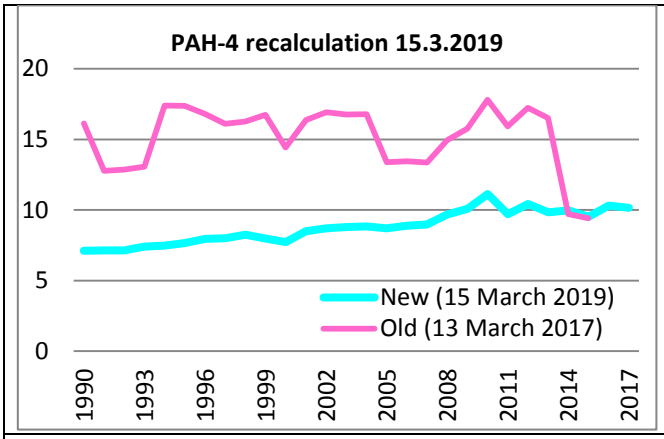
Explanation in Annex 9 by 1 May 2019



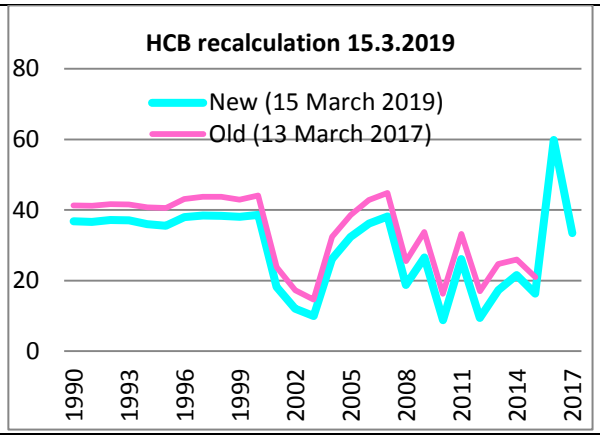
Explanation in Annex 9 by 1 May 2019



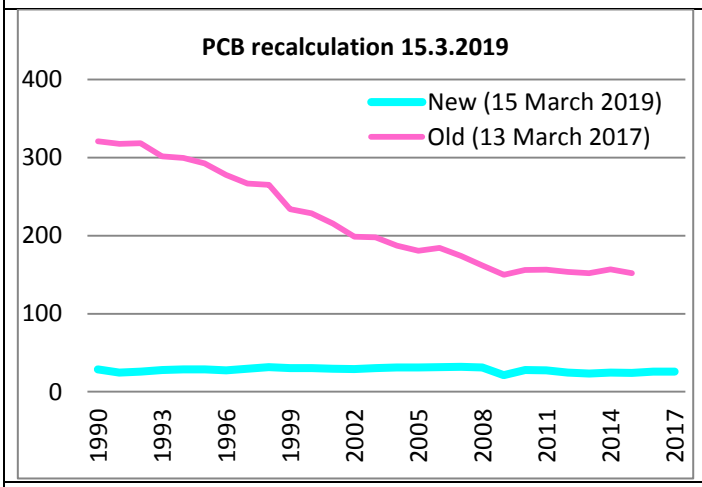
The drop of the emission value before 2005 is due to change in the EF for small combustion due to introduction of the techniques specific calculation model and the difficulty to derive fuel data for the years prior to 2005 before the recalculation.



Explanation in Annex 9 by 1 May 2019



The sharp fluctuation in the trend is caused by fluctiations at a specific chemical process (NFR 2B10a)



The drop of the emission level is due to the removal of the earlier estimate for landfill fires, which was based on international literature and national expert estimates, because the Guidebook 2016 does not give any method for this source.

Figure 1.01 Impact of recalculations submitted 13 April 2018 (new time series) to data submitted on 13 March 2017 (old time series)

8.5 Planned improvements

8.5.1 Inventory improvement programme at Finnish Environment Institute

Identification of further development needs in the Finnish UNECE CLRTAP inventory is carried out on a continuous basis according to annual work programmes (Table 1.01). although larger scale improvements are possible only when the necessary resources for the improvement projects are available.

In the past years the inventory improvement programme was strongly linked with the national emission data production methods provided to the operators in their reporting to emission registers such as the E-PRTR. Finnish Environment Institute maintains information on emission estimation methodologies and emission factors on a website (http://www.ymparisto.fi/fi-FI/Asiointi_luvat_ja_ymparistovaikutusten_arviointi/Luvat_ilmoitukset_ja_rekisterointi/Paastotiedon_ilmoittaminen_paastorekistereihin_PRTR) (in Finnish). These methods should be applied in the E-PRTR reporting by the plant operators whenever no plant specific data is available. This procedure has been developed to ensure consistency between the data reported by the plants and the emission inventory.

The programme has thus far included studies in the energy production sector (boilers >50 MW), industrial processes (pulp and paper, iron and steel), agriculture and waste sectors and resulted in updating or developing of several emission factors. The studies involve also examination of the applicability of the default methods presented in the Guidebook for the national conditions.

National emission factors are derived from data reported by the plants when these are based on site-specific measurements and other site-specific data. In the later years, the obligation to use the latest version of the Guidebook emission factors has been more dominant. After the full recalculation of the time series emphasis will be given to check and further develop national emission factors based on data reported by the plants and replace the Guidebook EFs with these where feasible.

The results of the uncertainty analysis are used to prioritise the improvements.

The overall scheme of the inventory improvement programme is presented in Chapter 14 in Table 1.01.

Information of the Nordic cooperation in harmonization and improvement of air pollutant emission inventories in the Nordic countries is presented in Chapter 8.5.2

Sector-specific improvements that have already been implemented due to the QA/QC work and the inventory improvement programme are presented in Table 1.02 and those still remaining in Table 1.03

Table 1.01. Sector-specific improvements implemented

(THE TABLE IS CURRENTLY NOT COMPLETE DUE TO TIME RESTRICTIONS TO DOCUMENT HERE ALL IMPROVEMENTS MADE. MOST OF THE IMPROVEMENTS IN THE LATEST YEARS ARE RECORDED UNDER THE DEDICATED PARAGRAPHS UNDER THE CATEGORY SPECIFIC CHAPTERS, THIS TABLE WILL BE COMPLETED TO THE NEXT SUBMISSION)

Changes in chapter	
May 2018/not complete	KS

NFR	Identified improvement	Completed	Reason
All	The first national PCB. PCP and SCCP inventories were carried out and reported to the UNECE CLRTAP Secretary	2006 submission	To prepare for the revision of the scope of the POPs Protocol
All	Emission inventories of TSP. PM_{10} and $PM_{2.5}$ were checked	2008 submission	New information in the Guidebook
All	NH_3 emissions from 1990-2009 were revised	2011 submission	Emission from agriculture were calculated using calculation method introduced in 2009 submissions. Also emissions from the other sectors were checked. The whole time-serie is calculated consistent methods but not yet reported in the NFR tables.
General/ IIR	Subcategory levels to aid navigation in the IIR	2010 submission	Review 2009
1A3	The calculation of tyre and brake wear and road abrasion emissions was revised	2009 submission	Nordic project on harmonization of the inventories
1A3	The calculation of heavy metals and particles from road abrasion and tyre and brake wear was checked and errors in the calculation were corrected	2010	QA/QC
1A3	Emissions from pipeline compressors have been reallocated under 1A3e since year 2009 emissions.	2011 submission	

NFR	Identified improvement	Completed	Reason
1B1b	Revision of NMVOC EF according to GB13 (old 17.7 yksikkö, nes 7.7 yksikkö)	2016	
1A3bvi-1A3bvii	Particle emissions from road abrasion and tyre and brake wear in 1990-2009 were reported according to previous time series updates in order to ensure timeseries consistency	2011 submission	Improvement of timeseries consistency and inclusion of 1990-1999 emissions to reporting tables.
1A3bvi	Heavy metal emissions from tyre and brake wear in 1990-2009 were reported according to previous time series updates in order to ensure timeseries consistency	2011 submission	Improvement of timeseries consistency and inclusion of 1990-1999 emissions to reporting tables.
1A3bvi	Brake wear AD updated (ratio of new/old vehicles) 2010-2015	2017 submission	EF update
1B	Allocation of fugitive emissions were checked. Few facilities were changed from 1B1ai to 1B2. Method descriptions in the IIR from this sector were improved as a result of review feedback	2010 submission	QA/QC. Review 2009
2D1 and 2D3	Allocation of mechanical wood processing. including manufacture of plywood. chipboard. reconstructed wood products. engineered wood products and sawmills. was changed from 2D1 to 2D3	2010 submission	New reporting templates 2010
2C5d	The emission factor for PCDD/F emissions from zinc manufacturing was revised to correspond the measurements performed at the zinc plant in 2003	2010 submission	QA/QC
2G	Tobacco smoking NMVOC EF according to GB 13 (4.8 -> 4.84)	2016 submission	
2G	Firework particles, AD updated, GB 2016 EFs, Completed with NOx, CO and Sox – emissions not yet reported because the earlier estimates in 2G include various sources which cannot be separated before recalculation of the time series	2018	
2G	Tobacco smoking particles GB 2016	2017 submission	EF update
2G			
3	A new calculation model for NH3 emissions from agriculture sector was introduced	2009 submission	Revision of the national method (QA/QC) and harmonization between the "ghg" and "air pollutant" nitrogen inventories
3	Recalculation of ammonia time series	2012-2015	Revision of national emission factors.
3A1-2	NMVOC emissions from NFR 3A were previously reported aggregated. The separation between 3A1 and 3A2 was performed.	2010 submission	New reporting templates
3B	Animal numbers (1990-2009) were cross-checked and harmonazed between "ghg" and "air pollutant" reporting	2011 submission	To make sure. that emissioin calculations are made using same animal numbers
3B	Particle emissions from manure management in 1990-2009 were recalculated and reported	2011 submission	Improvement of timeseries consistency and inclusion of 1990-1999 emissions to reporting tables.
3Da1	Particles calculated for the first time	2017 submission	Completeness
3Dc	Particles calculated for the first time	2017 submission	Completeness

NFR	Identified improvement	Completed	Reason
3D3	NO_x. CO. PAH-4 and NMVOC emissions from tobacco smoking were added to the inventory	2010 submission	QA/QC
3F	NH_3. CO and NO_x emissions from agricultural waste burning were included to the inventory	2009 submission	QA/QC
3F	NH3 emissions before 2011 were corrected due to updating AD	2016	
3F	Field burning heavy metals GB 2016	2017 submission	EF update
5C1bv	HCB from crematoria, GB 2016	2017 submission	EF update
5Cd	New activity data for cremation of corpses .	2010 submission	QA/QC. new sources for AD
5E	Car and house fires Particles, PCDD/F, heavy metals (GB 2016/Aasestad), 1990-2015	2017 submission	Check of EFs

8.3. Sector-Spesific Improvement Needs According to QA/QC (most of these have been done, table to be revised)

NFR	Identified improvement	Schedule	Reason for possible delay
General	Time series recalculation	2017 submission	Lack of resources
General	Documentation of the recalculation of the Energy sector	2018 submission	Lack of resources
General	Adding sub-category level chapters to navigation	2010	Partly carried out. to be finalized by 2015
1. 2 and 3	The splitting between energy and process based emissions (in cases where the reported emissions in VAHTI consist of both energy and process originated emissions together) will be improved in the forthcoming inventories when the energy sector recalculation has been finalized.	2018	Delay in recalculation of energy sector emissions
1A3	Emissions from the small scale inland cruising passenger transport are not included in the inventory at the moment as there is no data available for estimation of these emissions. The inventory includes inland waterway ferries and leisure boats.	not scheduled	Project with VTT not yet approved
1A3	Possibilities to revise the POP emission factors from off-road machinery will be studied further.	Project application 2018-2020 by VTT submitted	Lack of resources
1B2c and 1B2aiv	Emissions from venting and flaring (NFR 1B2c) are currently reported aggregated in NFR 1B2aiv. Reallocation will be considered parallel with the 2010 inventory.	2018	Delay in recalculation of energy sector emissions
2	The completeness of emission sources for heavy metals. persistent organic pollutants and ammonia and the need for new measurements shall be further studied. Input from Nordic cooperation project in 2016-2018	2017-2018	
2A	Activity data for production of glass was updated	2013	
2A1	PAH-4 emissions from cement production will be completed to cover both plants in the future inventories for the whole time series.	2018	Delay in recalculation of energy sector emissions
2D3	Allocation of SOx. NOx and PM2.5 emissions in NFR 2D3 will be corrected when the energy sector recalculation is finalized.	2018	Delay in recalculation of energy sector emissions

NFR	Identified improvement	Schedule	Reason for possible delay
2G	NMVOCs from tobacco smoking were left under 2G, other emissions were moved under 2D3i (HCB from use of chlorochemicals and NMVOCs reported by plants)	2014	
3D3	Heavy metal emissions from fireworks will be considered to be added to the inventory	2018	Lack of resources
3D3	Improving accuracy of the new calculation model for NMVOCs from households	2016-2017	
3A3	NMVOC emissions from NFR 3A were previously reported aggregated. The separation of 3A3 from 3A1 and 3A2 will be considered by e.g. adding these subcategories to the annual data collection.	2012	Improvement of annual data collection did not result information detailed enough for data disaggregation at this point.
3B1-2	The calculation method for NMVOC emissions from NFR 3B1 and 3B2 to be improved in order to report these categories separately. Data collection on the volume of NMVOC in imported products needs to be arranged.	2012	Lack of resources
3D1	NMVOC emissions from agricultural soils should be included in the future inventories. Suitability of the method in the EMEP/CORINAIR Emission Inventory Guidebook (EEA. 2002) to the Finnish conditions should be studied.	2016	Lack of resources
All	The results of the recalculated emissions from e.g. processes and product use will be officially reported when the energy sector recalculation has been finalized	?	Delay in recalculation of energy sector emissions
All	Allocation of emissions to be consistent with the greenhouse gas inventory as far as possible..	2016	Delay in recalculation of energy sector emissions
3D3	Update the time series of emissions from house fires due to changes in the activity data statistics (consistency)	2012	
5C1a	Municipal waste incineration: correction of erroneous values in NFR tables until 2011	2016	
5C1a, 5D1, 5D3, 5E	Allocation of emissions was corrected: NFR 5C1a is NE and the emissions from WWTPs are now included under 5D1 and 5D3 (industrial and domestic ww handing). also double reporting of some values was corrected	2016	

8.5.2 Review, Improvement and Harmonization of the Nordic Air Emission Inventories in the Nordic Air Emission Experts Group

Changes in chapter	
March 2018	KS

Since 2004 the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) have carried out several projects on reviewing. improving and harmonizing the national air pollutant emission inventories. The work has been funded by the Nordic Councilof Ministers. The target of the cooperation is to share knowledge and resources and to increase the quality of the Nordic CLRTAP air emission inventories with respect to accuracy, comparability, transparency and completeness. Until now, POP, NMVOC, particle and partly also heavy metal emission inventories in the Nordic countries have improved. Several improvements to the national inventories have been made in all Nordic countries due to the results of the work, for instance in NMVOC and particle emission inventories.

In addition to the overall review (2004), the following specific sectors have been under work:

- particulate emissions from small scale wood combustion and road transport (2006)
- emissions from the use of products (2006-2011)
- NMVOC inventories from the domestic product use sector (2010)
- SLCP emissions (2014-2017)
- POP and heavy metals from all sectors (2016-2018).

8.6 Improvements in the Finnish Inventory due to the Inventory Review Processes

8.6.1 CLRTAP S3 Review and EU Technical Review under the NECD in 2018

The improvements made to the inventory in response to the 2018 S3 review under the CLRTAP and to the EU Technical Review under the NECD in 2018 are presented in Table 1.03.

Table 1.03 Improvements made in response to the 2018 CLRTAP S3 review and the 2018 EU Technical Review under the NECD

ENERGY

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
CLRTAP 2018 Recommendation nr 29		Transparency	The ERT encourages Finland to explain the trends for each Key Trends in the IIR. Regarding the IIR, the trends are already explained in the general part of the IIR and it is planned to include the explanations on the trends by NFR category in the submission 2019.		The trend description was improved to the 2019 submission, and will be developed further in the next submissions
CLRTAP 2018 Recommendation nr 30		1A1 and 1A2 Transparency	The ERT notes that in the IIR Finland provides tables which show the evolution of fuel consumption per fuel, per year and by NFR code (1A1, 1A2,..). The ERT commends Finland for providing these detailed explanations as recommended in the previous review. However, these tables have been taken from Finland's NIR and are not consistent with the energy use reported in the NFR tables. The ERT encourages Finland to update the IIR with the data in the NFR tables to be consistent.		The tables have been changed to correspond the contents of the IPTJ calculation system at SYKE.
CLRTAP 2018 Recommendation nr 32		1A1 and 1A2 Transparency	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 2.9 and 2.12. The ERT encourages Finland to provide, in the energy part of the IIR, the list of sub-sectors included in NFR codes 1A2f and 1A2gvii to improve transparency.		A list will be developed to the 2020 submission.
CLRTAP 2018 Recommendation nr 33		Transparency	The ERT encourages Finland to include the answers that were provided to questions raised by the ERT during the review week in future submissions (see Sub-sector Specific Recommendations).		The information provided during the review is incorporated into the IIR.
CLRTAP 2018 Recommendation nr 36		Transparency	The ERT encourages Finland to justify most of the outliers and to include explanations for all large fluctuations highlighted during the stage 2 review.		See the response under CLRTAP Recommendation 37

