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Review of the 2014 Adjustment Application by Denmark

Expert review team report for the EMEP Steering Body

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Executive Summary

1. As mandated by Decision 2012/3 (ECE/EB.AIR/111/Add.1) of the Executive Body of the CLRTAP the nominated Expert Review Team undertook a detailed review of the adjustment application submitted by Denmark. The review was undertaken on behalf of the EMEP Steering Body and following the guidance published in the Annex to decision 2012/12 (ECE/EB.AIR/113/Add.1).
2. Each sector of the application was reviewed by two independent sectoral experts during May and June 2014. The findings were discussed at the meeting held from 23-27 June 2014 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

Reasons for adjustment application (Decision 2012/3, para 6)	Synthetic Fertiliser 4D1a: Significantly different EFs Agriculture, Other 4G: New sources
Pollutants for which adjustment is applied for	NH ₃
Year(s) for which adjustment is applied	2010, 2011, 2012
Date of notification of adjustment to the Secretariat	4 December 2013
Date of submission of supporting documentation	19 April 2014

3. The Expert Review Team has reviewed and evaluated the documents submitted by Denmark.
4. **4.D.1.a Synthetic Fertilizers, NH₃:** Default NH₃ EFs provided in the EMEP/EEA Emissions Inventory Guidebook for emission category 4.D.1.a have undergone significant changes between the time when emission reduction commitments were set, and the year they are to be attained. The use of the revised EFs according to the newest version of the Guidebook (EMEP/EEA Emission Inventory Guidebook 2013) resulted in considerably higher estimates as the new EFs are (unlike the EFs in the previous version of the Guidebook) not temperature dependent. The ERT therefore recommends that the EMEP Steering Body **ACCEPT** the adjustment submitted for this sector.
5. **4.G Emissions from Growing Crops, NH₃:** Denmark identified emission source categories for NH₃ which were not accounted for at the time when emission reduction commitments were set. This source category was mentioned for the first time in the EMEP/EEA Guidebook 2002. The EMEP/EEA Guidebook 2013 indicates that data are currently considered too uncertain to establish separate default EFs for this source. The RAINS model did not consider this emission source at the time when the NEC commitment was set and GAINS still does not consider this emission source. However the source is currently included in the Danish national emissions inventory estimates. The ERT therefore recommends that the EMEP Steering Body **ACCEPT** the adjustment submitted for this sector.
6. The following table provides a summary of the inventory adjustments that are accepted by the ERT.

Table ES1 Aggregated Sum of Accepted Inventory Adjustments (ktonnes)

Pollutant	Unit	2010	2011	2012	2013	2014	2015	2016
NH ₃	-kt	-9.08	-8.84	-8.70	-	-	-	-

Table ES2 Impact of the Accepted Inventory Adjustments on National Emissions

Poll.	GP Emission Commitment (kt)	2010 Emission reported in 2014 (kt)	2010 Emission (adjusted) (kt)	Difference (%)	2012 Emission reported in 2014	2012 Emissions (adjusted) (kt)	Difference (%)
NH ₃	69	78.7	69.6	-12%	76.2	67.5	-11%

7. Denmark's national total emissions will be below the Gothenburg Protocol ceilings from 2011 onwards, if the proposed adjustments are accepted.

Content

1	Introduction and Context	6
	Figure 1: Flow Diagram/Decision Tree for the Review of Adjustment Applications.....	7
2	Review of Submitted Adjustments	8
2.1	Assessment of Formal Criteria.....	8
2.2	Agriculture - Synthetic N-fertilisers 4D1a (NH ₃)	8
2.2.1	Assessment of Consistency with Requirements of Decision 2012/3	8
2.2.2	Assessment of the Quantification of the Impact of the Revision	9
2.3	Agriculture Other - 4G Emissions from Growing Crops (NH ₃)	9
2.3.1	Assessment of Consistency with Requirements of Decision 2012/3	9
2.3.2	Assessment of the Quantification of the Impact of the Revision	10
3	Conclusions and Recommendations	10
4	Information Provided by the Party.....	12
5	References	13

1 Introduction and Context

8. 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 targets¹. 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.

9. 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.

10. As mandated by Decision 2012/12 of the Executive Body of the CLRTAP, applications for adjustments that are submitted by Parties are subject to an expert review². 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](#)³ that Parties have nominated to the CEIP roster of experts.

11. 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.

