

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

This report presents the findings of the 2012 technical review of the greenhouse gas emission inventory of Romania 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 Romania 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 Romania, 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 Romania for the years 2005, 2008, 2009 and 2010 submitted in 2012 under the MMD included emission overestimates and underestimates.
2. The TERT identified 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 Romania in response to its initial findings and the draft review report (see Table 2).
4. The TERT considers that the aggregated revised GHG emission inventory estimates from Romania for the years 2005, 2008, 2009 and 2010 still include emission overestimates.
5. The TERT therefore suggests that it is necessary to implement technical corrections to the GHG emission inventory estimates and to amend the reported GHG total (see Table 2).
6. As stated beneath Table 1, Romania does not accept the aggregated GHG emission inventory estimates presented in Table 2 including any revised estimate received from Romania and accepted by the TERT, and the technical correction as proposed by the TERT.
7. The TERT identified non-binding recommendations for improvements of Romania's GHG inventory (see Table 3 in Annex 1).
8. The TERT considers that it received a response from Romania that was sufficient in order to undertake the review appropriately. The possibility of a country visit significantly contributed to undertake the review appropriately given the specific national circumstances of Romania.
9. The TERT considers that the significant number of revised estimates provided and the technical corrections in the draft review report and the recommendations should be addressed by strengthening the national system including the quality assurance (QA) and quality control (QC).

Statement from Romania on the conclusions of the TERT

Romania does not accept the aggregated GHG emission inventory estimates presented in Table 2 because Romania does not accept the technical correction as proposed by the TERT related to 4.A Enteric fermentation from buffalo, sheep, goats, horses, mules and assess.

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	21 Feb 2012, ROU-2012-v1.2		148 889.374	146 668.381	123 382.299	121 354.548
Revised estimates provided by Romania (⁴)						
1.A.2.f Other, Other fuels, CO ₂	07062012: Q&A RO overview questions_07-06-2012-RO answers. Estimates: RO - Revised 1A2f Other, RO-1A1, 1A2, 1A4, 1A5-5	Accepted by the TERT	-15.061	-29.114	-0.889	-0.889
1.A.3.b Road transportation, Diesel oil, CO ₂	Answer to question provided 2012-06-04. File RO-1A3+1C-25-answer.xls, RO-1A3+1C-25	Accepted by the TERT	NA	3.713	NA	NA
1.B.1.a. Coal Mining and Handling, CH ₄ recovery	06 August 2012 Revised emissions estimates RO-1B-4	Accepted by the TERT	-12.285	-19.131	-19.992	-21.378
1.B.1.b. Solid Fuel Transformation, CH ₄	06 August 2012 Revised emissions estimates RO-1B-7	Accepted by the TERT	NA	NA	NA	-0.006
1.B.2.b. iv. Distribution, AD Natural gas distribution, CH ₄	06 August 2012 Revised emissions estimates RO-1B-8	Accepted by the TERT	-76.985	NA	NA	NA
1.A.3.b Road transportation, gasoline and diesel oil, CH ₄ and N ₂ O	Data provided 2012-07-17. File RO-1A3+1C-13 Romanian estimation-Road.xls	Accepted by the TERT	-228.375	-322.870	-314.208	-538.100
1.A.3.c Railways, other fuels, CO ₂ , CH ₄ and	Data provided 2012-07-17. File RO-	Accepted by	-2.796	-3.510	-0.260	NA

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.

N ₂ O	1A3+1C-35.xls	the TERT				
1.A.3.d navigation, gasoline, CH ₄ and N ₂ O	Data provided 2012-07-17. File RO-1A3+1C-40 Romanian estimation-Navigation.xls	Accepted by the TERT	-1.649	-6.020	-4.033	-24.825
2.A.2 Lime Production, CO ₂	06 August 2012 Lime production.xlsx	Accepted by the TERT	-274.112	-726.428	-282.032	-279.718
2.A.3 Limestone and dolomite use	06 August 2012 CO ₂ emissions from Limestone and dolomite use category.xls	Accepted by the TERT	-132.118	-103.514	-57.530	-66.991
2.A.7 Glass production	09 August 2012 CO ₂ glass production. xls	Accepted by the TERT	5.171	14.060	8.270	5.759
4.B.8 Swine, CH ₄	06 August 2012 RO 4A+4B-2 recalculation xlsx.xls	Accepted by the TERT	-74.454	-78.532	-71.529	-65.506
4.D.1.4 Crop residue, N ₂ O	06 August 2012 RO 4C-4F -3.xlsx	Accepted by the TERT	-2.535	-12.335	-17.532	-31.378
6.A.1 Managed waste disposal on land, CH ₄	06 August 2012 Revised_estimate_RO-6-2.xlsx (from RO- 6-2-Revised estimates of CH ₄ emissions from managed SWDS.xls)	Accepted by the TERT	-29.446	-45.392	-52.787	-59.471
6.A.2, Unmanaged Waste Disposal on Land, CH ₄	RO_Revised estimates of CH ₄ emissions from unmanaged SWDS.xls	Accepted by the TERT	-1.890	-1.627	-1.547	-1.472
6.B.1. Industrial waste water, CH ₄	06 August 2012 Revised_estimate_RO-6-5_6B1.xlsx	Accepted by the TERT	-334.207	-249.021	-206.899	-224.800
Technical correction proposed by the TERT ⁽⁵⁾						
4.A.2 Buffalo, CH ₄	RO-4A+4B-17 + RO-4A+4B-24	Not accepted by MS	-34.017	-23.143	-23.349	-20.439

⁵ Difference: technical correction – original estimates. A positive difference indicates an increase compared to reported emissions. A negative number indicates a decrease compared to reported emissions. For more information on technical corrections, see Annex 2.