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
CLRTAP 2018 Recommendation nr 37		1A1 and 1A2 Transparency	The ERT encourages Finland to correct the data in order to remove outliers. During the review, mistakes in the inventory leading to outliers were highlighted: misallocation of SO2 emissions in 2001 (1A2b), missing petroleum coke entry from one facility operator in 1997 (1A1b), erroneous entries by facility operators in 2008 (1A1a) and in 1991 and 1999 (1A2gviii). ERT recommends Finland to investigate further and to correct these inaccuracies if necessary.		The corrections have been made to the 2019 submision.
CLRTAP 2018 Recommendation nr 40		Transparency	The ERT commends Finland for providing a comparison between the CRF tables and the NFR tables. However, this comparison only explains a small part of the differences. In response to the review, Finland indicated that they will investigate and harmonize where possible the allocation of emissions between the greenhouse gas inventory and the air pollutant inventory to the next submission in 2019. ERT commends Finland for this future investigation. ERT encourages Finland to do the same work for the activity data		Regarding the recommendation it has not been possible to allocate all air pollutant emissions under NFR categories that might seem harmonized with CRF categories due to the facts that (a) the air pollutant emissions are not generated in the same sources as ghgs, (b) the allocation of CFR data changes yearly according to possible outsourcing or purchasing of the energy production units between the energy companies and the industrial plant – as this happens almost annually, there are no resources to do this in the air pollutant inventory (c)
CLRTAP 2018 Recommendation nr 46		1A1 and 1A2 Stationary combustion PCBs	The ERT noted that according to the NFR tables, the emissions of PCBs are not applicable (NA) for the combustion in some sectors in 1A1 and 1A2 while the EMEP EEA Emission Inventory Guidebook 2016 suggests emission factors for PCBs for solid fuels and biomass. Finland answered that following the recalculation of the time series 1990-2015 there was no time to thorough checks and these emissions were not included in the 2018 submission. However, PCBs emissions from these categories will be calculated and reported in the 2019 submission. ERT recommends strongly Finland to estimate PCBs emissions from stationary combustion.		PCB emissions have been included
NECD Review FI-1A1a-2018-0001	No	1A1a Public Electricity and Heat Production, PCBs, 1990, 2005, 2016	For category 1A1a and pollutants PCBs the TERT noted that Finland reported 'NA' when there is a methodology in the 2016 EMEP/EEA Guidebook which suggested a potential under-estimate. In response to a question raised during the review, Finland explained that these emissions were not included in the 2018 submission, thus the notation key is incorrect and should be 'NE'. Finland stated that the emissions will be calculated and reported for the first time in the 2019 submission. The TERT recommends that Finland include the new estimate in its next submission.	No	The emissions are included
NECD Review FI-1A2-2018-0001	No	1A2 Stat CombMan Ind Const:, PCBs, HCB, 1990-2016	For category 1A2a-f and pollutant PCBs for all years the TERT noted that there is a potential under-estimate as these are reported as the notation key 'NA', when there is an emission factor and method in the 2016 EMEP/EEA Guidebook for solid fuels and biomass. The TERT		PCB emissions are included.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
			also noted that for category 1A2b, pollutant HCB, Finland report 'NA' for all years except 1992. In response to a question raised during the review, Finland explained that due to resource constraints PCB emissions from categories 1A2a-f were not included in the 2018 submission and that the emissions will be calculated and reported in the 2019 submission. Finland also explained that in 1992 boilers in 1A2b used biomass, so HCB emissions were estimated, but biomass was not used for other years. The TERT recommends that Finland include 1A2a-f PCB emission estimates in the 2019 submission. The TERT also recommends that Finland correct the notation key for HCB 1A2b from 'NA' to 'NO' if the relevant activity is not occurring for the rest of the time series, but also to include the HCB emission estimates from other solid fuels in 1A2a-f in the 2019 submission.		
NECD Review FI-1A2a-2018-0001	No	1A2a Stat CombMan Ind Const:: Iron and Steel, Hg, 1990-2016	For category 1A2a and pollutant Hg the TERT noted that there was a lack of transparency regarding the time series consistency. In response to a question raised during the review, Finland explained that one plant was incorrectly allocated to 1A2a for some years, causing strong fluctuations in emissions. Finland stated this will be corrected in the 2019 submission. The TERT recommends that Finland reviews the time series data and plant allocation to ensure time series consistency, and transparently document this update in the 2019 submission.		An incorrect value for 2009 has been corrected- In 1990-1997 the emissions are higher due to inclusion of a sintering plant under the category. Since 1998 the emissions are reported under 2C1 and the emissions do not fluctuate after that. An explanation is included in the relevant IIR chapters. A change in the allocation of the point source data before 1998 was not yet possible.
NECD Review FI-1A2b-2018-0001	No	1A2b Stat CombMan Ind Const: Non-Ferrous Cd, Hg, Pb, 1990-2016	For category 1A2b Stationary Combustion in Manufacturing Industries and Construction: Non-Ferrous Metals, pollutants Cd, Pb the TERT noted that there was a lack of transparency regarding the time series consistency. In response to a question raised during the review, Finland explained that emissions from 2C7c had incorrectly been allocated to 1A2b for several years. Finland stated that the allocation will be made consistent across the time series for the 2019 submission. The TERT recommends that Finland review the emissions allocation to ensure time series consistency, and to include transparency information regarding the method across the time series, in the 2019 submission.		Errors in Cd emissions have been corrected. Regarding Hg and Pb emissions in the early 1990's the emissions from zinc production are due to the use of coal, which varied strongly between the years and is reflected in the emissions. Use of coal has decreased strongly after that. Since 1995 the emissions of the zinc production are reported by the plant and allocated under 2C6. A change in the allocation of the point source data before 1995 was not yet possible.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
CLRTAP 2018 Recommendation nr 47		1A2 Stationary combustion NH3	The ERT noted that according to the NFR tables, the emissions of NH3 are not applicable (NA) for the combustion in some sectors in 1A2 while the EMEP EEA Emission Inventory Guidebook 2016 suggests emission factors for NH3 for biomass. Finland responded that they had checked the possibility of ammonia emissions with the plants in 2015 and the conclusion from the discussions with energy industry emission experts was that ammonium emissions are not occurring and it would be incorrect to calculate these as ammonia emissions can be expected only from NOx abatement using SNCR/SCR techniques, however, these units are rare in Finland. Following the EMEP EEA Emission Inventory guidebook, the NH3 EF for biomass in 1A2 is 37 g/GJ and the source is : Roe S.M., Spivey, M.D., Lindquist, H.C., Kirstin B. Thesing, K.B., Randy P. Strait, R.P & Pechan,E.H. & Associates, Inc, 2004:Estimating Ammonia Emissions from Anthropogenic Non-Agricultural sources. Draft Final Report April 2004. In this report, it's noticed that the emission factors are established considering that "all emissions are assumed to be uncontrolled". Others emission factors are included in this report in the case of SCR or SNCR. ERT recommends strongly Finland to estimate NH3 emissions from stationary combustion while being aware that there will be a likely revision of the Tier 1 NH3 emission factor for biomass in these sectors in the guidebook.		After consultation with the energy industries Finland still believes that there is an error in the Guidebook EF and thus does not see it appropriate to include the emissions in the inventory. However, those plants that have SCR/SNCR techniques, are already reporting the emissions and those are included in the inventory. Finland continues to study the issue as due to the revision of the IED, the BAT for measurements will require ammonia measurements after 2021.
FI-1A2-2018-0002	No	1A2 Stat CombMan Ind Const:, NH3, 1990-2016	For category 1A2 Stationary Combustion in Manufacturing Industries and Construction and pollutant NH3 the TERT noted that there was a potential under-estimate of emissions as these are reported as the notation key 'NA'. In response to a question raised during the review, Finland explained that they had checked the possibility of NH3 emissions with the plants in 2015 and the conclusion from the discussions with energy industry emission experts was that NH3 emissions are not occurring and it would be incorrect to calculate these as NH3 emissions can be expected only from NOX abatement using SNCR/SCR techniques, which are rare in Finland. Following the 2016 EMEP EEA Emission Inventory Guidebook, the NH3 EF for biomass in 1A2 is 37 g/GJ and the source is Roe S.M., Spivey, M.D., Lindquist, H.C., Kirstin B. Thesing, K.B., Randy P. Strait, R.P & Pechan, E.H. & Associates, Inc, 2004: Estimating Ammonia Emissions from Anthropogenic Non-Agricultural sources. Draft Final Report April 2004. In this report, its noted that the emission factors are established considering that overall emissions are assumed to be uncontrolled. Others emission factors are included in this report in the case of SCR or SNCR. However, the emission factor in the Guidebook is likely to be		

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
			revised. The TERT notes that using the 2016 EMEP/EEA Guidebook emission factor this under-estimation would be above the threshold of significance for a technical correction. However, as the NH3 emission factor is due to be revised and is expected to reduce, the TERT recommends that Finland estimate NH3 emissions in future submissions while being aware that there will be a likely revision of the Tier 1 NH3 emission factor for biomass in these sectors in the guidebook.		
CLRTAP 2018 Recommendation nr 44		1A1c Manufacture of solid fuels and other… all pollutants	In source category 1.A.1.c all emissions are flagged as NO. However there is coke production in Finland. Finland responded that all emissions from fuel use in coking are allocated to the category 1A2a. The coking plant is part of a very large steel factory complex and at the moment all fuel based emissions from that complex are allocated under the category 1A2a. However, the fuel use based emissions in the greenhouse gas inventory from coking are allocated to the category 1A1c. Therefore, the difference between the NFR and CRF tables is due to differences in allocation of emissions. The ERT encourages Finland to change the notation keys for this sector or to consider the need of changing the allocation of the emissions.		The notation key was changed to IE..
FI-1A2gviii-2018-0001	No	1A2gviii Stat CombMan Ind Const:: Other, PCBs, 1990-2016	For category 1A2gviii Stationary Combustion in Manufacturing Industries and Construction: Other, pollutant PCBs the TERT noted that there was a lack of transparency regarding the time series consistency. In response to a question raised during the review, Finland explained that there was duplication of data reported by plants for 1993-2006. Finland stated that this will be corrected for the 2019 submission. The TERT recommends that Finland reviews the activity data and update the time series in its next submission.		The double entries were corrected to the 2019 submission.
NECD Review FI-1A4bi-2018-0002	Yes	1A4bi Residential: Stationary, PAHs, PCBs, PCDD/F, 1990-2016	With reference to NFR 1A1a, 1A2d, PCDD/F are key categories, but emission factors are inconsistent with the 2016 EMEP/EEA Guidebook. With reference to 1A4bi, PCDD/F, PAH, and PCB are key categories but the emission factors for fuels other than wood combustion are inconsistent with the 2016 EMEP/EEA Guidebook. The TERT notes that in the 2018 IIR Finland states that a comparison of their EFs will be made with the 2016 EMEP/EEA Guidebook, and recalculations made where necessary, for the 2019 submission. The TERT recommends that this comparison is performed and, where necessary, estimates are updated to be consistent with the 2016 EMEP/EEA Guidebook or Tier 2 methods for key categories.		For 1A1 and 1A2 Finland uses national EFs listed in Annex 2 “Emission factor tables for point sources”, which are based on national research and thus considered to be representative for the national conditions. For 1A4 other fuels than wood Finland uses EFs presented in the energy IIR in table 2.22 (p. 41) and considered to be representative for the national conditions.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
FI-1A5a-2018-0001	No	1A5a Other Stationary (Including Military), SO2, 2005, 2010, 2015	For category 1A5a Other Stationary (Including Military), SOX for years 2005, 2010, 2015 the TERT noted that emissions have been recalculated from the previous submission and the change is above the threshold of significance. No explanation is given in the IIR. In response to a question raised during the review, Finland explained that recalculations were made throughout the inventory for the whole time series 1990-2015, during which many of the allocations of emissions were harmonized. For 1A5a this included the addition of areas sources to harmonize with the Finnish GHG inventory allocations. The TERT accepted this explanation and recommends that Finland includes and explanation of the recalculations in its 2019 submission.		The explanation is provided in Annex 9 for recalculations
CLRTAP 2018 Recommendation nr 45		1B1b Fugitive emissions from solid fuels NOx and CO	In source category 1.B.1.b, according to the NFR tables, the emissions of NOx and CO are not applicable (NA) for the fugitive emissions from the production of coke while the EMEP EEA Emission Inventory Guidebook 2016 suggests emission factors in the table 3-1. Finland answered that these emissions are allocated under the category 1A2a and they will investigate the possibility to split between energy and process emissions for the 2019 submission. The ERT encourages Finland to change the notation keys for these pollutants or to try to split these emissions.		The notation key was changed into IE.
NECD Review FI-1B1b-2018-0001	No	1B1b Fugitive Emission from Solid Fuels: Solid Fuel Transformation, NOX, 1990-2016	For category 1B1b Fugitive Emission from Solid Fuels: Solid Fuel Transformation and pollutant NOX for all year the TERT noted that there was a potential under-estimate of emissions as these are reported as 'NA'. In response to a question raised during the review, Finland explained that these emissions are estimated and included in 1A2a. Finland stated that the possibility to split between energy and process emissions will be studied and the allocation of emissions documented in the 2019 submission. The TERT notes that this does not related to an over-or under- estimate of emissions and recommends that Finland investigate the division of process and combustion emissions from this source, transparently document the findings, else update the notation key in 1B1b to 'IE' if this split is not possible for the 2019 submission and include the explanation of where the emissions are allocated.		
NECD Review FI-1B2aiv-2018-0001	No	1B2aiv Fugitive Emissions Oil: Refining / Storage, SO2, NOX, NH3, PM2.5, Cd, Hg, Pb, PCDD/F, 1990-2016	For category 1B2aiv Fugitive Emissions Oil: Refining / Storage and pollutants SOX, NOX, NH3, PM2.5, Cd, Hg, Pb, PCDD/Fs for all years the TERT noted that there was a lack of transparency of emissions allocation as these were reported as 'IE', but no explanation was given for where these emissions were included. In response to a question raised during the review, Finland explained that this was due to resource constraints, and that the allocations and notation keys will be		The documentation of the allocation is provided in General Part 1A of the IIR Table 1.8c

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
			checked for the next submission. The TERT notes that this does not relate to an over or under estimate and recommends that Finland review the allocation and notation keys, and transparently document the information in the 2019 submission.		
NECD Review FI-1B2aiv-2018-0002	No	1B2aiv Fugitive Emissions Oil: Refining / Storage, PCBs, 1990-2016	For category 1B2aiv and pollutant PCBs for all years the TERT noted that Finland is the only Member State that reports emissions for this category and that the 2016 EMEP/EEA Guidebook documents PCB emissions as 'NA' for 1B2aiv. In response to a question raised during the review, Finland highlighted a lack of confidence in its estimate and the underlying EF used. The TERT recommends that Finland reviews the estimate to ensure that emissions are not over-estimated and reports on its conclusion with any associated revised estimates or notation key in its next IIR.		The emissions have been removed as there is no method provided in the Guidebook.
CLRTAP 2018 Recommendation nr x		1B2b Fugitive emissions from solid fuels NMVOC	Concerning the sector 1B2b, ERT noticed that there is no source of the activity data in the IIR and the activity data is not included in the NFR tables. Finland answered that the activity data presented in the IIR is from the Energy Statistics (Statistics Finland, 2017). The ERT encourages Finland to include information on the activity data source in the IIR and to include the figures in the NFR tables.		Reference included in the IIR and AD in the NFR.
TRA CLRTAP Recommendation nr 50	Transparency		Finland has provided a detailed and generally transparent emissions inventory. Estimates are provided at the most detailed level for all transport subsectors. Finland's methodology and emission factors in the IIR are considered by the ERT to be transparent. The ERT encourages Finland to include more details in the IIR including a better description of the emission factors included in Finland's national model LIPASTO.		The documentation has been improved and will be further improved to the next submissions.
TRA CLRTAP recommendation nr 51	Transpareny		Finland has recalculated most of the transport sector using updated fuel consumption figures and has provided the related information in the IIR. Finland has also recalculated the emissions for selected pollutants and years in other subsectors based on updated methodology (e.g. using the latest 2016 version of the Guidebook). The ERT encourages Finland to document the differences in emissions in the IIR.		The documentation has been improved and will be further improved to the next submissions.
TRA CLRTAP	Transparency		Finland has used different versions of the Guidebook for calculating emissions from the transport sector. Finland is planning to update the		All EFs are updated according to Guidebook 2016

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
recommendation nr. 53 and 54			road transport inventory to be consistent with the 2016 Guidebook version for their next submission. The ERT identified possible underestimates in the road transport emissions as a result of using a previous (2013) version of the Guidebook. The ERT welcomes Finland's plan to use the latest 2016 version for their next submission		
TRA CLRTAP recommendation 56	Transparency		ERT commends Finland for having undertaken a quantitative uncertainty analysis for the transport sector. The IIR does not specify if the results are used to prioritize improvements in the transport sector. The ERT notes that the inherently high uncertainty of some of the default emission factors needs to be kept in mind when interpreting the results of the uncertainty analysis.		Information on the use of the UCA results in improvement of the inventory has been added.
TRA CLRTAP recommendation nr 57	Transparency		Finland has undertaken QA/QC checks for the Transport sector. The ERT encourages Finland to provide a more detailed description and the relevant outcomes of these QA/QC checks in the IIR.		This documentation will be added to the 2020 submission.
TRA CLRTAP recommendation (general)			The ERT notes that Finland indicates in its IIR that it will recalculate road transport emissions for the entire time series following a scheduled update of the LIPASTO model to be aligned with the latest (2016) Guidebook version. The ERT commends Finland for its commitment to complete a consistent time series and encourages Finland to implement the planned improvements		This is carried out to the 2019 submission
FI-1A3b-2018-0003	No	1A3b Road Transport, SO2, NOX, NH3, NMVOC, PM2.5, 1990-2015	For 1A3b Road Transport, all pollutants and years, the TERT noted that there was no evidence that the consumption of lubricants was accounted for in the energy balance for road transport used in the inventory. In response to a question raised during the review, Finland explained that all lubricant use related emissions are reported under IPPU. The TERT notes that this issue represents a minor double-count as emissions contribution from lubricant use under 1A3b are included in the exhaust emission factors. The TERT recommends Finland to take into account the contribution of lubricants to the energy consumption assigned to 1A3b in the future submissions and correct assignment is applied to 2-stroke engines in 1A3b and 4-stroke engines in IPPU sectors NFR 2D3 Solvent Use/2G Other Product Use, also avoiding a double-count for the IPPU sector. Assessment of the implementation in the 2018 submission: The TERT notes with reference to IIR Section 2.2 for 1A3bi-iv for all pollutants and years that there is a lack of transparency regarding the	No	The issue is scheduled to be solved to the 2020 submission.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
			lubricant consumption calculation and the associated reporting. This observation was raised during the 2017 NECD review (observation FI-1A3b-2017-0009). However, the IIR explains that Finland does not have data required to separate 2-stroke and 4-stroke oil consumption and emissions and all lubricant use is reported under 1A2bviii. The TERT notes that the 2016 EMEP/EEA Guidebook provides a method for estimating 2-stroke and 4-stroke lubricant consumption for different vehicle types which would allow an allocation of the lubricant consumption currently allocated to 1A2bviii to 1A3b. In response to a question raised during the review, Finland explained that it did not have the resources to do this development work due to the extensive recalculation of the time series carried out in 2018. The activity data to this improvement will need detailed work and will be included on the improvement plan included in the 2019 submission. The TERT notes that this issue does not relate to an over- or under-estimate and that this is a minor issue but continues to recommend that this improvement is carried out for inclusion in the 2019 submission or plans are made to carry out these improvements in the following year.		
FI-1A3b-2018-0002	No	1A3b Road Transport, SO_2, NO_X, NH_3, NMVOC, $PM_{2.5}$, 2005, 2010, 2015	For 1A3b Road Transport the TERT noted that no biomass consumption is reported in the NFR tables. In response to a question raised during the review, Finland explained that biogenic shares of road transport fuels are included in liquid fuels and gaseous fuels respectively. The TERT notes that this issue does not relate to an over- or under-estimate and recommends that Finland reports its biomass consumption separately or use the appropriate notation key in future NFR tables for transparency purposes. Assessment of the implementation in the 2018 submission: For 1A3b all years, the TERT noted that there is a lack of transparency regarding how biomass consumption is reported in NFR tables. This was raised during the 2017 NECD review (observation FI-1A3b-2017-0007). The TERT notes that the biomass share of transport fuels is clearly reported in the IIR, but as 'NA' in the NFR tables which is not an appropriate notation. In response to a question raised during the review, Finland explained that it did not have the resources to do this development work due to the extensive recalculation of the time series carried out in 2018. Finland explained that the activity data needed will require more detailed work due to the structure of the domestic model, but that the issue will be included on the improvement plan included in the 2019 submission. Finland also indicated that the notation key will be corrected to 'IE' to the next submission. The TERT notes that this issue does not relate to an over or under estimate and continues to recommend that to improve transparency this improvement is carried out for the 2019 submission, noting that activity data for biomass combustion are already presented	No	The data is included in the 2019 submission in the NFR tables.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
			in the IIR tables, just not in the NFR tables.		
1A3b CLRTAP recommendation nr. 64		Road Transport – all emissions	The ERT noted that in the NFR tables there is no activity data included for biomass and the NA notation key has been used. However, in the IIR it is mentioned that different types of biofuels are used for road transport purposes (e.g. bioethanol, biodiesel, ETBE, etc). During the review week Finland have clarified that the notation key "NA" in the NFR table will be replace by "IE" in the next submission. The ERT recommends Finland to make an effort to report biofuels separately.		See the response on the above row,
FI-1A3bv-2018-0001	Yes	1A3bv Road Transport: Gasoline Evaporation, NMVOC, 1990-2015	1A3bv Road Transport: Gasoline Evaporation is a key category in Finland's NMVOC inventory. The TERT noted that the methodology used by Finland to estimate emissions from 1A3bv is not comparable with the 2016 EMEP/EEA Guidebook method. In response to a question raised during the review Finland explained that its 1A3bv emissions were calculated from two factors (0.6 g VOC/km for vehicles not equipped with a catalyst and 0.06 g VOC/km for vehicles equipped with catalysts) which are based on VTT's expert judgement/ literature analysis. Finland also provided evidence that the impact of a revision (using Tier 1 default factors from the 2016 EMEP/EEA Guidebook) is below the threshold of significance. The TERT recommends that Finland updates its methodology to be in line with at least the Tier 2 method from the 2016 EMEP/EEA Guidebook in the next submission. Assessment of the implementation in the 2018 submission: The TERT notes with reference to the NFR tables and IIR Section 2.5/Table 2.26 for 1A3bv evaporative emissions of NMVOCs that the methodology of the EMEP/EEA 2016 Guidebook has not been implemented following recommendations made in the 2017 NECD Review because activity data were not available. 1A3bv is a key category in Finland's NMVOC inventory. In response to a question raised during the review, Finland explained that the possibilities to revise the calculation have been studied and a calculation model to do this has already been developed. Unfortunately, the activity data was not available to match the information required by the Guidebook method. Finland continues to study ways to implement the method presented in the Guidebook in Autumn 2018 for the 2019 submission. The TERT notes that this issue does not relate to an over- or under-estimate and understands the difficulties in finding the relevant activity data for the Tier 3 method in the Guidebook. The TERT recommends that Finland continues to look for the appropriate fleet data or use expert judgement or assumptions made in neighbouring countries to enable the Tier 3 method to be used in the next 2019 submission.	No	A new calculation model has been developed and the results are included in the 2019 submission.

