

Final Review Report

2020 Comprehensive Review of National Greenhouse Gas Inventory Data

pursuant to Article 4(3) of Regulation (EU) No 2018/842 and to
Article 3 of Decision No 406/2009/EC

Romania

30 August 2020

European Environment Agency



Reference: 340201/2019/814628/SER/CLIMA.C.2

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Conclusions from the 2020 comprehensive review

This Final Review Report presents the findings from the 2020 review of the greenhouse gas (GHG) emission inventory of Romania, pursuant to:

- Article 4(3) of Regulation (EU) No 2018/842 (the 'Effort Sharing Regulation', ESR), for the purpose of setting out Romania's annual emission allocations (AEAs) for the years from 2021 to 2030 in terms of tonnes of CO₂ equivalent, and
- Article 3 of Decision No 406/2009/EC (the 'Effort Sharing Decision', ESD), for the purpose of verifying Romania's GHG emissions and achievement of its GHG emission limitation target in the year 2018

The review was carried out as a comprehensive review in line with Article 19(1) of Regulation (EU) No 525/2013 (the 'Monitoring Mechanism Regulation', MMR). The global warming potentials applied are those from the IPCC Assessment Report 4.

The reviewers carried out checks to verify the transparency, accuracy, consistency, comparability and completeness of the national GHG inventory for the years 2005, 2016, 2017 and 2018 submitted in 2020 by Romania pursuant to Article 7 of the MMR.

The review consisted of two steps. The initial checks in step 1 were performed by the EU inventory team (European Environment Agency (EEA), European Topic Centre on Climate Change Mitigation and Energy (ETC/CME), Joint Research Centre (JRC) and Eurostat). Step 2 was performed by a Technical Expert Review Team (TERT).

More information on the Effort Sharing legislation and the procedures for the 2020 comprehensive review is presented in the annexes of this review report.

Romania provided a resubmission to the Commission on 06/05/2020. The TERT considered this resubmission as the basis for the comprehensive review.

Step 1 and 2 conclusions

1. The reviewers raised 61 issues with Romania during the first and the second step of the 2020 comprehensive ESD review (see Table 1). The TERT provided recommendations for 19 of these issues. Other issues raised during the comprehensive review were clarified and are considered non-issues for the ESD review 2020.
2. The TERT identified cases where inventory data were prepared in a manner, which is inconsistent with UNFCCC guidance documentation or Union rules. In particular, the TERT identified a number of under- or over-estimates exceeding the threshold of significance pursuant to Article 31 of Commission Implementing Regulation (EU) No 749/2014.
3. Romania provided 12 revised estimates that were accepted by the TERT. Table 2 and Table 3 below summarise the revised estimates and further information is provided in the respective chapter of this report.
4. The TERT did not deem necessary any technical corrections in the meaning of Article 19(3)(c) of Regulation (EU) No 525/2013.
5. The TERT identified non-binding recommendations in order to improve the national inventory data of Romania (see Table 6).
6. The TERT considers that it received a response from Romania that was sufficient in order to undertake the comprehensive review appropriately.

Table 1: Overview of issues raised with Romania during the first and the second step

	Issues raised step 1 ¹	Issues raised step 2	Recommendations	Revised estimates ²	Technical corrections ³
Total	41	20	19	12	-
Energy	13	6	9	3	-
IPPU	6	3	3	2	-
Agriculture	20	9	5	5	-
Waste	2	2	2	2	-
Cross-cutting	-	-	-	-	-

¹ Excluding findings related to Land Use, Land Use Change and Forestry (LULUCF) and Kyoto Protocol (KP) LULUCF.

² Revised estimates: changes in inventory estimates triggered by the review, which were provided by the country and accepted by the TERT.

³ Technical corrections: changes in inventory estimates triggered by the review and provided by the TERT.

National totals for the purpose of Article 3 of Decision No 406/2009/EC (ESD)

Table 2: National totals for the purpose of Article 3 of Decision No 406/2009/EC

Emission source category	Reference	Emission estimates (kt CO ₂ equivalent) ¹ 2018
Total greenhouse gas emissions, including indirect CO ₂ , without Land Use, Land Use Change and Forestry, without international aviation, as reported by Romania pursuant to Article 7(4) of Regulation (EU) No 525/2013, taking into account any resubmission to the Commission	ROU_2020_9_23042020	116 115.115
Difference between original estimates and revised estimates provided by Romania and accepted by the TERT²		
1A1a Public electricity and heat production, CO ₂ , CH ₄ , N ₂ O	RO-1A1a-2020-0001	1 511.206
1A1b Petroleum refining, CO ₂ , CH ₄ , N ₂ O	RO-1A1b-2020-0001	-4.644
2F1a, HFCs	RO-2F-2020-0001	1.769
2F1e, HFCs	RO-2F1-2020-0002	-3.219
3A Enteric fermentation, CH ₄	RO-3-2020-0005	-3 512.153
3B Manure management, CH ₄	RO-3B-2020-0009	-648.144
3 Agriculture, N ₂ O	RO-3B-2020-0010	2 543.603
3C Rice cultivation, CH ₄	RO-3C-2020-0001	-23.115
3D Agricultural soils, N ₂ O	RO-3D1-2020-0004	1 491.599
5D Wastewater treatment and discharge, CH ₄	RO-5D-2020-0001	85.552
5D Wastewater treatment and discharge, N ₂ O	RO-5D-2020-0002	-113.926
Total greenhouse gas emissions including revised estimates		117 443.643
CO ₂ emissions from 1A3a Domestic Aviation ³	ROU_2020_9_23042020	166.175
NF ₃ emissions ³	ROU_2020_9_23042020	-

¹ The tables presented in this report show numbers rounded to three decimal places, although most numbers are available with greater precision. For all calculations (in particular of total GHG emissions and total ESD emissions), all available decimal places were used. Therefore, the totals shown may slightly differ from calculation results where only three decimals are taken into account.

² A positive difference indicates an increase compared to reported emissions. A negative difference indicates a decrease compared to reported emissions.

³ Included in the totals. NF₃ was included in the comprehensive review (see Table A-1) for the purpose of the ESR, but has to be deducted for the purpose of ESD.

National totals for the purpose of Article 4(3) of Regulation (EU) No 2018/842 (ESR)

Table 3: National totals for the purpose of Article 4(3) of Regulation (EU) No 2018/842

Emission source category	Reference	Emission estimates (kt CO ₂ equivalent) ¹			
		2005	2016	2017	2018
Total greenhouse gas emissions, including indirect CO ₂ , without Land Use, Land Use Change and Forestry, without international aviation, as reported by Romania pursuant to Article 7(4) of Regulation (EU) No 525/2013, taking into account any resubmission to the Commission	ROU_2020_9_23042020	151 387.140	114 287.851	116 875.468	116 115.115
Difference between original estimates and revised estimates provided by Romania and accepted by the TERT²					
1A1a Public electricity and heat production, CO ₂ , CH ₄ , N ₂ O	RO-1A1a-2020-0001	1 301.988	-132.636	835.302	1 511.206
1A1b Petroleum refining, CO ₂ , CH ₄ , N ₂ O	RO-1A1b-2020-0001	-2 069.717	-354.461	-212.534	-4.644
1A3b Road transportation, CO ₂	RO-1A3b-2020-0001	-	-529.801	-593.589	-
2F1a, HFCs	RO-2F-2020-0001	0.119	1.789	1.667	1.769
2F1e, HFCs	RO-2F1-2020-0002	-	-2.439	-2.738	-3.219
3A Enteric fermentation, CH ₄	RO-3-2020-0005	-2 767.504	-3 447.389	-3 466.065	-3 512.153
3B Manure management, CH ₄	RO-3B-2020-0009	-1 126.163	-782.477	-727.217	-648.144
3 Agriculture, N ₂ O	RO-3B-2020-0010	2 273.120	2 376.566	2 455.173	2 543.603
3C Rice cultivation, CH ₄	RO-3C-2020-0001	-12.427	-27.829	-26.650	-23.115
3D Agricultural soils, N ₂ O	RO-3D1-2020-0004	1 295.977	1 358.210	1 504.393	1 491.599
5D Wastewater treatment and discharge, CH ₄	RO-5D-2020-0001	470.157	104.964	96.114	85.552
5D Wastewater treatment and discharge, N ₂ O	RO-5D-2020-0002	-119.160	-113.582	-114.530	-113.926
Total greenhouse gas emissions including revised estimates		150 633.528	112 738.766	116 624.793	117 443.643
CO ₂ emissions from 1A3a Domestic Aviation ³	ROU_2020_9_23042020	188.117	83.745	147.532	166.175

¹ The tables presented in this report show numbers rounded to three decimal places, although most numbers are available with greater precision. For all calculations (in particular of total GHG emissions and total ESR emissions), all available decimal places were used. Therefore, the totals shown may slightly differ from calculation results where only three decimals are taken into account.

