Ympäristöministeriö
Miljöministeriet
Ministry of the Environment

Date
8 September 2015
Dnro: YM/442014

Mr. Marco Keiner
Director
Environmental Division
United Nations Ecenomic Commission of Europe

Dear Mr. Marco Keiner

Finland has submitted its adjustment application concerning its ammonia emissions on the13th of March 2015. The application is based on Decisions 2012/3, 2012/12 and 2014/1 by the Executive Body to the Convention on Long-range Transboundary Air Pollution (CLRTAP). Based on above mentioned Decisions Executive Body has also nominated an expert review team (ERT) to make a detailed analysis of the Finnish adjustment application.

Finland appreciates the effort made by the Expert Review Team on adjustments related to the Finnish ammonia emission inventory. In its review report (CEIP/Adjustment RR/2015/Finland 20/072015) the expert team comes to the conclusion that the adjustment application for ammonia emissions from stationary combustion and road transport fulfills the criteria of emission adjustment and are recommended to be adjusted. However, the adjustment application for ammonia emissions from manure management does not fulfill the adjustment criteria and is recommended to be rejected. The recommendations are dealt with in the next EMEP Steering Body meeting on the 14th to 18 of September 2015.

Finland disagrees with the assessment and conclusions of the ERT related to paragraphs 34-35 and 43 of the review report. Detailed arguments are expressed in the annex of this letter.

Yours sincerely,

Deputy Director General,
Senior Environmental Adviser
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Jarmo Muurman

Annex 1 Disagreement by Finland related to the report on review of the 2015 adjustment application on ammonia emissions from manure management (CEIP/Adjustment RR/2015/Finland 20/072015)

Annex 2 Finnish calculations for nitrogen excretion of farm animals since 1999

Annex 1

DISAGREEMENT BY FINLAND RELATED TO THE REPORT ON REVIEW OF THE 2015 ADJUSTMENT APPLICATION ON NH_3 EMISSIONS FROM MANURE MANAGEMENT (CEIP/Adjustment RR/2015/Finland 20/072015)

Finland appreciates the effort by the Expert Review Team on Adjustments to have considered the adjustment application on ammonia emissions inventory from Manure Management and thanks the ERT for preparing the review document. However, Finland disagrees with the assessment and conclusions of the ERT related to paragraphs 34-35 and 43 of the review report.

Related text from the Review Report is copied below and the disagreement by Finland is presented from page 2.

(Text from CEIP/Adjustment RR/2015/Finland 20/072015)

2.4 Manure Management 3B (NH_3)

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

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.

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.

Table (Table 3 in the Review Report): 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**

DISAGREEMENT BY FINLAND:

NOTEs on differences in the Guidebook versions 2014 and 1999:

Animal type specific ammonia emission factor (EF; kg NH_3/animal(place)/yr) is based on the following components:
- animal type specific nitrogen excretion rates
- manure management data, incl. use of abatement measures
- **ammonia volatilization rates (unabated emission rates)**
- emission reduction potentials of the abatement measures
- in Finland also: temperature correction factors.

There has been a change in the terminology between the Guidebook versions: in the EMEP/EEA emission inventory guidebook 2013 (update July 2014), the **term *emission factor (EF)* is used in two ways: (a) referring to animal type specific emission factor and (b) also referring to unabated ammonia emission rates (volatilization rates)**. However, in the old version of the Emission inventory Guidebook (1999), only the term ***volatilization rate*** was used for unabated emission rates.

It is important to understand exactly how the term EF is used in each context.
In Finland's adjustment application, the term 'emission factor' is used for the animal type specific ammonia emission rates per year, not for volatilization rates.

FINLAND CONSIDERS THAT

(1) Nitrogen excretion is an integral part of an animal type specific emission factor (EF) and should not be considered as activity data, and

(2) Scientific understanding and knowledge on nitrogen excretion rates and the development of the rates has considerably increased since 1999.