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
1A3b CLRTAP recommendation nr 62		Road transport – all Pollutants	The ERT noted that in the IIR it is stated that "LIPASTO calculation system uses evaporation emission factors of 0.6 g VOC/km for vehicles not equipped with a catalyst and 0.06 g VOC/km to vehicles equipped with catalysts". The ERT also noted that the presence of a catalyst in road vehicles is irrelevant for evaporation emissions, unless it was assumed that catalyst-equipped vehicles are also equipped with an evaporation control system (such as a carbon canister for example). During the review week Finland have clarified that they are working on improving the methodology for estimating emissions from fuel evaporation. The ERT recommends Finland to apply a more detailed methodology (at least Tier 2 and preferably Tier 3) for the estimation of emissions from fuel evaporation for the next submission.		See the response on the above row.
1A3b CLRTAP recommendation nr 59		Road Transport All pollutants	The ERT noted that emissions of most pollutants from the road transport sector calculated with the LIPASTO model seem to be underestimated. Whereas the emission factors reported in the LIPASTO website are consistent with the latest Guidebook version 2016, the emissions reported in the NFR table are much lower than the activity levels reported in the IIR. For example, an average emission factor of 0.33 g/km is reported for NOx for passenger cars. A value of 41.2 billion kilometres is reported for passenger cars in the IIR (table 2.21, page 54). A simple multiplication gives a NOx emission value of 13.6 kt, which is much higher than the reported value of 9.95 kt. The same observation is true for most vehicle categories and most pollutants calculated with the LIPASTO model. During the review week Finland have indicated the emissions were calculated with the 2013 version of the Guidebook and that an update of the LIPASTO model to become consistent with the latest 2016 Guidebook is ongoing.		The calculation is updated to correspond to the Guidebook 2016 EFs in the 2019 submission.
1A3b CLRTAP recommendation nr 60		Road transport – all Pollutants	The ERT noted that in the IIR it is stated that "For each automobile type, the cold driving emission and fuel consumption surplus is calculated according to the EMEP/EEA emission inventory guidebook 2016". However, it is not clear whether these calculations are included in the LIPASTO model or not and hence it is not clear whether the average emission factors reported in the relevant webpage include cold start emissions or not. During the review week Finland have clarified that the emission factors included in the webpage of the LIPASTO model were actually not used in the calculations and cold start emissions were calculated with the 2013 Guidebook version.		As explainded in the IIR, the country specific EFs have been replace by GB16 EFs to the 2019 submission. A detailed explanation of the methodology will be included in the 2020 submission.
1A3b CLRTAP recommendation nr 61		Road transport – all Pollutants	The ERT noted that in the IIR the method for calculating NMVOC emissions from off-road machinery is described on page 62. The relevant section is included in chapter 2.5 (gasoline evaporation)		The IIR description corrected to the 2019 submission

Observation	Key Category	NFR, Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC in 2017	Response
			which implies that NMVOC emissions from off-road machinery are included in NFR code 1A3bv. During the review week Finland have clarified that the description of NMVOC emissions from off-road machinery is included in the wrong chapter and that emissions are reported in the correct NFR code.		
FI-1A3b-2018-0005		1A3b Road Transport, Pb, 1990	For 1A3b Road Transport: liquid fuels the TERT noted there had been very little change in Pb emissions and the Pb emission factor for 1A3bi, 1A3bii and 1A3biv over the time series 1990-2016, with no sharp reduction expected with the phasing out of leaded petrol. In response to a question raised during the review, Finland explained that prior to the 2017 submission, the NFR tables included only emissions of leaded gasoline 1990-1994 and this time series was completed for the previous years from 1980 to the 2018 submission. Heavy metal emissions from engine wear and lubricant use calculated with 2016 EMEP/EEA Guidebook EFs were included to the 2017 submission. However, in the compilation of the 2018 submission, the emissions of leaded gasoline 1990-1994 were incorrectly left out and only emissions calculated with the 2016 EMEP/EEA Guidebook EFs were included for 1990-1994. Finland provided corrected values for Pb emissions from 1A3bi, 1A3bii and 1A3biv. The TERT agrees with these new estimates and recommends that these corrections are included in the 2019 submission.		The corrections have been made to the 2019 submission.
FI-1A3dii-2018-0002	Yes	1A3dii National Navigation (Shipping), NOX, 2015	For 1A3dii Domestic Navigation the TERT noted a discontinuity in emissions of NOX in the NFR tables for 2015 reflected by a lower IEF in this year relative to adjacent years. In response to a question raised during the review, Finland explained that there was a mistake in the 2018 submission regarding cargo ship emissions and provided corrected values for all pollutants. The TERT agrees with these new estimates and notes that this issue does not relate to an over or under estimate and recommends that these corrections are included in the 2019 submission.		The correction has been made to the 2019 submission.

INDUSTRY

Observation	Kay Category	NFR Pollutant(s), Year(s)	Recommendation made in the review report	RE or TC	Response
IPPU CLRTAP Review recommendation nr. 64			Finland provided a detailed and generally transparent emissions inventory for the industrial processes sector. The IIR and the NFR tables are detailed enough to enable reviewers to fully assess methods, activity data, emission factors and other inventory parameters. Nevertheless, it appears during the review that		Documentation has been improved to the 2019 submission and work will continue to the 2020 submission

			methodology descriptions in the IIR have not been updated for some categories, due to lack of time. Finland provided the ERT with detailed methodology for those categories during the review. The ERT commends Finland for it and recommends Finland to update methodology descriptions and emission factors in the IIR for the next submission.		
IPPU CLRTAP recommendation 65		Transparency	The ERT noted that Finland did not include any activity data in the NFR table and used the notation key NA for most of the sectors although activity data are described in the IIR. The ERT recommends Finland to report activity data in the next submission and to use appropriate notation keys (e.g. NO where emissions are “Not Occurring”, NE where emissions are “Not Estimates”, IE where emissions are “Included Elsewhere” and NA where emissions are "Not Applicable") for reporting of activity data where estimates are not available or not necessary.		Efforts have been made to include AD where possible. However, there are some obstacles to do this: (1) The same AD is not valid for all emissions included under a NFR (2) There are less than 3 units under the NFR and the AD thus falls under confidentiality (C would be used when this is the only reason to not include AD, however, often there is a mix of reasons) (3) Only part of the emissions are calculated from an AD while there are emissions reported by plants. It is not possible to provide representative AD for the whoe category as incorrect interpretations are likely if calculating IEFs from such data. (4)
IPPU CLRTAP recommendation nr 66		Transparency	The ERT noted that in the IIR, trends are not transparently described for all categories and that the reasons for possible dips and jump are not included in the descriptions. The ERT encourages therefore Finland to include more detailed trends descriptions in the IIR for the next submission.		The recalculations are documented in Annex 9 to be submitted by 1 May 2019
IPPU CLRTAP recommendation nr 67		Completeness	The ERT noted that Finland uses the notation key NE for Cr emissions from copper production although the 2016 EMEP/EEA Guidebook provides a default emission factors for Cr from copper production. The ERT encourages Finland to estimate Cr emissions from Copper production using the emission factor provided by the 2016 EMEP/EEA Guidebook and to include these emissions in its next submission		Cr emissions are included in the 2019 submission and are reported by the plants. Also all other heavy metal emissions are reported by the plants.
IPPU CLRTAP recommendation nr. 71		Consistency	For some categories, the ERT noted that emissions of some pollutants have been reported only for some years and that the notation key IE has been used for the rest of the time series. Finland explained during the review that, due to lack of time, all consistency check have not been run for those categories and that it will be done for the next submission. The ERT recommends Finland to run all consistency check for the next submission.		Further improvement of allocations of emissions has been carried out to the 2019 submission.

FI-2B10a-2018-0002	No	2B10a Chemical Industry: Other, SO_2, 2010, 2015	For 2B10a Chemical Industry: Other, for SO_2 emissions for 2010 and 2015 the TERT noted that Finland made recalculations but did not provide the detailed information in the IPPU chapter of the IIR. In response to a question raised during the review, Finland explained that major recalculations were made in the current submission and that only a general explanation in the general chapter as there was not time to include detailed explanations in the sector chapters. Finland also explained that for 2B10a that changes are due to a reallocation of emissions from the Energy sector to the IPPU sector. The TERT agreed with the response provided by Finland. The TERT recommends that Finland includes the detailed explanation on the changes for 2B10a in its next IIR.		The emissions have been reallocated between the Energy sector to the IPPU sector as far as possible and in a consistent manner over the time series. The reallocation does not introduce changes into total emission levels. Detailed information on the allocations is provided in Annex 9.
FI-2B10a-2018-0001	Yes	2B10a Chemical Industry: Other, HCB, 1990-2016	The TERT noted that for HCB emissions from 2B10a Chemical Industry: Other, for the entire time series there is significant fluctuation in emissions for the period 2001-2016. Though the fluctuations are explained in the IIR the TERT recommends Finland to follow its suggestion to include the information regarding the estimation of emissions in 1990-2000 and correct the description in the IIR to include the current abatement.		The explanation is included in the IIR.
FI-2C1-2018-0001	No	2C1 Iron and Steel Production, PAHs, 1990-2016	The TERT identified a number of observations on the trend and its use of EFs that were not country specific or consistent with the guidebook for 2C1 Iron and Steel production and PAH emission for 2006-2016. In response to a question raised during the review Finland provided additional information on the estimation method and the trends. The TERT recommends that Finland include this information in its IIR and considers using the 2016 EMEP/EEA Guidebook emission factors if no better country specific emission factors are available.		Finland has compared the EF used with other Nordic countries with the understanding that the unit of the EF in the Guidebook is likely incorrect and is thousand times too large. While waiting a response to the question from the TFEIP Combustion and Industry panel, Finland has continued to use the EF that is considered to be most representative for national emissions.
FI-2C1-2018-0002	Yes	2C1 Iron and Steel Production, $PM_{2.5}$, 2010	For 2C1 Iron and Steel Production for $PM_{2.5}$ emissions for 2010 the TERT noted that Finland made recalculations but did not provide the detailed information in the IPPU chapter of the IIR. In response to a question raised during the review, Finland explained that it made major recalculations in its current submission and referred to the summarized explanation in the general chapter and that it had no time to include detailed explanations in the sector chapters. Finland did not provide the detailed explanation for this specific recalculation. The TERT recommends that Finland includes the detailed explanation on the recalculation in its next IIR.		Detailed information on recalculations is provided in Annex 9 to be submitted by 1 May 2019.
FI-2C3-2018-0002	No	2C3 Aluminium Production, PM2.5, 1990-2015	For 2C3 Aluminium Production the TERT noted that in response to a question raised during the review Finland agreed with the TERT that emissions from secondary aluminium production should be allocated to NFR 2C3 and that particle distribution factors should be updated to match the 2016 EMEP/EEA Guidebook. The TERT noted that the issue is below the threshold of significance for a technical correction. The TERT recommends that Finland includes the improvements mentioned above in the next submission.	No	Further improvement of allocations of emissions has been carried out to the 2019 submission Particle fraction factors were updated according to GB16.

			Assessment of the implementation of the 2018 recommendation: The TERT noted that Finland, following the 2017 recommendation [FI-2C3-2017-0001], changed the allocation of some but not all aluminium production allocation to NFR 2C3. The TERT recommends Finland to follow its plan to report all the emissions under the correct category in the 2019 submission		
FI-2C3-2018-0001	No	2C3 Aluminium Production, PCDD/F, HCB, 1990, 2005, 2016	In response to the review, Finland indicated that HCB and PCDD/F emissions for secondary Aluminium Production are included in the inventory but were incorrectly allocated to the category 2C7c in the NFR tables. The source category and emission estimation methodologies are described in the correct IIR chapter for NFR 2C3 (Chapter 3.19). Finland provided correct PCDD/F and HCB emissions for category 2C3 for the years 1990-2016 and indicated that the allocation of emissions will be corrected for the 2019 inventory submission. The TERT recommends that Finland makes this correction in their 2019 submission.	No	The emissions have been corrected to the 2019 submission
FI-2C7a-2018-0001	No	2C7a Copper Production, SO2, PM2.5, 2015.00	For category 2C7a Copper Production the TERT noted that in response to a question raised during the review Finland explained that only secondary copper production occurs in Finland and that emissions from one plant are missing from the data reported in the NFR. Finland provided a revised estimate for 2015 that solved the issue of the very low IEF. The TERT noted that the under-estimate is below the threshold of significance. The TERT recommends that Finland includes emissions from all producers in the next submission. Assessment of implementation in the 2018 submission: For category Copper Production (2C7a) and pollutant SO2 and PM2.5 for years 2014 and 2015 the TERT notes that Finland did not revise the estimates in accordance with its 2017 NECD review revised estimate [FI-2C7a-2017-0001]. In response to a question during the review Finland confirmed that it was accidentally left out of the 2018 submission and provided an updated revised estimate. The TERT were unable to verify the revised estimates as it had no accompanying description or documentation and was not consistent with the revised estimate provided in 2017 as the values for 2015 and 2014 are transposed. The TERT also notes that the revised estimates are well below the threshold of significance. The TERT recommends that Finland review its revised estimates and includes them in its 2019 submission.	RE	The emissions have been corrected to the 2019 submission

FI-2D3a-2018-0001	No	2D3a Domestic Solvent Use Including Fungicides, Hg, 1990, 2005, 2016	For 2D3a Domestic Solvent Use Including Fungicides, for HG, for 1990, 2005 and 2016, the TERT noted that emissions are reported as 'NA' in the NFR table and that no reference is made to emission estimates from this pollutant in the IIR while the 2016 EMEP/EEA Guidebook includes a Tier 1 method and an emission factor for emissions from this source. In response to a question raised during the review, Finland explained that it will start searching for the activity data to include mercury emissions from fluorescent tubes. The TERT recommends Finland to include this emission source in its next inventory submission.	No	There is unclarity of the EF presented in the Guidebook. We do not assume emissions from lamps in use but only when they are disposed. The emissions from disposal are included under NFR 1A1a in the emissions from hazardous waste treatment plants.
FI-2D3c-2018-0001	No	2D3c Asphalt Roofing, PM2.5, 2005, 2010, 2015	For category 2D3c Asphalt Roofing and the pollutant PM2.5 the TERT noted that Finland reported 'NA'. In response to a question raised during the review, Finland explained that there are two plants that fall under NFR 2D3c. At one plant the particle emission levels are below 0.0001 kt/a and considered to be negligible and therefore 'NA'. The maximum production rate in the other plant is 44,000 shingles per year, by using 2016 EMEP/EEA Guidebook EF the PM2.5 emissions would be 0.0035 kt. The TERT notes that this issue does not relate to a significant over- or under-estimate. However, the TERT still recommends that Finland includes the PM2.5 emissions in the next inventory. Assessment of the implementation in the 2018 submission or category 2D3c Asphalt roofing and the pollutant PM2.5 for the years 2005, 2015 and 2016 the TERT noted that Finland reported emissions as 'IE'. In response to a question raised during the review Finland explained that Finland has incorrectly changed the previous notation key 'NA' into 'IE'. Finland further explained that all particle emissions from asphalt roofing are energy related and reported under 1A2f and result from the use of LFO and confirmed that no process related emissions are generated, because the dust emitted is removed and treated through a specifically designed equipment (dust filters with continuous operation control) and that also particle emissions to the air are monitored through continuous measurements. The TERT recommends Finland to follow its plan to correct the notation key back to 'NA' and add the explanation in the IIR in its the next submission.	No	The notation key is corrected back to NA and an explanation included under the IPPU category 2D3c

FI-2D3g-2018-0001 -	Yes	2D3g Chemical Products, PAHs, 1990, 2005, 2016	The TERT notes with reference to the 2018 NFR Table, for 2D3g (for asphalt blowing), for PAHs (and NMVOCs, heavy metals and TSP (and PM2,5 and PM_{10} derived from TSP), for the entire time series, the notation key 'NA' is reported for PAHs while the 2016 EMEP/EEA Guidebook provides a Tier 2 methodology and a Tier 2 emission factor for benzo(a)pyrene for asphalt blowing (Tables 3-8 to 3-10 in the 2.D.3.g Chemical products 2016 Chapter). In response to a question during the Review Finland explained that no asphalt blowing occurs or has occurred in the past in Finland. The TERT recommends Finland to change the notation key to 'NO' and to correct the information provided in the IIR in its next submission.		Information has been included in the IIR regarding the period when the emissions occurred in Finland.

AGRICULTURE

FI-3B-2018-0001	No	3B Manure Management, PM2.5, 2005, 2010, 2015	For category 3B Manure Management, Sheep (3B2) and Goats (3B4d) and pollutants PM2.5 for years 2005, 2010 and 2015 the TERT noted that Finland reports 'NA' for PM2.5 emissions from sheep and goats. However, default EFs are available in the 2016 EMEP/EEA Guidebook and Finland reports animal numbers for sheep and goats in its NFR. The impact of the potential under-estimate is probably below the threshold of significance. In response to a question raised during the review, Finland explained that it is currently using the 2009 EMEP/EEA Guidebook Tier 2 emission factors (no EF for sheep and goats) and will revise its method according the 2016 EMEP/EEA Guidebook in the 2018 submission. Assessment of the implementation in the 2018 submission: Finland has in its 2018 submission estimated PM2.5 emissions from goats (3B4d), however Finland have not estimated PM2.5 emissions from sheep (3B2) as raised in observation FI-3B-2017-0001. In response to this observation Finland estimated that the effect of the inclusion of emissions from both of the above sources would equate to 0.015 % of all PM2.5 emissions in 2015. Furthermore, Finland has explicitly stated in its IIR (page 26 of the agriculture chapter) that "The particle emissions calculation will be revised to the next submission due to integration in the Finnish Agriculture Emissions Calculation model to the submission in 2019". Furthermore, in its 2018 submission Finland states that it currently uses the emission factors from the 2013 EMEP/EEA guidebook to estimate emissions of PM2.5 for the species for which it currently reports. The TERT recommends that Finland estimate emissions of PM2.5 from 3B2 sheep and include emissions in its 2019 submission.	No	The emissions are included in the 2019 submission.