4.A.3 Sheep, CH ₄	RO-4A+4B-17 + RO-4A+4B-24	Not accepted by MS	-1769.948	-2078.818	-2138.938	-1983.736
4.A.4 Goats, CH ₄	RO-4A+4B-17 + RO-4A+4B-24	Not accepted by MS	-165.544	-214.198	-218.554	-296.931
4.A.6 Horses, CH ₄	RO-4A+4B-17 + RO-4A+4B-24	Not accepted by MS	-333.170	-327.577	-305.206	-243.686
4.A.7 Mules and asses, CH ₄	RO-4A+4B-17 + RO-4A+4B-24	Not accepted by MS	-12.002	-12.002	-12.416	-12.416
Total GHG emissions including any accepted revised estimate received from Romania and technical corrections as proposed by the TERT			145 393.951	142 432.924	119 662.866	117 488.563
CO₂ emissions from 1.A.3.a Civil aviation	21 Feb 2012, ROU-2012-v1.2		45.219	385.999	249.344	329.119

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	Technical correction	
				Revised estimate ⁽⁶⁾	⁽⁷⁾
Yes	Energy: Comparison RA versus SA CO ₂ , All fuels 2005, 2008–2010	The TERT identified large systematic differences between the reference approach and the sectoral approach for all fuel types (liquid, solid, gaseous and other). Overall, the differences balance each other for most years, but for 2009 CO ₂ from the sectoral approach is estimated about 4 % higher than the reference approach. In the NIR, Romania has stated that the differences to a large extent are due to "statistical differences" in the energy balances. After the country visit Romania provided revised estimates for the reference approach taking into account revised data on feedstocks of additive oxygenates and other hydrocarbons and the non-energy use of petroleum coke.	The TERT recommends that Romania continue the work on reconciling the differences between the reference approach and the sectoral approach.	Yes	No
Yes	1.A.1.c. Manufacture of	CO ₂ emissions from solid fuels in 1.A.1.c. dropped by 98 % in 2010 compared to 2009.	The TERT recommends that Romania includes descriptions on major dips or jumps in AD, EFs or	No	No

⁶ The GHG emission estimate for this category was revised by Romania during the technical review.

