

Final report of the 2012 technical
review of the greenhouse gas emission
inventory of Denmark
to support the determination of annual emission
allocations under Decision 406/2009/EC

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Introduction

Pursuant to Article 3.2 of Decision 406/2009/EC⁽¹⁾ (the 'Effort Sharing Decision' – ESD), the European Commission shall determine the annual emission allocations (maximum allowed greenhouse gas emissions) of Member States for the period from 2013 to 2020 in tonnes of carbon dioxide equivalent (CO₂ eq.), using reviewed and verified emission data.

Complete sets of greenhouse gas (GHG) emission estimates for the reference years (2005, 2008, 2009 and 2010) were submitted by each Member State by the 15th of May, 2012 as part of the 2012 national inventory submission under Decision 280/2004/EC (the 'Monitoring Mechanism Decision' – MMD). These estimates must have been reviewed to allow the determination in 2012 of the annual emission allocations for the period from 2013 to 2020.

The 'Guidelines for the 2012 technical review of greenhouse gas emission inventories to support the determination of Member States' annual emission allocations under Decision 406/2009/EC' were endorsed by the Climate Change Committee on 19 May 2011 and published as a European Commission Staff Working Document on 26 April 2012⁽²⁾. The 2012 greenhouse gas emission inventory of Denmark was reviewed in accordance with these guidelines.

This report presents the findings of the 2012 technical review of the greenhouse gas emission inventory of Denmark to support the determination of annual emission allocations under Decision 406/2009/EC.

Review Objectives

The purpose of the technical review of Member States' GHG inventories is to support the determination of the annual emission allocations by:

- a) ensuring that the European Commission has accurate, reliable and verified information on annual GHG emissions for the years 2005, 2008, 2009 and 2010 to determine the annual emission allocations under Decision 280/2004/EC;
- b) providing the European Commission and its Member States with a consistent, transparent, thorough and comprehensive technical assessment of GHG emissions, with a focus on data for the years 2005, 2008, 2009 and 2010 reported in 2012;
- c) examining, in a facilitative and open manner, the reported inventory information for consistency with the 'Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories', with the 2000 'Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories', and with the requirements of Decision 280/2004/EC (the 'Greenhouse Gas Monitoring Mechanism' Decision)⁽³⁾;

⁽¹⁾ Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020. OJ L 140, 5.06.2009, p. 136.

⁽²⁾ Commission Staff Working Document of 26 April 2012: Guidelines for the 2012 technical review of greenhouse gas emission inventories to support the determination of Member States' annual emission allocations under Decision 406/2009/EC. SWD(2012) 107 final.

⁽³⁾ Decision No 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto protocol. OJ L 140, 5.06.2009, p. 136.

- d) assisting Member States in improving the quality of their GHG inventories.

Review approach and scope

The technical review of the 2012 GHG inventory estimates of Denmark for the years 2005, 2008, 2009 and 2010 was performed by a Technical Expert Review Team (TERT) under service contract 2011/S 234-378130 to the Directorate General for Climate Action of the European Commission. The review was conducted by the following experts: Kristien Aernouts & Tomas Gustafson for Stationary combustion (CRF categories 1.A.1, 1.A.2, 1.A.4, 1.A.5) + Reference approach; Maria Liden & Tinus Pulles for CRF categories 1.A.3 Transport + 1.C International bunkers; Ralph Harthan & John Watterson for CRF category 1.B Fugitive; Anke Herold & IIs Moorkens for CRF categories 2.A Mineral products + 2.B Chemical industry + CRF sector 3 Solvents; Kristina Saarinen & Dusan Vacha for CRF categories 2.C Metal production + 2.D Other production + 2.G Other; Maria Jose Lopez & Karin Kindbom for CRF categories 2.E Production of Halocarbons and SF₆ + 2.F Consumption of Halocarbons and SF₆; Michael Anderl & Steen Gyldenkaerne for CRF categories 4.A Enteric fermentation + 4.B Manure management; Sorin Deaconu & Etienne Mathias for CRF categories 4.C Rice cultivation + 4.D Agricultural soils, 4.E Prescribed burning of savannas, 4.F Field burning of agricultural residues; Juraj Farkas & Celine Gueguen for CRF sector 6 Waste. Ole-Kenneth Nielsen, Suvi Monni, Klaus Radunsky and Tatiana Tugui acted as lead reviewers. The review was coordinated by Bernd Gugele and Justin Goodwin. The TERT acknowledges the support of the EEA review secretariat Martin Adams, Francois Dejean and Melanie Sporer.

