

# Final Review Report

## 2019 annual review of national greenhouse gas inventory data

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

Cyprus  
28 June 2019

European Environment Agency



Reference: 340201/2018/790329/SER/CLIMA.C  
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## Conclusions from the 2019 annual ESD review

This Final Review Report presents the findings from the 2019 annual review of the greenhouse gas (GHG) emission inventory of Cyprus, pursuant to Article 19(2) of Regulation (EU) No 525/2013, with a view to monitoring Cyprus's achievement of its GHG emission reduction or limitation target pursuant to Article 3 of Decision No 406/2009/EC (the 'Effort Sharing Decision', ESD) in 2017.

The reviewers carried out checks to verify the transparency, accuracy, consistency, comparability and completeness of the national GHG inventory for the year 2017 submitted in 2019 by Cyprus 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 Climate Change Mitigation and Energy (ETC/CME), 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 2019 annual ESD review.

More information on the ESD legislation and the procedures for the 2019 annual ESD review is presented in the annexes to this review report.

### Step 1 conclusions

Due to the incomplete submission provided by Cyprus, the checks to identify significant issues could not be performed by the EU inventory team in accordance with the requirements and the timeline as set out in the Commission Implementing Regulation (EU) 749/2014. Therefore, Cyprus was subject to a second step of the 2019 annual ESD review. The EU inventory team identified 2 significant issues in the limited checks performed.

### Step 2 conclusions

1. The reviewers raised 38 issues with Cyprus during the first and the second step of the 2019 annual ESD review (see Table 1). The TERT provided recommendations for 8 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 under- or over-estimates exceeding the threshold of significance pursuant to Article 31 of Commission Implementing Regulation (EU) No 749/2014.
3. Cyprus provided 3 revised estimates. Table 2 below summarises the revised estimates and further information is provided in the respective chapter of this report. The TERT agreed with these revised estimates.
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 Cyprus.
5. The TERT identified non-binding recommendations in order to improve the national inventory data of Cyprus (see Table 4).
6. The TERT considers that it received a response from Cyprus that was sufficient in order to undertake the annual review appropriately.

**Table 1: Overview of issues raised with Cyprus 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>38</b>	<b>8</b>	<b>3</b>	<b>-</b>
Energy	12	1	-	-
IPPU	13	5	2	-
Agriculture	10	1	1	-
Waste	2	-	-	-
Cross-cutting	1	1	-	-

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

<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> 2017
Total greenhouse gas emissions, including indirect CO <sub>2</sub> , without land use, land-use change and forestry as reported by Cyprus pursuant to Article 7(4) of Regulation (EU) No 525/2013, taking into account any resubmission to the Commission	CYP_2019_3_14032019	8 779.879
<b>Difference between original estimates and revised estimates provided by Cyprus and accepted by the TERT<sup>2</sup></b>		
2.D Non-energy products from fuels and solvent use, CO <sub>2</sub>	CY-2D-2019-0003	10.300
2.F.1 Refrigeration and air conditioning, HFCs	CY-2F1-2019-0002	77.045
3.D Agricultural soils, N <sub>2</sub> O	CY-3D-2019-0003	77.357
Total greenhouse gas emissions including accepted revised estimates provided by Cyprus		8 944.581
CO <sub>2</sub> emissions from 1.A.3.a Domestic aviation	CYP_2019_3_14032019	0.821
NF <sub>3</sub> emissions	CYP_2019_3_14032019	-

<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> 2017
Total greenhouse gas emissions including accepted revised estimates provided by Cyprus	<i>See Table 2 above</i>	8 944.581
Total verified emissions from stationary installations under Directive 2003/87/EC	Extracted by the European Commission from EUTL on 8 March 2019 (as agreed at the Working Group I of the Climate Change Committee on 18 May 2015) <sup>2</sup>	4 672.870
CO <sub>2</sub> emissions from 1.A.3.a Domestic aviation	<i>See Table 2 above</i>	0.821
NF <sub>3</sub> emissions	<i>See Table 2 above</i>	-
<b>Total ESD emissions</b>		<b>4 270.890</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 Cyprus on the conclusions presented by the TERT

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

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

ESD Review Tool ID:	CY-3D-2019-0003
ESD Review Tool URL:	<a href="https://emrt-esd.eionet.europa.eu/2019/CY-3D-2019-0003">https://emrt-esd.eionet.europa.eu/2019/CY-3D-2019-0003</a>
Member State:	Cyprus
Sector:	3.D Agricultural soils
Gases:	N <sub>2</sub> O
Fuel:	-