⁷ 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 ⁽⁶⁾	Technical correction ⁽⁷⁾
	solid fuels and other energy industries CO ₂ , solid fuels 2010	In response to a question raised by the TERT during the technical review, Romania indicated that the data were rechecked and, according to the EUROSTAT data and the National Institute for Statistics' response, the data are correct. However, Romania did not provide an explanation for this sharp decline.	implied emission factor (EF) for key categories in the next NIR.		
Yes	1.A.2.c. Chemicals CO ₂ / Liquid fuels 2010	There is a large drop in CO ₂ emissions for 2009–2010 from liquid fuels, about 1 000 Gg. The decreasing trend cannot be seen in other fuels used in the source category (e.g. gaseous fuels). In addition, the CO ₂ implied EF of liquid fuels from 1.A.1.a. decreased by 9 % from 2009 to 2010. No explanations were provided in the NIR. In response to a question raised by the TERT during the technical review, Romania explained that the main reason for the decrease in emissions was that as a result of the economic crisis the chemicals industry switched from expensive fuels (such as liquid fuels) to less expensive fuels which are produced in the domestic market.	The TERT recommends that Romania includes descriptions on major dips or jumps in AD, EFs or implied EF for key categories in the next NIR.	No	No
No	1.A.2.f. Manufacturing Industries and Construction, Other, CO ₂ , Other fuels	The CO ₂ implied EF is decreasing from 2007 compared to previous years, indicating time-series inconsistency. Romania has responded that this is due to the use of different CO ₂ EFs before and after 2007. From 2007, information from the EU ETS is used. In response to a question raised by the TERT during the technical review, Romania provided corrected revised	The TERT recommends that Romania uses information from the EU ETS to develop time-series consistent EF and reports revised estimates in future inventories.	Yes	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		estimates for 2005-2010. For 2005 the revised estimates resulted in a decrease of CO ₂ emissions of 15.06 Gg.			
Yes	1.A.3. Transport All gases All years	Emissions from off-road vehicles and machinery are not reported in the inventory.	The TERT recommends that Romania estimates emissions from off-road vehicles and machinery and reports them. If this cannot be done, it is recommended that Romania explores national energy data, determines in what categories energy use for off-road vehicles and machinery are included and reports on this.	No	No
Yes	1.A.3. Transport All gases All years	The information provided in the NIR often lacks the necessary clarity, which raises issues of transparency. Therefore, the TERT in many cases had difficulties in understanding methodologies, assumptions, EFs and activity data used for the calculation of transport-related emission estimates. In response to a question raised by the TERT during the technical review, Romania indicated it would improve on transparency of transport-related data and information included in the NIR and its annexes as part of the next inventory submission.	The TERT recommends that Romania improves on the transparency of transport data and the information included in the NIR and its annexes as part of its inventory submission.	No	No
Yes	1.A.3.a. Civil aviation All gases All years	Emissions from aviation rise sharply after 2006 and the time series is volatile and seems unlikely. In response to a question raised by the TERT during the technical review, Romania explained that emissions in 1990–2006 were estimated by multiplying fuel consumption data with Revised 1996 IPCC Guidelines	The TERT recommends that Romania verifies the time series of consumption of fuels used in aviation and corrects erroneous activity data as appropriate. The TERT also recommends that Romania revises the time series 1990–2006 in order to make them consistent with later years. If activity data necessary for tier 2	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		default EFs whereas emissions from 2007 onwards were estimated using a tier 2 method, taking into account flight cycles and types of aircraft. This does not, however, explain the outlier values for 2008. The TERT concludes that emissions are probably overestimated in 2008. In addition, the TERT concludes that the time series is inconsistent as different methodologies are applied for the earlier and the later part of the time series.	estimates are not available, it is recommended that Romania applies splicing techniques as described in the 2000 IPCC Good Practice Guidance (GPG) to make the time series consistent.		
Yes	1.A.3.b. Road transportation CO ₂ gasoline 2010	The TERT identified several years for which the implied EFs for CO ₂ from gasoline used for road transport seem to be erroneous, in particular for 2010, but also for 2004, 2000, 1998, 1990–1992. In response to a question raised by the TERT during the technical review, Romania indicated that errors were detected for estimates of activity data or CO ₂ and provided corrected numbers for 1990–1991 (revised activity data) and 2004 (revised CO ₂ emissions). For the other years Romania did not provide any explanations/revised estimates.	The TERT recommends that Romania carefully checks the time series consistency and accuracy of AD and EF used for gasoline from road transport and reports thereon.	No	No
Yes	1.A.3.b. Road transportation Gaseous fuels 2010	Data on gaseous fuels used for road transport are reported as Not occurring (NO) in 2010. In response to a question raised by the TERT during the technical review, Romania indicated that the reporting of NO is accurate because neither the national energy balance nor EUROSTAT includes gaseous fuel consumption for road transport for 2010. However, the	The TERT recommends that Romania collects data on natural gas used for road transport in 2010. If data are not available, the value for 2009 could be extrapolated. The TERT recommends that Romania estimates related emissions and reports them.	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		TERT concludes that emissions are underestimated because it is not realistic that the use of gaseous fuels ended in 2010.			
Yes	1.A.3.b. Road transportation implied EF CO ₂ diesel oil 1990–2010	The TERT identified inconsistencies in the trend of the CO ₂ EF for diesel oil used for road transportation between 1990 and 2010. In response to a question raised by the TERT during the technical review, Romania indicated that errors have been detected for energy amounts and CO ₂ emissions from diesel oil used for road transport. Romania provided corrected revised estimates for some years (including 2008). For 2008 the revised estimates resulted in an increase of CO ₂ emissions of 3.71 Gg. The TERT accepts the revised estimates.	The TERT recommends that Romania verifies the time series for CO ₂ and TJ for diesel oil and ensures that accurate numbers are reported.	Yes	No
Yes	1.A.3.b. Road transportation Liquefied petroleum gases (LPG) 2005	The time series for emissions from LPG used for road transport are very volatile. In response to a question raised by the TERT during the technical review, Romania confirmed that data for 2005 were inaccurate resulting in an underestimation of emissions.	The TERT recommends that Romania explores available data sources, determines what amounts of LPG used for road transport are accurate for each year in the time series, estimates related emissions and reports them.	No	No
Yes	1.A.3.b. Road transportation CH ₄ , N ₂ O 2005, 2008–2010	A number of issues regarding the IEFs for CH ₄ and N ₂ O emissions from gasoline and diesel oil used for road transports have been identified by the TERT. Romania has provided corrected data which the TERT accepts.	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
No	1.A.3.b. Road transportation	The TERT identified that biomass emissions from road transport are not included in the GHG Inventory.	The TERT recommends that Romania explores EUROSTAT energy data regarding biomass used for	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
	Biomass 2008–2010	According to EUROSTAT energy data, significant consumption of biofuels occurs for road transport. In response to a question raised by the TERT during the technical review, Romania confirmed this.	road transport, determines what amounts are accurate for each year in the time series, estimates related emissions and reports them.		
No	1.A.3.c. Railways Solid fuels All years	Emissions from solid fuels used in railways are missing in 2006 and 2010. The TERT believes that this might be inaccurate even though values equal to 0 were reported in the EUROSTAT and domestic energy balance data.	The TERT recommends that Romania verifies the time series on fuel consumption of solid fuels used in railways, judges whether data provided in the EUROSTAT and the national energy balance data are reasonable and revises emissions as appropriate.	No	No
No	1.A.3.c. Railways CO ₂ , other fuels All years	CO ₂ emissions from biomass used in railways have been reported as "other fuels" as the CRF does not provide the option to report biomass in category 1.A.3.c. Because of this, emissions have been aggregated as fossil CO ₂ to the national total resulting in an overestimation of emissions. Romania has provided corrected data which the TERT accepts.	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
No	1.A.3.d. Navigation Gasoline CH ₄ N ₂ O All years	The TERT found that IEFs for CH ₄ and N ₂ O emissions from gasoline used in national navigation are extremely high and unlikely. Romania responded that errors had been detected and provided revised estimates which the TERT accepts.	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
No	1.A.3.e. Other transportation All gases All years	CO ₂ emissions from pipeline transport are reported in CRF 1.A.3.e. However, CH ₄ and N ₂ O emissions are reported as NO. Since emissions are occurring, this is an underestimation of emissions. In response to a question raised by the TERT during the technical review, Romania explained that CH ₄ and N ₂ O	The TERT recommends that Romania estimates emissions of CH ₄ and N ₂ O from pipeline transport using the default EFs for gas engines that are available in the IPCC Guidelines.	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		from 1.A.3.e. are not estimated because no Revised 1996 IPCC Guidelines or 2000 IPCC GPG default or country-specific EFs are available. However, the TERT considers that EFs for gas engines can be used which are available in the Revised 1996 IPCC Guidelines.			
Yes	1.B.1.a. Coal mining and handling CH ₄ recovery All years	The TERT noted that Romania reports significant CH ₄ emissions from coal mining. However, no methane capture is reported in the CRF (NO). Also, the NIR does not mention methane capture. However, methane capture in Romania takes places at least to a minor extent (as evidenced from an Internet research for Lupeni mine, http://www.globalmethane.org/documents/toolsres_coal_overview_ch29.pdf). Neglecting CH ₄ recovery constitutes an overestimation of CH ₄ emissions from coal mining. During the centralised review, the Party agreed to investigate further this issue and clarifications were ongoing. In the follow-up to the review week, the Party provided revised estimates based on methane recovery estimates for two mines (Vulcan, Lupeni). The revised estimates are accepted by the TERT.	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
Yes	1.B.1.b. Solid fuel transformation implied EF CH ₄ 2010	The TERT found that the implied emission factor for CH ₄ emissions from solid fuel transformation is constant throughout the time series with the exception of 2010, where there is a sharp increase. In response to the draft technical correction Romania provided	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