In more detail:

(1) Nitrogen excretion is an integral part of an animal type specific ammonia emission factor and should not be considered as activity data

1.1 In Finland, ammonia emissions from livestock are calculated multiplying animal numbers by animal type specific emission factors.
Emission factors are obtained from the calculation system using a mass-flow approach, and are based on:
- nitrogen excretion data (national data)
- manure management data (incl. use of mitigation measures; national data)
- volatilization rates (i.e. unabated emission rates; default values)
- emission reduction potentials of the mitigation measures (default values: Guidance from the UNECE Task Force on Reactive Nitrogen, Bittman et al. 2014)
- temperature correction factors (due to the northern climate; national estimates)

1.2 In the Guidebook, N-excretion rate is considered as an integral part of an animal type specific ammonia emission factor. Other major components of the EF are NH_3 volatilization rates, efficiencies of the abatement measures, and manure management data:
- **The text in EMEP/EEA Emission Inventory Guidebook 2013 updated July 2014, chapter 3.2.2 Default emission factors, states:**
  "Ammonia
  The default Tier 1 EFs for NH_3 have been calculated using the Tier 2 default NH_3-N EFs for each stage of manure management, default N excretion data and default data on proportions of TAN in excreta and, where appropriate, default data on the length of the grazing period."
- **The text in EMEP/EEA Emission Inventory Guidebook, September 1999 edition, Chapter Simpler Methodology, 4.1 Ammonia, states:**
  "The simpler approach for estimating ammonia emissions from animal husbandry is to use an

average emission factor per animal for each class of animal and to multiply this factor by the number of animals counted in the annual agricultural census. Table 4.1 presents the recommended ammonia emission factors for the different classes of animals. The ammonia emission factors are calculated for the average European farming situation, starting with an average nitrogen excretion per animal and using a volatilization percentage for ammonia losses in the housing and also volatilization factors for the remaining nitrogen entering the storage outside the building and for the nitrogen available for landspreading."

1.3 The nitrogen excretion value (kg N/animal/yr) is a *calculational* value. It is not a statistical value in the way e.g. animal numbers and manure management data are. However, the data needed for calculation of nitrogen excretion on animal feeding and production levels can be considered as activity data.

1.4 Because nitrogen excretion is calculational, different calculation methods can be used to quantify nitrogen excretion. Due to increased scientific understanding, calculation methods change and become more accurate, leading to changes in nitrogen excretion values (see point 2 "Scientific understanding" below).

Nitrogen excretion has, however, been considered as activity data in the EMEP EEA Emission Inventory Guidebook 2013 (Chapters 4.4 and 4.5.2). However, in IPCC 2006 Guidelines, N-excretion is not considered as activity data: it is under 10.5.2 "Choice of emission factors" in Chapter 10.5 (N_2O EMISSIONS FROM MANURE MANAGEMENT). In IPCC 1996 Revised Guidelines, N excretion has neither been dealt with as a activity data nor as a component of emission factor. There is a clear disagreement between the EMEP and IPCC Guidelines which becomes problematic as the EMEP EEA Guidelines refer to the IPCC Guidelines, for instance in Chapter 3.3 Tier 2 technology-specific approach; 3.3.1 Algorithm for ammonia and nitric oxide, as follows: "Step 2 is the calculation of the total annual excretion of N by the animals (Nex; kg AAP^{-1} a^{-1}). Many countries have detailed procedures to derive N excretion rates for different livestock categories. If these are not available, the method described in IPCC (2006), chapter 10 (equations 10.32 and 10.33), should be used as guidance, where Nex is the same as Nex(T). For convenience, default values are given in Table 3.5 below."

It is considered good practice to have consistency of inventories reported under the UNFCCC and the UNECE CLRTAP, therefore principal disagreements in the methodological guidance between the two conventions should not exist.

(2) Scientific understanding and knowledge on nitrogen excretion rates and the development of the rates has considerably increased since 1999.

In the 1990's there were deficiencies in knowledge related to the animal specific nitrogen excretion rates. The Finnish experts also considered that nitrogen excretion values do not increase but rather decrease due to the improvements in protein use efficiency in near future, which currently is regarded as a defective assessment.

2.1 Due to increased scientific understanding, calculation methods to quantify nitrogen excretion have changed and become more accurate (see Annex to this paper). In Finland, this increase of knowledge has led to increase in ammonia emission estimates.