This technical review was performed on the basis of GHG emission data and the national inventory report (NIR) officially reported by Member States by the 15th of April, 2012 under the MMD. Resubmissions reported by Member States were taken into account until the 15th of May, consistent with the reporting practice for resubmissions under Decision 280/2004/EC. Emissions from international transport and land use, land-use change and forestry (LULUCF) were not reviewed. The review was performed with a focus on data for the years 2005, 2008, 2009 and 2010, reported in 2012.

The technical review process for GHG inventories comprised three stages, each of which considered different aspects of the inventories in such a way that the purposes described above were achieved by the end of the process. The three stages were:

- Stage 1, completed by 15 April 2012 – initial completeness checks of each Member State GHG inventory (submitted by 15 January and by 15 March);
- Stage 2, completed by 15 April 2012 – initial consistency and comparability checks of each Member State GHG inventory (submitted by 15 January and by 15 March);
- Stage 3, to be completed by the end of August 2012 – detailed *technical review* of each Member State GHG inventory (submitted by 15 May).

The detailed timeline of the review, including a summary of the correspondence with Denmark, is presented in Annex 3.

ESD 2012 technical review conclusions

Table 1. Main conclusions from the TERT

Findings
1. The TERT considers that the GHG emission inventory estimates of Denmark for the years 2005, 2008, 2009 and 2010 submitted in 2012 under the MMD do not include emission overestimates .
2. The TERT did not identify inconsistency issues between the reported GHG emission inventory estimates and verified emission data under the EU ETS.
3. During the course of the technical review, the TERT did receive revised GHG emission inventory estimates from Denmark in response to its draft review report.
4. The TERT considers that it is not necessary to implement any technical correction to the GHG emission inventory estimates and to amend the reported GHG total.
5. As stated beneath Table 1, Denmark accepts the aggregated GHG emission inventory estimates presented in Table 2.
6. The TERT identified non-binding recommendations for improvements of Denmark GHG inventory (see Table 3 in Annex 1).
7. The TERT considers that it received a response from Denmark that was sufficient in order to undertake the review appropriately.

Statement from Denmark on the conclusions of the TERT

Denmark accepts the aggregated GHG emission inventory estimates presented in Table 2 including the revised estimates provided by Denmark and accepted by the TERT. Furthermore, Denmark has noted the non-binding recommendations made by the TERT and will consider these in the inventory improvement plan for the future.

Denmark would also like to acknowledge the excellent work of the TERT. The review has served as a very useful QA of our inventory and as a result of the recommendations the accuracy of our greenhouse gas inventory has been improved.

Table 2. Summary of national totals, including any revised estimates or technical corrections identified during the review

Data / Category	Reference	Status of GHG emission revision or correction	2005 Gg CO ₂ eq.	2008 Gg CO ₂ eq.	2009 Gg CO ₂ eq.	2010 Gg CO ₂ eq.
Total GHG emissions as reported in the 2012 submission under the MMD	2 May 2012, DNM-2012-v1.3		63 740.219	63 554.244	60 682.869	61 065.429
Revised estimates provided by Denmark ⁽⁴⁾						
1.A.3.b, 1.A.2.f & 1.A.4.c, LPG, CO ₂ , CH ₄ , N ₂ O	03 August 2012 DK Error correction concerning LPG use.xlsx	Accepted by the TERT	20.370	11.452	7.389	0.054
4.D.2. Pasture, range and paddock manure, N ₂ O	03 August 2012 DK Error correction concerning N2O from pasture range and paddock.xlsx	Accepted by the TERT	17.763	16.006	15.289	14.861
Total GHG emissions including any accepted revised estimate received from Denmark and/or technical correction as proposed by the TERT			63 778.352	63 581.701	60 705.546	61 080.343
CO₂ emissions from 1.A.3.a Civil aviation	2 May 2012, DNM-2012-v1.3		134.997	161.889	152.954	155.613

Note: National totals exclude emissions from LULUCF and emissions reported under memo items (e.g. international aviation and maritime transport).