FI-3B2-2018-0001	No	3B2 Manure Management - Sheep, NH_3, 2000,2005,2010,2015,2016	For category 3B2 Manure Management - Sheep and pollutants NH_3 for all years the TERT noted that the implied emission factor increases from 0.63 kg/head in 2000 to 0.664 kg/head in 2005, 0.894 kg/head in 2010 and 0.996 kg/head in 2015 and that there is a lack of transparency regarding rationale behind the increased emission factor for NH_3 emissions from sheep across the time series in the IIR. In response to a question raised during the review, Finland explained that the rationale for the increase in the emission factor is twofold, namely that the housing period for sheep in Finland is relatively short (in comparison to the 2016 EMEP/EEA Guidebook) and that changes in manure management practices in addition to increases in nitrogen excretion rates combine to result in the increase in implied emission factor. The TERT agreed with the explanation provided by Finland. The TERT recommends that Finland explain the increase in emission factor across the time series for category 3B2 in the IIR of future submissions.		The explanation is added to the IIR chapter 3B.
FI-3F-2018-0002	No	3F Field Burning of Agricultural Residues, SO_2, NO_X, NH_3, NMVOC, $PM_{2.5}$, PAHs, Cd, Hg, Pb, PCDD/F, 1990-2016	For category 3F Field Burning of Agricultural Residues and pollutants SO_2, NO_X, NH_3, NMVOC, $PM_{2.5}$, PAHs, Cd, Hg, Pb, PCDD/F for years 1990-2016 the TERT noted that there is a lack of transparency in the methodological description provided in the IIR. In response to a question raised during the review, Finland provided additional data with respect to the kg dm burning for specific crops types. The TERT agreed with the explanation provided by Finland. The TERT recommends that Finland provide information with respect to the kg dm burned per crop type in the IIR of future submissions to enhance transparency.		The methodology follows the EMEP//EEA Guidebook 2016 and is now explained in the Chapter 3F.
FI-3F-2018-0001	No	3F Field Burning of Agricultural Residues, SO_2, NO_X, NH_3, NMVOC, $PM_{2.5}$, PAHs, PCBs, HCB, Cd, Hg, Pb, PCDD/F, 1990-2016	For category 3.F Field Burning of Agricultural Waste and pollutants SO_2, NO_X, NH_3, NMVOC, $PM_{2.5}$, Pb, CD, Hg and PCDD/F for years 1990-2016 the TERT noted a lack of transparency in the methodological description in the IIR. In response to a question raised during the review, Finland provided further additional information on the methodological approach and calculation procedures. The TERT agreed with the explanation provided by Finland. The TERT recommends that Finland provide, in the IIR of future submissions, further information with respect to the methodological approach, activity data and emission factors used in the estimation of emissions from category 3.F.		The methodology follows the EMEP//EEA Guidebook 2016 and is now explained in the Chapter 3F.

WASTE

FI-5B1-2018-0001	No	5B1 Biological Treatment of Waste - Composting, NMVOC, 2005,2010,2015	For 5B1 Biological Treatment of Waste - Composting the TERT noted that Finland is using a Country Specific (CS) methodology to estimate NMVOC emissions. The TERT notes that this issue is related to a non-mandatory pollutant for the 5B1 category. However, concerning 5B1 Composting, which is an aerobic process, the TERT is not	No	The emissions have been removed in the 2019 submission.

			convinced that the NMVOC fraction is similar to the one in landfill gas. Moreover, the carbon mass balance approach is not clear as C is emitted as CH4, CO2 and various species of NMVOC during the composting process and a fraction remains in the produced compost. The TERT recommends that Finland checks its CS methodology and the underlying assumptions before using it in the next submission. Assessment of the implementation in the 2018 submission For category 5B2- biogas production, the TERT noted that NMVOC are estimated although no default EF is proposed in the 2016 EMEP/EEA Guidebook and that the country-specific methodology is not completely clear. The TERT recommends that Finland provide more transparency on the methods, data sources and assumptions used to estimate NMVOC emissions from 5B2 in future submissions.		
FI-5D-2018-0001	No	5D Wastewater Handling, NMVOC, 2005,2010,2015	For NMVOC emissions from 5D1 Domestic Wastewater Handling and 5D2 Industrial Wastewater Handling the TERT noted that in response to a question raised during the review Finland provided a more detailed description of the methodology applied. NMVOC are calculated on the basis of a NMVOC/CH_4 ratio and CH_4 emissions are estimated using the IPCC 2006 methodology. In the NIR, it is not clear if only sludge digestion is considered as a source of CH_4 (MCF are not provided) and it is not indicated if the biogas recovery is considered (or if the default value for R, i.e. 0, is applied). In the TERT's opinion this approach is not relevant as CH_4 and NMVOC are not produced through the same chemical process in waste water treatment plants (WWTP) and moreover there is no reason to apply the NMVOC/CH_4 of landfill biogas to WWTP. For instance, in digesters the CH_4 fraction in biogas is much higher than in landfill gas. The TERT noted that Finland has the highest NMVOC per inhabitant from 5D1 and 5D2 in the EU and the highest contribution of 5D1 and 5D2 in the national NMVOC total emissions. However, the issue is below the threshold of significance for a technical correction. The TERT strongly recommends that Finland checks if its country specific methodology is relevant in its next submission. Assessment of the implementation in the 2018 submission: For category 5D Wastewater Handling, the TERT noted that recommendation FI-5D-2017-0001 from the 2017 NECD review was not implemented and considers that the current country specific methodology is inappropriate. In response to a question raised during the review, FI did a first estimate using the 2016 EMEP/EEA Guidebook Tier 1 methodology and indicated that these estimates will be included in future submissions. FI highlighted that the default EFs may not be very well adapted to Nordic conditions and aims to	No	The methodology has been changed according to the one presented in the Guidebook and the emissions are included in the 2019 submission.

			study this more in future years when resources allow. The TERT notes that the impact on NMVOC total emissions is far below the threshold for a technical correction. The TERT agrees with the approach taken by Finland and recommends that Finland includes its revised estimates in its next submission.		
FI-5C1bv-2018-0001	No	5C1bv Cremation, Hg, 1990-2016	For 5C1bv Cremation, the TERT noted with reference to Hg emissions, that there is a lack of transparency regarding the emissions factor (EF) applied which is twice smaller than the default proposed in the 2016 EMEP/EEA Guidebook. In response to a question raised during the review, Finland explained that since 2012 the Hg EF from Sweden is used and that for previous years the EF is based on some other sources. Finland plans to clarify these sources and assess any needs for changes the EF and indicated that a justification for the EFs will be included in the next submission. The TERT notes that this issue does not relate to an over-or under-estimate and recommends that increase the transparency of its report concerning Hg emissions from 5C1bv.		Finland will investigate the suitability of the GB EF to the 2020 submission. The documentation of the method will be checked for the 2020 submission.
FI-5-2018-0001	No	5 Waste, SO_2, NO_X, NMVOC, $PM_{2.5}$, PAHs, Cd, Hg, Pb, PCDD/F, 1990-2016	For 5C2 - Open Burning of Waste, the TERT noted that 'NO' is reported in the NFR tables and no information is provided in the IIR. In response to a question raised during the review, Finland explained that the chapter for NFR 5C2 has accidentally been dropped out of the IIR and will be returned in the 2019 submission. The TERT recommends that Finland includes this chapter along with the justification of the notation key 'NO' in its next IIR.		The chapter accidentally deleted has been included in the 2019 submission

8.6.2 NECD Technical Review 2017

Implementation of the recommendations of the 2017 NECD Technical Review are provided in Table 1.04.

Table 1.04 Implementation of recommendations of the 2017 NECD Technical Review

Observation	IMPLEMENTED	Key Category	NFR, Pollutant(s), Year(s)	Recommendation	RE or TC
FI-1A3b-2017-0003	Submission 2018	Yes	1A3b Road Transport, $PM_{2.5}$, 1990-2015	For Road Transport categories 1A3bi-iv, the TERT noted that the ratio of $PM_{10}/PM_{2.5}$ emissions is 1.14. However, the 2016 EMEP/EEA Guidebook considers all PM exhaust emissions are $PM_{2.5}$, as the coarse fraction ($PM_{2.5}$-10) is negligible in vehicle exhausts. In response to a question raised during the review, Finland explained that its $PM_{2.5}$ and PM_{10} size fractions of TSP emissions have been calculated with fractions from a 2002 TNO study. Finland indicated its plan to revise the $PM_{2.5}$ emissions for 1A3bi-iv to be in line with the 2016 EMEP/EEA Guidebook in the next submission. Finland has provided evidence that the impact of a revision is below the threshold of significance. The TERT recommends that Finland carries out this improvement plan in its next submission.	no
FI-1A3b-2017-0004	Will be revised if the Guidebook will be revised	No	1A3b Road Transport, NH_3, 1990-2015	For 1A3b Road Transport - diesel vehicles and pollutant NH_3, the TERT noted that Finland has used the NH_3 factors presented in Table 3-21 and Table 3-23 of the 2016 EMEP/EEA Guidebook. During the review, the TERT found that there is inconsistency in the NH_3 factors for diesel vehicles as presented in the 2016 EMEP/EEA Guidebook between Table 3-21, Table 3-23 and Table 3-100 (in particular, different factors are suggested for Euro VI heavy duty vehicles). This issue will be raised to the Guidebook team. The TERT noted that the impact of a revision should be below the threshold of significance. The TERT recommends that Finland checks potential amendments of these NH_3 factors presented in the 2016 EMEP/EEA Guidebook in the near future.	no
FI-1A3b-2017-0005	Submission 2018 IIR Part 2, page 49	Yes	1A3b Road transport, SO_2, NO_X, NH_3, NMVOC, $PM_{2.5}$, 1990-2015	For 1A3b Road Transport the TERT noted that there is a lack of transparency in the IIR regarding the source of emission factors used to estimate 1A3b emissions and whether the impact of emission degradation has been taken into account. In response to a question raised during the review, Finland clarified that the emission factors are sourced from a combination of the 2016 EMEP/EEA Guidebook and VTT's own measurements, and that emission degradation has been taken into account according to the 2013 EMEP/EEA Guidebook. The TERT recommends that Finland provides such information in future IIRs and particularly, tables of implied emission factors (broken down by Euro standard, fuel and vehicle type) for transparency and comparability purposes.	no
FI-1A3b-2017-0007	Submission 2018 IIR Part 3, page 46	No	1A3b Road Transport, SO_2, NO_X, NH_3, NMVOC, $PM_{2.5}$, 2005,	For 1A3b Road Transport the TERT noted that no biomass consumption is reported in the NFR tables. In response to a question raised during the review, Finland explained that biogenic shares of road transport fuels are	no

			2010, 2015	included in liquid fuels and gaseous fuels respectively. The TERT notes that this issue does not relate to an over- or under-estimate and recommends that Finland reports its biomass consumption separately or use the appropriate notation key in future NFR tables for transparency purposes.	
FI-1A3b-2017-0009	Submission 2018 IIR part 2, page 35	No	1A3b Road transport, SO_2, NO_X, NH_3, NMVOC, $PM_{2.5}$, 1990-2015	For 1A3b Road Transport, all pollutants and years, the TERT noted that there was no evidence that the consumption of lubricants was accounted for in the energy balance for road transport used in the inventory. In response to a question raised during the review, Finland explained that all lubricant use related emissions are reported under IPPU. The TERT notes that this issue represents a minor double-count as emissions contribution from lubricant use under 1A3b are included in the exhaust emission factors. The TERT recommends Finland to take into account the contribution of lubricants to the energy consumption assigned to 1A3b in the future submissions and correct assignment is applied to 2-stroke engines in 1A3b and 4-stroke engines in IPPU sectors NFR 2D3 Solvent Use/2G Other Product Use, also avoiding a double-count for the IPPU sector.	no
FI-1A3bv-2017-0001	Submission 2019. The method is under development to the 2019 submission (see IIR part 2, page 56)	Yes	1A3bv Road transport: Gasoline evaporation, NMVOC, 1990-2015	1A3bv Road Transport: Gasoline Evaporation is a key category in Finland's NMVOC inventory. The TERT noted that the methodology used by Finland to estimate emissions from 1A3bv is not comparable with the 2016 EMEP/EEA Guidebook method. In response to a question raised during the review Finland explained that its 1A3bv emissions were calculated from two factors (0.6 g VOC/km for vehicles not equipped with a catalyst and 0.06 g VOC/km for vehicles equipped with catalysts) which are based on VTT's expert judgement/ literature analysis. Finland also provided evidence that the impact of a revision (using Tier 1 default factors from the 2016 EMEP/EEA Guidebook) is below the threshold of significance. The TERT recommends that Finland updates its methodology to be in line with at least the Tier 2 method from the 2016 EMEP/EEA Guidebook in the next submission.	no
FI-1B1a-2017-0001	Submission 2018 NK changed from “NA” to “IE” in the	No	1B1a Fugitive Emission from Solid fuels: Coal Mining and Handling, $PM_{2.5}$, 2000-2015	For category 1B1a Fugitive Emission from Solid fuels: Coal Mining and Handling and pollutant $PM_{2.5}$ the TERT noted that emissions are reported as ‘NA’ while coal is being used (and therefore also handled) in Finland. In response to a question raised during the review, Finland explained that these emissions are included in category 2A5c Storage, Handling and Transport of Mineral Products. The TERT agreed with the explanation provided by Finland. The TERT recommends that Finland reports emissions from coal handling in category 1B1a. In case that is not possible, the TERT recommends changing the notation key from ‘NA’ to ‘IE’ and clearly document where emissions from coal handling are reported in the IIR.	no
FI-1B1c-2017-0001	Submission 2018 IIR Part 2, pages 99, 100	Yes	1B1c Other Fugitive Emissions from Solid Fuels, $PM_{2.5}$, 2000-2015	For category 1B1c Other Fugitive Emissions from Solid Fuels and pollutant $PM_{2.5}$ the TERT noted that emissions from wood pellet production are described in the IIR, but seemed not to be included in the NFR table. In response to a question raised during the review, Finland explained these emissions are reported by the plants according to their monitoring and reporting requirements in their environmental permits and allocated in the	no

				inventory under NFR 1A2gviii Stationary Combustion in Manufacturing Industries and Construction: Other (and previously in other source categories). The TERT recommends that Finland describes this allocation in the IIR.	
FI-1B2b-2017-0001	Submission 2018 NMVOC emissions included in the NFR table and in the IIR Part 2, page 110	No	1B2b Fugitive Emissions from Natural Gas (exploration, production, processing, transmission, storage, distribution and other), NMVOC, 2000-2015	For category 1B2b Fugitive Emissions from Natural Gas and pollutant NMVOC for all years the TERT noted that emissions are reported as 'NA' (Not Applicable). While natural gas production does not take place in Finland, natural gas is used and therefore also transport, compressed and distributed. In response to a question raised during the review, Finland explained that emissions from compressor stations are reported under 1A3ei Pipeline Transport and no other emissions occur. The TERT agrees with the allocation of compressor stations but does not agree with the assumption no other emissions occur. Emissions of NMVOC are likely to occur during distribution and transport of gas (e.g. leakages) although these may be small quantities. The TERT therefore recommends that Finland reports these emissions, or alternatively change the notation key from 'NA' to 'NE' (Not Estimated). Additionally, it should be explained in the IIR how emissions from this source have been estimated (or why they have not been estimated in case of 'NE').	no
FI-2C3-2017-0001	2nd Submission of 2018, which includes the NFR including the recalculated time series (see IIR Part 3, pages 53-54)	No	2C3 Aluminium Production, $PM_{2.5}$, 1990-2015	For 2C3 Aluminium Production the TERT noted that in response to a question raised during the review Finland agreed with the TERT that emissions from secondary aluminium production should be allocated to NFR 2C3 and that particle distribution factors should be updated to match the 2016 EMEP/EEA Guidebook. The TERT noted that the issue is below the threshold of significance for a technical correction. The TERT recommends that Finland includes the improvements mentioned above in the next submission.	no
FI-2C6-2017-0001	Submission 2018 -- IIR Part 3, page 55 explanation for the not occurring SO2 emissions -The notation key "NA" has not been changed to "NO" because the activity exists (NO means it does not) and the notation key NA means, as is the case, that the emissions are not relevant.	No	2C6 Zinc Production, SO_2, NO_X, NMVOC, 2015	For category 2C6 Zinc Production the TERT noted that in response to a question raised during the review Finland explained that zinc production occurs alongside sulphur productions and that SO_2 emissions from zinc production are utilised in the sulphur production. Therefore, SO_2 emissions are not emitted from zinc production except in exceptional situations such as malfunctioning or during start-up and shut-down periods. The TERT noted that this is a transparency issue and not related to the reported data. ***The TERT recommends that Finland improves the transparency in the next submission by providing explanations in the IIR*** necessary to understand the data reported in the NFR and correcting notation keys in the NFR, e.g. SO_2 from 2C6 from 'NA' to the proper 'NO'.	no
FI-2C7a-	Submission 2018	No	2C7a Copper	For category 2C7a Copper Production the TERT noted that in response to a	RE

2017-0001	IIR Part 3 page 57-58. Corrections for the other pollutants and the time series will be carried out in the recalculated time series (2nd submission 2018).		Production, SO_2, $PM_{2.5}$, 2015	question raised during the review Finland explained that only secondary copper production occurs in Finland and that emissions from one plant are missing from the data reported in the NFR. Finland provided a revised estimate for 2015 that solved the issue of the very low IEF. The TERT noted that the under-estimate is below the threshold of significance. The TERT recommends that Finland includes emissions from all producers in the next submission.	
FI-2D3c-2017-0001	There was no error in the emissions, after all, as explained in the IIR Part 3, page 74. The notation key is changed to "IE" as the emissions are included under 2D3b (calculated from the production of bitumen)	No	2D3c Asphalt Roofing, $PM_{2.5}$, 2005, 2010, 2015	For category 2D3c Asphalt Roofing and the pollutant $PM_{2.5}$ the TERT noted that Finland reported 'NA'. In response to a question raised during the review, Finland explained that there are two plants that fall under NFR 2D3c. At one plant the particle emission levels are below 0.0001 kt/a and considered to be negligible and therefore 'NA'. The maximum production rate in the other plant is 44,000 shingles per year, by using 2016 EMEP/EEA Guidebook EF the $PM_{2.5}$ emissions would be 0.0035 kt. The TERT notes that this issue does not relate to a significant over- or under-estimate. However, the TERT still recommends that Finland includes the $PM_{2.5}$ emissions in the next inventory.	no
FI-2H2-2017-0001	2nd Submission of which includes the NFR including the recalculated time series . IIR Part 3 page xx	Yes	2H2 Food and Beverages Industry, $PM_{2.5}$, 2015	For the key category 2H2 Food and Beverages Industry, the pollutant $PM_{2.5}$ and the year 2015 the TERT noted a dip in the emissions in 2015. In response to a question raised during the review, Finland explained the reason for this and also stated that a full recalculation of the time series in underway to the 2018 submission and will thus be reflected in the IIR. The TERT recommends that the explanation for this recalculation is included in the IIR.	no
FI-3B-2017-0001	Submission 2019 Integration of the calculation into the Finnish Agriculture Emissions Model is scheduled to the second half of 2018. (IIR Part 4 page 22, 34)	No	3B Manure Management, $PM_{2.5}$, 2005, 2010, 2015	For category 3B Manure Management, Sheep (3B2) and Goats (3B4d) and pollutants $PM_{2.5}$ for years 2005, 2010 and 2015 the TERT noted that Finland reports 'NA' for $PM_{2.5}$ emissions from sheep and goats. However, default EFs are available in the 2016 EMEP/EEA Guidebook and Finland reports animal numbers for sheep and goats in its NFR. The impact of the potential under-estimate is probably below the threshold of significance. In response to a question raised during the review, Finland explained that it is currently using the 2009 EMEP/EEA Guidebook Tier 2 emission factors (no EF for sheep and goats) and will revise its method according the 2016 EMEP/EEA Guidebook in the 2018 submission.	no

9 PROJECTIONS

Changes in chapter	
Update of text	March 2019 MS KS
Update of projections	Every 1-3 years

9.1 Projections for 2020, 2025 and 2030

Emission pojections for 2020, 2025 and 2030 are reported in the NFR reporting table for nitrogen oxides, sulphur oxides, non-methane volatile organic compounds, ammonia and small particles <2.5um. For black carbon projections are reported for 2030 only. Emission scenarios are also available up to 2050 for the agriculture and transport sectors, however, not currently included in the NFR tables. Projections for PM10 emissions are available for all sectors, however, PM10 is not one of the pollutants to be included in the NFR reporting table.

