

Final Review Report

2017 annual review of national greenhouse gas inventory data

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

Croatia

30 June 2017

European Environment Agency



Reference: 34.0201/2016/743206/SER/CLIMA.C2
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Conclusions from the 2017 annual ESD review

This Final Review Report presents the findings from the 2017 annual review of the GHG emission inventory of Croatia, pursuant to Article 19(2) of Regulation (EU) No 525/2013, with a view to monitoring Croatia'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 2015.

The reviewers carried out checks to verify the transparency, accuracy, consistency, comparability and completeness of the national greenhouse gas inventory for the year 2015 submitted in 2017 by Croatia pursuant to Article 7(3) of Regulation (EU) No 525/2013.

The review consisted in 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 2017 annual ESD review.

More information on the Effort Sharing Decision and the procedures for the 2017 annual ESD review is presented in the annexes to this review report.

Step 1 conclusions

The EU inventory team could not fully perform the Step 1 checks because Croatia provided an inventory identical to the one submitted in 2016, which is not in agreement with the review procedure set out in Annex XVI of the Commission Implementing Regulation (EU) 749/2014. Therefore, Croatia was subject to the second step of the 2017 annual ESD review.

Step 2 conclusions

1. The reviewers raised 49 issues with Croatia during the first and the second step of the review 2017 (see Table 1). The TERT provided recommendations for 16 of these issues. 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. Croatia provided five revised estimates. The TERT agreed to four of these revised estimates. Table 2 below summarises the revised estimates and further information is provided at the end of this report.
4. As one revised estimate was not acceptable for the TERT, the TERT also deemed necessary one technical correction in the meaning of Article 19(3)(c) of Regulation (EU) No 525/2013 and calculated such technical correction(s) in consultation with Croatia. Table 2 below summarises the technical correction and further information is provided at the end of this review report. In its response to the draft technical correction, Croatia stated that it agreed with this technical correction.
5. The TERT identified non-binding recommendations in order to improve the national inventory data of Croatia (see Table 4).
6. The TERT considers that it received a response from Croatia that was sufficient in order to undertake the annual review appropriately.

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

	Issues raised	Recommendations	Revised estimates ¹	Technical corrections ²
Total	49	16	4	1
Energy	14	5	-	-
IPPU	12	4	2	-
Agriculture	16	5	1	-
Waste	6	2	1	1
Cross-cutting	1	-	-	-

¹ Revised estimates: changes in inventory estimates triggered by the review and provided by the Member State.

² 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 ₂ equivalent) ¹
		2015
Total greenhouse gas emissions, including indirect CO ₂ , without land use, land-use change and forestry as reported by Croatia pursuant to Article 7(3) of Regulation (EU) No 525/2013.	HRV_2017_08032017	23 502.150
Difference between original estimates and revised estimates provided by Croatia and accepted by the TERT²		
2.A.2 Lime production, CO ₂	HR-2A2-2017-0001	27.499
2.B.1 Ammonia production, CO ₂	HR-2B1-2017-0001	35.233
3.A Enteric fermentation, CH ₄ , N ₂ O	HR-3A-2017-0002	178.692
5.D Wastewater treatment and discharge, N ₂ O	HR-5D-2017-0003	- 17.880
Difference between original estimate and technical correction deemed necessary by the TERT²		
5.D Wastewater treatment and discharge, CH ₄	HR-5D-2017-0001	256.620
Total greenhouse gas emissions including any accepted revised estimates provided by Croatia and one technical correction deemed necessary by the TERT		23 982.313
CO ₂ emissions from 1.A.3.a Domestic aviation	HRV_2017_08032017	30.796
NF ₃ emissions	HRV_2017_08032017	-

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 would be taken into account.

² 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 ₂ equivalent) ¹
		2015
Total greenhouse gas emissions including accepted revised estimates provided by Croatia and one technical correction deemed necessary by the TERT	<i>See Table 2 above</i>	23 982.313
Total verified emissions from stationary installations under Directive 2003/87/EC	Extracted by the European Commission from EUTL on 8 March 2017 (as agreed at the Working Group I of the Climate Change Committee on 18 May 2015) ²	8 386.213
CO ₂ emissions from 1.A.3.a Domestic aviation	<i>See Table 2 above</i>	30.796
NF ₃ emissions	<i>See Table 2 above</i>	-
Total ESD emissions		15 565.304

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 would be 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.

