

# Final Review Report

## 2018 annual review of national greenhouse gas inventory data

pursuant to Article 19(2) of Regulation (EU) No 525/2013

### Romania

30 June 2018

European Environment Agency



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## Conclusions from the 2018 annual ESD review

This Final Review Report presents the findings from the 2018 annual review of the GHG emission inventory of Romania, pursuant to Article 19(2) of Regulation (EU) No 525/2013, with a view to monitoring Romania's achievement of its greenhouse gas emission reduction or limitation target pursuant to Article 3 of Decision No 406/2009/EC (the 'Effort Sharing Decision', ESD) in 2016.

The reviewers carried out checks to verify the transparency, accuracy, consistency, comparability and completeness of the national greenhouse gas inventory for the year 2016 submitted in 2018 by Romania pursuant to Articles 7(1) and 7(3) of Regulation (EU) No 525/2013.

The review consisted of two steps:

1. The EU inventory team (European Environment Agency (EEA), European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM), Joint Research Centre (JRC) and Eurostat) performed the initial checks under Step 1.
2. A Technical Expert Review Team (TERT) performed Step 2 of the 2018 annual ESD review.

More information on the Effort Sharing Decision and the procedures for the 2018 annual ESD review is presented in the annexes to this review report.

### Step 1 conclusions

Romania provided in the 15 January submission for some important categories of the inventory estimates for the reviewed year 2016 identical to the estimates for the year 2015 submitted in 2017. This prevented carrying out of the review procedure according to the timeline set out in Annex XVI of the Commission Implementing Regulation (EU) 749/2014. Therefore, Romania was subject to the second step of the 2018 annual ESD review. The EU inventory team identified 8 significant issues in the limited checks performed.

### Step 2 conclusions

1. The TERT raised 46 issues with Romania during the first and the second step of the review 2018. The TERT provided recommendations for 10 of these issues (see Table 1). Other issues raised during the annual review were clarified and are considered resolved.
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 underestimates or overestimates exceeding the threshold of significance pursuant to Article 31 of Commission Implementing Regulation (EU) No 749/2014.
3. Romania provided 4 revised estimates. The TERT agreed with these revised estimates. Table 2 below summarises the revised estimates and further information is provided at the end of this report.
4. On that basis, the TERT did not deem necessary any technical corrections within the meaning of Article 19(3)(c) of Regulation (EU) No 525/2013 in consultation with Romania.
5. The TERT identified non-binding recommendations in order to improve the national inventory data of Romania (see Table 4).
6. The TERT considers that it received a response from Romania that was sufficient in order to undertake the annual review appropriately.

**Table 1: Issues raised with Romania during the first and the second step**

	Issues raised <sup>1</sup>	Recommendations	Revised estimates <sup>2</sup>	Technical corrections <sup>3</sup>
<b>Total</b>	<b>46</b>	<b>10</b>	<b>4</b>	<b>-</b>
Energy	33	10	4	-
IPPU	3	-	-	-
Agriculture	8	-	-	-
Waste	2	-	-	-
Cross-cutting	-	-	-	-

<sup>1</sup> Excluding findings related to Land use, land use change and forestry (LULUCF) and LULUCF KP.

<sup>2</sup> Revised estimates: changes in inventory estimates triggered by the review and provided by the Member State.

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

## National totals

**Table 2: National totals**

Data / Source category	Reference	Emission estimates (kt CO <sub>2</sub> equivalent) <sup>1</sup> 2016
Total greenhouse gas emissions, including indirect CO <sub>2</sub> , without land use, land-use change and forestry as reported by Romania pursuant to Articles 7(1) and 7(3) of Regulation (EU) No 525/2013	ROU_2017_7_12032018	112 542.364
<b>Difference between original estimates and revised estimates provided by Romania and accepted by the TERT<sup>2</sup></b>		
1B1 Fugitive emissions from solid fuels, CH <sub>4</sub>	RO-1B1-2018-0001	370.762
1A4c, N <sub>2</sub> O	RO-1A4c-2018-0002	92.310
1A3b Road transportation, CO <sub>2</sub>	RO-1A3b-2018-0006	-57.917
1A1b Energy Industries / Petroleum Refineries, CO <sub>2</sub>	RO-1A1b-2018-0001	37.648
<b>Total greenhouse gas emissions including accepted revised estimates provided by Romania</b>		<b>112 985.168</b>
CO <sub>2</sub> emissions from 1A3a Domestic aviation	ROU_2017_7_12032018	83.745
NF <sub>3</sub> emissions	ROU_2017_7_12032018	-

<sup>1</sup> 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 would be taken into account.