Projections for sulphur dioxide. nitrogen oxides. NMVOC and PM_{10} and $PM_{2.5}$ emissions in 2015, 2020 and 2025/2030 are estimated in the Finnish Regional Emission Scenarios (FRES) model (Karvosenoja 2008), which is used to support Finnish air pollution polices and in assessing the co-benefits and trade-offs of climate change strategies on air pollution. The scenarios were last updated in 2018.

Agricultural NH3 emissions are based the national agriculture sector calculation model and projections for the other sectors on expert estimates on emission trends based on current inventories.

The current projected emission values are presented in Table 1.05 and the annual submissions of projected data are saved in the EIONET CDR.

The projected emissions will be revised during the preparation of the 2030 Air Protection Programme by the end of 2018.

Table 1.05. Projected national total emissions for 2015, 2020 and 2030 as reported on 15th Feb 2019

Pollutant	Unit	WM projections			
		2020	2025	2030	2050
Sulphur oxides (SO_x as SO_2)	kt	30	25	24	NA
Nitrogen oxides (NO_x as NO_2)*	kt	107	84	77	NA
Non-methane volatile organic compounds (NMVOC)*	kt	60	157	56	NA
Ammonia (NH_3) (without adjustments)	kt	28	27	27	NA
$PM_{2.5}$	kt	18	16	16	NA
BC	kt	3.6	3.3	2.9	NA

'* NFR table rows 99-122 are not included in the projections

9.2 Methodology for projections

FRES model

The FRES model (Karvosenoja 2008) covers the emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), ammonia (NH_3), non-methane volatile organic compounds (NMVOCs) and primary particulate matter (TSP,. PM_{10}, $PM_{2.5}$, PM_1 and $PM_{0.1}$). Primary PM includes the fractionation to main chemical species (black and organic carbon. sulfate. main heavy metals and mineral matter).

Transport sector emissions included in the model are calculated with the global GAINS model (http://gains.iiasa.ac.at) (Amann ym. 2011 and agriculture emissions with the national nitrogen (Grönroos et al. 2009).

The national FRES model is developed to be consistent with the GAINS model in respect to source sectors in order to be able to cross-check differences in the scenarios. FRES model, however, gives more accurate information than GAINS for Finland, due to inclusion of e.g. 400 point sources detailed techniques and emission factors. In addition, certain sectors, such as residential combustion, has been calculated at a more detailed level (14 different national techniques).

Parametres used in the FRES model are optimized for every five historical years (2010, 2015 etc.) and to target years according to specific needs. The intermediate years are presented linearly.

Activity data in the FRES model

The emissions are calculated from the parameters of activity levels. emission factors and emission control technology removal efficiencies and utilization rates. The energy comsumption and industrial production scenarios used in planning the national Energy and climate strategy (Huttunen, 2017) are used as input to the model (Table 1.06). In the FRES model the activity unit for combustion processes is annual primary energy use (e.g. PJ a-1) and for industrial non-combustion processes annual production or raw material use (e.g. Mg a-1). Other activity units include e.g. animal numbers and manure application for NH3 emissions from agriculture and driven vehicle km for non-exhaust primaryPM from road traffic.

Emission factors and abatement techniques

Emission factors in the FRES model are assumed to be constant over time. Changes in emission factors are thus to be described by changes in the use of emission control technologies. Emission factor changes due to e.g. modernization of combustion appliance stock can be described by corresponding source sector disaggregation and relative changes in activity levels.

The FRES model describes removal effi ciencies and costs of emission control technologies.
The technologies include e.g. end-of-pipe and process modifi cation measures of energy production and industry sources. technologies applied in traffic vehicles and manipulations of fuel qualities. Emission abatement techniques are defined according to current legislation (CLE) and with measures (WM).

The current and future use of emission control technologies is to a large extent defined by the requirements of the environmental legislation. Nowadays different EU directives and national legisladtion define emission limit values for different emission sources. Major emission legislations include:

- Industrial Emissions directive (2010/75/EU) and the BAT Reference Documents that set limit values/BAT levels for SO2. NOx and primary PM (TSP) emission factors for combustion plants larger than 50 MWth (thermal capacity)

- Medium Combustion Plants directive (EU) 2015/2193 that set limit values for SO2, NOx and primary PM (TSP) emission factors for combustion plants smaller than 50 MWth (thermal capacity)
- EURO standards (e.g. EC 1998) that give increasingly tightening emission limits for new traffic vehicles. and NMVOCs directives (EC 1999b. 1994) for solvents and fuel handling practices to reduce NMVOCs emissions.
- Ecodesign directive and Commission regulations 2015/1195 and 2015/1189 for residential combustion.

Sources

The basic spatial and temporal domains of the model are the country of Finland and one year. respectively. which are then disaggregated to 250m x 250 m and 1 hour resolutions. respectively. The emission sources are aggregated into source sector categories. The FRES aggregation is mainly convergent with the GAINS model categories. with more refined structure for some sectors with specific national characteristics that are not described in RAINS with adequate disaggregation (e.g. domestic wood combustion).

The source sectors include combustion-related activities (centralized and industrial energy production plants. domestic combustion. road traffic. off-road and machinery). industrial non-combustion process plants. and various sources associated with NH3 (agriculture), primary PM (several fugitive dust and other small non-combustion sources) and NMVOCs (solvents use, fuel evaporation). Combustionrelated source sectors are described as sector fuel combinations (e.g. industrial boilers – coal). the numbers of sectors and fuels being 101 and 15. respectively. The number of noncombustion source sectors is 53. The emission sources are described with a combined bottom-up and top-down approach for large point sources and area sources. respectively. Emissions of most significant individual polluters are calculated as point sources. i.e. on an individual plant basis (bottom-up).

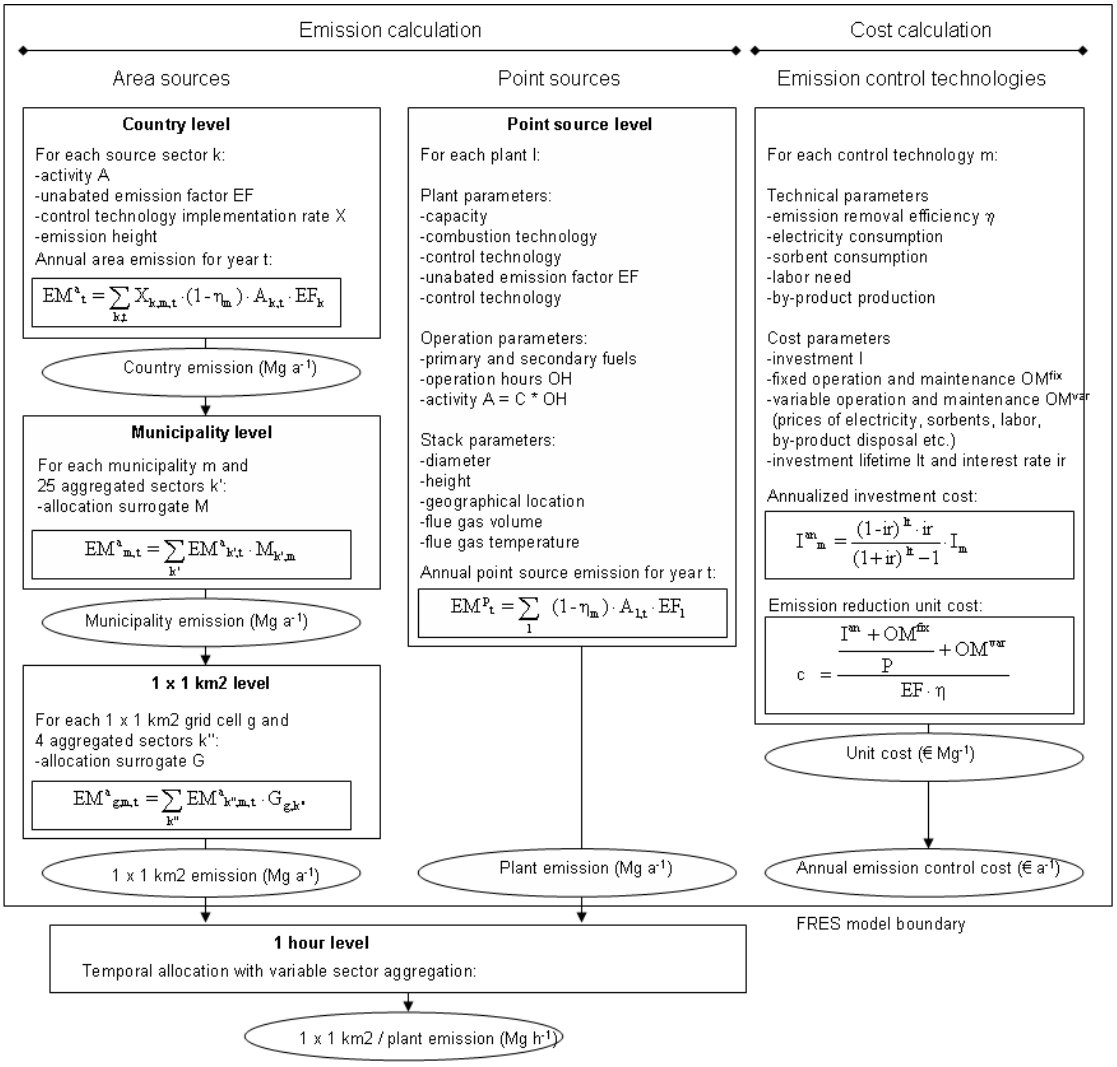


Figure 1.02. Structure of the FRES model.

9.3 Emission reductions based on existing measures and measures that have been adopted in the legislation

The base line scenario is based on fuel use according to the national energy and climate strategy from 2017 (Huttunen, 2017). The baseline scenario includes all relevant legislation currently in effect of approved including those mentioned above.

Sulphur emissions as SOx

Sulphur dioxide emissions originate mainly from energy production and industrial processes. Emissions from industry decreased already between 2005-2010 in line with the limits presented in the LCPD (2001/80/EY), although the uses of both coal and peat in 2010 were higher than in 2005. Between 2010 and 2020 emissions from energy production are projected to decrease sharply due to decreasing combustion of coal, peat and HFO and the limitations in the IED. From 2020 to 2030 combustion of coal will further decrease.

Emissions from industrial processes follow the projected increase of production volumes, while a slight decrease is projected to the emission factors for metal industry and refineries due to technical improvements of processes.

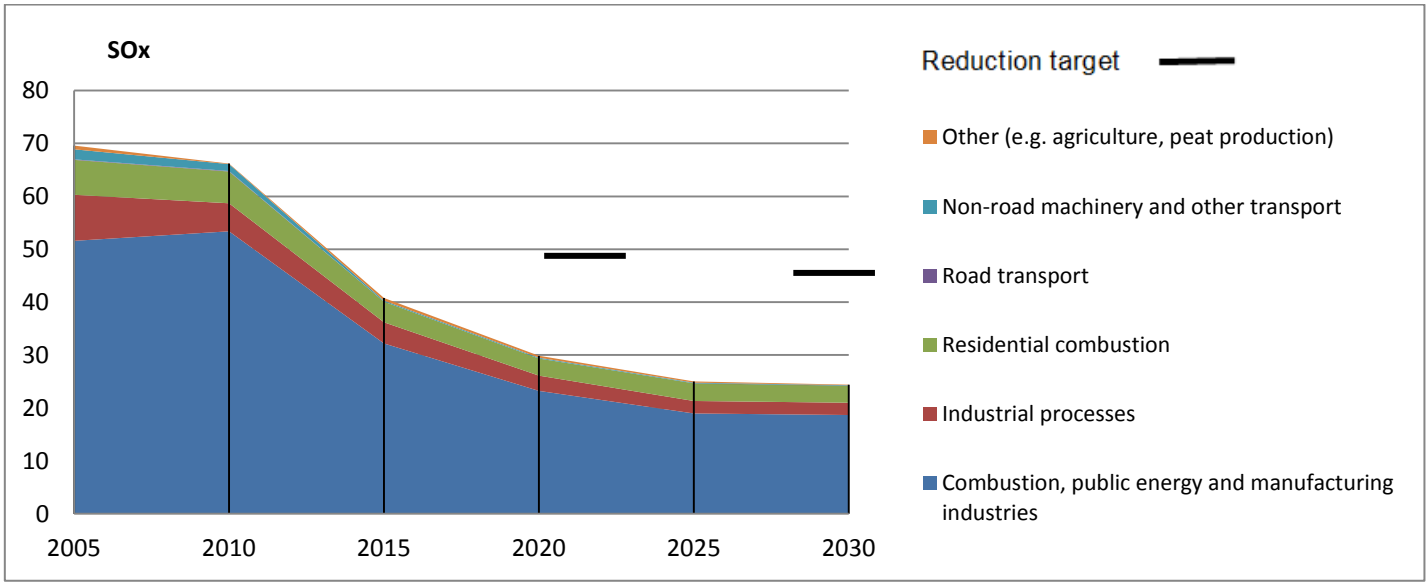


Figure 1.03. Development of SOx emissions by sectors according to the baseline

Nitrogen oxides

The main sources for NOx are road transport, off-road machinery and energy production. Emissions from the transport sector are projected to decrease due to EU legislation although transport volumes increase. The main contributor to decreases will be the implementation of EURO6 standards from 2015 onwards,

NOx emissions from energy production decreased only slightly between 2005-2010 when the uses of peat, coal and biomass were restored to the normal level from their exceptional levels in 2005 when the lock-out in forest industries and the extraordinary good water situation in production of hydroelectric power decreased the demand of fuels.

The IED restricts emissions from the use of coal and biomass. The use of coal and peat also decrease notably towards 2020-2030, although biomass use is expected to increase.

Emissions from industrial processes depend on the development of production volumes and in small scale combustion on the amount of wood combusted. Impacts to emission levels from small technical improvements in both the process industry and small scale combustion are included in the projections.

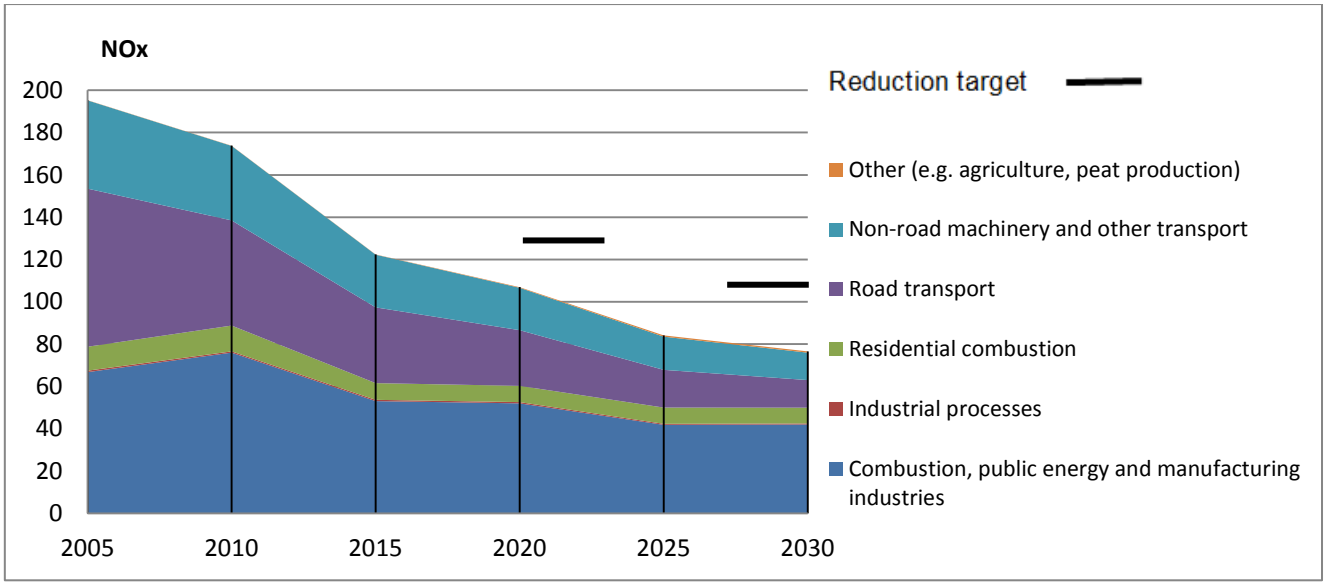


Figure 1.04. Development of NOx emissions by sectors according to the baseline

Particles

Important particulate matter sources are residential wood combustion, traffic, industry and peat production. In the national energy strategy it is assumed that the combustion volume will increase slightly from 2015 to 2030, but particulate emissions will decrease due to the renewal of the combustion equipment stock.

In transport, exhaust gas emissions decrease due to the increasing number of EURO6 standard vehicles. Although direct particulate emissions in exhaust gases almost cease by 2030, traffic dust will still remain an issue. PM emissions from traffic are a significant contributor to health impacts because the emissions occur at the height of inhalation and concentrate in high density population areas.

Emissions from peat production, i.e. operations related to extraction of peat, vary annually due to peat producton volumes which depend on weather (for instance between 2005–2012 from 2.7 to 5.5 kt. In the scenarios these emissions are projected to follow the projected use of peat each target year.

The increasingly stringent emission regulation in combustion plants decrease emissions only slightly, since biomass consumption is expected to increase significantly

For industrial processes, no changes have been made in emission factors over the years and the emissions follow development of production volumes.

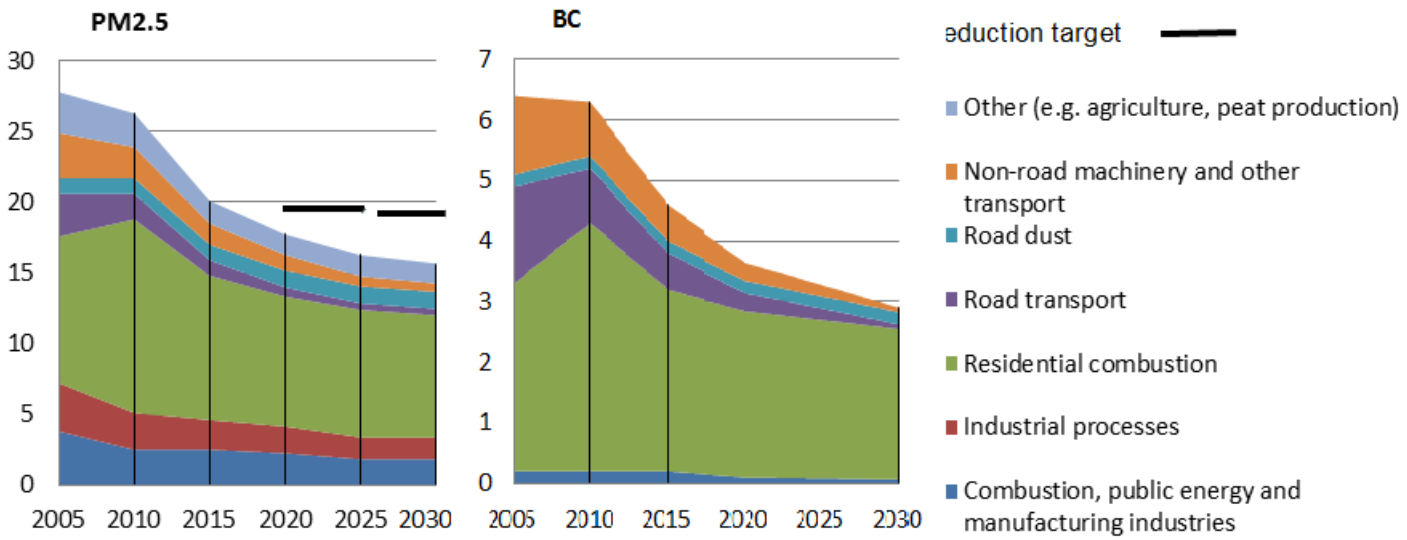


Figure 1.05. Development of small particle and black carbon emissions by sectors according to the baseline

Ammonia

The main ammonia source is agriculture where manure management drives the emissions. Small emissions are generated in transport, waste handling and industrial processes. The emission ceiling of 31 kt under the NECD and the Gothenburg Protocol is based in calculations in the RAINS model (Regional Air Pollution INformation and Simulation). In the revision of the NECD the target was to limit emissions to the level of 2010. For Finland this means a reduction of 20% in ammonia emissions from 2005, while the optimization in the GAINS would have been 15% for 2030. Both targets require the use of additional measures because the emission reduction according to the base line would be only 10% by 2030.