  

Completed by Sector Expert:	Steen Gyldenkaerne
Reviewed by Counterpart:	Etienne Mathias
Reviewed by Lead Reviewer:	Suvi Monni
Reviewed by Quality Controller:	Justin Goodwin

  

1	<p>The underlying problem:</p> <p>In the 2019 submission Cyprus introduced a country-specific EF for direct N<sub>2</sub>O emissions from agricultural soils (3.D.a) and applied it for inorganic N fertilizers (3.D.a.1.a), animal manure applied to soils (3.D.a.2.a) and other organic fertilizers applied to soils (3.D.a.2.c) for the entire time-series. The implied emission factors reported in CRF table 3.D for 2017 vary from 0.0015 to 0.0024 kg N<sub>2</sub>O-N/kg N and are considerably lower than the IPCC default value in the table 11.1 of the 2006 IPCC Guidelines, volume 4, chapter 11 (0.01 kg N<sub>2</sub>O-N/kg N). The recalculation decreased the emissions from 3.D.1 by 77% in 2016. During the review, Cyprus provided documentation regarding the country-specific emission factor. The TERT noted that the submitted documentation covers only one year despite the underlying research is a two-year project. Thus, interannual changes in emissions are not considered. It was unclear to the TERT if an appropriate correction for background emission has taken place and how negative emissions have been incorporated into the EF calculation. Furthermore, it was unclear for the TERT if all emissions have been measured since fertilizer/manure application. In addition, the study for mineral fertilizers was made with ammonium nitrate (NH<sub>4</sub>NO<sub>3</sub>) although this compound does not represent the typical fertilizer types in Cyprus. Thus, the TERT concluded that the country-specific EF is not sufficiently justified to be used in the inventory.</p> <p>Summarise the methodology used:</p> <p>The revised estimate was calculated by using the IPCC default EF for direct N<sub>2</sub>O emissions from inorganic N fertilizers, animal manure applied to soils and other organic fertilizers applied to soils. The correction given below is for the total emission in category 3.D.a (direct emissions)</p>
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<b>Details of the corrected estimate</b>									
		Original estimate (kt CO <sub>2</sub> e)							
	Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	Mixed GHG	Notes
	CY-3D-2019-0003-OE	2017			26.202				
Was a Revised Estimate received from the MS?		Yes							
		Revised Estimate received from MS (kt CO <sub>2</sub> e)							
	Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	Mixed GHG	Notes
	CY-3D-2019-0003-RE	2017			103.558				
2		Difference between RE and OE (kt CO <sub>2</sub> e)							
				77.357					
Was a Revised Estimate accepted by the TERT?		Yes							
		Technical Correction calculated by TERT (kt CO <sub>2</sub> e)							
	Year	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	Mixed GHG	Notes
	CY-3D-2019-0003-TC	2017							
		Difference between TC and OE (kt CO <sub>2</sub> e)							
Was the Technical Correction accepted by the MS?									



ESD Review Tool ID:	<b>CY-2D-2019-0003</b>
ESD Review Tool URL:	<a href="https://emrt-esd.eionet.europa.eu/2019/CY-2D-2019-0003">https://emrt-esd.eionet.europa.eu/2019/CY-2D-2019-0003</a>
Member State:	Cyprus
Sector:	2.D Non-energy products from fuels and solvent use
Gases:	CO <sub>2</sub>
Fuel	

Completed by Sector Expert:	Jolanta Merkeliene
Reviewed by Counterpart:	Kristina Kaar
Reviewed by Lead Reviewer:	Suvi Monni
Reviewed by Quality Controller:	Justin Goodwin

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The underlying problem:	The TERT noted that CO <sub>2</sub> emissions from 2.D.3 Other were recalculated due to revision of NMVOC emissions from solvents use, decreasing between 18.8% (in 2016) and 48.9% (in 2001) and asked Cyprus to explain the reason of significant emission decrease. Cyprus explained that NMVOC emissions from glues production were omitted in the latest GHG inventory. The TERT further noted that emissions from solvents use, road paving with asphalt and asphalt roofing were estimated by applying a carbon oxidation factor of 99 %, which is not in line with the default methodology to calculate CO <sub>2</sub> inputs to the atmosphere from emissions of NMVOCs provided in the 2006 IPCC Guidelines.
Summarise the methodology used:	CO <sub>2</sub> emission from solvents use was recalculated including NMVOCs emissions from glues production. CO <sub>2</sub> emission from solvents use, road paving with asphalt and asphalt roofing was recalculated without using 99% oxidation of carbon fraction.