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		revised estimates which are accepted by the TERT.			
Yes	1.B.2.a.i. Exploration implied EF CO ₂ , CH ₄ and N ₂ O 2001–2008	The implied EFs for CO ₂ , CH ₄ and N ₂ O emissions from oil exploration are quite stable for many years of the time series, with the exception of the years 2001–2008, during which there is significant variation. In response to a question raised by the TERT during the technical review, Romania explained that false activity data were transferred from its own calculation spreadsheet to the CRF. Corrected values were provided, which yield implied EFs in the same range as for previous years. Since there is no need to correct the emission values, no technical correction is applied.	The TERT recommends that Romania corrects the activity data transferred to the CRF tables in its next inventory submission.	No	No
Yes	1.B.2.b.iv. Distribution AD Natural gas distribution 2007–2010	The TERT noted that the pipeline length for natural gas distribution is considered to be constant from 1990 to 2006. From 2007 to 2010 there is a change to a significant longer distribution network. During the centralised review, the Party explained that for 2007 to 2009, the pipeline length provided by the Romanian National Authority for Regulatory in Energy was used, whereas for the rest of the time series (1990-2006), the average value of the available pipeline length values (2007-2009) was used. In the follow-up of the review week, the Party provided revised estimates corresponding to the technical correction by the TERT. The revised estimates were therefore accepted by the TERT.	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
Yes	1.B.2.c.i. Flaring,	The implied EFs for CO ₂ , CH ₄ and N ₂ O emissions from	The TERT recommends that Romania corrects the	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
	Oil implied EF CO ₂ , CH ₄ and N ₂ O 2001–2008	flaring in the oil industry are quite stable for many years of the time series, with the exception of the years 2001–2008, during which there is significant variation. During the centralised review, Romania explained that false activity data were transferred from its own calculation spreadsheet to the CRF. Corrected values were provided, which yield implied EFs in the same range as for previous years. Since there is no need to correct the emission values, no technical correction is applied.	activity data transferred to the CRF tables in its next inventory submission.		
No	1.C.1. Aviation bunkers CO ₂ , Aviation bunkers Jet kerosene 1990–2010, 2008	There are inaccuracies in the time series for jet kerosene used for international aviation bunkers. In response to a question raised by the TERT during the technical review, Romania confirmed that AD has been reported in an erroneous unit. The implied EF for CO ₂ diverges significantly in 2008. As CO ₂ emissions depend only on the carbon content of the fuel, the implied EF should be the same as for other years and the TERT concludes that estimated CO ₂ emissions are inaccurate in 2008.	The TERT recommends that Romania corrects AD on jet kerosene for international aviation bunkers for all years, corrects estimated CO ₂ emissions for 2008 and reports them.	No	No
No	1.C.2. Marine bunkers CO ₂ , Residual oil All years	The TERT identified that the implied EF was out of range. In response to a question raised by the TERT during the technical review, Romania indicated that the EF was used in a wrong unit resulting in an overestimation of emissions.	The TERT recommends that Romania corrects the EF used for residual oil for marine bunkers for all years, corrects the estimated CO ₂ emissions and reports them.	No	No
Yes	2.A.1 Cement	The default CO ₂ EF for cement production was	The TERT recommends that Romania improves the	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
	production CO ₂ 2008, 2009, 2010	recalculated and during the review Romania explained that the correction for CKD was applied in a inconsistent way across the time series (from 2008 for all installations, for 2007 for no installations and prior to 2007 for one operator only. This results in a time series inconsistency, however the resulting changes in the implied EF are relatively small.	consistency of the time series for cement production.		
Yes	2.A.2. Lime production CO ₂ All years	The TERT considered the lime production data for the years 2007 and 2008 unusually high. In response to the TERT, Romania revised the CO ₂ emission estimates and the AD for lime production. The AD for dolomite lime production were revised downwards, whereas the AD for quicklime production were revised upwards due to a reallocation of lime production in the iron and steel industry from category 2A3 to 2A2. All together, the revised AD resulted in lower CO ₂ emissions from 2A2 Lime Production. The revised estimates were accepted by the TERT.	The TERT recommends Romania to include the revised data in its future inventory submissions and to provide transparent information in the NIR on the recalculations performed as well as on the allocation of emissions between 2A2 and 2A3.	Yes	No
No	2.A.3. Limestone and dolomite use CO ₂ All years	In its response to the TERT related to the estimation of CO ₂ emissions from lime production, Romania revised the AD for quicklime production under 2A2 Lime Production. In addition it reallocated emissions from lime production and consumption in the iron and steel industry from category 2A3 Limestone and Dolomite Use to category 2A2 Lime Production. This reallocation resulted in lower CO ₂ emissions in category 2A3. The revision was accepted by the TERT as part of a more	The TERT recommends that Romania checks the allocation of CO ₂ emissions from lime consumption in iron and steel industry for the next inventory submission under the UNFCCC.	Yes	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		general revision of emissions in category 2A2, however 1996 IPCC guidelines recommend to allocate CO ₂ emissions from limestone and dolomite consumption in iron and steel industry under category 2A3.			
No	2.A.7. Glass production CO ₂ All years	<p>Process emissions reported in the inventory from Glass production under 2.A.7. are about 10 % of verified emissions from glass production under the EU ETS. Even when taking into account that EU ETS emissions include combustion emissions, the ratio of 10 % seems very low.</p> <p>In response to a question raised by the TERT during the technical review, Romania explained that the inventory only considers the activity data from glassware and window-glasses data provided by the National Institute for Statistics. Under the EU ETS also emissions from glass wool, colourless and coloured glass jars and flat glass are included. This issue indicates an underestimation of emissions from glass production. In response to the review, Romania provided revised estimates for CO₂ emissions from glass production that include emissions from glass wool for the years 2008-2010. The revised estimates are accepted by the TERT.</p>	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
No	2.A.7.a. Glass production CO ₂ 2005–2010	From the description in the NIR it is not clear whether the methodology used for CO ₂ emissions from glass production took into account that glass makers usually use a certain amount of recycled scrap glass (cullet) which should be subtracted in the emission estimation	The TERT recommends that Romania improves on the information in the NIR and explains whether the fraction of recycled glass was taken into account.	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		independent of the methodological tier as this fraction does not cause CO ₂ emissions. No response was received. However, as other answers to questions indicated an underestimation of emissions from glass production, no technical correction is necessary.			
No	2.C.1.d. Coke CH ₄ 2010	In response to a question raised by the TERT during the review related to CO ₂ from coke production, Romania explained that CH ₄ emissions from coke production are not estimated because the Revised 1996 IPCC Guidelines and 2000 IPCC GPG do not provide default EFs and estimation methods for estimating CH ₄ emissions from coke production and country-specific EFs and estimation methods are not available. The TERT considers that the methodology is available in the Revised 1996 IPCC Guidelines Part II - Workbook.	The TERT recommends that Romania uses the Revised 1996 IPCC Guidelines, which provide a methodology and an EF for coke production in Part II - Workbook chapter 2.12.1, Table 2-9 'Emission factors for CH ₄ from other chemical production' and estimates the CH ₄ emissions from coke production.	No	No
Yes	2.C.4. Aluminium foundries PFC All years	Romania reports by far the lowest implied EF for PFC from aluminium production compared to the other countries. Emissions are so low that the explanation provided by Romania seems to be insufficient to explain the difference compared to other countries and the TERT thus concludes that PFC emissions from aluminium foundries might be underestimated. The EU ETS requires that Member States include new installations from 2013 onwards, among others from aluminium production. Member States have to submit verified emission data to the Commission (see paragraph 9a of Directive 2009/29/EC). This means	The TERT recommends that Romania collects plant-specific verified emission data for CO ₂ and PFC emissions to improve the quality of its national inventory.	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		that plant-specific verified emission data for CO ₂ and PFC emissions should also be available in Romania and would provide a very good basis for the national emission inventory.			
Yes	2.F. Consumption of halocarbons and SF ₆ HFC, PFC, SF ₆ 2005–2010	<p>Romania uses a cluster method, described in the NIR of the 2012 submission, to estimate HFCs for 2.F.1.–2.F.4. This approach was taken in response to questions raised during the 2011 UNFCCC review. In the ARR of 2011 the ERT states that this is an interim solution and that it strongly recommends that Romania makes efforts to collect the required national data.</p> <p>In response to a question raised by the TERT during the technical review, Romania explained that Romania elaborated the Terms of Reference necessary for contracting the related data collection/development of relevant values; the procurement procedure is to be started. Romania also provided the calculation sheets showing how the cluster estimates were derived. The estimated emissions from the cluster method are considerably lower for 2.F.1.–2.F.4. than those calculated by an independent model (F-gas model from the Öko-Institut). For 2005, the Romanian estimates amount to 484.36 Gg CO₂ eq. while the F-gas model estimates 1696.8 Gg CO₂ eq. for Romania. The data for 2010 reported by Romania is 687.05 Gg CO₂ eq. and estimates from the F-gas model for the same sources are 2815.8 Gg CO₂ eq. This indicates an</p>	The TERT strongly recommends that Romania improves on its data collection procedure and estimates emissions from 2.F.1.–2.F.4. based on reliable national data in the near future. An independent top-down calculation by a model indicates potential significant underestimations in the range of 1 000 Gg CO ₂ eq.	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		underestimation of this source in the Romanian inventory.			
Yes	2.F. Consumption of halocarbons and SF ₆ HFC, PFC, SF ₆ 2005–2010	Romania has previously been recommended in the UNFCCC review process to ensure that the questionnaires used to collect data for calculations of emissions from consumption of halocarbons and SF ₆ cover the whole target audience in the industrial processes sector. In response to a question raised by the TERT during the technical review, Romania explains that except for 2.F.1.–2.F.4. categories where the cluster method has been used, the data on consumption of halocarbons and SF ₆ are collected from the operators based on questionnaires sent through local and regional environmental protection agencies. One criterion considered is the capture of full relevant data. With a view to the next GHG Inventory submission, Romania has elaborated the Terms of Reference that are necessary for contracting the related collection/development of the relevant values. The procurement procedure is to be started.	The TERT recommends that Romania continues improving its data collection procedures in order to ensure that all relevant sources and activity data are included in the estimated emissions of fluorinated GHGs. Omissions of sources or lack of data leads to an underestimation of emissions.	No	No
Yes	4.A., Buffalo, sheep, goats, horses, mules and asses CH ₄ All years	Please see technical correction reference RO-4.A.+4.B-17 and 24 in Annex II.	The TERT recommends that the inventory is revised to address the issues raised in the technical correction. Furthermore, the TERT recommends that time series consistency is ensured by implementing the revision for all relevant years of the time series.	No	Yes