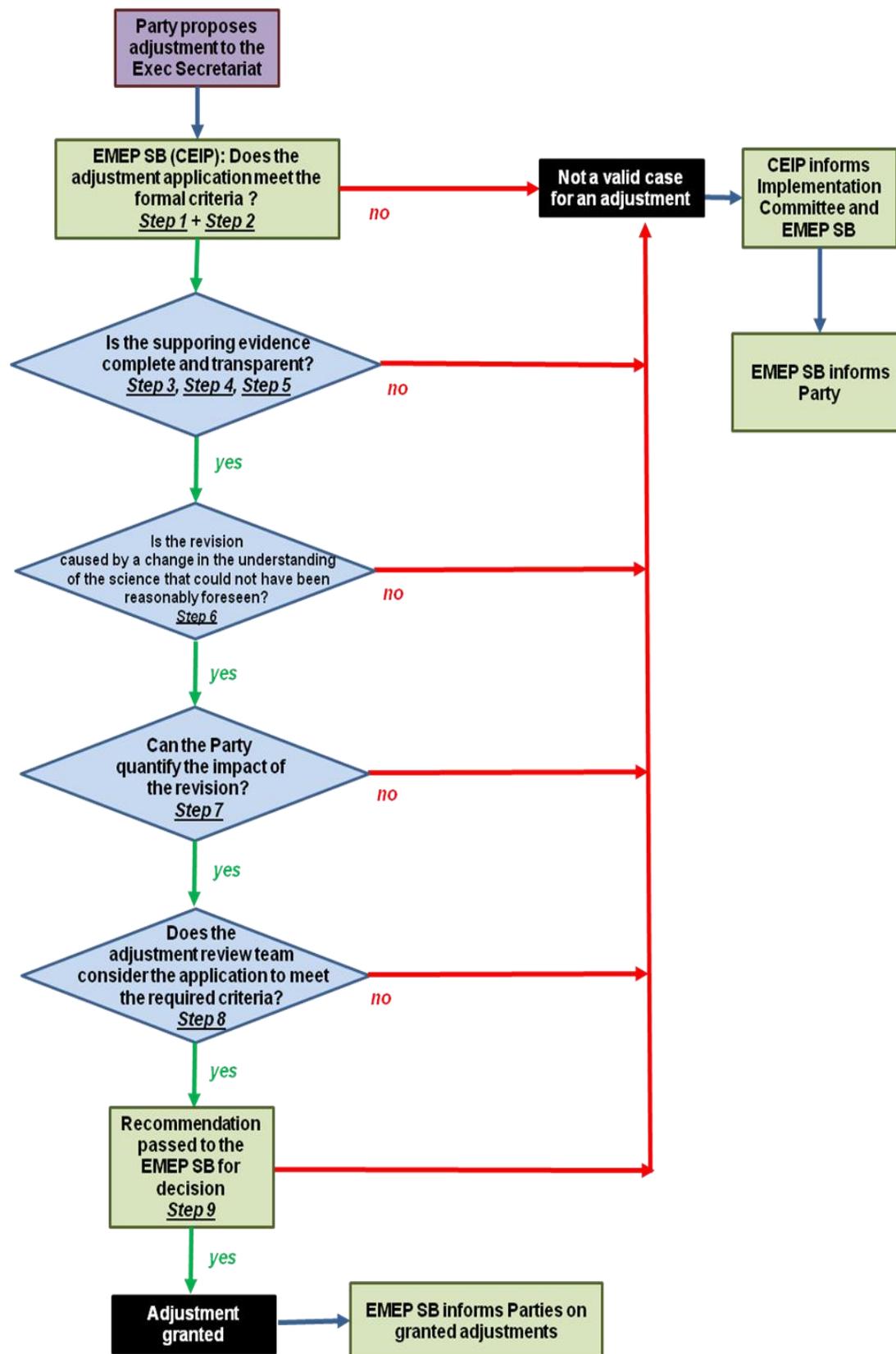
12. The flow diagram below outlines the different stages of the technical review. The following sections of this report are structured in the same way, and describe in detail the findings of the ERT at each of the decision gates in the process.

¹ Throughout this report the term "emission reduction commitments" is used. However, the term "emission ceilings" is equally applicable.

² 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 decision 2012/3 and the further guidance in decision 2012/12.

³ http://www.ceip.at/fileadmin/inhalte/emep/pdf/2014/0_Roster_2014.pdf

Figure 1: Flow Diagram/Decision Tree for the Review of Adjustment Applications



2 Review of Submitted Adjustments

2.1 Assessment of Formal Criteria

13. Denmark notified the Convention Secretariat through the Executive Secretary of its intention to apply for a new adjustment on 15/02/2014 and thus before the legal deadline of 15 February. All supporting information requested by Decision 2012/12 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 ERT. Section 4 lists the documentation provided by the Party.