Statement from Croatia on the conclusions presented by the TERT

Croatia agrees with the aggregated GHG emission inventory estimates presented in Table 2.

Technical corrections deemed necessary by the TERT

1	ESD Review Tool ID:	HR-5D-2017-001
	ESD Review Tool URL:	https://emrt.eea.europa.eu/2017/HR-5D-2017-0001#tab-qa
	Member State:	Croatia
	Sector:	5.D Wastewater treatment and discharge
	Gases:	CH ₄
	Fuel	
	Completed by (SE):	Juraj Farkas
	Reviewed by (Counterpart):	Hans Oonk
	Reviewed by (LR):	Klaus Radunsky
	The underlying problem:	Croatia provided revised estimate, stated that 20 % of the water is processed by waste water treatment plant and 80 % of water ends in septic tank, thus emissions are estimated from 80 % of waste water in this pathway. This is underestimation of emissions. Croatia agrees that all pollution (BOD5) ends in the septic tank and no pollution is discharged to the environment.
	The rationale for the corrected estimate:	The IPCC 2006 methodology specifies that emissions from wastewater treatment depend on organic matter (BOD5) present in the wastewater only. The amount of water or type of its use has therefore no influence on the amount of emissions from waste water treatment.
	Summarise the methodology used:	Full recalculation according to IPCC 2006 default methodology, Volume 5, Chapter 6, Eq. 6.1 and 6.2, parameters from Table 6.2 and 6.3. Activity data (DOC and population) from NIR 2017 Table 7.5-1 used. Entire timeline recalculated.
	References to other workbooks:	

2

Details of the corrected estimate								
		Original estimate (Gg CO ₂ eq)						Notes
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
HR-5D-2017-001-OE	2015		109.980					
Was a Revised Estimate received from the MS?								
		yes						
		Revised Estimate received from MS (Gg CO ₂ eq)						Notes
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
HR-5D-2017-001-RE	2015		293.250					
Was the Revised Estimate accepted by the TERT?								
		no						
		Technical Correction calculated by TERT (Gg CO ₂ eq)						Notes
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
HR-5D-2017-001-TC	2015		366.600					
Was the Technical Correction accepted by the MS?								
		yes						

Revised estimates provided by the MS and accepted by TERT

1	ESD Review Tool ID:	HR-2A2-2017-0001
	ESD Review Tool URL:	https://emrt.eea.europa.eu/2017/HR-2A2-2017-0001
	Member State:	Croatia
	Sector:	2.A.2 Lime production
	Gases:	CO ₂
	Fuel	n/a
	Completed by (SE):	Daniela Romano
	Reviewed by (Counterpart):	Eva Krtkova
	Reviewed by (LR):	Klaus Radunsky
	The underlying problem:	Croatia did not include CO ₂ emissions from lime production in sugar refineries in category 2.A.2. According to the 2006 IPCC Guidelines these CO ₂ emissions should be accounted for in 2.A.2 Lime production.
The rationale for the corrected estimate:	Underestimation of CO ₂ emissions.	
Summarise the methodology used:	Croatia provided a revised estimate which included also CO ₂ emissions from lime production in sugar refineries in category 2.A.2.	
References to other workbooks:	n/a	

2	Details of the corrected estimate								
			Original estimate (Gg CO₂eq)						Notes
		Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
	HR-2A2-2017-0001-OE	2015	73.397						
	Was a Revised Estimate received from the MS?		yes						
			Revised Estimate received from MS (Gg CO₂eq)						Notes
		Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
	HR-2A2-2017-0001-RE	2015	100.896						
	Was the Revised Estimate accepted by the TERT?		yes						
			Technical Correction calculated by TERT (Gg CO₂eq)						Notes
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆		
HR-2A2-2017-0001-TC	2015								
Was the Technical Correction accepted by the MS?		-							