#### Details of the corrected estimate

	Year	Original estimate (kt CO <sub>2</sub> e)							Notes
		CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	Mixed GHG	
CY-2D-2019-0003-OE	2017	7.575							Please note that this emission is not total 2.D.3 Other subcategory, it excludes emission from urea-based catalysts

Was a Revised Estimate received from the MS? ☒ yes

	Year	Revised Estimate received from MS (kt CO <sub>2</sub> e)							Notes
		CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	Mixed GHG	
CY-2D-2019-0003-RE	2017	17.875							Please note that this emission is not total 2.D.3 Other subcategory, it excludes emission from urea-based catalysts
		Difference between RE and OE (kt CO <sub>2</sub> e)							
		10.300							

Was a Revised Estimate accepted by the TERT? ☒ yes

	Year	Technical Correction calculated by TERT (kt CO <sub>2</sub> e)							Notes
		CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>	Mixed GHG	
CY-2D-2019-0003-TC	2017								
		Difference between TC and OE (kt CO <sub>2</sub> e)							

Was the Technical Correction accepted by the MS? ☐

1	ESD Review Tool ID:		CY-2F1-2019-0002	
	ESD Review Tool URL:		<a href="https://emrt-esd.eionet.europa.eu/2019/CY-2F1-2019-0002">https://emrt-esd.eionet.europa.eu/2019/CY-2F1-2019-0002</a>	
	Member State:		Cyprus	
	Sector:		2.F.1 Refrigeration and air conditioning	
	Gases:		HFCs	
	Fuel			
	Completed by Sector Expert:		Jolanta Merkeliene	
	Reviewed by Counterpart:		Kristina Kaar	
	Reviewed by Lead Reviewer:		Suvi Monni	
	Reviewed by Quality Controller:		Justin Goodwin	
	The underlying problem:			For category 2.F.1 Refrigeration and air conditioning and HFCs for year 2017 the TERT noted that in CRF table 2(II)B-Hs2 disposal loss factors for some HFCs were higher than 100%, meaning that emissions from disposal were higher than amount remaining in products at decommissioning. The TERT also noted that in CRF table 2(II)B-Hs2 "amount remaining in products at decommissioning" was not equal to "emissions from disposal" plus "recovery" for most of 2.F.1 subcategories, except for mobile air conditioning. In response to a question raised during the review, Cyprus provided to the TERT calculation files of 2.F.1 subcategory. The TERT identified that emissions were estimated using inaccurate GWP values for refrigerant blends and disaggregated into individual HFCs using incorrect blend composition shares. Furthermore, the TERT found an error (missing multiplication by GWP values in the formulas of lifetime emissions calculation) in the calculation of emissions from 2.F.1.a commercial refrigeration and 2.F.1.f stationary air conditioning.
	Summarise the methodology used:			In the revised estimates provided by Cyprus HFCs emissions from 2.F.1.a commercial refrigeration and 2.F.1.f stationary air conditioning were recalculated by first disaggregating refrigerant blends into individual HFCs and using correct GWP values. Activity data, assumptions on annual emission rates, residual charge in equipment disposed, recovery efficiency values used are the same as described in the NIR of Cyprus.

2	Details of the corrected estimate									
			Original estimate (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>	Mixed GHG	
	CY-2F1-2019-0002-OE	2017				105.588				Please note that these emissions are only for 2.F.1.a and 2.F.1.f, not complete 2.F subcategory
	Was a Revised Estimate received from the MS?		yes							
			Revised Estimate received from MS (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>	Mixed GHG	
	CY-2F1-2019-0002-RE	2017				182.633				Please note that these emissions are only for 2.F.1.a and 2.F.1.f, not complete 2.F subcategory
			Difference between RE and OE (kt CO <sub>2</sub> e)							
						77.045				
	Was a Revised Estimate accepted by the TERT?		yes							