14. Denmark submitted an application for emissions adjustments to NH₃ for 2010-2012 for the following sectors:

- a) Synthetic N-fertilizers 4D1a
- b) Agriculture, Other (emissions from growing crops) 4G

15. Denmark does not comply with its emission reduction commitments for NH₃ listed in Annex II of the 1999 Gothenburg Protocol (paragraph 1 of Decision 2012/3).

16. Denmark provided evidence of to what extent the adjustment to its emission inventory reduces the exceedance and possibly brings the Party in compliance.

17. Denmark did include information on when it will meet its emission ceiling for NH₃ in the supporting documentation.

2.2 Agriculture - Synthetic N-fertilisers 4D1a (NH₃)

2.2.1 Assessment of Consistency with Requirements of Decision 2012/3

18. The Party made an application based on significant changes to emission factors (EFs).

19. The adjustment application requires the provision of specific supporting information to demonstrate compliance with specific criteria (Decision 2012/3, para. 6a-c). The ERT reviewed the supporting documentation (see Annex 1) with regard to these criteria and concluded that emission factors used to determine emission levels from synthetic N-fertilisers 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.

20. 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.

21. The ERT reviewed the documentation that was provided to support the application (listed in Appendix 1).

22. The supporting information provided by the Party on the revisions made to emission factors was considered to be complete.

23. In the estimation of NH₃ emissions from synthetic N-fertilizers Denmark follows the technology-specific approach. In the 2014 submission, Denmark updated its methodology by using revised default EFs provided in the new EMEP/EEA air pollutant emission inventory guidebook published in August 2013 on the EEA homepage. The application of new, considerable higher default EFs resulted in significant higher emissions from source category 4.D.1.a.

24. Denmark documented activity data (AD), EFs and resulting emissions in both the IIR and the adjustment proposal in detail in a transparent way. Denmark was able to demonstrate that increased emissions are not the result of higher activity data or changed agriculture practices, but are solely due to the revision of EFs. This is especially the case for northern countries, because the new default EFs from the EMEP/EEA Emissions Inventory Guidebook are not temperature dependent (unlike the EFs from the previous version of the Guidebook). These new higher EFs were not known at the time of setting the reduction commitments and the significant change of default EFs could not have been reasonably foreseen. RAINS calculations were based on lower EFs as outlined in previous versions of the Guidebook.

25. The ERT is therefore of the opinion that the adjustment (calculated by using the default NH₃ EFs provided in the 2009 edition of the EMEP/EEA Guidebook) is an acceptable approach.

2.2.2 Assessment of the Quantification of the Impact of the Revision

26. 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 NH₃ adjustment applications of Denmark in the Synthetic N-fertilisers 4D1a sector.

Table 1: Denmark's NH₃ Adjustment Applications for Synthetic N-fertiliser

Reference number	Pollutant	NFR09	unit	2005	2010	2011	2012
DEN/2014/1a	NH ₃	4.D.1.a	ktonnes			-3.67	-3.42	-3.30

2.3 Agriculture Other - 4G Emissions from Growing Crops (NH₃)

2.3.1 Assessment of Consistency with Requirements of Decision 2012/3

27. The Party made an application based on a new emission source.

28. The adjustment application requires the provision of specific supporting information to demonstrate compliance with specific criteria (Decision 2012/3, para. 6a-c). The ERT reviewed the supporting documentation (see Annex 1) with regard to these criteria and concluded that the new source added to sector 4G was not identified in the guidance (and hence no methodology was available) when emission reduction commitments were set.

29. The ERT reviewed the documentation that was provided to support the application (listed in Appendix 1). The supporting information provided by the Party on the addition of the new source in 4G was considered to be complete.

30. Denmark transparently demonstrated that increased emissions are based on a new emission, and are not the result of changes in agricultural activities causing additional emissions in

Denmark. Furthermore, the ERT confirmed that source was not included in the RAINS model of IIASA nor in Denmark's national inventory.

31. Denmark uses a country specific approach for estimating the emissions from growing crops (EFs are based on a literary survey). The EMEP/EEA Guidebook 2013 acknowledges that emissions of NH₃ from crops are particularly uncertain and probably vary greatly from year to year depending on environmental conditions and harvest. Emissions may be overestimated due to limited experimental work and restricted laboratory measurements. Hence, no default methodologies and EFs are provided in the guidebook. The newest version of GAINS does not consider this emission source.

2.3.2 Assessment of the Quantification of the Impact of the Revision

32. 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 NH₃ adjustment applications of Denmark in sector 4G Emissions from Growing Crops.