1	ESD Review Tool ID:	HR-2B1-2017-0001
	ESD Review Tool URL:	https://emrt.eea.europa.eu/2017/HR-2B1-2017-0001
	Member State:	Croatia
	Sector:	2.B.1 Ammonia production
	Gases:	CO ₂
	Fuel	n/a
	Completed by (SE):	Daniela Romano
	Reviewed by (Counterpart):	Eva Krtkova
	Reviewed by (LR):	Klaus Radunsky
	The underlying problem:	Croatia subtracted CO ₂ emissions for dry ice production in the ammonia production process. According to the 2006 IPCC Guidelines (box 3.1), the amount of CO ₂ recovered from ammonia production used in freezing applications is not accounted for separately and it should be assumed that all the CO ₂ will be released in the producing country.
The rationale for the corrected estimate:	Underestimation of CO ₂ emissions.	
Summarise the methodology used:	As Croatia had no accurate information on where dry ice was applied Croatia submitted a revised estimate without subtracting CO ₂ emissions for dry ice production.	
References to other workbooks:	n/a	

2	Details of the corrected estimate								
			Original estimate (Gg CO₂eq)						Notes
		Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
	HR-2B1-2017-0001-OE	2015	537.042						
	Was a Revised Estimate received from the MS?		yes						
			Revised Estimate received from MS (Gg CO₂eq)						Notes
		Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
	HR-2B1-2017-0001-RE	2015	572.275						
	Was the Revised Estimate accepted by the TERT?		yes						
			Technical Correction calculated by TERT (Gg CO₂eq)						Notes
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆		
HR-2B1-2017-0001-TC	2015								
Was the Technical Correction accepted by the MS?		-							

1	ESD Review Tool ID:	HR-3A-2017-0002
	ESD Review Tool URL:	https://emrt.eea.europa.eu/2017/HR-3A-2017-0002#tab-qa
	Member State:	Croatia
	Sector:	3 Agriculture
	Gases:	CH ₄ , N ₂ O
	Fuel	n/a
	Completed by (SE):	Rocio Condor
	Reviewed by (Counterpart):	Chris Dore
	Reviewed by (LR):	Klaus Radunsky
	The underlying problem:	The TERT identified a problem related to animal numbers (swine and poultry) which is associated with an underestimation of methane and nitrous oxide emissions. There were significant inconsistencies between the animal numbers reported by Croatia in the CRF and FAO statistical data related to annual average population.
The rationale for the corrected estimate:	Underestimation of methane and nitrous emissions for swine and poultry	
Summarise the methodology used:	Croatia has provided the TERT with worksheets of their revised estimates based on the updated number of animals for swine and poultry for all relevant source categories of agriculture. Those revised animal numbers more accurately describe the relationship between production figures (number of animals produced yearly) and annual average population. Estimates are provided in sheets of the Excel file: emissions, AD provided. Original estimates from Croatia were obtained from the CRF submission (Table3s1, Table3s2).	
References to other workbooks:	n/a	

2	Details of the corrected estimate								
			Original estimate (Gg CO₂eq)						Notes
		Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
	HR-3A-2017-0002-OE	2015		1 368.818	1 117.166				
	Was a Revised Estimate received from the MS?		yes						
			Revised Estimate received from MS (Gg CO₂eq)						Notes
		Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
	HR-3A-2017-0002-RE	2015		1 488.411	1 176.265				
	Was the Revised Estimate accepted by the TERT?		yes						
			Technical Correction calculated by TERT (Gg CO₂eq)						Notes
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆		
HR-3A-2017-0002-TC	2015								
Was the Technical Correction accepted by the MS?		-							