In the base line approach, reductions in agricultural ammonia emissions follow the decrease in animal numbers, impacts from liquid manure systems to become more common in line with the growth of the unit size, as well as the implementation of new regulations for storage and spreading of sludge according to the updated nitrates directive (Government Decree VNa 1250/2014). On the other hand, increased production volumes raise the level of nitrogen excretion, which partly cancel the reduction by the decrease in animal numbers.

Although ammonia emissions from transport already have decreased due to improvements in technology and will further decrease, the emissions in the model are estimated at the level in 2012.

Emissions from energy production were not included in the inventory the time the FRES model was updated. These emissions will be included in the model when the inventory results are finalized.

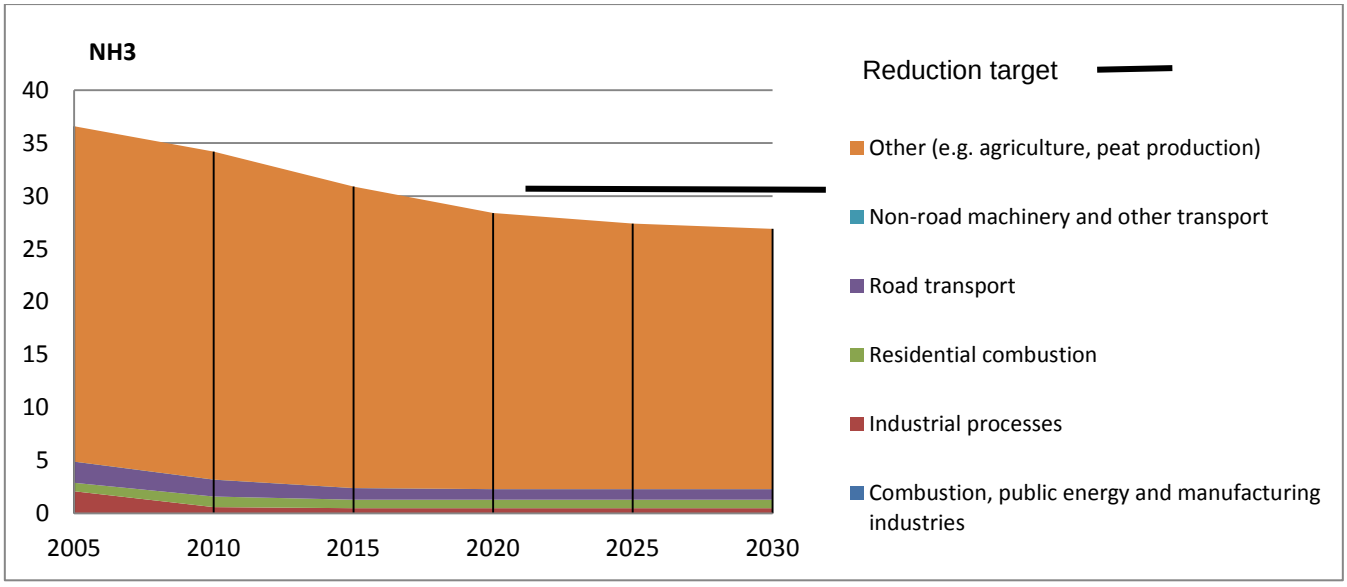


Figure 1.06. Development of ammonia emissions by sectors according to the baseline

NMVOC

NMVOC emissions have been decreased between 2005 - 2010 and further thereafter. The most important source is transport where emission reductions are expected due to EURO5/6 standard vehicles. Half of exhaust gas emissions originate in gasoline vehicles and half from fuel refining, storage and distribution.

FRES model only covers NMVOC emission from transport and small combustion. Projections for emissions from industry and product use are based on national emission inventory values in 2016.
These emissions have decreased since the beginning of the 2000s' due to implementation of VOC Directives (1999/13/EC and 2004/42/EC), In Finland also the levels of activities in these sectors have decreased. For oil refineries the emission factor is estimated to decrease by 2030, however, the expected growth of the activity volume keeps the projected emission levels constant.

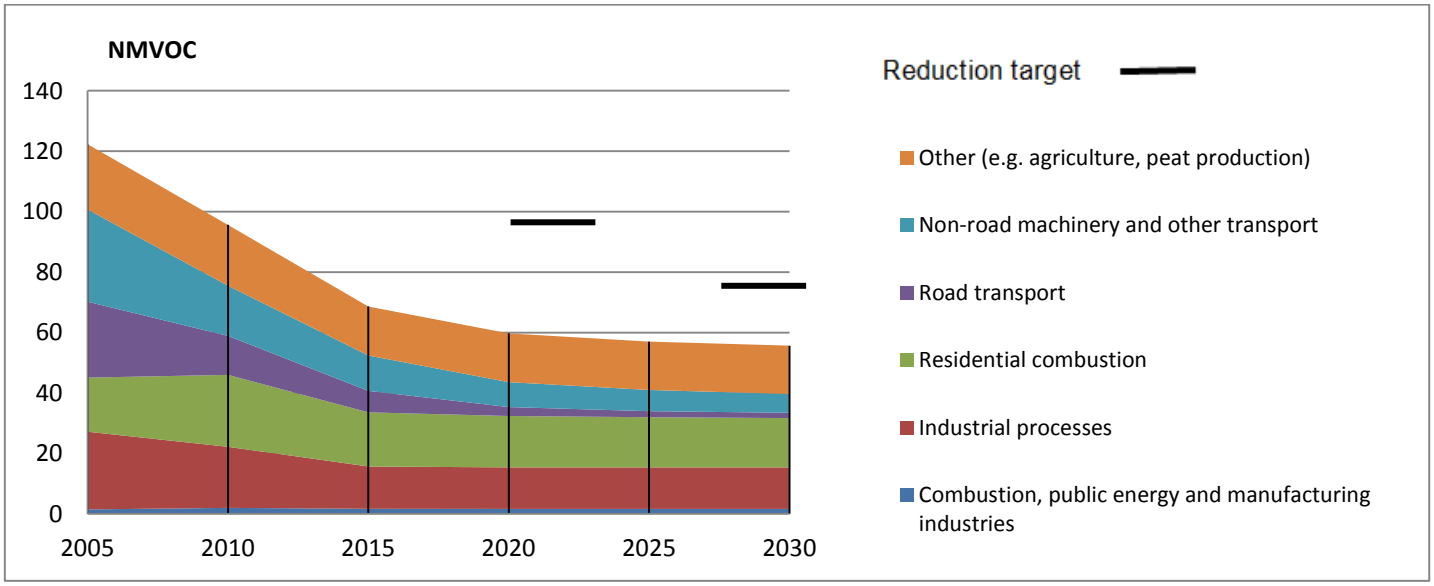


Figure 1.07. Development of NMVOC emissions by sectors according to the baseline

10 GRIDDED EMISSIONS AND LPS

Changes in chapter	
Update of text	March 2018 KS
Change in methodology	New grid 2015

10.1 Gridded data

The new EMEP grid of 0.1 degrees introduced in the 2014 Reporting Guidelines was implemented in the inventory system in 2015. Finland lies between the northern latitudes of 60^{o} and 70^{o}, where one degree corresponds to approximately to a 7 km *7 km area.

The presentation of gridded data in the 1^{o} * 1^{o} format has at the moment been implemented for the land cover of activities only in 2005. It is planned to prepare datasets also for the earlier years as well as for future years when resources are available for this kind of work.

Gridded data in the resolution of 50 km * 50 km according to the earlier versions of the Reporting Guidelines is available also for the earlier reporting years.

Submissions of gridded data are presented in Table 1.07 in Chapter x.

Figure 1.08. Geographical location of Finland (Maps of the World 2016)

Developments in land use

In comparison to other European countries, Finland is still a sparcely populated country with a small urban zone in the Southern part of the country. Only the capital region is a highly urbanized area according to the classifiactions of EuroStat and OECD.

In addition to the low population density, a specific feature of Finland is the share of rural areas and long distances between inhabitant centres. An exceptional feature compared to other low density countries is that almost all of Finland is populated and the most distant rural areas are rather vital. In an European comparison Finland was one of the top 5 countries in the share of rural areas of total area.

During the last decades more people have moved to the population centres, rural centres of in their vicinity and especially in the Southern part of Finland. Inside municipalities, population is more and more moving from sparcely populated areas to villages. Largest growth can be seen in population centres exceeding 100 000 inhabitants and secondly in 1000 - 100 000 population centres. Growth rate has been high also in centres less than 1000 inhabitants, while the sparcely populated areas continue to loose their inhabitants.

10.2 LPS data, sources, geographical coordinates and emissions

Changes in chapter	
Update of text	March 2018 KS
Change in method	none

The definition of the set of Finnish Large Point Sources (LPS) was revised in the 2012 submission under the UNECE CLRTAP to correspond to the definition of E-PRTR installations, as defined in the revised UNECE Reporting Guidelines (ECE/EB.AIR/97)**.**

Emission data from LPS installations are reported by plants according to the environmental monitoring requirements in their environmental permits, as well as their reporting requirements under the E-PRTR Regulation. As described in Chapter 2.3.3 of the IIR, these data are available for the use in inventories from the regional environmentral authorities' VAHTI database.

Data on Finnish LPSs has been submitted annually under the CLRTAP and since 2002 under the NECD.

During the preparation of the 2012 submission, it was observed that the conversion of nationally used coordinates into the coordinates in the CLRTAP reporting did not work as believed. A new method to convert the coordinates was introduced. The geographical coordinates used in national reporting for point sources is EUREF-FIN and there was a need to carry out a conversion between the level and geographical coordinates. In the 2017 submission, additional functionality challenges were met, and were solved by the following submissions

11 ADJUSTMENTS

11.1 Adjustment Application 2015

Finland applied for adjustments for the ammonia emissions inventories in Manure Management (NFR 3B), Small Scale Combustion (NFR 1A4) and Road transport, Railways, Navigation (NFRs 1A3b, 1A3c, 1A3d). The application was due to the fact that the 2010 emission ceiling for ammonia emissions set for Finland in the 1999 Gothenburg Protocol is 31 kilotonnes and according to the best science inventories, ammonia emissions in Finland were 38.2 kt in 2010, 37.4 kt in 2011, 37.3 kt in 2012 and 37.1 kt in 2013. The application of adjustments is presented as Annex 3 to Finnish IIR 2015.

The Adjustments Expert Review Team in 2015 accepted two of the applied adjustments the sums of which are presented in Table ES2 below. The Adjustments ERT Review Report is in Appendix 2 of this IIR.

Table ES2 Aggregated Sum of Recommended Inventory Adjustments (ktonnes), Finland 2010-2013

Pollutant		2010	2011	2012	2013
NH_3	kt	-2.05	-1.85	-1.85	-1.72

11.2 Reporting of Approved Adjustments

Documentation of the adjusted Small Scale Combustion NH3 inventory and the adjusted Road Transport NH3 inventory is provided in files:

- FI IIR 2019 Appendix 3B REVISED 15032019 Documentation Small Combustion.xls
  Saved in reporting folder C. Adjustment – Revised 2019 Approved Adjustments Reporting

- FI IIR 2019 Appendix 3B Documentation of Road Transport February 2019.xls
  Saved in reporting folder C. Adjustments – Approved Adjustments Reporting 2019

- Approved Adjustments FI Reporting year 2019 RESUBMISSION 15032019.docx
  Saved in reporting folder C. Adjustments - Revised 2019 Approved Adjustments Reporting

Finland has submitted the approved adjustments reporting (Annex VII) in 2016, 2017, 2018 and 2019 and included the in the submission the Declaration of consistency in the methods used (file name “Approved Adjustments Reporting”). Information on changes in activity data or new information to correct EFs has been included in these reports.

Adjustment for Small Scale Wood Combustion, submission 2019

In the 2019 submission, for small scale combustion of wood, Finland used the revised official wood use statistics, which is based on a survey conducted in 2017-2018. This traditional survey also includes use of wood in the different combustion equipment, which means that both the wood consumption data and the allocation of wood between the

14 techniques was revised. The new category for modern sauna stoves was added in the inventory due to the improved data.

In addition, the technique specific EFs were corrected according to new information from various national studies. The new EFs are higher for conventional devices and lower for modern devices, compared to the earlier used EFs. As a result of the revision, the emissions for 2017 increased by 0.344 kt compared to those calculated with the earlier used EF. The national total NH3 emissions in 2017 were 31.083 kt, which is 0.083 kt above the ceiling of 31 kt. As the share of wood combusted in modern sauna stoves, modern masonry ovens and modern iron stoves is continuously growing, the change in the EFs follows more closely the real world emissions than the earlier used EFs .

Detailed information on the changes is provided in the file "Approved Adjustments FI Reporting year 2019 RESUBMISSION 15032019".

Adjustment for Road Transport

A revision of the kilometrage in the national road transport emissions model LIISA was carried out and four EFs were corrected (see file Approved Adjustments FI Reporting year 2019 RESUBMISSION 15032019).

11.3. Adjustment ERT's review report 2015

(the following page)

Convention on Long-range Transboundary Air Pollution

emep Co - operative programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe

First Joint session of the EMEP SB and the Working Group on Effects
Geneva, 14–18 September 2015
CEIP/Adjustment RR/2015/Finland
1 September 2015
English ONLY

Review of the 2015 Adjustment Application by Finland

Expert Review Team Report for the EMEP Steering Body

Report title	Review of the 2015 Adjustment Application by Finland
Country	Finland
Report reference	CEIP/Adjustment RR/2015/ Finland
Date	20/07/2015
Version no	Final

Expert Review Team

Role	Sectors	Name	Country
Adjustment lead reviewer	All	Chris Dore	United Kingdom
Primary expert reviewer	Stationary combustion (1A2gviii, 1A4ai, 1A4bi, 1A4ci)	Stephan Poupa	Austria
Secondary expert reviewer	Stationary combustion (1A2gviii, 1A4ai, 1A4bi, 1A4ci)	Tomas Gustafson	Sweden
Primary expert reviewer	Road transport (1A3bi-iv)	Melanie Hobson	European Union
Secondary expert reviewer	Road transport (1A3bi-iv)	Michael Kotzulla	Germany
Primary expert reviewer	Manure management (3B)	Jim Webb	United Kingdom
Secondary expert reviewer	Manure management (3B)	Michael Anderl	European Union
Basic checks (Step 1 and 2)	N/A	Katarina Mareckova	CEIP

Executive Summary

1. As mandated by Decision 2012/3 (ECE/EB.AIR/111/Add.1) of the Executive Body to the Convention on Long-range Transboundary Air Pollution (CLRTAP) the nominated expert review team (ERT) undertook a detailed review of the adjustment application submitted by Finland. The review was undertaken on behalf of the EMEP EMEP[1] Steering Body (SB) and following the guidance published in the Annex to decision 2012/12 (ECE/EB.AIR/113/Add.1) and 2014/1 (ECE/EB.Air/130).

2. Each sector of the application was reviewed by two independent sectoral experts during May and June 2015. The findings were discussed at the meeting held from 22-26 June 2015 in Copenhagen at the EEA. The conclusions and recommendations for the EMEP SB are documented in this country report.

Table ES1 Summary Information on the Submitted Application, Finland 2015

Reasons for adjustment application (Decision 2012/3, para 6 as amended by decision 2014/1, annex, para 3)	Stationary combustion 1A2gviii, 1A4ai, 1A4bi, 1A4ci: New Source Road transport 1A3bi-iv: Significantly different EFs Manure management 3B: Significantly different EFs
Pollutant for which adjustment is applied for	NH_3
Year(s) for which inventory adjustment is applied	2010, 2011, 2012, 2013
Date of notification of adjustment to the Secretariat	20 February 2015
Date of submission of supporting documentation	13 March 2015

3. The expert review team (ERT) reviewed and evaluated the documents submitted by Finland.

4. **NH_3 emissions from stationary combustion (1A2gviii, 1A4ai, 1A4bi, 1A4ci):** Finland provided information that transparently presented "extraordinary" revisions to emission factors for NH_3, and also clearly quantified the impact of the revisions to the EFs. The Expert Review Team has concluded that the application does meet all of the requirements laid out in Decision 2012/12 of the Executive Body of the CLRTAP, and therefore recommends that the EMEP Steering Body **ACCEPT** this adjustment application.

5. **NH_3 emissions from road transport (1A3bi-iv):** Finland provided information that transparently presented "extraordinary" revisions to emission factors for NH_3, and also clearly quantified the impact of the revisions to the EFs alone. The Expert Review Team has concluded that the application does meet all of the requirements laid out in Decision 2012/12 of the Executive Body of the CLRTAP, and therefore recommends that the EMEP Steering Body **ACCEPT** this adjustment application.

6. **NH_3 emissions from manure management (3B):** Finland provided information that transparently presented revisions to N excretion rates for livestock, and the resulting impact on NH_3 emissions. The ERT reviewed the information provided and concluded that the application regarding NH_3 from Manure Management[2] (3B) does not meet the requirements laid out in Decision 2012/12 of the Executive Body of the CLRTAP. The ERT noted that revisions of N excretion estimates are regarded as revisions to activity data, and that the application was therefore not based on one of the three circumstances listed in

[1] Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
[2] NFR 3B1a, 3B1b, 3B2, 3B3, 3B4d, 3B4e, 3B4gi-iv and 3B4h henceforth referred as 3B

paragraph 6 of decision 2012/3, as amended by Decision 2014/1. The ERT therefore recommends that the EMEP Steering Body **REJECT** the adjustment submitted for NH_3 from Manure Management 3B.

7. The quantity and impact of the adjustments recommended for acceptance is summarized in tables ES2 and ES3 below.

Table ES2 Aggregated Sum of Recommended Inventory Adjustments (ktonnes), Finland 2010-2013

Pollutant		2010	2011	2012	2013
NH_3	kt	-2.05	-1.85	-1.85	-1.72

Table ES3 Impact of the Recommended Inventory Adjustments on National Emissions, Finland 2010 and 2013

Poll.	GP Emission Commitment (kt)	2010 Emission reported in 2015 (kt)	2010 Emission (adjusted) (kt)	Difference (%)	2013 Emission reported in 2015 (kt)	2013 Emissions (adjusted) (kt)	Difference (%)
NH3	31	38.25	36.20	5%	37.28	35.56	5%

8. Finland's national total emissions will remain above the 1999 Gothenburg Protocol ceilings if the EMEP SB follow the recommendations of the ERT.

Content

12 INTRODUCTION AND CONTEXT

9. Parties may apply to adjust their inventory data or emission reduction commitments if they are (or expect to be) in non-compliance with their emission reduction targets[3]. However, in making an adjustment application, they must demonstrate that extraordinary circumstances have given rise to revisions to their emissions estimates. These extraordinary circumstances fall into three broad categories:

a) Emission source categories are identified that were not accounted for at the time when the emission reduction commitments were set; or

b) For a particular source, the emission factors used to estimate emissions for the year in which emissions reduction commitments are to be attained are significantly different to those used when the emission reduction commitments were set; or

c) The methodologies used for determining emissions from specific source categories have undergone significant changes between the time when emission reduction commitments were set and the year they are to be attained.