² A positive difference indicates an increase compared to reported emissions. A negative difference indicates a decrease compared to reported emissions.

³ Included in the totals

Statement from Romania on the conclusions presented by the TERT

Romania agrees with the aggregated GHG emission inventory estimates presented in Table 2 and Table 3.

Greenhouse gas emissions covered by Decision 406/2009/EC (ESD)

Table 4: Greenhouse gas emissions for the purpose of Article 3 of Decision No 406/2009/EC

Emission source category	Reference	Emission estimates (kt CO₂ equivalent)¹ 2018
Total greenhouse gas emissions including any accepted revised estimates provided by Romania and any technical corrections deemed necessary by the TERT	See Table 2 above	117 443.643
Total verified emissions from stationary installations under Directive 2003/87/EC	Extracted by the European Commission from EUTL on 9 March 2020 (as agreed at the Working Group I of the Climate Change Committee on 18 May 2015) ²	39 638.158
CO ₂ emissions from 1A3a Domestic Aviation	See Table 2 above	166.175
NF ₃ emissions	See Table 2 above	-
Total ESD emissions		77 639.310

¹ The tables presented in this report show numbers rounded to three decimal places, although most numbers are available with greater precision. For all calculations (in particular of total GHG emissions and total ESD emissions), all available decimal places were used. Therefore, the totals shown may slightly differ from calculation results where only three decimals are taken into account.

² The emissions of ETS stationary installations were independently verified and recorded in the EU Transaction Log (EUTL). These emissions do not derive from the national greenhouse gas emission inventory data and therefore the TERT was not tasked to review them.

Greenhouse gas emissions covered by Regulation (EU) No 2018/842 (ESR)

Table 5: Greenhouse gas emissions for the purpose of Article 4(3) of Regulation (EU) No 2018/842 (ESR)

Emission source category	Reference	Emission estimates (kt CO ₂ equivalent) ¹			
		2005 ³	2016	2017	2018
Total greenhouse gas emissions including any accepted revised estimates provided by Romania and any technical corrections deemed necessary by the TERT	See Table 3 above	150 633.528	112 738.766	116 624.793	117 443.643
Total verified emissions from stationary installations under Directive 2003/87/EC	Extracted by the European Commission from EUTL on 9 March 2020 (as agreed at the Working Group I of the Climate Change Committee on 18 May 2015) ²	-	39 778.381	40 617.496	39 638.158
CO ₂ emissions from 1A3a Domestic Aviation	See Table 3 above	188.117	83.745	147.532	166.175
Total ESR emissions		-	72 876.640	75 859.766	77 639.310

¹ The tables presented in this report show numbers rounded to three decimal places, although most numbers are available with greater precision. For all calculations (in particular of total GHG emissions and total ESR emissions), all available decimal places were used. Therefore, the totals shown may slightly differ from calculation results where only three decimals are taken into account.

² The emissions of ETS stationary installations were independently verified and recorded in the EU Transaction Log (EUTL). These emissions do not derive from the national greenhouse gas emission inventory data and therefore the TERT was not tasked to review them.

³ Due to changes in ETS scope and country coverage between 2005 and 2013, 'Total ESR emissions' cannot be calculated for 2005 by deducting 'Total verified emissions from stationary installations under Directive 2003/87/EC' and 'CO₂ emissions from 1A3a Domestic Aviation' from 'Total GHG emissions including any revised estimates and any technical corrections'.

Recommendations from the TERT, considering revised estimates and technical corrections deemed necessary by the TERT

Table 6: Recommendations from TERT (RE = Revised estimate; TC = Technical correction)

EMRT-ID	Key category	Category, gas, year	Recommendation	Revised estimate or technical correction in 2020
RO-1A1a-2020-0003	Yes	1A1a Public Electricity and Heat Production, CO ₂ , 2005, 2016-2018	For category 1A1a Public Electricity and Heat Production, CO ₂ /CH ₄ /NO ₂ emissions, and all years, the TERT noted that emissions reported in the GHG inventory are lower than emissions from EU-ETS as reported in MMR Annex: Implementing Regulation Article 10: "Reporting on consistency of reported emissions with data from the emissions trading system". In response to a question raised during the review, Romania explained that EU-ETS reports are used to estimate fuel consumptions for certain fuels and for others, the energy balance is used. Romania provided a revised estimate for the years 2005, 2016, 2017 and 2018 primarily based on EU-ETS data. The TERT agreed with the revised estimate provided by Romania. The TERT recommends that Romania include the revised estimate in its next submission.	RE
RO-1A1b-2020-0001	Yes	1A1b Petroleum Refining, CO ₂ , 2005, 2016-2018	For category 1A1b Petroleum Refining, CO ₂ /CH ₄ /NO ₂ emissions, and all years, the TERT noted that emissions reported in the GHG inventory are higher than emissions from EU-ETS as reported in MMR Annex: Implementing Regulation Article 10: "Reporting on consistency of reported emissions with data from the emissions trading system". In response to a question raised during the review, Romania explained that EU-ETS reports are not used to estimate activity data and calculate CO ₂ emissions. Romania provided a revised estimate for the years 2005, 2016, 2017 and 2018 primarily based on EU-ETS data. The TERT agreed with the revised estimate provided by Romania. The TERT recommends that Romania include the revised estimate in its next submission.	RE
RO-1A3b-2020-0001	Yes	1A3b Road Transportation, CO ₂ , 2016-2017	For category 1A3b Road Transportation, diesel oil, CO ₂ and for years 2016, 2017, the TERT noted that the values of the IEF are higher than the upper limit of the range proposed by the 2006 IPCC Guidelines (72.6-74.8 t/TJ). In response to a question raised during the review, Romania provided revised estimates for years 2016, 2017, using the default EF value available in Table 3.2.1 of 2006 IPCC guidelines and stated that it will be included in the next submission. The TERT agreed with the revised estimates provided by Romania. The TERT recommends that Romania include the revised estimate in its next submission.	RE