<sup>2</sup> A positive difference indicates an increase compared to reported emissions. A negative difference indicates a decrease compared to reported emissions.

## Greenhouse gas emissions covered by Decision 406/2009/EC

**Table 3: Greenhouse gas emissions covered by Decision 406/2009/EC**

Data	Reference	Emissions (kt CO <sub>2</sub> equivalent) <sup>1</sup> 2016
Total greenhouse gas emissions including accepted revised estimate(s) provided by Romania	<i>See Table 2 above</i>	112 985.168
Total verified emissions from stationary installations under Directive 2003/87/EC	Extracted by the European Commission from EUTL on 8 March 2018 (as agreed at the Working Group I of the Climate Change Committee on 18 May 2015) <sup>2</sup>	39 778.381
CO <sub>2</sub> emissions from 1A3a Domestic aviation	<i>See Table 2 above</i>	83.745
NF <sub>3</sub> emissions	<i>See Table 2 above</i>	-
<b>Total ESD emissions</b>		<b>73 123.042</b>

<sup>1</sup> 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 would be taken into account.

<sup>2</sup> 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.

## Statement from Romania on the conclusions presented by the TERT

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

## Revised estimates provided by Romania and accepted by the TERT

1	ESD Review Tool ID:	RO-1A1b-2018-0001
	ESD Review Tool URL:	<a href="https://emrt-esd.eionet.europa.eu/2018/RO-1A1b-2018-0001">https://emrt-esd.eionet.europa.eu/2018/RO-1A1b-2018-0001</a>
	Member State:	Romania
	Sector:	1.A.1.b Energy Industries / Petroleum Refineries
	Gases:	CO <sub>2</sub>
	Fuel	Gaseous fuels
	Completed by Sector Expert:	Ioannis Sempas
	Reviewed by Counterpart:	Graham Anderson
	Reviewed by Lead Reviewer:	Klaus Radunsky
	Reviewed by Quality Controller:	Bernd Guegle
The underlying problem:	The TERT noted with reference to CRF Table 1.A(a)s1 and category 1.A.1.b Energy Industries / Petroleum Refineries / gaseous fuels / CO <sub>2</sub> emissions / year 2016 that there may be an under estimate of emissions. The CO <sub>2</sub> IEF of gaseous fuels is 50.23 tCO <sub>2</sub> /TJ, which is outside the range proposed by the 2006 IPCC Guidelines; an outlier of the time series of CO <sub>2</sub> IEFs of 1.A.1.b category / gaseous fuels; and around 11% lower than the EF that is used in other sectors of the Romanian's inventory. During the review, Romania confirmed that there was an error in the data used in the calculation of CO <sub>2</sub> emissions. Romania provided a revised estimate, which was accepted by the TERT.	
The rationale for the corrected estimate:	Underestimation of CO <sub>2</sub> emissions from CRF Category 1.A.1.b Energy Industries / Petroleum Refineries / gaseous fuels	
Summarise the methodology used:	The revised estimate provided by Romania during the review was based on the country specific CO <sub>2</sub> EF of natural gas that was also used in the estimation of CO <sub>2</sub> emissions of other categories (e.g. 1.A.1.a), which is 55.54 t/TJ.	
References to other workbooks:		