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
Yes	4.A.1.OptA.a. Dairy cattle CH ₄ All years	The GE-Intake of dairy cattle is the lowest of all reporting Member States (227 MJ). The official milk yield data provided by the National Institute of Statistics include both milk production of dairy cattle and of milk drunk by suckling cows. Romania explained that suckling cows are included in the category 'Calves younger'.	The TERT recommends that Romania re-examines the expert judgements on feeding assumptions made in the study 'Elaboration of national emission factors/other parameters relevant to NGHGI Sectors Energy, Industrial Process, Agriculture and Waste', to allow for the higher tier calculation methods. Furthermore, the TERT recommends that Romania calculates GE-intake separately for suckling cows and dairy cows. Further efforts should be undertaken for generation of the following activity data: <ul style="list-style-type: none"> suckling cow number: should be shifted to the non-dairy cattle category and not be included in dairy cow number; milk production data: should only include milk production of dairy cows and then be applied to the dairy cow number. 	No	No
Yes	4.A.1.OptA.b. Non-dairy cattle CH ₄ All years	The TERT identified that the implied EF is out of range. In response to a question raised by the TERT during the technical review, Romania explained that in the CRF Tables 4.A and 4.B(a)s1 a livestock number value 1 000 times higher than the correct value was filled in for all livestock categories, resulting in a too low CH ₄ implied EF.	The TERT recommends that Romania revises the livestock numbers in the next inventory and improves on its QA/QC procedures.	No	No
No	4.A.1.OptA.b. Non-dairy cattle N ₂ O All years	The country-specific GE-Intake of constant 193.8 MJ/head/day is the highest of reporting Member States. In response to a question raised by the TERT during the	The TERT recommends that Romania evaluates the assumptions on weights, daily feed intake and digestibility of feed of non-dairy cattle and whether they are representative for Romania. The results of this	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		technical review, Romania stated that for the feeding assumptions the average of intensive and extensive farming practice was used. Average ratios take into consideration the production potential, regardless of the geographic area and type of exploitation. In addition, Romania explained the assumptions on feed intake by the average animal weights and the weight gain of the animals.	evaluation should be documented in the NIR.		
No	4.B. Manure management CH ₄ 2005	In 2011, the study 'Elaboration of national emission factors/other parameters relevant to NGHGI Sectors Energy, Industrial Process, Agriculture and Waste' was implemented for the Romanian inventory. The new AWMS distribution shows a high yearly variability, especially in the years from 2000 onwards. A sharp change of AWMS (decrease in liquid systems of cattle) resulted in a significant decrease of CH ₄ emissions in 2005. In general, the share of liquid systems of dairy cattle (2 % in 2005) and non-dairy cattle (0.75 % in 2005) applied in the Romanian inventory is much lower than the Revised 1996 IPCC Guidelines default value of Eastern Europe. In response to a question raised by the TERT during the technical review, Romania explained this by the fact that liquid systems were not popular on Romanian farms.	The TERT recommends that Romania re-examines its AWMS distribution in order to prevent an unrealistic yearly variability of applied systems. The low shares of liquid systems in cattle husbandry might result in an underestimation and should also be reviewed.	No	No
Yes	4.B.1.OptA.a. Dairy cattle	The country-specific annual average nitrogen-excretion rate per head of dairy cattle (53.6 kg N/animal/yr) is	The TERT recommends that Romania re-examines the expert judgements on feeding assumptions made in	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
	N ₂ O All years	lower than the Revised 1996 IPCC Guidelines default value of Eastern Europe (70 kg) and the lowest of all EU Member States. In response to a question raised by the TERT during the technical review, Romania explained its low annual average nitrogen-excretion per head of dairy cattle with the many household exploitations/subsistence farms.	the study 'Elaboration of national emission factors/other parameters relevant to NGHGI Sectors Energy, Industrial Process, Agriculture and Waste, to allow for the higher tier calculation methods'.		
Yes	4.B.1.OptA.b. Non-dairy cattle N ₂ O All years	Annual average nitrogen-excretion rate per head of non-dairy cattle (38.2 kg N/animal/yr) is lower than the IPCC default value of Eastern Europe (50 kg) which is explained with the high share of household exploitations/subsistence farms. The low nitrogen-excretion rate contradicts the high assumptions on gross energy intake of non-dairy cattle and the low assumptions on feed digestibility within the calculations of CH ₄ emissions from enteric fermentation.	The TERT recommends that Romania re-examines the expert judgements on feeding assumptions made in the study 'Elaboration of national emission factors/other parameters relevant to NGHGI Sectors Energy, Industrial Process, Agriculture and Waste, to allow for the higher tier calculation methods'.	No	No
Yes	4.B.3. Sheep N ₂ O All years	The nitrogen-excretion values of sheep (4.47 kg/head/yr) and goats (5.30 kg/head/yr) are the lowest of the reporting Member States and much lower than the IPCC default values for Eastern Europe (16 kg/head and year for sheep). This is explained with the high share of household exploitations/subsistence farms.	The TERT recommends that Romania reviews the expert judgements made in the study 'Elaboration of national emission factors/other parameters relevant to NGHGI Sectors Energy, Industrial Process, Agriculture and Waste, to allow for the higher tier calculation methods'.	No	No
No	4.B.8. Swine CH ₄	The TERT identified a high share of anaerobic lagoons (27.4% in 2005). During the review Romania	The TERT recommends that the revised estimates are reflected in future submissions. Furthermore, the TERT	Yes	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		2005, 2008–2010	reconsidered the use of anaerobic lagoons and provided revised estimates which reflect a change from anaerobic lagoons to liquid manure systems. The TERT accepts the revised estimates.	recommends that time-series consistency is ensured by implementing the revision for all relevant years of the time-series.	
No	4.B.8. Swine CH ₄ All years	Romania corrected the livestock data from the National Institute for Statistics (NIS) and ISPE (Institute for Studies and Power Engineering) with the factor 'days of exploitation' for each subcategory of swine. This correction factor refers to the number of days in a year in which the animal is exploited and applies to categories of young animals exploited for meat (irrespective of the species). This causes a reduction of animal numbers compared to the national statistics and EUROSTAT in all livestock categories, but especially in the swine category (about – 70 %).	Following the IPCC Guidelines, inventory agencies should use population data from official national statistics. Correcting the exploitation period as done by Romania systematically underestimates the total number of animals held in a year and therefore also the emissions. The TERT recommends that Romania applies a representative average of one year's population as required by the IPCC Guidelines.	No	No
Yes	4.D.1.2 Animal manure applied to soils N ₂ O All years	Inconsistency between the CRF tables 4.B(b) and 4.Ds1 in respect to the nitrogen input from manure applied to soils.	The TERT recommends Romania to correct the AD in CRF table 4Ds1 consistently with manure management estimations.	No	No
Yes	4.D.1.2. Animal manure applied to soils N ₂ O All years	The TERT identified an outlier implied EF associated with the Animal manure applied to soils category. In response to a question raised by the TERT during the technical review, Romania clarified that a wrong value for the AD had been reported. Romania provided sufficient information for TERT to conclude that the emissions were correctly estimated.	The TERT recommends that Romania corrects the AD in CRF Table 4.Ds1 ensuring consistency with AD used for manure management estimations.	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
Yes	4.D.1.3. N-fixing crops N ₂ O All years	The TERT identified an outlier implied EF associated with the nitrogen-fixing crops category which is significantly higher than the value in the 2000 IPCC GPG. In response to a question raised by the TERT during the technical review, Romania clarified that the reason was a wrong value reported for the AD (factor 1 000). Romania provided sufficient information for the TERT to conclude that the emissions were correctly estimated.	The TERT recommends that Romania corrects the AD for nitrogen-fixing crops in CRF Table 4.Ds1.	No	No
Yes	4.D.1.4. Crop residue N ₂ O All years	The TERT identified that the EF associated with the Flax for oil and Other oilseed plants-castor crop production was by error 0.125 kg N ₂ O-N/kg N instead of 0.0125 kg N ₂ O-N/kg N, which is the default value of the 2000 IPCC GPG. In response to a draft technical correction of the TERT Romania provided revised estimates which are accepted by the TERT.	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
Yes	4.D.2. Pasture, range and paddock manure N ₂ O Since 2005	The TERT identified an inconsistency between the CRF Tables 4.B(b) and 4.Ds1 in respect to N-excretion on pasture, range and paddock. In response to a question raised by the TERT during the technical review, Romania indicated that this inconsistency is due to having divided by 2, by error, the N-excretion of goats in CRF Table 4.B(b). Romania also indicated that the relevant estimates in CRF Table 4.Ds1 and N ₂ O emissions from the Manure management category are correct.	The TERT recommends that Romania corrects the value of nitrogen-excretion from goats in the next inventory.	No	No