EMRT-ID	Key category	Category, gas, year	Recommendation	Revised estimate or technical correction in 2020
RO-2F-2020-0001	Yes	2F1a Commercial Refrigeration, HFCs, 2005, 2016-2018	For 2F1a Commercial Refrigeration and HFCs for all years, the TERT noted that the calculation method needed some clarifications. In response to a question raised during the review, Romania provided a file with the calculation method for commercial refrigeration. The file was corrected even if, eventually, the impact on the emissions proved to be under the threshold of significance. Romania provided revised estimates for years 2005, 2016, 2017 and 2018 and stated that it will be included in the next submission for the whole time series. The TERT agreed with the revised estimate provided by Romania. The TERT recommends that Romania extend the review of the calculation method to the remaining quantities at disposal and include the revised estimate in its next submission.	RE
RO-2F1-2020-0002	Yes	2F1 Refrigeration and Air Conditioning, HFCs, 2016-2018	For 2F1e Mobile Air Conditioning the TERT noted that Romania did not take into account the introduction of R-1234yf in mobile air conditioning. In response to a question raised during the review, Romania explained that this should be improved. Romania provided revised estimates for years 2016, 2017, 2018 based on the approach proposed by the TERT but using national ratios. Romania stated that it will be included in the next submission. The TERT agreed with the revised estimate provided by Romania but encourages Romania to verify further the share of R-1234yf in the fleet equipment, as the assumptions are still low. The TERT recommends that Romania include the revised estimate in its next submission.	RE
RO-3-2020-0005	Yes	3 Agriculture, CH ₄ , 1990-2018	For category 3A Enteric Fermentation and 3B Manure Management and gas CH ₄ for all years the TERT noted that many animal types in Romania have been estimated to have very high feed intake. Often more than twice the energy intake as given in the 2006 IPCC Guidelines. The result of this is very high CH ₄ emissions from enteric fermentation and manure management. In response to a question raised during the review, Romania submitted revised estimates based on IPCC Tier 1 and Tier 2 methodology combined with country specific data. The revised estimates were accepted by the TERT. The TERT recommends that Romania include the revised estimate in its next submission.	RE

EMRT-ID	Key category	Category, gas, year	Recommendation	Revised estimate or technical correction in 2020
RO-3B-2020-0009	Yes	3B Manure Management, CH ₄ , 1990-2018	<p>For category 3B Manure Management from swine and CH₄ for all years TERT noted that a high share of pig manure is allocated to Anaerobic lagoons. Anaerobic lagoons have a very high CH₄ emission factor (66%) compared to liquid manure handling (17%). Use of Anaerobic lagoons is very seldom in Europe as well as they have high temperature demands for working properly. The average temperature in Romania is 10 degrees C (Romanian NIR) under which temperatures Anaerobic lagoons do not function. The TERT is of the opinion that it is a misallocation of manure management systems in the Romanian inventory where the shares of swine manure allocated to Anaerobic lagoons should be seen as liquid manure. In response to a question raised during the review, Romania explained that it was based on the implementation in 2011 of the study “Elaboration of national emission factors/other parameters relevant to National Greenhouse Gas Inventory (NGHGI) Sector Energy, Industrial Process, Agriculture and Waste, to allow for the higher tier calculation methods”; the country-specific value of 25-35% was developed in the context of the mentioned study. According with the study mentioned (document "Memoriu_Raport_final.doc", pg.35), in Romania, all the systems described in the 2006 IPCC Guidelines are used, except for the “dry batch” system, which involves leaving manure in the shelter to dry and spread in the field after a long period of time." Romania has submitted revised estimates where the emission estimates are without Anaerobic lagoons. The TERT accept the revised estimates and recommend Romania to include these estimates in its next submission.</p>	RE

EMRT-ID	Key category	Category, gas, year	Recommendation	Revised estimate or technical correction in 2020
RO-3B-2020-0010	Yes	3B Manure Management, 3D Agricultural Soils, N ₂ O, 1990-2018	For category 3B Manure Management and 3D Agricultural Soils and N ₂ O for all years, the TERT noted that the estimated nitrogen excretion rates (Nex) for cattle, sheep and goats were below what was expected. In response to a question raised during the review, Romania provided revised estimates for the years 2005, 2016, 2017 and 2018 using default Tier 1 Nex data from the 2006 IPCC Guidelines. The TERT agreed that the revised estimate provided by Romania is an approximate for the N ₂ O emission for Romania and accepted these as currently the best estimate. However, as these sources are key categories for Romania, a Tier 2 approach should be used for estimating Nex from the animals. Romania is recommended to develop validated country specific Nex rates for these animal categories and implement these in its next submission. Furthermore, Romania is using the 2006 IPCC Guidelines methodology for estimating the indirect N ₂ O emission from volatilized nitrogen. The TERT recommends Romania to coordinate the estimation of volatilized nitrogen with the Romanian submission to the Convention on Long-range Transboundary Air Pollution (CLRTAP) for streamlining its reporting obligation. The TERT recommends that Romania update its emission estimates accordingly and include the revised estimate in its next submission to both the EU and UNFCCC.	RE
RO-3C-2020-0001	No	3C Rice Cultivation, CH ₄ , 2005, 2016-2018	For 3C Rice Cultivation, CH ₄ emissions and 2005, 2016, 2017 and 2018 the TERT noted that scaling factors might be not consistent with the assumptions in NIR 2020. The NIR indicated (SFw) corresponding to lowland – irrigated – intermittently flooded – multiple aeration water management regime (from Table 5.12 in 2006 IPCC Guidelines), but the factor in that table is 0.52, not 0.78 as used by Romania. The TERT also noted a lack of transparency in the calculations of SFo. In response to a question raised during the review, Romania provided a revised estimate for years 2005, 2016, 2017 and 2018. The TERT agreed with the revised estimate provided by Romania. The TERT recommends that Romania include the revised estimate in its next inventory submission, and further explain all assumptions for ROA estimates.	RE

EMRT-ID	Key category	Category, gas, year	Recommendation	Revised estimate or technical correction in 2020
RO-3D1-2020-0004	Yes	3D1 Direct N ₂ O Emissions from Managed Soils, N ₂ O, 2005, 2016, 2017, 2018	<p>For category 3D14 Crop Residues and N₂O emissions, the TERT noted that there may be an under-estimate of emissions. Following the NIR, Tables 5.26 and 5.27, high amounts of above-ground residues were removed from the fields (FracREMOVE). In its answer to a question raised during the review Romania could not justify the amounts of crop residues removed from the fields and used as fodder (25% of the straw, 20% of oats and maize grains, 30% of rape, sunflowers, 40% of sugar beet and 20% of the above-ground residues of textile plants). Romania provided a calculation sheet with data for 2005. The TERT calculated a technical correction by changing the fractions of crop residues assumed to be removed from the fields for the purpose of fodder to zero which resulted in revised estimates above the threshold of significance. In its answer to the PTC Romania provided a revised estimate including revised assumptions on the fractions removed from fields. The revised estimate was checked by the TERT and, unfortunately, could not be accepted as some incorrect calculations were detected (e.g. calculation of AGDM, calculation of CropT, calculation of FCR). Additionally, Romania used the value of zero for individual crops where no default IPCC values were available. In such cases the default values for major crop types provided in Table 11.2 of the 2006 IPCC Guidelines should be used. For forage crops a FracREMOVE of 1 instead of zero would be appropriate, Maize for silage was not considered in these calculations at all. The TERT raised a follow-up question including a commented version of the RE. In its reply Romania provided an updated version of its revised estimate taking the comments of the TERT into account. The revised estimate was checked by the TERT and, unfortunately, again could not be accepted as some incorrect calculations were detected: 1) the estimated total direct N₂O emissions from crop residues did not include emissions from all types of crop residues for 2017 and 2018 (some calculations were omitted); 2) for several crop types an incorrect ratio value of below-ground residues to above-ground biomass (RBG-Bio) was used. The organic N amounts (FON) 2016-2018 used in the calculation of the recalculation difference were not the same as reported in the CRF Table 3.D. The effect of the findings is above the threshold of significance for the year 2018. The TERT thus disagreed with the revised estimate provided by Romania. The TERT decided to calculate a technical correction on the basis of the revised estimate and the corrections mentioned above. In response to the draft review report, Romania provided another revised estimate taking into account the corrections applied by the TERT. The TERT recommends that Romania include the revised estimate in its next submission. The TERT further recommends that Romania improves its quality control procedures to ensure that all N inputs from all agriculture crop residues cultivated in Romania are considered in the calculations and that no N₂O emissions are omitted.</p>	RE