2	<b>Details of the corrected estimate</b>								
			<b>Original estimate (kt CO<sub>2</sub>eq)</b>						Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	
	RO-1A1b-2018-0001- OE	2016	356.52						
	<b>Was a Revised Estimate received from the MS?</b>		<b>yes</b>						
			<b>Revised Estimate received from MS (kt CO<sub>2</sub>eq)</b>						Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	
	RO-1A1b-2018-0001-RE	2016	394.167						
	<b>Was the Revised Estimate accepted by the TERT?</b>		<b>yes</b>						
			<b>Technical Correction calculated by TERT (kt CO<sub>2</sub>e)</b>						Notes
	Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>		
RO-1A1b-2018-0001-TC	2016								
<b>Was the Technical Correction accepted by the MS?</b>									



1	ESD Review Tool ID:	RO-1A3b-2018-0006
	ESD Review Tool URL:	<a href="https://emrt-esd.eionet.europa.eu/2018/RO-1A3b-2018-0006">https://emrt-esd.eionet.europa.eu/2018/RO-1A3b-2018-0006</a>
	Member State:	Romania
	Sector:	1.A.3.b Road transportation
	Gases:	CO <sub>2</sub>
	Fuel	Liquid fuels
	Completed by Sector Expert:	Ioannis Sempos
	Reviewed by Counterpart:	Graham Anderson
	Reviewed by Lead Reviewer:	Klaus Radunsky
	Reviewed by Quality Controller:	Bernd Guele
	The underlying problem:	For CRF category 1.A.3.b Road transport, fuel diesel, and gas CO <sub>2</sub> for year 2016, the TERT noted that in CRF Table 1.A(a)s3 the IEF of CO <sub>2</sub> is 81.92 tCO <sub>2</sub> /TJ, which is higher than the upper limit of the range proposed by the 2006 IPCC Guidelines (72.6-74.8 t/TJ), and the highest IEF among EU Member States. According to the NIR, page 224, CO <sub>2</sub> emissions were estimated by applying Copert 4 emission factors. The TERT also noted that the diesel fuel consumption reported in the CRF Table 1.A(a)s3 for road transportation deviates from the fuel consumption reported in the national energy balance. More specifically, according to the energy balance, 3760 kt of diesel (without including biodiesel) with NCV 40.649 TJ/kt were used in road transportation, which are 152,840.24 TJ. In CRF, 5.6% lower diesel consumption was reported (144,715.20 TJ). The TERT noted that if we use the fuel consumption based on energy balance to calculate CO <sub>2</sub> emissions, by applying the CO <sub>2</sub> EF from Copert 4, then emissions are 57.92 kt lower compared to CRF tables. This is a potential overestimation above the significance level.
	The rationale for the corrected estimate:	Overestimation of CO <sub>2</sub> emissions from CRF Category 1.A.3.b Road transportation / diesel fuel.
	Summarise the methodology used:	The revised estimate was calculated on the basis of activity data from national energy balance (Annex 4.2 to the NIR), and by following the COPERT 4 methodology as Romania used in emission calculations (i.e. default Copert 4 CO <sub>2</sub> EF 3.137592 kgCO <sub>2</sub> /kg fuel and country specific NCV 40.649 TJ/kt).
	References to other workbooks:	

2	<b>Details of the corrected estimate</b>								
			<b>Original estimate (kt CO<sub>2</sub>eq)</b>						Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	
	RO-1A3b-2018-0006- OE	2016	11855.26						
	<b>Was a Revised Estimate received from the MS?</b>		<b>no</b>						
			<b>Revised Estimate received from MS (kt CO<sub>2</sub>eq)</b>						Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	
	RO-1A3b-2018-0006-RE	2016							
	<b>Was the Revised Estimate accepted by the TERT?</b>		<b>no</b>						
			<b>Technical Correction calculated by TERT (kt CO<sub>2</sub>e)</b>						Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	
	RO-1A3b-2018-0006-TC	2016	11797.346						
	<b>Was the Technical Correction accepted by the MS?</b>		<b>YES</b>						