1	ESD Review Tool ID:	HR-5D-2017-0003
	ESD Review Tool URL:	https://emrt.eea.europa.eu/2017/HR-5D-2017-0003#tab-qa
	Member State:	Croatia
	Sector:	5.D Wastewater treatment and discharge
	Gases:	N ₂ O
	Fuel	
	Completed by (SE):	Juraj Farkas
	Reviewed by (Counterpart):	Hans Oonk
	Reviewed by (LR):	Klaus Radunsky
	The underlying problem:	For estimation of N ₂ O from municipal wastewater, Croatia is using a higher factor for non-consumed protein F(non-con) = 1.4, which assumes that kitchen garbage disposal units are widely used in about 90 % of households (see 2006 GL, Volume 5, Chapter 6, pg. 6.25, 6.3.1.3 Choice of AD). However, available information (EPA Ireland report. http://www.epa.ie/pubs/reports/research/waste/strivereport11.html) indicates, that use of kitchen garbage disposal units in the EU is limited, and less than 1 % (UK 5 %).
The rationale for the corrected estimate:	Available information indicates that the use of kitchen garbage disposal units in the EU is limited, less than 1 % (UK, with the highest share of all MS 5%). Therefore, the lower default factor for non-consumed protein shall be used F(non-con) = 1.1	
Summarise the methodology used:	The country applied the same methodology, but this time using the lower factor for non-consumed protein F (non-con) = 1.1 which assumes that kitchen garbage disposal units are not widely used. Revised estimate was verified - previous value was divided by 1.4 and multiplied by 1.1	
References to other workbooks:		

2	Details of the corrected estimate								
			Original estimate (Gg CO₂eq)						Notes
		Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
	HR-5D-2017-0003-OE	2015			83.440				
	Was a Revised Estimate received from the MS?		yes						
			Revised Estimate received from MS (Gg CO₂eq)						Notes
		Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
	HR-5D-2017-0003-RE	2015			65.560				
	Was the Revised Estimate accepted by the TERT?		yes						
			Technical Correction calculated by TERT (Gg CO₂eq)						Notes
	Year	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆		
HR-5D-2017-0003-TC	2015								
Was the Technical Correction accepted by the MS?		-							

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

Table 4: Recommendations from the TERT

EMRT - ID	Key category	Category, gas, year	Conclusion step 2 note	Revised estimate	Technical correction
HR-1-2017-0003	Yes	1 Energy, CO ₂ , 1990-2015	<p>For the comparison between the Reference and the Sectoral Approaches, Croatia did not explain the significant difference observed in natural gas consumption in its NIR. The lack of transparency on these differences could trigger ultimately a potential technical correction.</p> <p>In response to a question raised during the review, Croatia explained the rationale behind the split between energy and Non Energy Use of natural gas. The TERT agreed with the explanation provided by Croatia.</p> <p>The TERT therefore recommends that Croatia:</p> <ol style="list-style-type: none"> 1. Improve the transparency of chapter "3.2.3. Feedstocks and non-energy use of fuels" from the NIR explaining that natural gas used as feedstock in the Transformation sector in NGL plant (0.42 PJ) and Gas works (0.01 PJ) are added to Non Energy Use amount estimated in the national Energy Balance (17.148 PJ). 2. Improve the consistency between table 1.A(d)-Non-energy use of fuels and 1.A(b)-Reference Approach as the amount of Carbon excluded from the reference Approach should be the same in these 2 tables. 	No	No
HR-1-2017-0004	Yes	1 Energy, CO ₂ , 1990-2015	<p>For category 1.A and gas CO₂ for all years, the TERT noted that default emission factors are applied. However, according to the 2006 IPCC guidelines, Country Specific EF should be applied for key categories. The TERT recommends that Croatia elaborate a plan to clearly define the actions foreseen and the timeframe to develop country specific EF. The TERT decided to include this recommendation because a revision might trigger changes in the emissions above the level of the threshold of significance. However, a technical correction would employ the same approach as is currently used and therefore not result in any change of the emissions.</p>	No	No
HR-1A2c-2017-0002	No	1.A.2.c Chemicals, CO ₂ , 2015	<p>For category 1.A.2.c Chemicals and CO₂ for 2015, the TERT noted a large difference between CO₂ emissions reported under EU-ETS and the CRF. The lack of transparency on these differences could trigger ultimately a potential technical correction. This issue was also raised for the sector 1.A.2.f Non-metallic minerals (see observation HR-1A2f-2017-0001).</p> <p>In response to a question raised during the review on explanations provided in the MMR Article 10 table, Croatia explained that CRF emissions are based on Energy balance classification which differs from EU-ETS classification but that all fuel consumptions are taken into account. Croatia also mentioned that the Ministry of Environment and Energy performs activities on developing the project related to harmonization of data (with emphasis on CRF categories) from the Energy balance, ETS and Inventory. Plan is to use this data in NIR2019 and at the latest in NIR2020. The TERT agreed with the explanation provided by Croatia.</p> <p>The TERT recommends that Croatia start using EU-ETS reports as soon as possible in its GHG inventory as it can be done step by step, starting with the main sectors such as Non Energy Uses (NEU) of fuels in the</p>	No	No