10. Any Party submitting an application for an adjustment to its inventory is required to notify the Convention Secretariat through the Executive Secretary by 15 February at the latest. The supporting information detailed in Decision 2012/12 must be provided (either as part of the Informative Inventory Report, or in a separate report) by 15 March of the same year.

11. As mandated by Decision 2012/12 as amended by the Decision 2014/1 of the Executive Body of the CLRTAP, applications for adjustments that are submitted by Parties are subject to an expert review[4]. Technical coordination and support to the review is provided by EMEP's Centre on Emission Inventories and Projections (CEIP). The members of the review team are selected from the available review experts[5] that Parties have nominated to the CEIP roster of experts.

12. The expert review team (ERT) undertakes a detailed technical review of the adjustment application in cooperation with the EMEP technical bodies and makes a recommendation to the EMEP Steering Body on the acceptance or rejection of the application. The EMEP Steering Body then takes its decision on any adjustment application based on the outcome of the technical assessment completed by ERT.

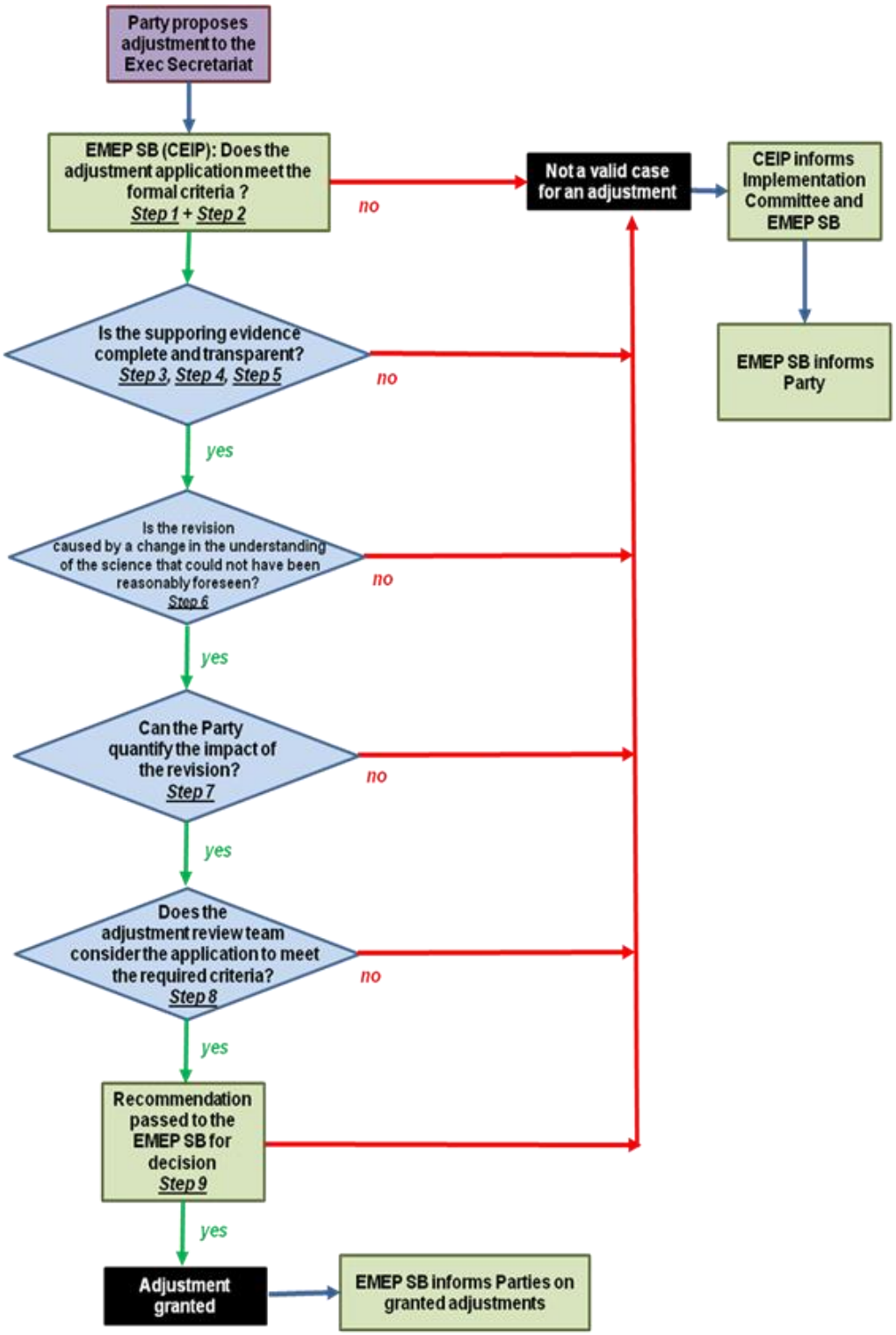
13. The flow diagram below outlines the different stages of the technical review. The following sections of this report are structured in the same way, and describe in detail the findings of the ERT at each of the decision gates in the process.

[3] Throughout this report the term "emission reduction commitments" is used. However, the term "emission ceilings" is equally applicable.

[4] The EMEP Steering Body, in conjunction with other appropriate technical bodies under EMEP, shall review the supporting documentation and assess whether the adjustment is consistent with the circumstances described in paragraph 6 of EB decision 2012/3 and the further guidance in EB decision 2012/12 as amended by EB decision 2014/1 and Technical guidance document ECE/AB.Air/130 ..

[5] http://www.ceip.at/fileadmin/inhalte/emep/pdf/2015/0_Roster_2015.pdf

Figure 1.010: Flow Diagram/Decision Tree for the Review of Adjustment Applications



1 Review of Submitted Adjustments

1.1 Assessment of Formal Criteria

14. Finland notified the Convention Secretariat through the Executive Secretary of its intention to apply for an adjustment on 20/02/2015 and thus after the legal deadline of 15 February. All supporting information requested by Decision 2012/12 amended by Decision 2014/1 was provided as part of the Informative Inventory Report before the legal deadline of the 15 March of the same year that it is being submitted for review by the EMEP Steering Body(Decision 2012/12, annex, para 1). Additional documentation was provided during the review in response to requests from the CEIP and ERT. Section 4 lists the documentation provided by the Party.

15. Finland submitted an application for emissions adjustments to NH_3 for 2010-2013 for the following sectors:

a) NH_3 Stationary combustion 1A2gviii, 1A4ai, 1A4bi, 1A4ci

b) NH_3 Road transport 1A3bi-iv

c) NH_3 Manure management 3B1a, 3B1b, 3B2, 3B3, 3B4d, 3B4e, 3B4gi-iv and 3B4h (henceforth referred as 3B).

16. Finland does not comply with its emission reduction commitments listed in Annex II of the Gothenburg Protocol (paragraph 1 of Decision 2012/3).

17. Finland provided information on the impact of the adjustment to its emission inventory, and the extent to which it would reduce the current exceedance and possibly bring the Party in compliance with emission reduction commitments.

18. Finland did include information on when it will meet its emission ceiling for NH_3 in the supporting documentation.

1.2 Stationary Combustion 1A2gviii, 1A4ai, 1A4bi, 1A4ci (NH_3)

1.2.1 Assessment of Consistency with Requirements of EB Decision 2012/3 as amended by EB Decision 2014/1

19. Finland initially made an adjustment application based on new sources. However following some discussion with the ERT, elected to amend this to an application based on significant revisions to emission factors (EFs).

20. The adjustment application requires the provision of specific supporting information to demonstrate compliance with specific criteria (Decision 2012/3, para. 6a-c as amended by decision 2014/1, annex, para 3). The ERT reviewed the supporting documentation (see section 4) with regard to these criteria and concluded that NH_3 emission factors used to determine emission levels for the source categories 1A2gviii, 1A4ai, 1A4bi and 1A4ci for the year in which emissions reduction commitments are to be attained are significantly different than the emission factors applied to these categories when emission reduction commitments were set.

21. The biomass NH_3 EFs used for calculation of the 2015 submission are significantly higher than those which were available in the Second Edition of the EMEP/CORINAR Emissions Inventory Guidebook 1999. However, NH_3 EFs used for coal are lower than those in the second edition of the EMEP/CORINAR Emissions Inventory Guidebook 1999.

22. The ERT therefore concludes that the provided supporting evidence does comply with the criteria presented in Decision 2012/3, and that the circumstances on which the adjustment is based could not have been reasonably foreseen by Finland when the emission ceilings were established for 2010.

1.2.2 Assessment of the Quantification of the Impact of the Revision

23. The adjustment application process requires that the Party submit a quantification of the impact of the adjustment for which an application has been submitted. Table 1 provides an overview of the NH_3 adjustment applications of Finland in Stationary combustion. The Adjustments for categories 1A2gviii, 1A4ci and 1A4ai are positive because the selected EFs for coal are lower than those in the Second Edition of the EMEP/CORINAR Emissions Inventory Guidebook 1999.

Table 1: Finland's NH_3 Adjustment Applications for the Stationary Combustion, 2010-2013

Reference number	Pollutant	NFR14	unit	2010	2011	2012	2013
11a-11b	NH3	1A2gviii	kt	0.015	0.014	0.017	0.015
12a-12b	NH3	1A4ai	kt	0.023	0.022	0.026	0.024
13a-13af	NH3	1A4bi	kt	-0.610	-0.485	-0.594	-0.542
14a-14c	NH3	1A4ci	kt	0.042	0.036	0.044	0.041
	NH3	**Total**	**kt**	**-0.531**	**-0.413**	**-0.507**	**-0.462**

1.3 Road Transport 1A3bi-iv (NH_3)

1.3.1 Assessment of Consistency with Requirements of EB Decision 2012/3 as amended by EB Decision 2014/1

24. Finland initially made an adjustment application based on new sources. However following some discussion with the ERT, elected to amend this to an application based on significant revisions to the NH_3 road transport emission factors (EFs).

25. The adjustment application requires the provision of specific supporting information to demonstrate compliance with specific criteria (Decision 2012/3, para. 6a-c as amended by decision 2014/1, annex, para 3). The ERT reviewed the supporting documentation (see section 4) with regard to these criteria and concluded that emission factors used to determine emission levels for the road transport source categories 1A3bi-iv for the year in which emissions reduction commitments are to be attained are significantly different than the emission factors applied to these categories when emission reduction commitments were set.

26. Finland provided information to support its application for an adjustment, which was based on NH_3 emission factors for the transport sector being significantly different. This was on the basis that the NH_3 emission factors in the 1999 EMEP/EEA Guidebook are significantly different to that provided in the 2013 EMEP / EEA Guidebook.

27. Finland did not include NH_3 emissions from the transport sector in their inventory until their 2005 submission. However, for the basis of determining whether the emission factor has significantly changed, a comparison of the 1999 and 2013 EMEP/EEA Guidebooks has been undertaken.

28. The changes in EFs highlighted in the adjustment application could not have been foreseen at the time of setting 2010 emission ceilings, and result from NH_3 emissions being higher from vehicles fitted with catalysts than originally accounted for.

29. The ERT therefore concludes that the provided supporting evidence does comply with the criteria presented in Decision 2012/3, and that the circumstances on which the adjustment is based could not have been reasonably foreseen by the Party when the emission ceilings were established for 2010.

30. The supporting information provided by the Party on the revisions made to emission factors was considered to be complete. A spreadsheet outlining the NH_3 emission factors contained in the 1999 and 2013 versions of the Emissions Inventory Guidebook and the emission factors used in the Finland emissions inventory was provided.

1.3.2 Assessment of the Quantification of the Impact of the Revision

31. The adjustment application process requires that the Party submit a quantification of the impact of the adjustment for which an application has been submitted. Table 2 provides an overview of the NH_3 adjustment applications of Finland in the Road transport sector.

Table 2: Finland's NH_3 Adjustment Applications for Road Transport, 2010-2013

Reference number	Pollutant	NFR14	unit	2010	2011	2012	2013
FI/2014/1a	NH3	1A3bi-iv	kt	-1.52	-1.44	-1.34	-1.26

1.4 Manure Management 3B (NH_3)

1.4.1 Assessment of Consistency with Requirements EB Decision 2012/3 as amended by EB Decision 2014/1

32. The Party made an application based on revised EFs for Manure management (3B1a, 3B1b, 3B2, 3B3, 3B4d, 3B4e, 3B4gi-iv and 3B4h - referred to as "3B").

33. The adjustment application requires the provision of specific supporting information to demonstrate compliance with specific criteria (Decision 2012/3, para. 6a-c as amended by decision 2014/1, annex, para 3). The ERT reviewed the supporting documentation (see section 4) with regard to these criteria.

34. The ERT noted that the basis of the application was that N excretion from livestock had increased since the ceilings were set in 1999. However the ERT consider N excretion to be activity data, and not a component of an EF. In addition, the ERT considered that applying year-specific N excretion values (rather than a fixed value) did not represent a change in methodology. The ERT recognized that it was good practice to revise input data when productivity and farming practices changed, but considered this particular revision to constitute routine emissions inventory development.

35. Consequently the ERT concluded that the application for an NH_3 adjustment from Manure management 3B did not comply with the criteria presented in Decision 2012/3. In particular, the ERT noted that the application was not based on one of the three circumstances listed in paragraph 6 of decision 2012/3, as amended by decision 2014/1.

1.4.2 Assessment of the Quantification of the Impact of the Revision

36. The adjustment application process requires that the Party submit a quantification of the impact of the adjustment for which an application has been submitted. Table 3 provides an overview of the NH_3 adjustment applications of Finland from Manure management.

Table 3: Finland's NH_3 Adjustment Applications for Manure Management, 2010 - 2013

Reference number	Pollutant	NFR14	unit	2010	2011	2012	2013
FI/2015/1	NH_3	3B1a	kt	-1.149	-1.194	-1.260	-1.271
FI/2015/2a-2d	NH_3	3B1b	kt	-3.389	-3.274	-3.093	-3.116
FI/2015/3	NH_3	3B2	kt	0.259	0.261	0.257	0.268
FI/2015/ 4a-4d	NH_3	3B3	kt	-0.111	-0.068	-0.108	-0.169
FI/2015/5	NH_3	3B4d	kt	0.010	0.009	0.009	0.009
FI/2015/6a-6b	NH_3	3B4e	kt	0.261	0.253	0.236	0.237
FI/2015/7a-7b	NH_3	3B4gi	kt	-0.281	-0.259	-0.254	-0.273
FI/2015/8a-8b	NH_3	3B4gii	kt	-0.710	-0.819	-0.894	-1.012
FI/2015/9	NH_3	3B4giii	kt	-0.161	-0.171	-0.163	-0.152
FI/2015/10a-10b	NH_3	3B4giv	kt	-0.307	-0.284	-0.294	-0.326
FI/2015/11a-11c	NH_3	3B4h	kt	1.119	1.157	0.987	1.075
	NH_3	**3B TOTAL**	**kt**	**-4.459**	**-4.387**	**-4.578**	**-4.730**

37. Finland did not inform the ERT when the emission ceilings would be reached. However, Finland noted that it continued implementing measures to abate ammonia emissions and would further develop the inventory to timely reflect impacts of the measures on the emission levels.

2 Conclusions and Recommendations

38. The ERT has undertaken a full and thorough assessment of the application for adjustments of NH_3 emissions inventory that was submitted by Finland for the following source sectors:

a. Stationary combustion- 1A2gviii, 1A4ai, 1A4bi, 1A4ci
b. Road transport - 1A3bi-iv
c. Manure management - 3B.

39. The review of the submitted application followed the guidance provided in the Annex to Decision 2012/12 of the Executive Body of the CLRTAP as amended by Technical Guidance ECE/EB.AIR/130. The findings of the ERT are described in detail in Section 2 of this report.

40. Table 4 below provides a summary of the adjustment applications received from Finland, and the subsequent recommendations made by the ERT to the EMEP SB.

Table 4: Recommendations from the ERT to the EMEP SB, Finland 2015

Country	Sector	NFRs	Pollutant	Years	ERT Recommendation
Finland	Stationary Combustion	1A2gviii, 1A4ai, 1A4bi, 1A4ci	NH_3	2010- 2013	Accept
	Road Transport	1A3bi-iv	NH_3	2010 – 2013	Accept
	Manure Management	3B	NH_3	2010 - 2013	Reject

41. **Stationary combustion (1A2gviii, 1A4ai, 1A4bi, 1A4ci, 1A2gviii) NH_3:** Finland provided information to support their application for an adjustment. During the review, the ERT requested more detailed information from Finland, which they were able to provide, and this is detailed in Table 6. The ERT therefore recommends that the EMEP Steering Body **ACCEPT** the adjustments submitted for these sectors.

42. **Road transport (1A3bi-iv) NH_3**: Finland provided information to support their application for an adjustment. During the review, the ERT requested more detailed information from Finland, which they were able to provide, and this is detailed in Table 6. The ERT therefore recommends that the EMEP Steering Body **ACCEPT** the adjustments submitted for these sectors

43. **Manure management (3B) NH_3:** Finland provided information that transparently presented the quantification of an adjustment for NH_3 Manure management 3B. However, the ERT concluded that the application does not meet the requirements laid out in Decision 2012/12 of the Executive Body of the CLRTAP, and in particular, that the application was not based on one of the three circumstances listed in paragraph 6 of Decision 2012/3, as amended by Decision 2014/1. The ERT therefore recommends that the EMEP Steering Body **REJECT** the adjustment submitted for NH_3 Manure Management 3B. Finland did not provide information on when it will meet its emission ceiling for NH_3 in the supporting documentation. However, Finland noted that it continued implementing measures to abate ammonia emissions and would further develop the inventory to timely reflect the impacts of the measures on the emission levels.

3 Information Provided by the Party

44. Table 5 lists the information provided by the Party in its adjustment application. The information provided by Party can be downloaded from the CEIP website[6].

Table 5: Information Provided by the Finland

Filename	Short description of content
Appendix 3 to FI IIR 2015 DOCUMENTATION ADJUSTMENT APPLICATION 13March2015.docx	Special Appendix to IIR 2015. Includes documentation of adjustments.
FI_IIR2015_22_May2015_revised_Part_1.pdf	IIR 2015. Revised version 22nd May.
FI_IIR2015_13March2015_Part2.pdf	IIR 2015 Annexes. Version 13th March
FI_NotificationTemplate__CLRTAP_EMEP_emission_inventory_status_report_2015_20022014.docx	CLRTAP submission 2015 notification template.
FI_YM12_44_2014.pdf	Official letter from Ministry of Environment to UNECE about adjustment application, 12th Feb 2015.

45. The ERT found it necessary to ask the Party for further information. The information provided is described in Table 6 below.

Table 6: Additional Information Provided by Finland

Filename	Short description of content
Documentation Transport 24 June 2015.xls	Road transport NH3 emission factors provided in the 1999 EMEP/EEA Guidebook and those used in the 2014 Finland emissions inventory and accompanying calculations to assess the difference in emission estimates.
Documentation Small Combustion 23June2015.xlsx	Detailed calculations of NH3 emissions for biomass and coal with EFs from GB 1999 and EFs used for the 2015 submission.