1	ESD Review Tool ID:	RO-1A4c-2018-0002
	ESD Review Tool URL:	<a href="https://emrt-esd.eionet.europa.eu/2018/RO-1A4c-2018-0002">https://emrt-esd.eionet.europa.eu/2018/RO-1A4c-2018-0002</a>
	Member State:	Romania
	Sector:	1.A.4.c
	Gases:	N <sub>2</sub> O
	Fuel	Liquid fuels (diesel and gasoline)
	Completed by Sector Expert:	Ioannis Sempas
	Reviewed by Counterpart:	Graham Anderson
	Reviewed by Lead Reviewer:	Klaus Radunsky
	Reviewed by Quality Controller:	Justin Goodwin
	The underlying problem:	For CRF category 1.A.4.c Other sectors / agriculture, fuel diesel and gasoline, and gas CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O for years 1990-2016, the TERT noted that emissions are reported aggregately under CRF category 1.A.4.c.i (Stationary), without being separated between stationary and mobile sources. For gas N <sub>2</sub> O and 2016, the reported IEF is 0.58 kg/TJ, which is quite close to the 2006 IPCC default EF for stationary sources (0.6kg/TJ). However, the N <sub>2</sub> O IEF deviates significantly from the EF for mobile sources which is 28.6 kgN <sub>2</sub> O/TJ (2006 IPCC default). Additionally, in general fuel consumption in agriculture sector is mainly linked to mobile or other agriculture equipment, the engine / motor of which resemble to mobile sources. The TERT checked the GHG inventory submissions of other Member States and identified that the share of liquid fuels used in mobile activities in agriculture are for example 95.8%, 98.5% and 91.5% for Poland, Slovakia and Hungary, respectively. During the review, Romania provided detailed information about the types of fuels used in Agriculture. This revised estimate is based on this information.
	The rationale for the corrected estimate:	Underestimation of N <sub>2</sub> O emissions from CRF sector 1.A.4.c.
	Summarise the methodology used:	The revised estimation was based on detailed activity data about fuel consumption in agriculture sector, which were provided by Romania, during the review week. Tier default EFs from 2006 IPCC GLs were applied to estimate the associated N <sub>2</sub> O emissions.
	References to other workbooks:	

<b>Details of the corrected estimate</b>								
2			Original estimate (kt CO <sub>2</sub> eq)					Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	
	RO-1A4c-2018-0002- OE	2016			2.04			
	Was a Revised Estimate received from the MS?		yes					
			Revised Estimate received from MS (kt CO <sub>2</sub> eq)					Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	
	RO-1A4c-2018-0002-RE	2016			94.35			
	Was the Revised Estimate accepted by the TERT?		yes					
			Technical Correction calculated by TERT (kt CO <sub>2</sub> e)					Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	
	RO-1A4c-2018-0002-TC	2016						
	Was the Technical Correction accepted by the MS?							

1	ESD Review Tool ID:	RO-1B1-2018-0001
	ESD Review Tool URL:	<a href="https://emrt-esd.eionet.europa.eu/2018/RO-1B1-2018-0001">https://emrt-esd.eionet.europa.eu/2018/RO-1B1-2018-0001</a>
	Member State:	Romania
	Sector:	1.B.1 Fugitive emissions from solid fuels
	Gases:	CH <sub>4</sub>
	Fuel	n/a
	Completed by Sector Expert:	Ioannis Sempos
	Reviewed by Counterpart:	Graham Anderson
	Reviewed by Lead Reviewer:	Klaus Radunsky
	Reviewed by Quality Controller:	Bernd Guegele
	The underlying problem:	Romania reported that no CH <sub>4</sub> emissions occurred from category 1B1a1i - underground mining (notation key 'NO') in 2016, although CH <sub>4</sub> emissions were reported for the previous years of the time series (1990-2015). Romania based this estimation on its national energy balance. Because the statistical difference of bituminous coal reported in the national energy balance for year 2016 was considered high (-840 kt), the TERT further investigated this issue during Step 2 of the ESD review. During the review, Romania provided data of bituminous coal production from underground mines, which were obtained through collaboration with INSEMEX (National Institute for Research and Development in Mine Safety and Protection to Explosion), and were received directly from the mining exploitation operators.
	The rationale for the corrected estimate:	Underestimation of CH <sub>4</sub> emissions from CRF Category 1.B.1.a.i Underground mines
	Summarise the methodology used:	The revised estimate was based on activity data provided by Romania about bituminous production from underground mines. Tier 1 default EFs from 2006 IPCC GLs were applied to estimate the associated CH <sub>4</sub> emissions.
References to other workbooks:		