2.2 In the 1990's there were no standardized methods to calculate nutrient excretion rates per animal. During the 2000's knowledge on nitrogen excretion has increased significantly due to improved methods.

2.3 In Finland the methodologies used to estimate nitrogen excretion were deficient at the end of 1990's, when the first projections for agricultural ammonia emissions were conducted and were used as a basis for the emission reduction targets.

2.4 The Finnish experts did not see then that the deficient information used in estimation of emissions was used to set emission reduction targets with an impact for several decades ahead.

2.5 In the emission estimates made in the end of 1990's, it was suggested that protein use efficiency will increase in near future due to:

- the changes in forage crops fertilization recommendations and levels -> lower nitrogen fertilization -> lower crude protein contend in forage, and

- Introducing diet formulation system based on metabolizable protein (MP) content instead of digestible crude protein (CP) content, for lactating dairy cows, in the middle of 1990's.
- introducing synthetic amino acids in pigs and poultry feeding.

2.6 Despite the increased protein use efficiency, absolute N excretion rates did not decrease in parallel because of the increased productivity of the animals.

As the guidance in the international conventions' guidebooks do not strongly guide using best up-to-date information on nitrogen excretion, the countries are rather free to use the most suitable N excretion factors, which brings different countries in unequal situations.

The guidance to calculate time series in EMEP EEA Guidebook 2013 is rather weak - should N excretion values be kept constant or not: "Developing a consistent time series of emission estimates for this source category requires, at a minimum, the collection of an internally consistent time series of livestock population statistics. General guidance on the development of a consistent time series is addressed in General Guidance Chapter 4, Time series consistency, of the Guidebook. Under current IPCC guidance (IPCC, 2006) the other two activity data sets required for this source category (i.e. N excretion rates and manure management system usage data), as well as the manure management EF, will be kept constant for the entire time series. However, there may be evidence to modify these values over time. For example, milk yield and live weight gain may have increased with time, farmers may alter livestock feeding practices which could affect N excretion rates. Furthermore...") - Based on this it can be stated that the Guidebook does not strongly guide using up-to-date correct N excretion information, which is confusing, because N excretion are the basis of calculation of ammonia emissions.

Luke
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ANNEX

8.9.2015

Finnish calculations for nitrogen excretion of farm animals since 1999

Annual nitrogen excretion calculation began in MTT Agrifood Research Finland, presently Natural Resources Institute Finland Luke, in 2005. Calculations were needed for annual greenhouse gas emissions inventory. In GHG emission inventories before 2005, IPCC default values for nitrogen excretion were used. In NH_3 emission inventories, national data on nitrogen excretion originating from the end of 1990's and obtained from different unpublished sources were used.

Calculation methods for nitrogen excretion have been established for the each farm animal category, i.e. cattle, pigs, poultry and other animal groups. They are all based on the mass balance approach, in principle: Excretion of N (kg/year) = Intake of N (kg/year) - Retention of N (kg/year).

Estimation of nitrogen intake requires information about the yearly feed intake per animal and its protein content. Calculation of nitrogen retention needs information about animal growth (whole body), reproduction, and production of milk/eggs/wool (kg animal product). Furthermore, the composition of growth, reproduction, milk, eggs and wool are essential for exact calculations. Growth composition is the most variable and thus the most demanding information to estimate.

Moreover, further calculation is needed for those animal groups whose lifespan is less than a year.
The end-use of data determines what the excretion calculations are like. If they are used for national summaries, the excretion value should be divided by the breeding time and then multiplied by 365 in order to receive yearly values. These values are analogous with the animal numbers of Finnish agricultural statistics. If it is known how many breeding groups are harvested per animal place, the excretion value should be multiplied by these. It is very crucial that these two calculation methods are not confused. No information has been available whether the calculation methods for nitrogen excretion in 1998-2005 have been precise with this fact.

Moreover, present calculations use also Finnish milk, meat and egg production statistics where average slaughter weights, milk production per cow and egg production are available. Other data sources will not necessarily give representative results for national use. In the calculations conducted before 2005, the default production levels are often not reported.

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