⁴ Difference: revised estimates – original estimates. A positive difference indicates an increase compared to reported emissions. A negative difference indicates a decrease compared to reported emissions. For more information on revised estimates, see Annex 1.

Annex 1 – Recommendations, revised estimates and technical corrections

Table 3. Recommendations of the TERT

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁵⁾	Technical correction ⁽⁶⁾
Yes	1.A.3.b., 1.A.2.f & 1.A.4.c, Liquefied petroleum gases (LPGs) 2005, 2008–2009	LPG consumption for road transportation is estimated in the COPERT 4 emission model based on fleet and mileage data. The residual LPG consumption, that is the difference between statistical fuel sold and LPG consumption calculated for road transport, is, however, currently not included in the inventory resulting in an underestimation of emissions. During the review Denmark submitted revised emission data for the years 2005 and 2008 to 2010 following the recommendation of the TERT for the categories 1A2f and 1A4c.	The TERT recommends including these revised estimates in future inventory submissions.	Yes	No
Yes	4.D.2. Pasture, range and paddock manure N ₂ O All years	The activity data in Table 4.Ds1 for Pasture, range and paddock manure is calculated as the total nitrogen excretion minus the ammonia emission, which is based on a national emission factor of 7 %. The TERT understands the intention of the Party to apply a mass	The TERT recommends including these revised estimates in future inventory submissions.	Yes	No

⁵ The GHG emission estimate for this category was revised by Denmark during the technical review.

⁶ The GHG emission estimate for this category is subject to a technical correction proposal by the TERT.

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁵⁾	Technical correction ⁽⁶⁾
		flow approach for nitrogen and to subtract the volatilisation of ammonia for pasture as it is done for manure spreading. However, following all the IPCC guidelines (2000 IPCC Good Practice Guidance (GPG) and Revised 1996 IPCC Guidelines), nitrogen excretion during pasture should not be adjusted by volatilisation if the IPCC default emission factor is used. This assumption remains the same in the 2006 IPCC Guidelines and is even applied for all nitrogen application to soil. Denmark submitted a revised time series 1990-2010 following the recommendation of the TERT.			
No	6.B. Wastewater handling Activity data, DOC All years	The TERT noticed that the production of BOD per capita (DOCst) applied is 18 250 kg BOD/1 000 pers./yr and that this value is also applied to estimate the TOW inlet in WWTPs. The 2000 IPCC GPG is specified as the source of this value in the NIR. However, this value is indicated in the Revised 1996 IPCC Guidelines and has been updated to 60 g/pers./d (21 900 kg BOD/1 000 pers./yr) in the 2000 IPCC GPG (p5.16). Denmark confirmed during the technical review that the value is based on the Revised 1996 IPCC Guidelines and indicated that this value has been verified against national statistics on BOD in the inlet wastewater. Not using the value from the 2000 IPCC GPG leads to an underestimation of emissions.	The TERT encourages Denmark to use national statistics on BOD5 in the inlet wastewater if available. Otherwise, the TERT recommends applying the value proposed in the 2000 IPCC GPG value instead of the one in the Revised 1996 IPCC Guidelines.	No	No
No	6.B. Wastewater	It is indicated in the NIR that CH ₄ generation and	The TERT encourages Denmark to estimate CH ₄	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁵⁾	Technical correction ⁽⁶⁾
	handling CH ₄ recovery All years	<p>combustion efficiency for anaerobic digester is 0.99 according to expert knowledge. During the technical review, the TERT asked for more clarification concerning this reference and the availability of measured data.</p> <p>Denmark indicated that work is ongoing with respect to verifying the reported efficiency by comparing it with statistics from the Danish Energy Agency and that the results will be reported next year.</p>	recovered from WWTPs on the basis of monitored data.		
No	6.B.3.b. N ₂ O from human sewage N ₂ O All years	<p>The methodology applied to estimate N₂O from the population connected to septic tanks is not presented in the NIR. Therefore, it was not clear to the TERT whether human sewage N discharge is considered in the inventory for all collected and uncollected wastewaters.</p> <p>Denmark explained in response to a question raised by the TERT that only national statistics on effluent from scattered houses are included in the inventory as reported yearly by the Danish EPA. Therefore only indirect N₂O emissions from scattered houses are included. In addition, Denmark informed that it is extending its sewerage system these years.</p>	The TERT recommends Denmark to check whether all human sewage nitrogen discharge is considered in the inventory for all collected and uncollected wastewaters.	No	No

Annex 2 – Detailed technical corrections

There are no technical corrections applied to the Denmark's estimates of emissions.