2	<b>Details of the corrected estimate</b>								
			Original estimate (kt CO <sub>2</sub> eq)						Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	
	RO-1B1-2018-0001- OE	2016		0.00					
	Was a Revised Estimate received from the MS?		yes						
			Revised Estimate received from MS (kt CO <sub>2</sub> eq)						Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	
	RO-1B1-2018-0001-RE	2016		370.76					
	Was the Revised Estimate accepted by the TERT?		yes						
			Technical Correction calculated by TERT (kt CO <sub>2</sub> e)						Notes
		Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	
	RO-1B1-2018-0001-TC	2016							
	Was the Technical Correction accepted by the MS?								

## Recommendations from the TERT including revised estimates and technical corrections

**Table 4: Recommendations from the TERT**

EMRT - ID	Key category	Category, gas, year	Conclusion step 2 note	Revised estimate	Technical correction
RO-1A1b-2018-0001	Yes	1.A.1.b Petroleum refining, CO <sub>2</sub> , 2016	For CRF Category 1.A.1.b Energy Industries / Petroleum Refineries / gaseous fuels / CO <sub>2</sub> / 2016 the TERT noted that there may be an underestimate of emissions. The CO <sub>2</sub> IEF of gaseous fuels is 50.23 t CO <sub>2</sub> /TJ, which is outside the range proposed by the 2006 IPCC Guidelines. It is an outlier of the time series 2015/2016 and around 11% lower than the Emission factor that is used in other sectors of the Romanian's inventory. In response to a question raised during the review, Romania explained that there was an error in the data used in the calculation of CO <sub>2</sub> emissions. Romania provided a revised estimate for year 2016 and stated that it will be included in the next submission. The TERT agreed with the revised estimate provided by Romania and attached to the annex of the review report. The TERT recommends that Romania include the revised estimate in its next submission. The TERT also noted that this revised estimate is below the threshold of significance.	Yes	No
RO-1A3b-2018-0006	Yes	1.A.3.b Road transportation, CO <sub>2</sub> , 2016	For CRF category 1.A.3.b Road transport, fuel diesel, and gas CO <sub>2</sub> for year 2016, the TERT noted that in CRF Table1.A(a)s3 the IEF of CO <sub>2</sub> is 81.92 tCO <sub>2</sub> /TJ, which is higher than the upper limit of the range proposed by the 2006 IPCC Guidelines (72.6-74.8 t/TJ), and the highest IEF among EU Member States. According to the NIR, page 224, CO <sub>2</sub> emissions were estimated by applying Copert 4 emission factors. The TERT also noted that the diesel fuel consumption reported in the CRF Table1.A(a)s3 for road transportation deviates from the fuel consumption reported in the national energy balance (Annex 4.2 of the NIR). More specifically, according to the energy balance, 3760 kt of diesel (without including biodiesel) with NCV 40.649 TJ/kt were used in road transportation, which are 152,840.24 TJ. In CRF, 5.6% lower diesel consumption was reported (144,715.20 TJ). The TERT noted that if we use the fuel consumption based on energy balance to calculate CO <sub>2</sub> emissions, by applying the CO <sub>2</sub> EF from Copert 4, then emissions are 57.92 kt lower compared to CRF tables. This is a potential overestimation above the significance level. In response to a question raised during the review, Romania provided a revised estimate for year 2016 and stated that it will be included in the next submission. The TERT agreed with the revised estimate provided by Romania and attached to the annex of the review report. The TERT recommends that Romania include the revised estimate in its next submission.	Yes	No
RO-1A4c-2018-0002	No	1.A.4.c Agriculture/for estry/fishing, N <sub>2</sub> O, 2016	For CRF category 1.A.4.c Other sectors / agriculture the TERT noted that emissions are reported aggregately under CRF category 1.A.4.c.i (Stationary), without being separated between stationary and mobile sources. For gas N <sub>2</sub> O and 2016, the reported IEF is 0.58 kg/TJ, which is quite close to the 2006 IPCC default EF for stationary sources (0.6kg/TJ). However, the N <sub>2</sub> O IEF deviates significantly from the EF for mobile sources which is 28.6 kgN <sub>2</sub> O/TJ (2006 IPCC default). Additionally, in general fuel consumption in agriculture sector is mainly linked to mobile or other agriculture equipment, the	Yes	No