			manufacturing Industry to properly split Energy and NEU quantities (already recommended in observation 1.A.2.f Non-metallic minerals) and report on progress made in the next inventory submission.		
HR-1A2f-2017-0001	No	1.A.2.f Non-metallic minerals, CO ₂ , 2015	<p>For category 1.A.2.f Non-metallic minerals and CO₂ for 2015, the TERT noted a large difference between CO₂ emissions reported under EU-ETS and the CRF. The lack of transparency on these differences could trigger ultimately a potential technical correction. This issue was also raised for the sector 1.A.2.c Chemicals (see observation HR-1A2c-2017-0002).</p> <p>In response to a question raised during the review on explanations provided in the MMR Article 10 table, Croatia explained that CRF emissions are based on Energy balance classification which differs from EU-ETS classification but that all fuel consumptions are taken into account. Croatia also mentioned that the Ministry of Environment and Energy performs activities on developing the project related to harmonization of data (with emphasis on CRF categories) from the Energy balance, ETS and Inventory. Plan is to use this data in NIR2019 and at the latest in NIR2020. The TERT agreed with the explanation provided by Croatia.</p> <p>The TERT recommends that Croatia start using EU-ETS reports as soon as possible in its GHG inventory as it can be done step by step, starting with the main sectors such as Non Energy Uses (NEU) of fuels in the manufacturing Industry to properly split Energy and NEU amounts and to document the progress in the next NIR submission.</p>	No	No
HR-1A3b-2017-0001	Yes	1.A.3.b Road transportation, CO ₂ , 1990-2015	<p>For category 1.A.3.b and CO₂ for all years, the TERT noted that default CO₂ EFs are applied for road transport. The use of country specific emission factors could result in changes of emissions above the threshold of significance.</p> <p>In response to a question raised during the review, Croatia explained that as indicated in table 10.4-3 of the NIR, this issue is included in Croatian Improvement plan as long term goal but Ministry of Environment and Energy performs activities on developing the project to determine national emission factors. Plan is to use this data in NIR2018 and at the latest in NIR2019. For now, detailed plan for deriving country specific CO₂ EF is not available.</p> <p>The TERT takes note of this plan and reiterates the last ESD review 2016 (HR-1A3b-2016-0001) recommendation to apply a Country Specific CO₂ Emission Factor for road transport, which is a key category, as soon as it is available.</p>	No	No
HR-2A2-2017-0001	No	2.A.2 Lime production, CO ₂ , 2011-2015	For 2.A.2, CO ₂ , 2015 the TERT noted that CO ₂ emissions from lime production in sugar refineries were not included under category 2.A.2. In response to a question raised during the review, Croatia provided details about all lime production at plant level. Croatia also provided a revised estimate for 2015. The TERT agreed with the revised estimate provided by Croatia and presented above. The TERT recommends that Croatia include the revised estimate in its next submission and recalculate also the complete time series.	Yes	No
HR-2B1-2017-0001	Yes	2.B.1 Ammonia production, CO ₂ , 1990-2015	For category 2.B.1, CO ₂ , whole time series, Croatia subtracted CO ₂ emissions for dry ice production in the ammonia production process. According to the 2006 IPCC Guidelines (box 3.1), the amount of CO ₂ recovered from ammonia production used in freezing applications is not accounted for separately and it should be assumed that all the CO ₂ will be released in the producing country. In response to a question raised during the review, Croatia provided a revised estimate. The TERT noted that the issue is above the threshold of significance. The TERT agreed with the revised estimate (which is presented in this report above) and recommends that Croatia include the revised estimate in its next submission and further	Yes	No