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
Yes	6.A. Solid waste disposal on land CH ₄ recovery All years	It is indicated in the NIR that the increase of CH ₄ recovery between 2001 and 2009 is due to the fact that 'many more operators have reported their activity'. In response to a question raised by the TERT during the technical review, Romania explained that CH ₄ recovery data comprises exclusively data directly provided by the operators following the questionnaires sent in 2011 by the National Environmental Protection Agency (NEPA). For undocumented solid waste disposal sites Romania assumes that no CH ₄ recovery occurs.	The TERT recommends that Romania improves on the transparency of the NIR concerning the estimation of CH ₄ recovered on landfills. When direct data from landfills are used, the completeness of the reporting should be presented and recalculations made for undocumented sites (closed landfills, not reporting) should be explained. The type of monitored parameters used for this estimation should be indicated (amount of CH ₄ /biogas recovered, flared or valorised (in mass or energy units, energy generation, etc.). If monitored data is not available in terms of amounts of CH ₄ or biogas but only in energy units (e.g. TJ, electricity/heat generation), the parameters used for the conversion of energy data to CH ₄ amounts (e.g. efficiency of the energy plants, NCV, on-site energy use) should be well documented.	No	No
Yes	6.A.1. Managed waste disposal sites CH ₄ , Ox All years	For managed solid waste disposal sites (SWDS), the oxidation factor applied by Romania is 0 as proposed as default value in the 1996 IPCC GL because no precise information on the well-covering with materials status of disposal sites is available. The global recovery ratio in Romanian managed landfills calculated on the basis of data provided in the CRF tables is over 34%. The TERT considers that, under such a situation, Romanian landfills cannot be considered as not properly managed SWDS. During the review report Romania provided revised estimates which are	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