EMRT - ID	Key category	Category, gas, year	Conclusion step 2 note	Revised estimate	Technical correction
			engine / motor of which resemble to mobile sources. The TERT checked the GHG inventory submissions of other Member States and identified that the share of liquid fuels used in mobile activities in agriculture are for example 95.8%, 98.5% and 91.5% for Poland, Slovakia and Hungary, respectively. In response to a question raised during the review, Romania provided detailed activity data about fuel consumption in agriculture sector. The revised estimate for 2016 is based on these activity data. Romania also stated that the revised estimate will be included in the next submission. The TERT agreed with the revised estimate provided by Romania and attached to the annex of the review report. The TERT recommends that Romania include the revised estimate in its next submission.		
RO-1B1-2018-0001	Yes	1.B.1 Fugitive emissions from solid fuels, CH <sub>4</sub> , 2016	For CRF category 1.B.1.a.1.i Underground mining the TERT noted that CH <sub>4</sub> emissions were reported as not occurred (notation key 'NO') in 2016, although CH <sub>4</sub> emissions were reported for the previous years of the time series (1990-2015). Romania based this estimation on its national energy balance. Because the statistical difference of bituminous coal reported in the national energy balance for year 2016 was considered high (-840 kt), the TERT further investigated this issue during Step 2 of the ESD review. In response to a question raised during the review, Romania provided data of bituminous coal production from underground mines, which were obtained through collaboration with INSEMEX (National Institute for Research and Development in Mine Safety and Protection to Explosion), and were received directly from the mining exploitation operators. The revised estimate for 2016 is based on these activity data. Romania also stated that the revised estimate will be included in the next submission. The TERT agreed with the revised estimate provided by Romania and attached to the annex of the review report. The TERT recommends that Romania include the revised estimate in its next submission.	Yes	No
RO-1A1a-2018-0002	Yes	1.A.1.a Public electricity and heat production, CO <sub>2</sub> , 2016	For CRF category 1.A.1.a Public electricity and heat production, fuel lignite, and gas CO <sub>2</sub> for year 2016, the TERT noted that the oxidation factor of lignite is 91%. The TERT noted that this oxidation factor is significantly lower compared to the oxidation factor reported by other EU Member States for lignite power plants. Even Member States with old lignite-fired power plants report higher oxidation factors (>94%). In response to a question raised during the review, Romania explained that the results for the oxidation factor are generated by accredited ISO 17025 laboratories, which are considered to have the competence and the ability to generate technically valid results using relevant analytical procedures. Romania also explained that the laboratories are accredited by the Romanian Accreditation Association-RENAR and that the operators are not required to submit test reports generated by the laboratory. The TERT notes that this issue does not relate to an over or underestimate of the emissions of the ESD sectors and recommends that Romania include the above information, which was provided during the review, in the next NIR report, along with an example of the laboratory analysis performed by EU-ETS operators that contains all the assumptions, measurements and calculations that are	No	No

