

Final report of the 2012 technical
review of the greenhouse gas emission
inventory of Luxembourg
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 Luxembourg was reviewed in accordance with these guidelines.

This report presents the findings of the 2012 technical review of the greenhouse gas emission inventory of Luxembourg 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 Luxembourg 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 & Ils 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 Luxembourg, is presented in Annex 4.

ESD 2012 technical review conclusions

Table 1. Main conclusions from the TERT

Findings
1. The TERT considers that the GHG emission inventory estimates of Luxembourg for the years 2005, 2008, 2009 and 2010 submitted in 2012 under the MMD included 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 received revised GHG emission inventory estimates from Luxembourg in response to its initial findings (see Table 2).
4. The TERT considers that the aggregated revised GHG emission inventory estimates from Luxembourg for the years 2005, 2008, 2009 and 2010 do not include emission overestimates .
5. The TERT therefore suggests that it is not necessary to implement a technical correction to the GHG emission inventory estimates and to amend the reported GHG total (see Table 2).
6. As stated beneath Table 1, Luxembourg accepts the aggregated GHG emission inventory estimates presented in Table 2 including revised estimates received from Luxembourg and accepted by the TERT.
7. The TERT identified non-binding recommendations for improvements of Luxembourg's GHG inventory (see Table 3 in Annex 1).
8. The TERT considers that it received a response from Luxembourg that was sufficient in order to undertake the review appropriately.
9. The TERT notes that Luxembourg did not submit a National Inventory Report on time, which impeded the work of the TERT during the desk review phase.

Statement from Luxembourg on the conclusions of the TERT

Luxembourg welcomes that the TERT accepted Luxembourg's comments and revised estimates to the draft review report. Thus, Luxembourg accepts the proposed changes to the final version of the review report as proposed by the TERT on August 13th, 2012, in particular the revised estimates as shown in Table 2 of this report.

Finally, Luxembourg would like to thank the TERT and EEA ESD Review Secretariat for their highly professional acting and communication during this review.

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	2008	2009	2010
			GgCO ₂ eq.	GgCO ₂ eq.	GgCO ₂ eq.	GgCO ₂ eq.
Total GHG emissions as reported in the 2012 submission under the MMD	15 March 2012, LUX-2012-v1.2		12 950.486	12 047.394	11 515.121	12 075.340
Revised estimates provided by Luxembourg ⁽⁴⁾						
Road transportation – gasoline, CO ₂	2 August 2012, LU-1A3+1C-1	Accepted by the TERT	66.654	54.066	50.204	49.165
Poultry Manure Management, CH ₄	5 July 2012, LU-4A+4B-78	Accepted by the TERT	-1.251	-1.220	-1.461	-1.343
Poultry Manure Management, N ₂ O	2 August 2012, (LU-4A+4B-78)	Accepted by the TERT	0.136	0.149	0.168	0.152

⁴Difference: 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.

Synthetic fertilizers, N ₂ O	19 June 2012, LU-4C-4F-1	Accepted by the TERT		-3.031	-4.532	-4.910
Crop residue, N ₂ O	19 June 2012, LU-4C-4F-4	Accepted by the TERT	-1.850	-2.147	-2.144	-1.903
Atmospheric deposition, N ₂ O	19 June 2012, LU-4C-4F-1	Accepted by the TERT		-0.269	-0.403	-0.436
Nitrogen leaching and run-off, N ₂ O	19 June 2012, LU-4C-4F-1	Accepted by the TERT		-2.020	-3.022	-3.274
SWDS disposal, CH ₄	2 August 2012, LU-6-4	Accepted by the TERT	-4.583	-3.963	-3.751	-3.475
Total GHG emissions including any accepted revised estimate received from Luxembourg and/or technical correction as proposed by the TERT			13 009.592	12 088.958	11 550.180	12 109.316
CO₂ emissions from 1.A.3.a Civil aviation	15 March 2012, LUX-2012-v1.2		0.608	0.525	0.536	0.530

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

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. Road transportation CO ₂ All years	Luxembourg is using the CO ₂ EF value for gasoline used by Belgium that in turn uses the IPCC default value. CO ₂ from road transportation is a key category, however the 2000 IPCC Good Practice Guidance (GPG) states in this respect: ‘For traded fuels in common circulation, it is good practice to obtain the carbon content of the fuel and net calorific values from fuel suppliers, and use local values wherever possible. If these data are not available, default values can be used.’ The TERT also notes that the implied EF is at the low end as compared with other Member States (which have country specific data), which could indicate an	The TERT recommends that the revised estimates are reflected in future submissions.	Yes	No