## 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
CY-2D-2019-0003	No	2.D Non-energy products from fuels and solvent use, 1990-2017, CO <sub>2</sub>	<p>For category 2.D Non-energy products from fuels and solvent use (2.D.3 Other) and CO<sub>2</sub> for year 2017 the TERT noted that emissions from solvent use were recalculated, resulting in a decrease of emissions. During the review, Cyprus explained that emissions from glues production, which were included in the previous submission, were excluded in the 2019 submission. The TERT further noted from the calculation files provided by Cyprus that the Member State had applied, in the estimation of indirect CO<sub>2</sub> emissions originating from NMVOCs, a carbon oxidation factor of 99 percent for glues production, solvents use, road paving with asphalt and asphalt roofing. The use of such oxidation factor is not in line with the default methodology provided in the 2006 IPCC Guidelines. During the review, the Member State provided revised estimates for year 2017. The TERT agreed with the revised estimates provided by Cyprus and included in the review report. The impact of the revised estimate is above the threshold of significance. The TERT recommends that Cyprus include the revised estimate in its next submission.</p> <p>The TERT further noted from the revised estimate provided by Cyprus that emissions from road paving with asphalt and asphalt roofing were estimated using 60 % fossil carbon content fraction of NMVOCs, which is included in Box 7.2 in the 2006 IPCC Guidelines, Vol.1. However, the 2006 IPCC Guidelines, Vol. 3, p. 5.16, provide more specific fossil carbon content fractions for NMVOCs from asphalt production and use for road paving (between 40 to 50 percent by mass) and for asphalt roofing (about 80 percent). The TERT noted that road paving with asphalt and asphalt roofing are minor emission sources in Cyprus, and that a revision of the fossil carbon content factors would result in a change well below the threshold of significance. However, the TERT recommends that Cyprus use, in its next submission, the carbon content factors which are specific for asphalt roofing and road paving with asphalt.</p>	Yes	No

EMRT - ID	Key category	Category, gas, year	Conclusion step 2 note	Revised estimate	Technical correction
CY-2F1-2019-0002	Yes	2.F.1 Refrigeration and air conditioning, 2017, HFCs	For category 2.F.1 Refrigeration and air conditioning and HFCs for year 2017 the TERT noted that in CRF table 2(II)B-Hs2 disposal loss factors for some HFCs were higher than 100%, meaning that emissions from disposal were higher than amount remaining in products at decommissioning. The TERT also noted that in CRF table 2(II)B-Hs2 “amount remaining in products at decommissioning” was not equal to “emissions from disposal” plus “recovery” for most of 2.F.1 subcategories, except for mobile air conditioning. In the calculation files provided by Cyprus the TERT identified that emissions were estimated using inaccurate GWP values for refrigerant blends and disaggregated into individual HFCs using incorrect blend composition shares. Furthermore, the TERT found errors (missing multiplication by GWP values in the formulas of lifetime emissions calculation) in the calculation of emissions from 2.F.1.a commercial refrigeration and 2.F.1.f stationary air conditioning. During the review, the Member State provided revised estimates for year 2017. The TERT agreed with the revised estimates provided by Cyprus and included in the review report. The revised estimates demonstrate that the impact of the revised estimate is above the threshold of significance. The TERT recommends that Cyprus estimate emissions from refrigeration and air conditioning using accurate GWP values for refrigerant blends and disaggregate into individual HFCs using correct blends composition shares (weighted by GWP) or calculate emissions from refrigerant blends by first disaggregating the blends into individual HFCs. The TERT further recommends that Cyprus correct the errors in the calculation file for 2.F.1.a commercial refrigeration and 2.F.1.f stationary air conditioning and include the revised estimate in its next submission.	Yes	No

EMRT - ID	Key category	Category, gas, year	Conclusion step 2 note	Revised estimate	Technical correction
CY-3D-2019-0003	Yes	3.D Agricultural soils, 1990-2017, N <sub>2</sub> O	For category 3.D (Agricultural soils) and gas N <sub>2</sub> O for all years the TERT noted that Cyprus has implemented a country-specific EF for N applied to soils. In response to a question raised during the review, Cyprus submitted information on and results of N <sub>2</sub> O emission measurements from a Cypriot research but did not provide information on how the specific country-specific emission factor was calculated. The Member State further explained that the final results of the research would be available in May 2019. The TERT is of the opinion that the submitted information was not sufficient to justify the country-specific EF, for several reasons: the EF is based on data for one year and thus inter-annual changes have not been taken into consideration; it is unclear if an appropriate correction for background emission has taken place and how negative emissions have been incorporated into the EF calculation; the fertiliser type used in the research does not represent the average fertiliser types used in Cyprus; it is unclear for the TERT if all emissions since fertiliser/manure application are included in the estimate. During the review, Cyprus provided a revised estimate for the year 2017. The TERT agreed with the revised estimate provided by Cyprus and included in the review report. The TERT recommends that Cyprus include the revised estimate in its next submission.	Yes	No
CY-0-2019-0001	No	0 Cross cutting, 1990-2017, CH <sub>4</sub> , CO <sub>2</sub> , HFCs, N <sub>2</sub> O, PFCs, SF <sub>6</sub>	The TERT noted that Cyprus did not report the key annexes related to recalculations (Annex VIII of Article 16 MMR), implementation of recommendations (Annex IV of Article 9 MMR) and consistency of EU ETS data with the GHG inventory (Annex V of Article 10 MMR). These annexes include crucial information for the checks carried out in step 1 and step 2 of the ESD review. In response to questions raised during the review, Cyprus provided one annex: the annex on consistency of EU ETS data with the GHG inventory (Annex V of Article 10 MMR) received on 23 April 2019. However, the TERT strongly recommends that Cyprus submit all the annexes in its next submission on 15 January 2020.	No	No