EMRT-ID	Key category	Category, gas, year	Recommendation	Revised estimate or technical correction in 2020
RO-5D-2020-0001	Yes	5D Wastewater Treatment and Discharge, CH ₄ , 1990-2018	For 5D1 Domestic Wastewater Treatment, CH ₄ , 1990-2018, the TERT noted that a MCF of 0.2 for centralised aerobic treatment was used and industrial wastewater co-discharged has not been taken into account, which is not in line with the 2006 IPCC Guidelines. In response to a question raised during the review, Romania agreed to use a country specific MCF for aerobic treatment of wastewater derived from information available from the Urban Wastewater Directive website (uwwtd.eu) and agreed to include co-discharged industrial wastewater with the IPCC default value of 1.25 for collected domestic wastewater. Romania provided revised estimates for years 2005, 2016, 2017 and 2018 and stated that it will be included in the next submission. The TERT agreed with the revised estimate provided by Romania. The TERT recommends that Romania include the revised estimate in its next submission.	RE
RO-5D-2020-0002	Yes	5D Wastewater Treatment and Discharge, N ₂ O, 1990-2018	The TERT notes with reference to 5D1 Domestic Wastewater Treatment, N ₂ O, all years 1990-2018 that Romania calculated N ₂ O emissions taking into account a factor for non-consumed protein of 1.4, which is to be applied if disposal of food via the drain is a common practise. In response to a question raised during the review, Romania agreed that this is not the case and therefore the default factor of 1.1 is more appropriate. Romania provided a revised estimate for years 2005, 2016, 2017 and 2018 and stated that it will be included in the next submission. The TERT agreed with the revised estimate provided by Romania. The TERT recommends that Romania include the revised estimate in its next submission.	RE
RO-1A3a-2020-0001	No	1A3a Domestic Aviation, CH ₄ , CO ₂ , N ₂ O, 2018	For Military Aviation, for all gases and fuels the TERT noted that based on information included in the CRF and NIR it was not clear where military aviation emissions were reported. The TERT notes that this issue does not relate to an over- or underestimate of emissions. In response to a question raised during the review, Romania explained that military transport related emissions are accounted in the CRF category 1A5a Other. The TERT recommends that Romania includes in the next NIR submission clear explanation on where military aviation emissions are included in the CRF.	No

EMRT-ID	Key category	Category, gas, year	Recommendation	Revised estimate or technical correction in 2020
RO-1A3b-2020-0002	Yes	1A3b Road Transportation, CO ₂ , 2018	For category 1A3b Road Transportation, CO ₂ emissions from fossil carbon content in biofuels the TERT noted that these emissions are not calculated by Romania and not reported separately in CRF tables. The TERT notes that this issue does not relate to an over- or underestimate of emissions that is above the threshold. Based also on a recommendation from last year (https://emrt-esd.eionet.europa.eu/2019/RO-1A3b-2019-0002), the TERT recommends that Romania calculates these emissions in future submissions, using data reported under the Article 7a of the Fuel Quality and the methodology provided in “Note on fossil carbon content in biofuels”.	No
RO-1A3c-2020-0001	No	1A3c Railways, CO ₂ , 2014-2018	For category 1A3c Railways, for liquid fuels, CO ₂ , for 2016-2018 the TERT noted that Romania uses county-specific EFs, which are outside the upper and lower default IPCC values. The TERT notes that this issue does not relate to an over- or underestimate of emissions (based on calculations performed by the TERT using default Tier 1 IPCC EFs). In response to a question raised during the review, Romania explained that in order to characterize more accurately the CO ₂ emissions in railways sector, and considering the use of the same fuels under stationary and mobile combustion, country-specific values derived from the European Union Emission Trading Scheme (EU - ETS) data have been used. The TERT recommends that Romania investigate the big changes (+15%, -12%) in the IEF from year to year and provide an explanation of this trend in the next submission.	No
RO-1B2a-2020-0001	Yes	1B2a Fugitive Emissions from Oil, CH ₄ , 1990-2018	For category 1B2a2 Oil Production and gas CH ₄ for the years 1990-2018 the TERT noted that Romania calculates these emissions with a Tier 1 methodology, applying the default emission factor from the 2006 IPCC Guidelines. According to Table 7 of Romania’s CRF, CH ₄ emissions from category 1B2a Oil are a key category in trend in 2018 (due to decreasing trend). In response to a question raised during the review related to shifting to a higher Tier method to calculate CH ₄ emissions from this source, Romania explained that it is further analysing this issue and, if possible, will make improvements in the following submissions of the inventory. The TERT recommends that Romania is setting efforts to calculate CH ₄ emissions from category 1B2a2 with a higher Tier method in future submissions.	No

EMRT-ID	Key category	Category, gas, year	Recommendation	Revised estimate or technical correction in 2020
RO-1B2b-2020-0001	Yes	1B2b Fugitive Emissions from Natural Gas, CH ₄ , 1990-2018	For CH ₄ emissions from subcategory 1B2b6 Natural Gas Other the TERT noted that, in response to a question raised during the review, Romania is applying a default emission factor from the Revised 1996 IPCC Guidelines, Former USSR, Central & Eastern Europe (Table 1-6), to calculate CH ₄ emissions from this source. The TERT noted that Romania is calculating emissions from other subcategories of sector 1B2 for the years 1989-1999 with default emission factors for developing countries and from the year 2000 onwards with default emission factors for developed countries from the 2006 IPCC Guidelines to reflect technical improvement in this sector. This approach is not reflected in subcategory 1B2b6. Therefore, the TERT considers the reported CH ₄ emissions from this source as overestimated, taking into account that countries with similar national circumstances calculate emissions from this source with default emission factors from the 2019 Refinement of the 2006 IPCC Guidelines (e.g. Bulgaria). The TERT noted that the issue is related to a non-mandatory category. The TERT recommends that Romania applies more accurate emission factors, either through a country specific methodology or more recent literature values applicable to the circumstances in Romania to calculate fugitive CH ₄ emissions from industrial plants, power stations as well as for appliances in the residential and commercial sectors.	No
RO-1B2c-2020-0001	Yes	1B2c Fugitive Emissions from Venting/Flaring, CH ₄ , 1990-2018	For category 1B2c1i (Venting/Oil) and gas CH ₄ for years 1990-2018 the TERT noted that Romania calculates these emissions with a Tier 1 methodology, applying the default emission factor from the 2006 IPCC Guidelines. According to Table 7 of Romania's CRF, CH ₄ emissions from category 1B2c are a key category in level in 2018. In response to a question raised during the review to shift to a higher Tier method to calculate CH ₄ emissions from this source, Romania explained that it is further analysing this issue and, if possible, will make improvements in the following submissions of the inventory. The TERT recommends that Romania makes the effort to calculate CH ₄ emissions from category 1B2c1i with a higher Tier method in the next submission.	No

EMRT-ID	Key category	Category, gas, year	Recommendation	Revised estimate or technical correction in 2020
RO-2B1-2020-0001	Yes	2B1 Ammonia Production, CO ₂ , 2005-2018	<p>For 2B1 Ammonia Production, CO₂ for all years, the TERT noted that EU-ETS emissions allocated to 2B1 are only at about 80-85% of the 2B1 CO₂ emissions reported in the inventory, which could indicate an overestimate of emissions. In response to a question raised during the review, Romania provided an explanation why the ETS emissions allocated are lower than the emissions reported in the inventory. The TERT notes that this issue does not relate to an over- or underestimate of emissions. The TERT recommends that Romania improves the allocation of ETS emission data to CRF codes, i.e. ETS emissions from ammonia production should be fully allocated to CRF 2B1 in order to facilitate the inventory consistency check and transparently describes how ETS data are used in the inventory and how the consistency with the energy balance is ensured.</p>	No

Revised estimates provided by Romania and accepted by the TERT

ESD Review Tool ID:	RO-1A1a-2020-0001
ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-1A1a-2020-0003
Country:	Romania
Sector:	1A1a Public Electricity and Heat Production
Gases:	CO ₂ , CH ₄ , N ₂ O
Fuel	N/A
Completed by Sector Expert:	Julien Vincent
Reviewed by Counterpart:	Katrina Young
Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen
Reviewed by Quality Controller:	Bernd Guegle