Annex 3 – Checks and tests completed

The initial checks (stage 1 and 2 checks), which cover the national inventory submissions, informed the stage 3 technical review with a view to:

- a) assess whether all emission source categories and gases are reported as required under Decision 280/2004/EC;
- b) assess whether sub-category sums are consistent with sectoral and national totals;
- c) assess whether emission data time series are consistent;
- d) assess whether implied emission factors across Member States are comparable;
- e) assess the use of 'Not Estimated' notation keys where IPCC Tier 1 methodologies exist;
- f) compare with the previous year's inventory submission of the Member State;
- g) limited sector-specific checks performed by ETC/ACM sector experts.

The EU initial checks were extended in 2012 to address additional elements needed for the 2012 technical review. The extended checks included:

- a) a detailed analysis of recalculations performed for the 2012 inventory submissions, in particular if recalculations are based on methodological changes.
- b) a comparison of the verified emissions reported under the EU ETS with the greenhouse gas emissions reported in GHG inventories. The verified emissions under the EU ETS are not fully comparable with the emissions reported in the GHG inventories. This comparison may only highlight areas where some Member States' data and trends deviate considerably from those of other Member States.
- c) a comparison of the results from Eurostat's reference and sectoral approach, based on energy data reported under Regulation (EC) No 1099/2008, with the Member States' reference and sectoral approach.

The specific activities of the 2012 technical review included:

- a) an analysis of the Member States' implementation of recommendations related to improving inventory estimates in accordance with the Revised 1996 IPCC Guidelines and the 2000 IPCC good practice guidance (GPG) as listed in the UNFCCC Annual Review Reports from the 2010 and 2011 UNFCCC review processes. Where UNFCCC recommendations have not been implemented, the analysis included an assessment as to whether the Member State provided adequate justification for this;
- b) an assessment of the time series consistency of the greenhouse gas emissions estimates, with a particular focus on the 2005 and 2008-2010 estimates;
- c) checking whether problems identified for one Member State in UNFCCC reviews might also have been a problem for other Member States (whether identified by the UNFCCC expert review team or not);
- d) an assessment of any recalculations made by a Member State in its inventory since the previous submission, and an assessment as to whether these were transparently reported and were in accordance with IPCC good practice guidance;
- e) a follow-up on any outstanding findings from existing and extended stage 1 and 2 checks;
- f) the inclusion of revised estimates as provided by Member States in response to the review, and as accepted by the TERT during the review;

- g) the provision of an estimate for any 'technical correction' to emission estimates reported by a Member State where it is believed that emissions reported by the Member State are overestimated, and a statement of the significance of these 'technical corrections' in comparison to the overall reported inventory estimates;
- h) the provision of recommendations where problems have been identified that do not require technical corrections.

Material from previous UNFCCC inventory reviews was used to inform the technical review, including the previous years' Annual Review Reports, which provide an indication of the overall quality of the inventory.

The TERT used additional technical information in the review process, such as EU ETS data, information from Eurostat, and F-gas data from the 'Preparatory study for a review of Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases (⁷), as well as data from other international organisations.

⁷ Service contract 070307/2009/548866/SER/C4 to the European Commission

Annex 4 – Correspondence references

Date	Reference
2 May 2012	Final NIR submission under the MMD
10 May 2012	Final CRF submission under the MMD, version DNM-2012-v1.3
21, 23 May 2012	Initial questions raised by the TERT during the desk review
30 May 2012	Response from Denmark to TERT questions
13 July 2012	Draft review report from TERT to Denmark
3 August 2012	Response from Denmark to draft review report
13 August 2012	Draft final review report from TERT to Denmark
15 August 2012	Response and additional information from Denmark to final review report
17 August 2012	Final review report to European Commission