EMRT - ID	Key category	Category, gas, year	Conclusion step 2 note	Revised estimate	Technical correction
CY-1A3b-2019-0003	Yes	1.A.3.b Road transportation, 2017, CO <sub>2</sub>	<p>For category 1.A.3.b Road transportation, liquid fuels, CO<sub>2</sub>, 2017 Cyprus explained during the review that it did not include the emissions from fossil components in biofuels in its inventory. Cyprus did not provide revised estimates during the review week but stated that it will consider this issue for the 2020 submission. The TERT noted that the issue is below the threshold of significance for a technical correction.</p> <p>The TERT recommends that Cyprus include in its next inventory submission CO<sub>2</sub> emissions from fossil carbon in biofuels. The Member State may use reported data on the Article 7a of the Fuel Quality Directive. The TERT considers that this data could be used in combination with the information included in the "Note on fossil carbon content in biofuels" to estimate the fossil carbon emissions from biofuels. The TERT recommends that Cyprus report these emissions under 1.A.3.b, "Other fossil fuels". The TERT notes that the CRF Reporter software provides the option to specify the type of fossil fuel (e.g. it can be named "fossil part of biodiesel or biogasoline"). The related activity data associated to the fossil part of biofuels should be also reported under "Other fossil fuels". They can be estimated by multiplying the amount of biofuel by the fossil part of the carbon content (%). Finally, the TERT recommends that Cyprus include a description of the method applied in the next NIR.</p>	No	No
CY-2F1-2019-0005	Yes	2.F.1 Refrigeration and air conditioning, 2017, HFCs	<p>For category 2.F.1.c Refrigeration and air conditioning, industrial refrigeration and HFCs for year 2017 the TERT noted that although the only refrigerant blend used for industrial refrigeration is R404a, in CRF Table 2(II)B-Hs2 product life factors and disposal loss factors were different for all individual HFCs composing a single blend R404a. In response to a question raised during the review, Cyprus provided to TERT calculation file of 2.F.1.c subcategory. The TERT identified that emissions were estimated using inaccurate GWP value for refrigerant blend R404a and disaggregated into individual HFCs using incorrect blend composition shares.</p> <p>The TERT noted that the issue is below the threshold of significance for a technical correction. The TERT recommends that Cyprus estimate emissions from industrial refrigeration using accurate GWP values for refrigerant blends used and disaggregate into individual HFCs using correct blends composition shares (weighted by GWP) or calculate emissions from refrigerant blends by first disaggregating the blends into individual HFCs. The TERT recommends that Cyprus include the revised estimate in its next submission.</p>	No	No