EMRT - ID	Key category	Category, gas, year	Conclusion step 2 note	Revised estimate	Technical correction
			applied to estimate the oxidation factor. By this way, Romania will provide a sufficient and transparent justification of the oxidation factor applied in 1.A.1.a category for lignite.		
RO-1A5b-2018-0001	No	1.A.5.b Mobile, CH <sub>4</sub> , CO <sub>2</sub> , N <sub>2</sub> O, 1990-2016	For CRF category 1.A.5 Other mobile, liquid fuels, and gases CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O for all years of the time series 1990-2016, the TERT noted that emissions were reported as 'NO' in CRF table Table1.A(a)s4. The TERT also notes that Romania has a military air force according to public information found in web (e.g. Wikipedia). The emissions associated to military flights have to be included under the ESD total and therefore should not be reported under category 1.A.3.a Civil aviation. The TERT noted that in response to a question raised during the review Romania did not provide information whether the emissions associated to military flights are estimated and reported. By making a rough estimation using data from other EU Member States, the TERT concluded that the issue is most likely below the threshold of significance (see attached file). The TERT recommends that Romania include CO <sub>2</sub> emissions from this category in its inventory or demonstrate that emissions are below the level of significance.	No	No
RO-1AB-2018-0003	No	1.A.B Reference approach, CO <sub>2</sub> , 2016	According to the comparison between reference and sectoral approach for 2016 reported in CRF Table1.A(c), the TERT noted that for solid fuels the difference of energy consumption is 0.74% (quite good), while the difference in CO <sub>2</sub> emissions is 9.27% (rather high). In response to a question raised during the review, Romania did not provide an explanation about the difference in CO <sub>2</sub> emissions in 2016. The replies of Romania were related to the inter-annual variation of the difference of energy consumption between the reference and sectoral approaches, instead of the difference of CO <sub>2</sub> emissions. During the review, the TERT figured out that the reason for the difference of CO <sub>2</sub> emissions of solid fuels is explained by the different oxidation factor considered in the two approaches. Namely, in sectoral approach, the oxidation factor of lignite is 91%, while in the Reference Approach 100% of oxidation was considered. By considering the same oxidation factor, the difference between the two approaches becomes 0.45%. The TERT notes that this issue does not relate to an over or underestimate and recommends that Romania include the above information in the next NIR.	No	No
RO-1AB-2018-0004	No	1.A.B Reference approach, CO <sub>2</sub> , 2016	According to the comparison between the reference and sectoral approach for 2016 reported in CRF Table1.A(c), the TERT noted that for liquid fuels the difference of energy consumption is -1.29%, which can be considered an acceptable level; however, the difference in CO <sub>2</sub> emissions is -7.42%, which is rather high. In the NIR, pages 143-144, this difference is not sufficiently explained. In response to a question raised during the review, Romania provided evidence that focuses on the justification of the difference in energy consumption between the two approaches, but not on the difference in CO <sub>2</sub> emissions. The TERT notes that the difference between the two approaches may be attributed to: a. the use of country specific EFs for secondary liquid fuels (e.g. diesel, RSO) in the Reference Approach, while a default EF is used for primary fuel and in particular crude oil; b. the fact that the associated CO <sub>2</sub> emissions to reducing agents are reported under IPPU sector in the sectoral approach, while they are	No	No

EMRT - ID	Key category	Category, gas, year	Conclusion step 2 note	Revised estimate	Technical correction
			not excluded from the reference approach. The TERT notes that this issue most likely does not relate to an over or underestimate and recommends that Romania include a clear explanation, preferably quantitatively, of the difference between the two approaches, as concerns the CO <sub>2</sub> emissions associated to liquid fuels, in the next submission.		
RO-1B1-2018-0002	Yes	1.B.1 Fugitive emissions from solid fuels, CH <sub>4</sub> , 2016	For 1.B.1.a.i Abandoned underground mines, CH <sub>4</sub> emissions, 2016, the TERT noted that the information included in the NIR is not sufficient for the reader, in order to replicate the emissions estimation. In particular, Romania did not report about the percentage of coal mines that are gassy for the time intervals considered. In response to a question raised during the review, Romania explained that Romania, in estimating emissions from abandoned mines, used the arithmetic mean of default EFs in Table 4.1.5 of the 2006 IPCC Guidelines. The use of the arithmetic mean was considered more appropriate, because they do not have historical data on abandoned mines (coal rank, mine depth, etc.). The TERT notes that this issue does not relate to an over or underestimate and recommends that Romania include the above explanation provided during the review week in the next NIR submission, along with any other information that justifies their selection of the percentage of coal mines that are considered gassy in the time intervals 1976-2000 and 2001-present, and the rationale - criteria of choosing this percentage (e.g. coal rank, gas content, depth of mining, recorded instances of gassy mines, etc).	No	No
RO-1B-2018-0001	Yes	1.B Fugitive emissions from fuels, CH <sub>4</sub> , 1990-2016	For categories 1.B.1 Fugitive emissions from fuels / Solid fuels and 1.B.2 Fugitive emissions from fuels / Oil and natural gas, and gas CH <sub>4</sub> for years 1990-2016, the TERT noted that Romania applies Tier 1 method from the 2006 IPCC Guidelines. According to the 2006 IPCC Guidelines, it is good practice to move to a Tier 2 or Tier 3 approach when a category is key. In response to a question raised during the review, Romania replied that it will analyse this issue and, if possible, will make improvements to the following inventory submissions. Due to lack of national emission factors, the TERT is unable to determine whether the issue relates to an over or underestimate above the threshold of significance. Noting that this is a key category, the TERT recommends that Romania include the collection of more detailed AD as well as development of country-specific emission factors in its inventory improvement plan.	No	No