			recommends Croatia to apply the recalculation also to the time series.		
HR-2F1-2017-0002	No	2.F.1 Refrigeration and air conditioning, HFCs, 1990-2015	For category 2.F.1 and HFCs for the years 1990-2015 the TERT noted that additional information and emission estimates for mobile air conditioning in other types of vehicles than passenger cars should be included. The share of emissions from other vehicles is smaller than 10 % of the emissions from the mobile air conditioning subcategory in other Member States and would therefore also be below the threshold of significance for Croatia. In response to a question raised during the review, Croatia explained that the collection of such data had been started and Croatia stated that These emissions will be included in the next submission. The TERT agreed with the explanation provided by Croatia and welcomes the efforts being made. The TERT recommends that Croatia include additional emission estimates in its next submission.	No	No
HR-2G-2017-0001	No	2.G Other product manufacture and use, N ₂ O, 1990-2015	For category 2.G.3.b and N ₂ O for years 2014 and 2015 the TERT noted that emissions are reported as NO although it is unlikely that the use of such cans has stopped completely in 2014. The TERT recommends that Croatia estimates these emissions using information from years before 2014, when N ₂ O was used for several purposes or Croatia may use an approach taken by another Member State (e.g. Danish NIR). Croatia agreed with the proposed solutions and will include these emission estimates in the next submission. This issue is below the threshold of significance and therefore a recommendation only.	No	No
HR-3A-2017-0001	Yes	3.A Enteric fermentation, CH ₄ , 1990-2015	For category 3.A and gas CH ₄ for year 2015 the TERT noted a low IEF for growing cattle for enteric fermentation. In response to a question raised during the review, Croatia provided an explanation of the methodology and sources of information used for estimating methane emissions from this source. The TERT commends Croatia for its efforts to improve the Tier 2 for enteric fermentation and recommends providing detailed information in its next submission.	No	No
HR-3A-2017-0002	Yes	3.A Enteric fermentation, CH ₄ , N ₂ O, 1992-2006	For category 3.A and gasses CH ₄ and N ₂ O the TERT noted that the number of animals for swine and poultry has been corrected leading to an underestimation of emissions for the agriculture sector. In response to a question raised during the review, Croatia agreed to provide revised estimates for year 2015. The TERT agreed with the revised estimate provided by Croatia as presented above. The TERT recommends that Croatia include the revised estimate in its next submission.	Yes	No
HR-3B-2017-0007	Yes	3.B Manure management, CH ₄ , 2015	The TERT notes that Croatia are concerned that, although the estimates made for this submission follow the approach used for a technical correction proposed by the ESD TERT in 2016, the 2017 TERT are still proposing revisions to Croatia's estimation methods. Within the ESD Review process, technical corrections that have been performed by the TERT should only be considered as interim estimate in order to fulfil the immediate needs of the ESD Review process and not considered to be long term improvements to the estimates or necessarily consistent with 2006 IPCC methods. Therefore, the TERT reiterates its recommendation that Croatia collect country-specific parameters (e.g. MCF) that can improve estimations for this source category and revise its estimates accordingly for its next submission. For this ESD Review (2017) no technical correction has been suggested as the expected changes would be below the threshold of significance.	No	No
HR-3D1-2017-0002	Yes	3.D.1 Direct N ₂ O emissions from managed soils, N ₂ O, 1990-2015	For category 3.D.1.a and nitrous oxide for the year 2015 the TERT noted that data on composting is available in the Waste sector (NIR Table 7.3-1). In response to a question raised during the review, Croatia explained that they will implement improvements in this sector to address the above missing estimate. The TERT recommend Croatia to include for this source the notation key "not estimated" (NE) and verify if	No	No