The underlying problem:	The TERT notes with reference to sector 1A1a Public Electricity and Heat Production, CO ₂ that there may be an underestimate of emissions. This underestimate may have an impact on total emissions that is above the threshold of significance. The TERT notes that this underestimate may be because Activity Data from 1A1a are based on the national energy balance which seems to present lower fuel consumptions than the EU-ETS reports as verified emissions under Directive 2003/87/EC are equivalent to 104,75% of the GHG inventory emissions (Annex_6.5_Comparison_with_ETS_data). The NIR states on page 192 that "the 1.A.1.a. - Electricity and Heat Production activity category covers emissions from fuel combustion in Main Activity Producer Electricity Plants, Main Activity Producer CHP Plants, Main Activity Producer Heat Plants and Own Use in Electricity, CHP and Heat Plants."
Summarise the methodology used:	Romania provided a Revised Estimate for the years 2005, 2016, 2017 and 2018. The revised estimate covers emissions from fossil fuels only, excluding biomass. 2016, 2017 and 2018 estimates are based on EU-ETS activity data and CO ₂ emissions. Estimate for 2005 is based on the energy balance. Non-CO ₂ GHG emissions are calculated based on 2006 IPCC Guidelines Tier 1 EF.

Year	Original estimate (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005	33 207.943	12.238	113.920						RO-1A1a-2020-0003.xlsx
2016	22 657.310	7.489	88.069						RO-1A1a-2020-0003.xlsx
2017	22 451.955	7.313	91.126						RO-1A1a-2020-0003.xlsx
2018	20 247.787	6.868	83.250						RO-1A1a-2020-0003.xlsx

Year	Revised Estimate received from country (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005	34 490.102	11.809	134.178						RE provided by Romania
2016	22 521.214	7.886	91.132						RE provided by Romania
2017	23 289.603	7.800	88.292						RE provided by Romania
2018	21 758.069	7.452	83.591						RE provided by Romania

Year	Difference between RE and OE (Gg CO ₂ e)							
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG
2005	1 282.159	-0.429	20.258					
2016	-136.096	0.397	3.063					
2017	837.648	0.488	-2.834					
2018	1 510.281	0.584	0.341					

ESD Review Tool ID:	RO-1A1b-2020-0001
ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-1A1b-2020-0001
Country:	Romania
Sector:	1A1b Petroleum Refining
Gases:	CO ₂ , CH ₄ , N ₂ O
Fuel	N/A
Completed by Sector Expert:	Julien Vincent
Reviewed by Counterpart:	Katrina Young
Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen
Reviewed by Quality Controller:	Bernd Guegle

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The underlying problem:	The TERT notes with reference to sector 1A1b Petroleum Refining, CO ₂ that there may be an overestimate of emissions because CO ₂ Verified emissions under Directive 2003/87/EC are different from the GHG inventory (for example equivalent to 80.35% of the GHG inventory emissions for the year 2018). This also impacts the other years 2005, 2016 and 2017. However, GHG emissions reported under EU-ETS for refineries should be 100% or more as refineries report total CO ₂ emissions under EU-ETS, including fugitive emissions. After a discussion with the country, it was made clear that EU-ETS data are not used directly so fuel consumptions considered in the GHG inventory are different from the ones from the EU-ETS reports.
Summarise the methodology used:	Romania provided a revised estimate for the years 2005, 2016, 2017 and 2018. The revised estimate covers emissions from fossil fuels, excluding transport diesel and Petroleum coke. 2016, 2017 and 2018 estimates are based on EU-ETS activity data and CO ₂ emissions. Estimate for 2005 is based on the Crude oil intake reported in the energy balance and an average ratio (kt CO ₂ /TJ of crude oil intake) calculated from EU-ETS data for 2016, 2017 and 2018. Non-CO ₂ GHG emissions are calculated based on 2006 IPCC Guidelines Tier 1 EF.

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Year	Original estimate (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005	3 893.660	1.988	2.930						Only residual fuel oil, refinery gas and natural gas in 1A1b
2016	1 922.480	0.858	1.026						Only residual fuel oil, refinery gas and natural gas in 1A1b
2017	1 740.880	0.783	0.936						Only residual fuel oil, refinery gas and natural gas in 1A1b
2018	1 454.710	0.651	0.779						Only residual fuel oil, refinery gas and natural gas in 1A1b

Year	Revised Estimate received from country (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005	1 827.004	0.807	1.049						See sheet "Data provided by RO"
2016	1 568.393	0.684	0.826						See sheet "Data provided by RO"
2017	1 528.570	0.681	0.813						See sheet "Data provided by RO"
2018	1 450.084	0.642	0.769						See sheet "Data provided by RO"

Year	Difference between RE and OE (Gg CO ₂ e)							
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG
2005	-2 066.656	-1.181	-1.881					
2016	-354.087	-0.173	-0.201					
2017	-212.310	-0.102	-0.123					
2018	-4.626	-0.008	-0.010					

1	ESD Review Tool ID:	RO-1A3b-2020-0001								
	ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-1A3b-2020-0001								
	Country:	Romania								
	Sector:	1A3b Road Transportation								
	Gases:	CO ₂								
	Fuel	Diesel oil								
	Completed by Sector Expert:	Matina Kastori								
	Reviewed by Counterpart:	Melanie Hobson								
	Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen								
Reviewed by Quality Controller:	Bernd Guegele									
The underlying problem:	For category 1A3b Road Transportation, diesel oil and gas CO ₂ , the TERT noted that for 2016-2017 the values of the IEF are higher than the upper limit of the range proposed by the 2006 IPCC Guidelines (72.6-74.8 t/TJ).									
Summarise the methodology used:	Romania provided a revised estimate which was obtained by multiplying the diesel consumption in road transportation (provided by the National Institute for Statistics through the Energy Balance), with the default emission factor available in Table 3.2.1 of IPCC 2006 guidelines.									
2	Original estimate (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	Notes
	2005									
	2016	11 855.262								1A3b Road Transportation, diesel oil
	2017	12 847.112								1A3b Road Transportation, diesel oil
	2018									
	Revised Estimate received from country (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	Notes
	2005									
	2016	11 325.462								1A3b Road Transportation, diesel oil
	2017	12 253.523								1A3b Road Transportation, diesel oil
	2018									
	Difference between RE and OE (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
	2005									
2016	-529.801									
2017	-593.589									
2018										

1	ESD Review Tool ID:	RO-2F-2020-0001								
	ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-2F-2020-0001								
	Country:	Romania								
	Sector:	2F1a Commercial Refrigeration								
	Gases:	HFCs								
	Fuel	N/A								
	Completed by Sector Expert:	Stephanie Barrault								
	Reviewed by Counterpart:	Barbara Gschrey								
	Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen								
Reviewed by Quality Controller:	Bernd Guegele									
The underlying problem:	The calculation method was unclear and needed some clarification about how the refrigerant stock and the remaining quantities at disposal were calculated. The calculation file has been sent by Romania and the TERT identified some errors. The TERT proposed corrections which were accepted by Romania.									
Summarise the methodology used:	Romania applied the following correction of the stock calculation: Stocks n = Stocks n-1 + Quantities of refrigerant used for servicing and initial charging of equipment – Emissions from operation n-1 – Emissions from disposal n which has finally a low impact on the product life emissions (Product life emissions = EF * stock)									
2	Original estimate (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	Notes
	2005				28.936					2F1a Commercial Refrigeration
	2016				389.689					2F1a Commercial Refrigeration
	2017				446.355					2F1a Commercial Refrigeration
	2018				460.504					2F1a Commercial Refrigeration
	Revised Estimate received from country (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	Notes
	2005				29.055					2F1a Commercial Refrigeration
	2016				391.478					2F1a Commercial Refrigeration
	2017				448.022					2F1a Commercial Refrigeration
	2018				462.272					2F1a Commercial Refrigeration
	Difference between RE and OE (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
	2005				0.119					
	2016				1.789					
	2017				1.667					
2018				1.769						

ESD Review Tool ID:	RO-2F1-2020-0002
ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-2F1-2020-0002#tab-qa
Country:	Romania
Sector:	2F1e Mobile Air-Conditioning
Gases:	HFCs
Fuel	N/A
Completed by Sector Expert:	Stephanie Barrault
Reviewed by Counterpart:	Barbara Gschrey
1 Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen
Reviewed by Quality Controller:	Bernd Guegle

The underlying problem:	The TERT noted that Romania did not take into account the introduction of R-1234yf in mobile air conditioning thereby overestimating the emissions of HFC-134a.
Summarise the methodology used:	Romania provided a revised estimate using a simplified approach - as suggested by the TERT - to take into account new equipment with R-1234yf as a share of the new market and its impact on the stock. Then Romania updated manufacturing and product life emissions using the same emission factors as for the original estimate. Romania introduced national data to improve the share of air-conditioned equipment and used data from an EC study.