⁵ The GHG emission estimate for this category was revised by Luxembourg 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⁾
		underestimation of emissions. The TERT also notes that that local or country-specific data should be available in LU and that therefore the use of the default value is not in line with good practice. In response to the draft review report Luxembourg provided revised estimates for all years. The TERT agreed with these estimates.			
No	1.A.4.b. Residential CH ₄ solid fuels 2005, 2008–2010	The TERT identified that Luxembourg used the wrong EF for CH ₄ emissions from solid fuels in 1.A.4.b. (10 instead of 300 kg/TJ) leading to a minor underestimation of emissions (approximately 0.01 Gg CH ₄ (0.03 %) or 0.14 Gg CO ₂ eq. (0.001 %) of the national total (2005–2010)). Luxembourg indicated that they will correct this mistake in the next submission.	The TERT recommends that Luxembourg uses the correct CH ₄ EF for solid fuels in 1.A.4.b. Furthermore, the TERT recommends that time-series consistency is ensured by implementing the revision for all relevant years of the time-series.	No	No
Yes	2.F(a).3. Fire extinguishers HFC 2005, 2008–2010	Luxembourg has reported NO in this category for the whole time series. Most Parties report HFCs emissions from this category and the 'NO' reporting by Luxembourg could be related to an issue of underestimation.	The TERT recommends that Luxembourg provides in the NIR an explanation on the non-existence of fire extinguishers containing HFCs in the country by, for example, illustrating the quantities of other agents in use in fire extinguishers imported and used in Luxembourg and showing that this is representative of the total usage of fire extinguishers in Luxembourg.	No	No
No	4.B. N ₂ O emissions per AWMS All years	During the review, and in response to questions from the TERT, Luxembourg provided revised estimates for N ₂ O emission per AWMS for all years. The TERT agreed with the revised estimates.	The TERT recommends that the revised estimates are reflected in future submissions.	Yes	No
No	4.B.9. Poultry	During the review, and in response to questions from	The TERT recommends that the revised estimates are	Yes	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁵⁾	Technical correction ⁽⁶⁾
	CH4 All years	the TERT, Luxembourg provided revised estimates for CH ₄ emission from poultry manure management for all years. The TERT agreed with the revised estimates. This further affected the N ₂ O emission estimates per AWMS (liquid system & solid storage).	reflected in future submissions.		
Yes	4.D. Agricultural soils N ₂ O 1990-2009	Based on an answer and documents sent by Luxembourg to an initial finding of the TERT, nitrogen input from manure applied to soils and the associated emissions data for all years but 2010 were wrongly provided in the CRF Table 4.Ds1, leading to an underestimation of emissions.	Due to a CRF Reporter bug, the TERT recommends that Luxembourg corrects manually the values in the CRF Table 4.Ds1 for all relevant years of the time-series.	No	No
Yes	4.D.1.4. Crop residue N ₂ O All years	The use of a value of 0.45 for $Frac_R$ is inconsistent with the provisions in pages 4.59 and 4.63 of 2000 IPCCGPG: the equation 4.28 of 2000 IPCCGPG uses a default value of 2 to convert the nitrogen amount in the N-fixing and non-N-fixing crops annual production to total aboveground crop residue and product which is not consistent with the $Frac_R$ value of 0.45. During the review Luxembourg provided revised estimates for N ₂ O emission from crop residue for all years. The TERT agreed with the revised estimates.	The TERT recommends that the revised estimates are reflected in future submissions.	Yes	No
Yes	4.D.3.1. Atmospheric deposition N ₂ O 2008–2010	See above.	The TERT recommends that the revised estimates are reflected in future submissions.	Yes	No
Yes	4.D.3.2. Nitrogen	See above.	The TERT recommends that the revised estimates are	Yes	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁵⁾	Technical correction ⁽⁶⁾
		leaching and run-off N ₂ O 2008–2010		reflected in future submissions.	
Yes	6.A.1. Managed waste disposal on land CH ₄ All years	The solid waste disposal in Luxembourg is described in the NIR as well-managed. However, the use of default value for oxidation factor (OX=0) is not appropriate, as according to the 2000 IPCC Good Practice Guidance (GPG): 'Currently, most industrialised countries with well-managed SWDS use 0.1 for OX, which is a reasonable assumption based on available information. During the review Luxembourg provided revised estimates for 2005 and 2008-2010 using an oxidation factor of 0.1. The TERT agreed with the revised estimates.	The TERT recommends that the revised estimates are reflected in future submissions. Furthermore, the TERT recommends that time-series consistency is ensured by implementing the revision for all relevant years of the time-series.	Yes	No

Annex 2 – Detailed technical correction

There are no technical corrections applied to Luxembourg'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 EUETS 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.

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

Annex 4 – Correspondence references

Date	Reference
23 March 2012	Final CRF submission under the MMD, version LUX-2012-v1.2
11 May 2012	Final NIR submission under the MMD
21, 23 May 2012	Initial questions raised by the TERT during the desk review
14, 15 June 2012	Additional questions raised by the TERT during the centralised review
1, 18 June 2012	Responses from Luxembourg to TERT questions
21 June 2012	Draft technical corrections from TERT to Luxembourg
5 July 2012	Response from Luxembourg to TERT draft technical corrections
13 July 2012	Draft review report from TERT to Luxembourg
2 August 2012	Response from Luxembourg to draft review report
13 August 2012	Draft final review report from TERT to Luxembourg
14 August 2012	Response and additional information from Luxembourg to final review report
17 August 2012	Final review report to European Commission
17 September 2012	Revised review report to European Commission