			compost is applied to soils in Croatia as part of agricultural practices. As it is quite unlikely that this issue results in changes of emissions above the threshold of significance the TERT decided for a recommendation.		
HR-3D1-2017-0003	No	3.D.1 Direct N ₂ O emissions from managed soils, N ₂ O, 1990-2015	For category 3.D and gas N ₂ O for year 2015 the TERT noted that the quantity of N fertiliser use for estimating N ₂ O emissions are different from statistics published in international sources (e.g. FAO). In response to questions from the TERT Croatia provided information on the different sources used for different time series and that it had to splice activity data together. During a call held during the review week, Croatia mentioned that they are making efforts to understand better the different sources and that they will have meetings with key national stakeholders involved in data collection of N fertiliser. The TERT commends Croatia for this effort and recommends to justify differences of N fertilisers data from the different sources, if any and include this information in future submissions.	No	No
HR-5D-2017-0001	Yes	5.D Wastewater treatment and discharge, CH ₄ , 1990-2015	For 5.D for CH ₄ for 2015 and the complete timeseries, the TERT noted that Croatia calculates emissions from individual waste water treatment (septic tanks) with 70 % reduction, because 70 % of the waste water leaves the septic tanks as overflow and is therefore assumed not to contribute to methane emissions. This was not accepted by the TERT as a country-specific approach to emission estimation from domestic waste water. In response to questions raised during the review Croatia provided a revised estimate that the TERT disagreed with. The TERT decided to calculate a technical correction for the year 2015 which was accepted by Croatia. The technical correction demonstrates that the issue is above the threshold of significance. The TERT recommends that Croatia includes a revised estimate in its next submission ensuring that the method applied is consistent with 2006 IPCC.	No	Yes
HR-5D-2017-0003	No	5.D Wastewater treatment and discharge, N ₂ O, 1990-2015	For 5.D for N ₂ O the TERT noted that Croatia is using Factor for non-consumed protein F(non-con) = 1.4, which assumes that kitchen garbage disposal units are widely used. In response to a question raised during the review, Croatia provided a revised estimate for years 1990-2015 which use F(non-con) = 1.1, assuming that less than 1 % of household uses garbage disposal units. Croatia stated that it will be included in the next submission. The TERT agreed with the revised estimate provided by Croatia and presented above. The TERT recommends that Croatia includes the revised estimate in its next submission.	Yes	No

Annex I: Legal background and procedures of the 2017 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 2017 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 2015 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 2017 annual ESD review of national greenhouse gas (GHG) inventory data was carried out for the compliance year 2015 pursuant to Article 19 of the MMR. The EEA review secretariat (consisting of Melanie Sporer, John van Aardenne and Emma Salisbury) coordinated the 2017 annual ESD review as foreseen in Article 28 of the Commission Implementing Regulation (EU) No 749/2014.

The scope of the 2017 annual ESD review is presented in Table A.1.1. The checks carried out during the 2017 annual ESD review are presented in Annex II.

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 (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 2017 annual ESD review was performed by a Technical Expert Review Team (TERT) under service contract 34.0201/2016/743206/SER/CLIMA.C2 of the Directorate General for Climate Action of the European Commission. The TERT consisted of the following experts:

- Lead Reviewers: Anke Herold, Suvi Monni, Klaus Radunsky
- Energy: Julien Vincent, Ralph Harthan, Graham Anderson
- IPPU F-gases: Barbara Gschrey, Domenico Gaudioso
- IPPU excluding F-gases: Daniela Romano, Eva Krtkova
- Agriculture: Steen Gyldenkaerne, Rocio Condor, Chris Dore, Katalin Lovas
- Waste: Hans Oonk, Kaat Jespers, Juraj Farkas
- Quality controller: Justin Goodwin
- Co-ordinator: Bernd Guegle

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 2017 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 2015.

Table A.1.1: Scope of the 2017 annual ESD review

Element	Scope	Further information
Member States	EU geographical coverage of the Member States	
Years	2015	
Gases	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆	NF ₃ 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 ₂ emissions	Included in national total	
Inventory Submission	Submissions received by 15 March, 2017	

Annex II: Checks carried out during the 2017 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, accuracy, 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.