Year	Original estimate (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005									
2016				479.563					2F1e Mobile Air-Conditioning
2017				546.635					2F1e Mobile Air-Conditioning
2018				627.430					2F1e Mobile Air-Conditioning

Year	Revised Estimate received from country (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005									
2016				477.124					2F1e Mobile Air-Conditioning
2017				543.896					2F1e Mobile Air-Conditioning
2018				624.210					2F1e Mobile Air-Conditioning

Year	Difference between RE and OE (Gg CO ₂ e)							
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG
2005								
2016				-2.439				
2017				-2.738				
2018				-3.219				

1	ESD Review Tool ID:	RO-3-2020-0005								
	ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-3-2020-0005#tab-qa								
	Country:	Romania								
	Sector:	3A Enteric Fermentation								
	Gases:	CH ₄								
	Fuel	N/A								
	Completed by Sector Expert:	Steen Gyldenkaerne								
	Reviewed by Counterpart:	Bernard Hyde								
Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen									
Reviewed by Quality Controller:	Bernd Guegle									
The underlying problem:	The TERT noted that the current used feed intake for sheep, buffalo, goats, horses, mules and poultry is a factor 2 to 2.5 higher than the IPCC default values. The feed intake has also influence on the CH ₄ emissions from Manure Management.									
Summarise the methodology used:	Romania provided revised estimates using for sheep the IPCC Tier 2 methodology and for the other animal categories IPCC Tier 1 methodology.									
2	Original estimate (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	Notes
	2005		4 924.900							3A and 3B for sheep, buffalo, goats, horses, mules, poultry
	2016		5 958.288							3A and 3B for sheep, buffalo, goats, horses, mules, poultry
	2017		5 978.361							3A and 3B for sheep, buffalo, goats, horses, mules, poultry
	2018		6 054.710							3A and 3B for sheep, buffalo, goats, horses, mules, poultry
	Revised Estimate received from country (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	Notes
	2005		2 157.396							See above
	2016		2 510.899							See above
	2017		2 512.296							See above
	2018		2 542.557							See above
	Difference between RE and OE (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
	2005		-2 767.504							
2016		-3 447.389								
2017		-3 466.065								
2018		-3 512.153								

ESD Review Tool ID:	RO-3B-2020-0009								
ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-3B-2020-0009#tab-qa								
Country:	Romania								
Sector:	3B Manure Management								
Gases:	CH ₄								
Fuel	N/A								
Completed by Sector Expert:	Steen Gyldenkaerne								
Reviewed by Counterpart:	Etienne Mathias								
1 Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen								
Reviewed by Quality Controller:	Bernd Guegele								
The underlying problem:	The TERT noted that Romania is reporting use of Anaerobic lagoons for handling of pig manure. Anaerobic lagoons have a very high CH ₄ emission factor compared to liquid handling of manure. An Anaerobic lagoon has a complete degradation of the organic matter in the lagoon. Anaerobic lagoons are very seldom in Europe as they do not work properly due to too low temperatures.								
Summarise the methodology used:	Romania provided revised estimates reallocating the amount of pig manure reported as treated in Anaerobic lagoons to liquid manure handling and applying default values from the 2006 IPCC Guidelines.								
	Original estimate (Gg CO₂e)								
Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	Notes
2005		1 595.618							3B3 Swine
2016		1 107.839							3B3 Swine
2017		1 029.585							3B3 Swine
2018		917.720							3B3 Swine
	Revised Estimate received from country (Gg CO₂e)								
Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	Notes
2005		469.455							3B3 Swine
2016		325.362							3B3 Swine
2017		302.367							3B3 Swine
2018		269.577							3B3 Swine
	Difference between RE and OE (Gg CO₂e)								
Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005		-1 126.163							
2016		-782.477							
2017		-727.217							
2018		-648.144							

1	ESD Review Tool ID:	RO-3B-2020-0010								
	ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-3B-2020-0010#tab-qa								
	Country:	Romania								
	Sector:	3 Agriculture								
	Gases:	N ₂ O								
	Fuel	N/A								
	Completed by Sector Expert:	Steen Gyldenkaerne								
	Reviewed by Counterpart:	Chris Dore								
Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen									
Reviewed by Quality Controller:	Bernd Guegle									
The underlying problem:	The TERT noted that nitrogen excretion rates from several animal categories are lower than default values and lower than in countries with similar productivity. This has implications for emissions in both categories 3B Manure Management and 3D Agricultural Soils.									
Summarise the methodology used:	Romania provided a revised estimate using default nitrogen excretion rates from the 2006 IPCC Guidelines for both categories 3B Manure Management and 3D Agricultural Soils.									
2	Original estimate (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	Notes
	2005			6 235.630						3B, 3D1.2a, and 3D1.3
	2016			5 856.747						3B, 3D1.2a, and 3D1.3
	2017			6 305.406						3B, 3D1.2a, and 3D1.3
	2018			7 091.972						3B, 3D1.2a, and 3D1.3
	Revised Estimate received from country (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	Notes
	2005			8 508.749						3B, 3D1.2a, and 3D1.3
	2016			8 233.312						3B, 3D1.2a, and 3D1.3
	2017			8 760.579						3B, 3D1.2a, and 3D1.3
	2018			9 635.575						3B, 3D1.2a, and 3D1.3
	Difference between RE and OE (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
	2005			2 273.120						
	2016			2 376.566						
	2017			2 455.173						
2018			2 543.603							

ESD Review Tool ID:	RO-3C-2020-0001
ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-3C-2020-0001#tab-qa
Country:	Romania
Sector:	3C Rice Cultivation
Gases:	CH ₄
Fuel	N/A
Completed by Sector Expert:	Beatriz Sanchez
Reviewed by Counterpart:	Katalin Lovas
1 Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen
Reviewed by Quality Controller:	Bernd Guegle

The underlying problem:	The TERT noted an inconsistency between the water regime indicated in the NIR (irrigated, intermittently flooded-multiple aeration) and the default scaling factor (SFw) used. Romania used an SFw of 0.78 which is the scaling factor for the aggregated case. However, Romania should have used the scaling factor for Intermittently flooded – multiple aeration disaggregated case which is 0.52 in the IPCC 2006 Guidelines.
Summarise the methodology used:	Romania provided revised estimates using the correct default scaling factors from the IPCC 2006 Guidelines. The organic amendment amount is based on rice production.