Table 2: Denmark's NH₃ Adjustment Applications for Growing Crops

Reference number	Pollutant	NFR09	unit	2005	...	2010	2011	2012
DEN/2014/2a	NH ₃	4G	ktonnes			-5.41	-5.42	-5.40

33. The ERT concludes that the quantification of the impact of this adjustment, as calculated by the Party, on national total emissions uses an appropriate methodology and does not include any calculation errors. Furthermore, the ERT concludes that the information presented by the Party is line with the most up-to-date available guidance from the EMEP/EEA Emissions Inventory Guidebook and the scientific literature.

3 Conclusions and Recommendations

34. The expert review team (ERT) has undertaken a full and thorough assessment of the application for an adjustment of NH₃ emissions inventory that was submitted by Denmark for the following source sectors:

- a. Synthetic N-fertilizers 4D1a
- b. Agriculture Other (Emissions from growing crops) 4G

35. The review of the submitted application followed the guidance provided in the Annex to Decision 2012/12 of the Executive Body of the CLRTAP. The findings of the ERT are described in detail in Section 2 of this report.

36. Table 3 below provides a summary of the adjustment applications received from Denmark, and the subsequent recommendations made by the ERT to the EMEP SB.

Table 3: Recommendations from the ERT to the EMEP SB

Country	Sector	NFRs	Pollutant	Years	ERT Recommendation
Denmark	Agriculture	4D1a	NH ₃	2010 - 2012	Accept
		4G			Accept

37. The ERT 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 the submitted adjustment applications.

38. **4.D.1.a Synthetic Fertilizers, NH₃:** Default NH₃ EFs provided in the EMEP/EEA Emissions Inventory Guidebook for emission category 4.D.1.a have undergone significant changes between the time when emission reduction commitments were set, and the year they are to be attained. The use of the revised EFs according to the newest version of the Guidebook (EMEP/EEA Emission Inventory Guidebook 2013) resulted in considerably higher estimates as the new EFs are (unlike the EFs in the previous version of the Guidebook) not temperature dependent. The ERT therefore recommends that the EMEP Steering Body **ACCEPT** the adjustment submitted for this sector.

39. **4.G Emissions from Growing Crops, NH₃:** Denmark identified emission source categories for NH₃ which were not accounted for at the time when emission reduction commitments were set. This source category was mentioned for the first time in the EMEP/EEA Guidebook 2002. The EMEP/EEA Guidebook 2013 indicates that data are currently considered too uncertain to establish separate default EFs for this source. The RAINS model did not consider this emission source at the time when the NEC commitment was set and GAINS still does not consider this emission source. However the source is currently included in the Danish national emissions inventory estimates. The ERT therefore recommends that the EMEP Steering Body **ACCEPT** the adjustment submitted for this sector.

40. Table 4 below provides a summary of the adjustments recommended for acceptance.

Table 4 Adjustment Applications Recommended by ERT for Acceptance

Reference number	Pollutant	NFR09	unit	2010	2011	2012
DK/2014/1a	NH ₃	4D1a	ktonnes	-3.67	-3.42	-3.30
DK/2014/2a	NH ₃	4G	ktonnes	-5.41	-5.42	-5.40
	NH ₃	TOTAL (Agriculture)	ktonnes	-9.08	-8.84	-8.7

41. Denmark's national total emissions will be below the Gothenburg Protocol ceilings from 2011 onwards, if the proposed adjustments are accepted.

42. The impact of these adjustments on the national emission totals is summarised in Table 5 below.

Table 5: Impact of the Inventory Adjustments on National Emissions

Poll.	GP Emission Commitment (kt)	2010 Emission reported in 2014 (kt)	2010 Emission (adjusted) (kt)	Difference (%)	2012 Emission reported in 2014 (kt)	2012 Emissions (adjusted) (kt)	Difference (%)
NH ₃	69	78.7	69.6	-12%	76.2	67.5	-11%

4 Information Provided by the Party

Table A1 lists the information provided by the Party in its adjustment application. The information provided by Party can be downloaded from CEIP website⁴.

Table 6: Information provided by the Party (as part of the application process)

Filename	Short description of content
Adjustment template,	Excel table with information on activity data , EFs and adjusted emissions
Danish adjustment NH ₃ , pdf	Short description of adjustments
Danish_NH ₃ _adj_proc, pdf	Application letter to the UNECE

⁴ http://www.ceip.at/ms/ceip_home1/ceip_home/adjustments_gp/

5 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

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>

2009 Reporting Guidelines (ECE/EB.AIR/97) for Estimating and Reporting Emission Data under CLRTAP

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