EMRT - ID	Key category	Category, gas, year	Conclusion step 2 note	Revised estimate	Technical correction
CY-2F1-2019-0003	Yes	2.F.1 Refrigeration and air conditioning, 2017, HFCs	<p>For category 2.F.1 Refrigeration and air conditioning and HFCs for year 2017 the TERT noted that the assumptions on shares of refrigerants used reported in Cyprus' NIR are incomplete for some subcategories, i.e. the following shares are missing: for commercial refrigeration (11 %), domestic refrigeration (30 %), industrial refrigeration (12 %) and chillers (10.5 %).</p> <p>In response to a question raised during the review, Cyprus provided data on missing shares of refrigerants and explained that although there is a mistake in the NIR regarding the percentage of the gases used, the correct numbers were used for the calculation of emissions from chillers.</p> <p>The TERT partly agreed with the explanation provided by Cyprus, however noted that based on information provided, part of HFCs containing refrigerant blends, though in small quantities, are not included in the emission estimates. Specifically, emissions are not estimated from several refrigerant blends in industrial refrigeration (R410a, R407c, R134a, R422d, R434a, R507, R408a, R424a), chillers (R404a, R422d, R424a, R434a) and commercial refrigeration (R410a, R407c, R422d, R507, R424a, R434a).</p> <p>The TERT noted that the issue is below the threshold of significance for technical correction. The TERT recommends that Cyprus correct the information in the NIR on refrigerant shares used and estimate HFCs emissions from all refrigerant blends containing HFCs in industrial refrigeration, commercial refrigeration, chillers and include the revised estimate in its next submission.</p>	No	No
CY-2F1-2019-0004	Yes	2.F.1 Refrigeration and air conditioning, 2017, HFCs	<p>For category 2.F.1.b Refrigeration and air conditioning, domestic refrigeration and HFC-134a for year 2017 the TERT noted that there are empty cells in CRF table 2(II)B-Hs2 for emissions from stocks and disposal. In response to a question raised during the review, Cyprus explained that a mistake was identified in the transfer of data from Excel sheets to the CRF Reporter. Cyprus provided a revised estimate for year 2017 and stated that it will be included in the next submission.</p> <p>The TERT disagreed with the revised estimate provided by Cyprus, because the emissions were estimated using inaccurate GWP values for refrigerant blends (R404a) and disaggregated into individual HFCs using incorrect blend composition shares. The TERT noted that the issue is below the threshold of significance for a technical correction. The TERT recommends that Cyprus estimate emissions from domestic refrigeration using accurate GWP values for refrigerant blends used (R404a) and disaggregate into individual HFCs using correct blends composition shares (weighted by GWP) or calculate emissions from refrigerant blends by first disaggregating the blends into individual HFCs. The TERT recommends that Cyprus include the revised estimate in its next submission.</p>	No	No

## Annex I: Legal background and procedures of the 2019 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 2019 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 2017 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 2019 annual ESD review of national GHG inventory data was carried out for the compliance year 2017 pursuant to Article 19 of the MMR. The EEA review secretariat (consisting of Melanie Sporer, Claire Qoul and Kirsten May) coordinated the 2019 annual ESD review as foreseen in Article 28 of the Commission Implementing Regulation (EU) No 749/2014.

The scope of the 2019 annual ESD review is presented in Table A.1.1. The checks carried out during the 2019 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 (EEA, ETC/CME, JRC, Eurostat). The EU inventory team consisted of the following experts:

- ETC/CME task manager: Nicole Mandl, Marion Pinterits (ETC/CME)
- Energy: Julien Vincent, Coralie Jeannot, Beata Ondrusova, Eva Krtkova, Marion Pinterits, Matina Kastori (ETC/CME), Michael Goll (Eurostat)
- IPPU: Barbara Gschrey, Steffi Osterheld, Lorenz Moosmann, Graham Anderson (ETC/CME)
- Agriculture: Adrian Leip, Janka Szemesova, Gema Carmona (JRC)
- Waste: Celine Gueguen (ETC/CME)
- LULUCF: Raul Abdas-Vinas (JRC)
- Quality coordinators: Adrian Leip, Giacomo Grassi (JRC), Bernd Guegle, Nicole Mandl, Maria Purzner, Julien Vincent, Giorgos Mellios, Ils Moorkens, Kaat Jespers (ETC/CME)
- Cross-cutting: Nicole Mandl (ETC/CME)

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 2019 annual ESD review was performed by a Technical Expert Review Team (TERT) under service contract 340201/2018/790329/SER/CLIMA.C of the Directorate General for Climate Action of the European Commission. The TERT consisted of the following experts:

- Lead Reviewers: Suvi Monni, Ralph Harthan
- Energy: Graham Anderson, Stephan Poupa, Eva Krtkova
- IPPU: Kristina Kaar, Jolanta Merkeliene
- Agriculture: Etienne Mathias, Steen Gyldenkaerne



- Waste: Hans Oonk, Juraj Farkas
- Quality controller: Justin Goodwin
- Co-ordinator: Bernd Gugele

The TERT 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 2019 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 2017.

**Table A.1.1: Scope of the 2019 annual ESD review**

Element	Scope	Further information
Member States	EU geographical coverage of the Member States	
Years	2017	
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 2019	

## Annex II: Checks carried out during the 2019 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 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.