Year	Original estimate (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005		26.053							
2016		63.028							
2017		60.957							
2018		55.122							

Year	Revised Estimate received from country (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005		13.626							
2016		35.199							
2017		34.307							
2018		32.006							

Year	Difference between RE and OE (Gg CO ₂ e)							
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG
2005		-12.427						
2016		-27.829						
2017		-26.650						
2018		-23.115						

ESD Review Tool ID:	RO-3D1-2020-0004
ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-3D1-2020-0004#tab-qa
Country:	Romania
Sector:	3D Agricultural Soils
Gases:	N ₂ O
Fuel	N/A
Completed by Sector Expert:	Michael Anderl
Reviewed by Counterpart:	Katalin Lovas
Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen
Reviewed by Quality Controller:	Bernd Guegle

1	The underlying problem:	Romania assumed that considerable amounts of crop residues are removed from the field for the purpose of feeding. Expert assumptions were referred to in the NIR but not documented and justified. The TERT detected incorrect calculations in the calculation sheets (e.g. calculation of AGDM, calculation of CropT, calculation of FCR) and Romania used the value of zero if no default IPCC values for individual crops were available. However, in that cases the default values for major crop types provided in Table 11.2 of the 2006 IPCC Guidelines should be used. For forage crops the above-ground residues correspond to the harvest removed from the field. For these kinds of crops a FracREMOVE of 1 instead of zero would be appropriate. As the IPCC default values for wheat are not appropriate for European wheat species, for wheat the default values for grains could be used.
	Summarise the methodology used:	Romania submitted a Revised Estimate including the following revisions: corrected calculations of AGDM, CropT, FCR; use of IPCC default values for main crops and other crops instead of the use of zero; use of a FracRemove value of zero for the purpose of feeding for all crop types except for forage crops; consideration of green maize with a dry matter content of 30%. As there were still errors in the revised estimate provided by Romania the TERT calculated a potential technical correction implementing the following corrections to the revised estimate: Correction of ratio of below-ground residues to above-ground biomass (RBG-Bio) for several crop types; inclusion of the omitted N ₂ O emissions for several crop types to the 2017 and 2018 totals; use of the total amount of organic N fertiliser (FON) according to the CRF Table 3.D for comparison with previous inventory data. Romania provided another revised estimate taking into account the points made by the TERT, which was accepted by the TERT.

Year	Original estimate (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005			1 817.922						3D1.4 Crop Residues & 3D2.2 Nitrogen Leaching
2016			1 869.393						3D1.4 Crop Residues & 3D2.2 Nitrogen Leaching
2017			2 205.962						3D1.4 Crop Residues & 3D2.2 Nitrogen Leaching
2018			2 598.264						3D1.4 Crop Residues & 3D2.2 Nitrogen Leaching

Year	Revised Estimate received from country (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005			3 113.898						corrected RBG-Bio
2016			3 227.604						corrected RBG-Bio, FON
2017			3 710.355						corr. RBG-Bio, FON, omitted N ₂ O included
2018			4 089.863						corr. RBG-Bio, FON, omitted N ₂ O included

	Difference between RE and OE (Gg CO ₂ e)							
Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG
2005			1 295.977					
2016			1 358.210					
2017			1 504.393					
2018			1 491.599					

ESD Review Tool ID:	RO-5D-2020-0001
ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-5D-2020-0001#tab-qa
Country:	Romania
Sector:	5D Wastewater Treatment and Discharge
Gases:	CH ₄
Fuel	N/A
Completed by Sector Expert:	Elisabeth Kampel
Reviewed by Counterpart:	Hans Oonk
Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen
Reviewed by Quality Controller:	Bernd Guegle

1	The underlying problem:	The TERT noted that Romania is applying a MCF of 0.2 for centralised aerobic treatment, which is not in line with the 2006 IPCC Guidelines. Further industrial wastewater co-discharged has not been taken into account. In response to questions raised by the TERT Romania agreed with the issues found by the TERT and provided a revised estimate. Unfortunately, the revised estimate could not be verified by the TERT as only values have been provided, without the underlying calculations. For this reason, the TERT calculated a potential technical correction. After some further explanation and elaboration, Romania and the TERT agreed on a calculation that was submitted by Romania as revised estimate.
	Summarise the methodology used:	Romania provided a revised estimate where following wastewater treatment pathways are considered: (1) Unconnected to sewerage, Connected to centralised aerobic treatment, Connected without treatment. Population data for these wastewater treatment paths have been taken from information provided by Romania. For MCF-centralised WWTP, the values provided by Romania derived from the UWWTD website have been used: the MCF for 2005 is assumed to be the same as the averaged MCF calculated for 2009; the MCF for 2016 has also been used for 2017 and 2018. The BOD removed with sludge has been taken from the NIR (table 7.25) for treated wastewater. All other factors are from the 2006 IPCC Guidelines.

Year	Original estimate (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005		2 093.758							CH ₄ from 5D1
2016		1 497.148							CH ₄ from 5D1
2017		1 442.670							CH ₄ from 5D1
2018		1 383.593							CH ₄ from 5D1

Year	Revised Estimate received from country (Gg CO ₂ e)								Notes
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
2005		2 563.915							CH ₄ from 5D1
2016		1 602.112							CH ₄ from 5D1
2017		1 538.784							CH ₄ from 5D1
2018		1 469.145							CH ₄ from 5D1

Year	Difference between RE and OE (Gg CO ₂ e)							
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG
2005		470.157						
2016		104.964						
2017		96.114						
2018		85.552						

1	ESD Review Tool ID:	RO-5D-2020-0002								
	ESD Review Tool URL:	https://emrt-esd.eionet.europa.eu/2020/RO-5D-2020-0002#tab-qa								
	Country:	Romania								
	Sector:	5D Wastewater Treatment and Discharge								
	Gases:	N ₂ O								
	Fuel	N/A								
	Completed by Sector Expert:	Elisabeth Kampel								
	Reviewed by Counterpart:	Hans Oonk								
Reviewed by Lead Reviewer:	Ole-Kenneth Nielsen									
Reviewed by Quality Controller:	Bernd Guegle									
The underlying problem:	For the calculation of indirect N ₂ O emissions from 5D1 Domestic Wastewater Treatment a factor for non-consumed protein of 1.4 was used by Romania, which is only to be applied if disposal of food via the drain is a common practise. As this is not the case in Romania, the factor was changed to 1.1.									
Summarise the methodology used:	Romania provided revised estimates using a factor for non-consumed protein of 1.1 instead of 1.4.									
2	Original estimate (Gg CO₂e)									Notes
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
	2005			556.082						5D1 Domestic Wastewater
	2016			530.040						5D1 Domestic Wastewater
	2017			534.824						5D1 Domestic Wastewater
	2018			531.655						5D1 Domestic Wastewater
	Revised Estimate received from country (Gg CO₂e)									Notes
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
	2005			436.922						5D1 Domestic Wastewater
	2016			416.457						5D1 Domestic Wastewater
	2017			420.294						5D1 Domestic Wastewater
	2018			417.729						5D1 Domestic Wastewater
	Difference between RE and OE (Gg CO₂e)									
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Mixed GHG	
	2005			-119.160						
2016			-113.582							
2017			-114.530							
2018			-113.926							

Annex I: Legal background and procedures of the 2020 comprehensive review

The Effort Sharing Decision No 406/2009/EC (ESD) sets national emission limits for greenhouse gas (GHG) emissions in the sectors outside the EU's Emission Trading System (ETS) for the period 2013-2020. The ESD and the Monitoring Mechanism Regulation (EU) 525/2013 (MMR) lay down annual reporting obligations, compliance checks and a Union review process to ensure that the compliance with annual GHG emission limits is assessed in a credible, consistent, transparent and timely manner.

The requirements for the Union review of the national inventory data submitted by countries are set out in Article 19 of the MMR. The details concerning the review process, such as the timing and steps of conducting the annual and comprehensive reviews are set out in Chapter III and Annex XVI of the Commission Implementing Regulation (EU) No 749/2014.

The Effort Sharing Regulation (EU) 2018/842 (ESR) sets national emission limits for greenhouse gas emissions in the sectors outside the EU's ETS for the period 2021-2030. In Article 4(3) of the ESR, the Commission is required to adopt implementing acts setting out annual emission allocations (AEAs) for the period 2021-2030 in terms of CO₂ equivalents, for which it shall carry out a comprehensive review.