## Annex I: Legal background and procedures of the 2018 annual ESD 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 Member States 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 regulations (EU) No 749/2014.

The objectives of the 2018 annual ESD review of Member States' GHG emission inventories are:

- a) to support the European Commission by ensuring it has accurate, reliable and verified information on annual GHG emissions for determining compliance with ESD targets for the year 2016 in a credible, consistent, transparent and timely manner, according to Article 19 (2) of the MMR;
- b) to assist Member States in improving the quality of their GHG inventories.

The 2018 annual ESD review of national greenhouse gas (GHG) inventory data was carried out for the compliance year 2016 pursuant to Article 19 of the MMR. The EEA review secretariat (consisting of Melanie Sporer, Claire Qoul and Emma Salisbury) coordinated the 2018 annual ESD review as foreseen in Article 28 of the Commission Implementing Regulation (EU) No 749/2014.

The scope of the 2018 annual ESD review is presented in Table A.1.1. The checks carried out during the 2018 annual ESD review are presented in Annex I.

The review consisted of 2 steps. Step 1 was combined with the 'EU QA/QC procedures' (i.e. initial checks) and was carried out by the EU inventory team (EEA, ETC/ACM, JRC, Eurostat). All findings from the initial checks that were relevant for the ESD and that were not resolved within the initial check phase were followed up in the second step of the annual review.

Step 2 of the 2018 annual ESD review was performed by a Technical Expert Review Team (TERT) under service contract 340201/2017/765292/SER/CLIMA.C2 of the Directorate General for Climate Action of the European Commission. The TERT consisted of the following experts:

- Lead Reviewers: Suvi Monni, Klaus Radunsky
- Energy: Laetitia Nicco, Graham Anderson, Ioannis Sempas
- IPPU: Kristina Kaar, Eva Krtkova
- Agriculture: Etienne Mathias, Katalin Lovas
- Waste: Hans Oonk, Juraj Farkas
- Quality controller: Justin Goodwin
- Co-ordinator: Bernd Gugele

The lead reviewers and sector review experts did not review emission inventories of Member States 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 Member State whose inventory is concerned, did not take part in the review of that inventory.

Step 2 of the review was performed on the basis of GHG emission data and the national inventory report (NIR) officially reported by Member States by 15 March 2018 under the MMR. Where relevant, the TERT calculated technical corrections for over- or underestimates identified in a mandatory category in the



Member States' GHG inventories that exceed the threshold of significance. Technical corrections were calculated for the year 2016.

**Table A.1.1: Scope of the 2018 annual ESD review**

Element	Scope	Further information
Member States	EU geographical coverage of the Member States	
Years	2016	
Gases	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, HFCs, PFCs, SF <sub>6</sub>	NF <sub>3</sub> is not covered by the ESD
Sectors	All emission source sectors excluding LULUCF	National totals exclude emissions from LULUCF and emissions reported under memo items
Indirect CO <sub>2</sub> emissions	Included in national total	
Inventory Submission	Submissions received by 15 March 2018	

## Annex II: Checks carried out during the 2018 annual ESD review in line with Art.29 and 32 of the Commission Implementing Regulation (EU) No 749/2014

**As part of the EU's effort to assist Member States in improving the quality of the GHG inventories, the checks to verify the transparency, consistency, comparability and completeness of the greenhouse gas inventory included:**

### **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 overestimations or underestimations 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.