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		accepted by the TERT.			
Yes	6.A.2. Unmanaged waste disposal sites CH ₄ , AD All years	CH ₄ emissions from municipal solid waste (MSW) disposed in solid waste disposal sites are calculated using a FOD method. According to the Romanian Waste Management Plan, MSW includes 'household and similar waste (from population, economic and commercial unit, offices and institutions), waste from municipal services (street cleaning, markets, gardens, parks and green spaces) and waste from construction'. In response to a question raised by the TERT during the technical review, Romania indicated that organic industrial waste (from food industries and sludge from wastewater treatment plants) is not included in the disposed MSW amount provided by the NEPA. The 2000 IPCC Good Practice Guidance (GPG) recommends including all type of degradable solid waste disposed in landfills, including disposed organic industrial waste such as food industry waste, pulp and paper waste. During the review Romania provided revised estimates but these estimates did not yet consider emissions from organic industrial waste.	The TERT recommends that Romania includes disposed industrial organic waste in its inventory in order to be compliant with the 2000 IPCC GPG.	Yes	No
Yes	6.B.1. Industrial wastewater CH ₄ All years	"The type of process applied for industrial wastewater treatment plant is the process of biological nitrogen removal incorporated into basins with activated sludge. The overall mechanism follows the route of nitrification (oxidation of ammonia to nitrite and nitrate) and denitrification (reduction of nitrate	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

Key category	Gas, fuel, activity	Observation	Recommendation	Revised estimate ⁽⁶⁾	Technical correction ⁽⁷⁾
		<p>sequentially to nitrite, nitric oxide, nitrous oxide and nitrogen). The TERT identified that the MCF value used by Romania (0.9) was out of range. The type of "advanced" treatment processes based on nitrification/denitrification steps are aerobic processes and should be considered with a MCF value of 0 (0 - 0,1) or 0,3 if not well managed or overloaded. Romania indicated during the review that anaerobic treatment corresponds to anaerobic reactors used for industrial waste-water treatment only in brewery industries. In response to a draft technical correction Romania provided revised estimates which were accepted by the TERT.</p>			

Annex 2 – Detailed technical corrections

Name of technical correction	CH₄ emissions from enteric fermentation – buffalo, sheep, goats, horses, mules and asses				
Reference to transcript finding record	RO-4.A + 4.B-17 and 24.				
Subsector	Enteric fermentation, subsectors 4.A.2 Buffalo, 4.A.3 Sheep, 4.A.4. Goats, 4.A.6 Horses, 4.A.7 Mules and Asses				
Gas/fuel/activity	CH ₄				
	2005	2008	2009	2010	
Original estimate	3 953.63	4 500.88	4 565.03	4 288.98	Gg CO ₂ eq.
Corrected estimate	1 638.95	1 845.14	1 866.56	1 731.77	Gg CO ₂ eq.
The underlying problem	For buffaloes, sheep, goats, horses & mules and asses the calculations within the Tier 2 methodology cause overestimation of emissions from enteric fermentation due to overestimated amounts of average gross energy intake. CH ₄ IEFs are significant higher than the IPCC default emission factors.				
The rationale for the technical correction	The emission estimates for enteric fermentation from buffaloes, sheep, goats, horses & mules and asses are based on country specific feeding recommendations. Romania provided the TERT with copies from Popa et al. (1984) ⁸ and Stoica et al. (1997) ⁹ . Converted to gross energy intake, these feeding values are in general a factor of 2-3 higher than the default values in the 1996 IPCC guidelines. Romania could not provide robust evidence that the actual feeding corresponds to the recommendations from 1984. In addition, the feeding recommendations in Popa et al. (1984) and Stoica et al. (1997) and the body weights and the milk yields of sheep and goats applied in the inventory cannot be justified by comparison with data from other national and international scientific literature, e.g. Roşu et al. (2011), Ilişiu et al. (2010) ¹⁰ , Gavojdian et al. (2010) ¹¹ , Radu et al. ¹² and Pascal et al. ¹³ . A technical correction is therefore suggested.				
The assumptions, data	Since the data in the feeding tables could not be verified and significant				

⁸ O. Popa, M. Milos, P. Halga, El. Bunicelu, 1984: Livestock feeding, EDP. Bucharest.

⁹ Stoica, I., 1997: Animals nutrition and feeding. Coral-Sanivet Bucuresti Publishing House.

¹⁰ E. Ilişiu, S. Dărăban, M. Gabi-Neacşu, V.-C. Ilişiu, G. Rahmann: Landbauforschung – vTI. Agriculture and Forestry Research 4 2010 (60)259-266. Improvement of lamb production in Romania by crossbreeding of local Tsigai breed with high performance breeds

¹¹ Gavojdian, D., Pădeanu, I. Voia, S., Bratu, I., 2010: Study Regarding Body Weight of Yearlings and Mature Indigenous Sheep Breeds Reared in the Western Part of Romania Animal Science and Biotechnologies, 43 (2)

¹² R. Radu, Ana Enciu, A. Ida, G.P. Vicovan, Camelia-Zoia Zamfir, Alina Nicolescu: The improvement of the milk production in the sheep breeds and population from various climatic areas. Universitatea de Ştiinţe Agricole şi Medicină Veterinară Iaşi Research and Development Institute for Sheep and Goat Breeding Palas Constanţa

¹³ Pascal et al. (Lucrări Ştiinţifice - vol. 54, Seria Zootehnie)

and methodology used to calculate the technical correction

discrepancies exist compared to the current scientific literature and the data of neighbouring countries the TERT have applied a Tier 1 method for the Technical Correction of CH₄ from enteric fermentation, of 4.A.2 Buffalo, 4.A.3 Sheep, 4.A.4. Goats, 4.A.6 Horses, 4.A.7 Mules and Asses for the years 2005, 2008, 2009 and 2010..