The 2020 Union review was thus held as a comprehensive review in line with MMR Article 19 (1) in concert with the Union review required by the ESR.

Objectives

The objectives of the comprehensive review of countries' GHG emission inventories in 2020 are:

- a) to support the European Commission by ensuring it has accurate, reliable and verified information on annual GHG emissions for
 - o determining compliance with ESD targets for the years 2018 in a credible, consistent, transparent and timely manner, and for
 - o setting out countries' annual emission allocations (AEAs) for the years from 2021 to 2030 in terms of tonnes of CO₂ equivalent, according to Article 4(3) of the ESR.
- b) to assist countries in improving the quality of their GHG inventories.

Procedures

The scope of the 2020 comprehensive review is presented in Table A-1. The checks carried out during the 2020 comprehensive review are presented in Annex II. The review consisted of two steps.

The Step 1 was combined with the 'EU QA/QC procedures' (i.e. initial checks) and was carried out by the EU inventory team (ETC/CME, JRC, Eurostat). All findings from the initial checks that were partly resolved or not resolved within the initial check phase were followed up in the second step of the review.

The EU inventory team consisted of the following experts:

- ETC/CME task manager: Nicole Mandl, Marion Pinterits (ETC/CME)
- Energy: Julien Vincent, Coralie Jeannot, Eva Krtková, Marion Pinterits, Matina Kastori, Giorgos Mellios, Markéta Müllerová, Bernd Gugele (ETC/CME), Michael Goll (Eurostat)
- IPPU: Barbara Gschrey, Lorenz Moosmann, Kristina Kaar, Lukas Emele, Maria Purzner, Ils Moorkens (ETC/CME)
- Agriculture: Adrian Leip, Janka Szemesová, Alexander De-Meij (JRC)
- Waste: Céline Gueguen (ETC/CME)
- LULUCF: Raúl Abad-Viñas (JRC)

- Quality coordinators: Adrian Leip, Giacomo Grassi (JRC), Bernd Gugele, Nicole Mandl, Marion Pinterits, Maria Purzner, Julien Vincent, Giorgos Mellios, Ils Moorkens, Kaat Jespers (ETC/CME)
- Cross-cutting: Nicole Mandl (ETC/CME)

Step 2 of the comprehensive review 2020 was performed by a Technical Expert Review Team (TERT) under service contract **340201/2019/814628/SER/CLIMA.C.2** of the Directorate General for Climate Action of the European Commission. The lead reviewers and sector review experts did not review emission inventories of countries where these individuals have themselves contributed to the compilation of that inventory, or presently are or have been any part of the decision-making process related to the compilation of that inventory. Reviewers who are nationals of the country whose inventory is concerned, did not take part in the review of that inventory.

The TERT consisted of the following experts:

- CRF categories 1A1, 1A2, 1A4, 1A5 (Stationary Combustion) + Reference Approach: Katrina Young, Julien Vincent and Stephan Poupa;
- CRF categories 1A3 Transport + 1D International Bunkers: Melanie Hobson, Jean-Marc André and Matina Kastori;
- CRF categories 1B Fugitive + 1C CO₂ Transport and Storage: Ioannis Sempos, Marlene Plejdrup and Marion Pinterits;
- CRF categories IPPU Fluorinated Gases: Barbara Gschrey, Jacek Skoskiewicz and Stephanie Barrault;
- CRF categories IPPU Other Gases than Fluorinated Gases: Emma Salisbury, Kristina Kaar and Wolfram Jörß;
- CRF categories 3A Enteric Fermentation and 3B Manure Management: Chris Dore, Steen Gyldenkærne and Bernard Hyde;
- CRF categories 3C-3J: Katalin Lovas, Etienne Mathias and Michael Anderl;
- CRF sector 5 Waste: Céline Gueguen, Elisabeth Kampel and Hans Oonk;
- Lead reviewers: Karin Kindbom, Suvi Monni, Ole-Kenneth Nielsen and Ralph Harthan;
- The following experts supported the team on request of the TERT: Tomas Gustafson (IPPU), Maria Purzner (F-gases), Beatriz Sanchez (Agriculture), Katja Pazdernik (Waste).

The second step of the review was coordinated by Bernd Gugele and Justin Goodwin.

The EEA review secretariat consisting of Melanie Sporer, Claire Qoul, Kirsten May, Justine Raoult and Henry Irvine prepared and coordinated the Union comprehensive review as foreseen in Article 28 of Commission Implementing regulations (EU) No 749/2014 and Article 42 of the Governance Regulation (EU) 2018/1999.

The step 2 of the review was performed on the basis of the 15 April submissions of GHG emission data and the national inventory report (NIR) under the Monitoring Mechanism. Resubmissions reported by countries were taken into account until 8 May 2020.

Where relevant, the TERT calculated technical corrections for over- or under-estimates identified in a mandatory category in the countries' GHG inventories that exceed the threshold of significance. Technical corrections have been calculated only for the years 2005 and 2016-2018. If the technical correction exceeds the threshold of significance for at least one year of the inventory under review (2005, and 2016-2018) but not for all the years the technical correction was calculated for all years under review in order to ensure time series consistency.

Table A-1: Scope of the comprehensive review 2020

Element	Scope	Further information
Countries	EU geographical coverage of the Member States, the United Kingdom, Norway and Iceland	
Years	2005, 2016, 2017, 2018	According to MMR Article 27(2); According to MMR Article 19(1); According to ESR Article 4(3)
Gases	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆ , NF ₃	
Sectors	All emission source sectors excluding LULUCF	National totals exclude emissions from LULUCF and emissions reported under memo items
Indirect CO ₂ emissions	Included in national total	

Annex II: Checks carried out during the 2020 comprehensive review in line with Art. 29, 32 and 33 of the Commission Implementing Regulation (EU) No 749/2014

First step review checks:

1. Assessment whether all emission source categories and gases required under Regulation (EU) No 525/2013 are reported;
2. Assessment whether emissions data time series are consistent;
3. Assessment whether implied emission factors across Member States are comparable taking the IPCC default emission factors for different national circumstances into account;
4. Assessment of the use of 'Not Estimated' notation keys where IPCC Tier 1 methodologies exist and where the use of the notation key is not justified in accordance with paragraph 37 of the UNFCCC reporting guidelines on annual greenhouse gas inventories as included in Annex I to Decision 24/CP.19;
5. Analysis of recalculations performed for the inventory submission, in particular if the recalculations are based on methodological changes;
6. Comparison of the verified emissions reported under the Union's Emissions Trading System with the greenhouse gas emissions reported pursuant to Article 7 of Regulation (EU) No 525/2013 with a view of identifying areas where the emission data and trends as submitted by the Member State under review deviate considerably from those of other Member States;
7. Comparison of the results of Eurostat's reference approach with the Member States' reference approach;
8. Comparison of the results of Eurostat's sectoral approach with the Member States' sectoral approach;
9. Assessment whether recommendations from earlier Union or UNFCCC reviews, not implemented by the Member State could lead to a technical correction;
10. Assessment whether there are potential over-estimations or under-estimations relating to a key category in a Member State's inventory.

Second step review checks:

1. Detailed examination of the inventory estimates including methodologies used by the Member State in the preparation of inventories;
2. Detailed analysis of the Member State's implementation of recommendations related to improving inventory estimates as listed in its most recent UNFCCC annual review report made available to that Member State before the submission under review or in the final review report pursuant to Article 35(2) of this Regulation; where recommendations have not been implemented a detailed analysis of the justification provided by the Member State for not implementing them;
3. Detailed assessment of the time series consistency of the greenhouse gas emissions estimates;
4. Detailed assessment whether the recalculations made by a Member State in the given inventory submission as compared to the previous one are transparently reported and made in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories;
5. Follow-up on the results of the checks referred to in Article 29 of the Commission Implementing Regulation (EU) No 749/2014 and on any additional information submitted by the Member State under review in response to questions from the technical experts review team and other relevant checks.