[6] http://www.ceip.at/ms/ceip_home1/ceip_home/adjustments_gp/

4 References

Decision 2012/3 (ECE/EB.AIR/111/Add.1): Adjustments under the Gothenburg Protocol to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them

Decision 2012/12 (ECE/EB.AIR/113/Add.1): Guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them

Decision 2014/1 (ECE/EB.Air/127/Add.1) Improving the guidance for adjustments under the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to emission reduction commitments or to inventories for the purposes of comparing total national emissions with them

Data submitted by Parties applying for an adjustment:
http://www.ceip.at/ms/ceip_home1/ceip_home/adjustments_gp/

EMEP/EEA Air Pollutant Emission Inventory Guidebook 2013
http://www.eea.europa.eu/publications/emep-eea-guidebook-2013

EMEP/CORINAIR Air Pollutant Emission Inventory Guidebook 1999, 2nd edition
http://www.eea.europa.eu//publications/EMEPCORINAIR

2014 Reporting Guidelines (ECE/EB.AIR/125) for Estimating and Reporting Emission Data under CLRTAP
http://www.ceip.at/ms/ceip_home1/ceip_home/reporting_instructions/

ECE/EB.AIR/130: Technical Guidance for Parties Making Adjustment Applications and for the Expert Review of Adjustment Applications, 14 April 2015

The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone
http://www.unece.org/env/lrtap/multi_h1.htm

12 MEMO ITEMS

Changes in chapter	
Update of text	March 2018 KS
Change in methodology	
Other (e.g. language. layout)	

Overall description and methodologies

1 A 3 ai(ii) International aviation cruise

See IIR Part 2 Energy under Aviation.

1 A 3 aii(ii) Domestic aviation cruise

See IIR Part 2 Energy under Aviation.

1 A 3 dii(i) International maritime navigation

See IIR Part 2 Energy under Navigation.

1 A 5 c Multilaterial operations

IE/NE?

1 A 3 Transport (fuel used)

.Not applicable. The inventory is based on fuels sold.

6 B Other not included in national total of the entire territory

Not occuring

11 A Volcanoes

There are no volcanoes in Finland.

11 B Forest fires

Not applicable.

11 C Other natural emissions

Not applicable.

Uncertainty and time series' consistency

No uncertainty estimation for international bunkers has been carried out.

The time series for 1990-1999 will be recalculated during 2010 and reported by February 15th 2011.

Source-specific QA/QC and verification

Normal statistical quality checking related to the assessment of the magnitude and trends has been carried out. At present. no verification has been performed for the specific source-sector emissions.

Source-specific recalculations including changes made in response to the review process

None.

Source-specific planned improvements

Emissions from international navigation will be available in the EMEP grid format in the future.

More pollutants will be included in the future to the emissions from international aviation.

13 REFERENCES

Aasestad K. (2013) Emissions of black carbon and organic carbon in Norway 1990-2011.

AEAT (2000). UK Fine Particulate Emissions from Industrial Processes. May 2000.

Aittola, J-P.. Paasivirta. J., Vattulainen, A.. Sinkkonen, S., Koistinen, J. and Tarhanen, J. (1996). Formation of chloroaromatics at a metal reclamation plant and efficiency of stack filter in their removal from emissions. Chemosphere 32. 99-108.

Arnold, M., Kuusisto, S. and Mroueh, U.-M. (1998). Emissions from volatile organic compounds (VOC) in 1996. VTT Publications 1921. Technical Research Centre of Finland. 35 p. (In Finnish).

Bailey, R.E. (2001). Global hexachlorobenzene emissions. Chemosphere 42 167-182.

BiPRO (2006). Identification. assessment and prioritisation of EU measures to reduce releases of unintentionally produced/released Persistent Organic Pollutants. Interim Report. reference: ENV.D.4/ETU/2005/0068r. 99 p.

Blomberg. T. (2008). Recalculation of NMVOC emissions from road paving.

Brenback. M. (2003). Main nutritients in fertilizers 2001/2002. Vihreä kirja. Kemira (In Finnish)

Björndal. H. (1996). Alternatives to persistent organic pollutants. Rapport från kemikalieinspektionen. 4/96. SEPA (Swedish Environment Protection Agency). (In Swedish)

Best Available Techniques (BAT) Reference Document for the Manufacture of Glass Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control)

CLRTAP/EEA (2006). Tthe Individual review of the CLRTAP air emission inventory of Finland submitted in 2005 (21.12.2006). 13 pages.

EEA (2013). EMEP/EEA air pollutant emission inventory guidebook - 2013. Technical guidance to prepare national emission inventories. EEA Technical report No 12/2013. European Environmental Agency ISSN 1725-2237, ISBN 978-92-9213-403-7. URL: http://www.eea.europa.eu/publications/emep-eea-guidebook-2013

EEA (2009). EMEP/EEA air pollutant emission inventory guidebook - 2009. Technical guidance to prepare national emission inventories. EEA Technical report No 9/2009. European Environment Agency ISBN 978-92-9213-034-3, ISSN 1725-2237. URL: http://www.eea.europa.eu/publications/emep-eea-emission-inventory-guidebook-2009

EEA (2007). EMEP/CORINAIR Emission Inventory Guidebook - 3rd edition. Updated files from December 2007. European Environment Agency Technical report No 30. URL: http://www.eea.europa.eu/publications/EMEPCORINAIR5

EEA (2005). EMEP/CORINAIR Emission Inventory Guidebook - 2005. Sources of HCB emissions. http://reports.eea.europa.eu/EMEPCORINAIR4/en/sources_of_HCB.pdf

EIPPCB (2000). IPPC BAT Reference Document on Iron and Steel Industries (BREF). European Integrated Pollution Prevention and Control Bureau. Seville. March 2000.

Environment Canada (2006). HCB Canadian Inventory for Long Range Transport Modeling. Presentation 17 May 2006 GLBTS Meeting.

FINAVIA (2009). Calculation of international aviation emissions (Ms Niina Rusko).

Finergy (2008). Information on storing of coal. Finnish Energy Industries Federation. Personal communication.

Finland's 6th National Communication to the UNFCCC (2013)

Finlands National Inventory Report to the UNFCCC (2013)

Finnish Glas Industry BAT Group (2001). Conclusions of national BAT group on glass manufacturing (not published)

Finnish Environment Institute (2000) Calculation model for Finnish NMVOC emissions. 32 p.

Finnish Environment Institute (2001). Documentation of the expert estimation for the emission factors of industrial and medical waste incineration. (In Finnish)

Finnish Environment Institute (2007). Waste statistics. Environmental Management Division. Finnish Environment Institute.

Finnish Environment Institute (2004) Ammonia emissions in the UNECE CLRTAP inventory. May 2004. 17 pages

Finnish Environment Institute (2004) Development of the Finnish UNFCCC and UNECE CLRTAP inventories in the agriculture source sector. 22.10.2003. 21 pages

Finnish Environment Institute (2004) NMVOC emissions in the UNFCCC and CLRTAP inventories. 4.2.2004. 29 p.

Finnish Environment Institute (2004) Particle emissions in the UNECE CLRTAP inventory. April 2004. 24 p.

Finnish Environment Institute and Energy Producers (2005). Production of Emission Data – Energy Industries. 103 p. http://www.ymparisto.fi/download.asp?contentid=46599&lan=fi

Finnish Environment Institute (2006). Report on Finnish HCB air emissions1990 – 2004 to the Secretariat of the UNECE Convention on Long-Range Transboundary Air Pollution. 18 December 2006

FFIF (1996). The Finnish Forest Industries Federation Annual Report. August 1996.

FFIF (2003). The Finnish Forest Industries Federation Annual Report 2002. Sawmills and board production.

Finnish Congregations (2013). Number of dead and cremated.

Finnish Fur Sales (2013). Statistics for fur production.

Finnish Petroleum Federation (2014). Oil product and natural gas sales in Finland 2013. http://www.oil.fi/sites/default/files/sivut/sisaltosivu/liitetiedostot/3.4_sales.pdf

Finstad, A., Haakonsen, G and K. Rypdal (2003) Utslipp til luft av partikler I Norge, Dokumentasjon av metode og resultater. Raportter 2003/15. Statistik sentralbyrå 2003

Fortum Oil and Gas Ltd. 2002. Revised inventory of Finnish NMVOC emissions in 1988-2001. In Finnish (confidential)

Grönfors. K. (2012). Statistics Finland. Personal communications

Grönroos, J., Nikander, A., Syri, S., Rekolainen, S. and Ekqvist, M. (1998). Agricultural ammonia emissions in Finland. Finnish Environment Institute. The Finnish Environment 206. 65 p. (In Finnish).

Grönroos. J.. Mattila. P.. Regina. K.. Nousiainen. J.. Perälä. P.. Saarinen. K. and Mikkola-Pusa. J. (2009) Development of ammonia emission inventory in Finland: Description of the revised model and results. Publication available at www.environment.fi>publications>The Finnish Environment.

Hupa, M., Boström, S. and Nermes, M. (1988) Total emissions from energy production in Finland. Insinööritoimisto Prosessikemia Ky. Ministry of Trade and Industry. Energy Department. Series D:162. 62 p. (In Finnish)

Huttula, P(2002). Written information on emissions from service stations and storage tanks outside the refineries for 2000-2001. Finnish Oil and Gas Federation. (In Finnish)

Information Centre of the Ministry of Agriculture and Forestry (2012) Storage and handling of grain.

Isännäinen, S. (1994). Utilisation of wastewater sludge. Jätevesilietteistä ja niiden hyötykäytöstä. In: Seminaariesitelmiä: Vesiensuojelu. Ympäristönsuojelutekniikan julkaisuja 1994(4): 19–39. Helsinki University of Technology. Laboratory of Environmental Pollution Prevention Technology. (In Finnish).

Joas, A. (2006). Working paper in preparation of EU Implementation plan on POPs under the Stockholm Convention. Annex 1.

Jones, K. (2005). Hexachlorobenzene – Sources. environmental fate and risk characterization. Science Dossier. Euro Chlor.Joas. A. (2006)

Huttunen, M.J. and Kuittinen, V.. Suomen biokaasulaitosrekisteri n:o 17. Publications of the University of Eastern Finland. Reports and s_tureid in Forestry and Natural Sciences No 19 (2014) (In Finnish).

Karvosenoja, N., Johansson, M. and Kupiainen, K. (2002) The importance of primary particulate emissions from non-combustion sources in Finland. Proceedings of 16th International Clean Air and Environment Conference. 19-22.8.2003. Christ Church. New Zealand. Clean Air Society of Austria and New Zealand.. p. 393-398

Karvosenoja, N. (2008) Emission scenario model for regional air pollution. Monographs of the Boreal Environment Research no. 32. p.55.URN:ISBN:978-952-11-3185-1. ISBN 978-952-11-3185-1 (PDF). The publication is available also in printed form ISBN 978-952-11-3184-4.

Kemia-Kemi (2012). Activity data for cement production.

Keränen, S. and Niskanen, R. (1987). Typpilannoituksen vaikutus happamoitumiseen Suomessa. The acidification impact of nitrogen fertilisation in Finland. Helsinki. Ministry of the Environment (HAPRO). 64 p. (In Finnish).

KTM (1988). Ministry of Trade and Industry. National total emissions from energy production. Energian-tuotannon kokonaispäästöt Suomessa. KTM. Energiaosasto. D:162.1988 (In Finnish)

Lamberg Heikki (2018) Personal communication Heikki Lamberg, University of Eastern Finland, August 2018.

LIPASTO (2015). Calculation system for traffic exhaust emissions and energy consumption in Finland. http://lipasto.vtt.fi/index.htm

Louhelainen, K., Vilhunen, P., Kangas, J. and Terho E.O. (1987) Dust exposure in piggeries. European Journal of Repiratory Deseases. Vol. 71. p. 80-90

Melanen, M., Ekqvist, M., Mukherjee, A.B., Aunela-Tapola, L., Verta, M. and Salmikangas, T. (1999). Heavy metal emissions in Finland in the 1990's. Suomen ympäristö 329. 92 p. (In Finnish)

MEE, 2012. Study on energy use of waste and emission trading in Finland. Ministry of Employment and Economy. Pöyry Management Consulting. (In Finnish)

MET (2013). Activity data for production rates. Federation of Finnish Metal. Engineering and Electronical Industries. URL: http://www.met.fi/

Miljöstyrelsen (2000). Substance Flow Analysis for Dioxins in Denmark. Environmental Project no 570 2000. Miljöstyrelsen

Ministry of the Environment (2002). Air Pollution Control Programme 2010 . The Finnish National Programme for the implementation of Directive 2001/81/EC. approved by the Government on September 26. 2002. 39 p. Available electronically (in Finnish) at http://www.environment.fi. please search the site using keyword SY588

Monni, S. & Syri, S., Savolainen, I. (2003). Uncertainties in the Finnish greenhouse gas emission inventory. Environmental Science & Policy. Vol. 7 (2004) NO:2. 87-98.

Monni, S (2004). Uncertainties in the Finnish 2002 Greenhouse Gas Emission Inventory. VTT. Espoo. 31 p. + app. 18 p. VTT Working Papers 5.
http://www.vtt.fi/inf/pdf/workingpapers/2004/W5.pdf

Mäkelä, K., Laurikko, J. and Kanner, H. (2002). Road traffic exhaust gas emissions in Finland. LIISA 2001.1 calculation model. Technical Research Centre of Finland. VTT Research Notes 2177. (In Finnish).

Mäkelä, K., Laurikko, J. and Kanner, H. (2003). Road traffic exhaust gas emissions in Finland. LIISA 2002 calculation model. Technical Research Centre of Finland. VTT Research Notes 1377. (In Finnish)

Mäkelä, K. (2012). VTT. Gasoline evaporation from vehicles. Personal communication.

Norwegian Emission Inventory (2005). Documentation of methodologies for estimating emissions of greenhouse gases and long-range transboundary air pollutants. Rapport 2005/28. ISBN 82-537-6860-5. 159 p.

NPI (1999). NPI Industry Handbooks. National Pollutant Inventory. Environment Australia. November 1999. http://www.npi.gov.au/

Nuutinen. J.. Yli-Pirilä. P.. Hytönen. K. and Kärtevä. J. (2007) Turvetuotannon pöly- ja melupäästöt sekä vaikutukset lähialueen ilmanlaatuun (only in Finnish). Association of Finnish Peat Industries 2007

OSPAR (1999). Oslo and Paris Convention for the protection of the marine environment of the North -East Atlantic. Draft Harp-Haz Guidance on Quantification and Reporting of Polycyclic Aromatic Hydrocarbons (PAH).

Pacyna, J.M.,. Breivik, K., Münch, J. and Fudala J. (2003). European atmospheric emissions of selected persistent organic pollutants. 1970-1995. Atmospheric Environment 37

Paulig Ltd (2005) Environmental report 2004.

Pellikka T. (2019) Personal communication Tuula Pellikka VTT, February 2019

Pipatti, R., Tuhkanen, S., Mälkiä, P. and Pietilä, R. (2000). Agricultural greenhouse gas emissions and abatement options and costs in Finland. VTT Publications 841. 72 p. Technical Research Centre of Finland. (In Finnish).

Pohjola, V., Hahkala, M. and Häsänen, E. (1983). Report on emissions from coal. peat and oil combustion processes. VTT Technical Research Centre in Finland. Research Notes 231. Espoo 1983. 139 p. (In Finnish)

Posch. M. (2006) A programme for displaying data on European maps – User Manual.

Rekolainen, S., Pitkänen. H., Bleeker. A. and Felix. S. (1995). Nitrogen and phosphorus fluxes from Finnish agricultural areas to the Baltic Sea. Nordic Hydrology 26: 55 B 72.

RT, (2013). Information on production rates. Confederation of Finnish Construction Industries. Information on the website URL: http://www.rakennusteollisuusrt.fi/ and personal communication.

Ruuskanen, J. (2000). Environmental protection technology for reducing dioxine emissions in the 1990's. Dioksiineja vähentävät ympäristönsuojelukeinot 1990-luvulla ja uudet mahdollisuudet. Ympäristö- ja terveyslehti 3:2000. (In Finnish)

Saarinen, K.. Lammi. R.. Silvo. K. and Hietamäki. M. (2004) Emission data production – Forest Industries. 73 p. Website at www.ymparisto.fi > Yritykset ja yhteisöt > Päästöt > Päästörekisterit > Päästötiedon tuottaminen > Aineistoa päästöjen määrittämisen tueksi (In Finnish)

Saarinen, K (ed (2004) Emission data production – Energy Industries. Website at www.ymparisto.fi > Yritykset ja yhteisöt > Päästöt > Päästörekisterit > Päästötiedon tuottaminen > Aineistoa päästöjen määrittämisen tueksi (In Finnish)

SEPA1996. Alternatives to persistent organic pollutants. Rapport från kemikalieinspektionen. 4/96. Swedish Environment Protection Agency. SEPA.

Seppänen, H. & Matinlassi, T. (1998). Environmental care programs at Finnish farms 1995 B 1997. Maaseutukeskusten liitto (Rural Advisory Centres). 19 p. (In Finnish).

Statistics Finland (2014). Preliminary information on 2012 data from Statistics Finland.

Statistics Finland (1995). Wastes from Manufacturing and Related Industries 1992. Official Statistics of Finland. Environment 1995 (7). 162 p.

Statistic Finland (2009) Greenhouse gas emissions in Finland 1990-2007; National Inventory Report to the European Union

Suoheimo, P, Grönroos, J., Karvosenoja, N., Petäjä, J., Saarinen, K., Savolahti, M., Silvo, K (2015). Impacts of the implementation of the Revision of National Emission Ceilings Directive and the Proposed Medium Combustion Plants Directive in Finland. Reports of the Finnish Environment Institute 6/2015. ,https://helda.helsinki.fi/bitstream/handle/10138/153981/SYKEra_6_2015.pdf?sequence=3 78 p. In Finnish.

SYKE, (2001). Expert estimation based on UNEP 1999.

SYKE, (2007a). Expert estimation based on Aittola (1996) and Joas (2006).

Takai, H., Pedersen, S., Johnsen. O., Metz,J. H.M., Groot Koerkamp, P.W.G.,Uenk. G.H.. Phillips. V.R.. Holden. M.R.. Sneath. R.W.. Short.. J.L.. White. R.P.. Hartung. J.. Seedorf. J.. Schröder, M., Linkert, K.H. and Wathes, C.M. (1998) Concentrations and emissions of airborne dust in livestock buildings in Northern Europe. Journal of Agricultural Engineering Research. Vol 70. p. 59-77

The Federation of Finnish Technology Industries (2014) Activity data for production rates. Technology Industries of Finland. URL: http://www.teknologiateollisuus.fi

TIKE (2014) Yearbook of Farm Statistics 2013. Information Center of the Ministry of Agriculture and Forestry. URL: http://tike.mmm.fi/

TNO (2002). The Co-ordinated European Programme on Particulate Matter Emission Inventories. Projections and Guidance (CEPMEIP). http://www.air.sk/tno/cepmeip/

TNO (1995). TNO-Report TNO-MEP - 95/247: Technical paper to the OSPARCOM-HELCOM-UNECE emission Inventory of Heavy Metals and POP.

Toda, E. (2005). POPs and heavy metals emission inventory of Japan. TFEIP & ES-PREME Workshop on "Heavy Metals and POPs Emissions. Inventories and Projections". 18-19 October 2005. Rovaniemi. Finland.

Tsupari, E., Tormonen, K., Monni,S., Vahlman, T., Kolsi, A. and Linna,V. (2006). Emission factors for nitrous oxide (N2O) and methane (CH4) from Finnish power and heating plants and small-scale combustion. VTT. Espoo. 94 s. + liitt. 7 s. VTT Working Papers : 43
ISBN 951-38-6595-9

UBA (1998). Umwelt Bundesamt. Investigation of emissions and abatement measures for persistent organic pollutants in the FRG. research report 295 44 365. UBA-*FB 98-115/e. 75/98

UNEP (1999). United Nations Environment Programme. Dioxin and furan inventories. National and regional emissions of PCDD/PCDF. May 1999

UNEP (2005) Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases. 2nd editioin. February 2005

USEPA (1997). United States Environmental Protection Agency. Office of Air Quality Planning And Standards. Locating and Estimating Air Emissions from Sources of Dioxins and Furans. USEPA. May 1997.

USEPA (1998). Locating and Estimating Air Emissions from Sources of Polycyclic Organic Matter (EPA-454/R-98-014) July 1998

Westerlund.. K-G. (2001) Metal emissions from Stockholm Traffics Wear of Brake Linings; Reports from SLB-analys. 2:2001; Environment and Health Protection Administration in Stockholm: Stockholm 2001