Response from Romania on the technical correction

Romania does not accept the technical correction.

Final remarks by TERT

The TERT appreciates that Romania is moving to a Tier 2 method using country-specific factors for the source category 4.A Enteric fermentation. However, the TERT believes that the current Tier 2 estimates provided by Romania include considerable overestimations for buffaloes, sheep, goats, horses, mules and asses. The emission estimates for enteric fermentation from buffaloes, sheep, goats, horses, mules and asses are based on country specific feeding recommendations (Popa et al., 1984) and (Stoica et al., 1997). Converted to gross energy intake, these feeding values are in general a factor of 2-3 higher than the default values in the 1996 IPCC guidelines/the values used by other EU Member States. For sheep Romania uses 46.1 MJ/head/day (EU average: 20.9); for goats Romania uses 51.1 MJ/head/day (EU average: 15.8); for horses Romania uses 225.8 MJ/head/day (EU average: 111.6); for mules and asses Romania uses 181.2 MJ/head/day (EU average: 60.0).

Romania explained that the GE-intake from the ration is significantly higher than the IPCC values because the animal weights which were considered in the rations are higher. This hypothesis could not be validated when reviewing the scientific papers provided by Romania and found by the TERT (e.g. Roşu et al. 2011¹⁴). All studies show lower values on GE intake, milk yield and animal weights in the range of the values presented in other international scientific literature (see TERT background information paper reference RO4A+4B-17). Thus, the TERT is of the opinion that the feeding recommendations based on the feeding tables from Popa et al. (1984) and Stoica et al. (1997) are not representative for Romania. Based on the information given in the resubmission where a gross energy intake of 42.78 MJ/sheep/day is given, it can as an example be estimated that the Romanian inventory for milking sheep is probably based on a daily feed intake for the different periods: lactating period, no lactating period and pregnancy. The energy intake can be converted to dry matter by dividing it with 18.45 MJ/kg. This results in a daily average feed intake of approximately 2.3 kg dm/mother sheep/day for the whole year. Roşu et al. 2011, Table 4, shows considerable lower feed intake, (1.33-1.4 kg dry matter (SU in Romanian) in the beginning of the lactation period, where the feed consumption is high) than the figures given in the Romanian inventory.

Romania explained that in the DM calculation concentrates should not be considered. The TERT does not agree with this approach because all the feed is a source of methane and should be included. Furthermore, the TERT made some plausibility checks with other national data reported to Eurostat. In the NIR Romania has reported feeding plans for sheep, goats, horses and mules which include high amounts of beet roots which are not very commonly used as feed for these animals. The TERT has compared the feeding plans with the actual beet roots area grown and reported to Eurostat and found that the area grown with beet roots only cover 4% of what is required through the feeding plan based approach and reported in the inventory. This indicates that the feeding plans / feed intake assumptions for beet root used in the inventory are inconsistent with the area grown for beet root unless 96% of the beet root is imported.

¹⁴ Roşu, Ion, Nicoleta Roşu and Cristinel Şonea, 2011: Influence of Nutrition in Milk Production of Sheep and Lambs in Weight, Animal Science and Biotechnologies, 2011, 44 (1)

Romania explained that this beet root may be replaced by another forage, so that the ration nutritive input meets the category requirements. The TERT is of the opinion that the feeding with concentrates is very unusual for sheep. This conclusion is supported by Ilisiu (2010) and an answer received from Romania to a question regarding the high digestibility percentage of feed. . Additionally, the feeding of concentrates is very unlikely to result in such a high GE-intake of Romanian sheep.

Since the data in the feeding tables could not be verified and significant discrepancies exist compared to the scientific data and data from neighbouring countries, the TERT concludes that the country specific feeding data based on feeding recommendation used in the Romanian inventory cause an overestimation of emissions. The TERT therefore recommends that Romania use the default Emission Factors (EF) in the 1996 IPCC guidebook for buffalo, sheep, goats, horses and mules and asses for estimating the 2005 base year under the European Effort Sharing Decision. Before implementing a higher Tier 2 method in the Romanian inventory Romania should verify its country specific feeding data by another independent method (see TERT background information paper reference RO4A+4B-17). According to the IPCC Good Practice Guidelines it is good practice to apply sector specific QA/QC in case of key categories if country specific higher Tier methods are applied.

Finally, the TERT would like to express its appreciation for the constructive attitude of the Romanian colleagues during the review process in general and the country visit in particular which is demonstrated by the fact that Romania did provide resubmissions, including usually even more accurate data for almost all technical corrections included in the draft review report.

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'¹⁵, as well as data from other international organisations.

¹⁵ Service contract 070307/2009/548866/SER/C4 to the European Commission

Annex 4 – Correspondence references

Date	Reference
22 March 2012	Final CRF and NIR submission under the MMD, version ROU-2012-v1.2
21, 23 May 2012	Initial questions raised by the TERT during the desk review
7, 11, 12, 13, 15, 16 June 2012	Additional questions raised by the TERT during the centralised review
30 May, 1, 4, 8, 11, 12, 14, 15, 18, 19, 29 June 2012	Responses from Romania to TERT questions
7, 15 June	Telephone conferences (EEA, TERT lead reviewers and Romania)
21 June 2012	Draft technical corrections from TERT to Romania
6 July 2012	Response from Romania to TERT draft technical corrections
13 July 2012	Draft review report from TERT to Romania
17, 18 July	Country visit
19, 23, 31 July, 1, 2, 3, 7, 9, 10, 13 August 2012	Response and additional information from Romania to draft review report
16 August 2012	Draft final review report from TERT to Romania
17 August 2012	Response and additional information from Romania to final review report - phone conference
17 August 2012	Final review report to European Commission
31 August 2012	Revised review report to European Commission