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Climate Change

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Report on the individual review of the annual submission of the European Union submitted in 2018*

Note by the expert review team

Summary


Each Party included in Annex I to the Convention must submit an annual greenhouse gas inventory covering emissions and removals of greenhouse gas emissions for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual inventory review of the 2018 annual submission of the European Union, conducted by an expert review team in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol”. The review took place from 24 to 29 September 2018 in Bonn.

* In the symbol for this document, 2018 refers to the year in which the inventory was submitted, not to the year of publication.

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Contents

	<i>Paragraphs</i>	<i>Page</i>
Abbreviations and acronyms		3
I. Introduction	1–6	5
II. Summary and general assessment of the 2018 annual submission.....	7	6
III. Status of implementation of issues and/or problems raised in the previous review report	8	8
IV. Issues identified in three successive reviews and not addressed by the Party	9	27
V. Additional findings made during the individual review of the 2018 annual submission.....	10	28
VI. Application of adjustments.....	11	46
VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol.....	12–13	46
VIII. Questions of implementation	14	46
Annexes		
I. Overview of greenhouse gas emissions and removals for the European Union for submission year 2018 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by the European Union in its 2018 annual submission		47
II. Information to be included in the compilation and accounting database		51
III. Additional information to support findings in table 2		54
IV. Documents and information used during the review		55

Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AAU	assigned amount unit
AD	activity data
Annex A sources	source categories included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
ARR	annual review report
Article 8 review guidelines	“Guidelines for review under Article 8 of the Kyoto Protocol”
C	confidential
CCS	carbon dioxide capture and storage
CER	certified emission reduction
CH ₄	methane
CM	cropland management
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CP	commitment period
CPR	commitment period reserve
CRF	common reporting format
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
FM	forest management
FMRL	forest management reference level
GE	gross energy intake
GHG	greenhouse gas
GM	grazing land management
HCFC	hydrochlorofluorocarbon
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPCC good practice guidance	<i>Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories</i>
IPPU	industrial processes and product use
JRC	Joint Research Centre of the European Commission
KP-LULUCF activities	activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
MMS	manure management system
MSW	municipal solid waste
N ₂ O	nitrous oxide
NA	not applicable
NE	not estimated
NF ₃	nitrogen trifluoride
NIR	national inventory report

NO	not occurring
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF ₆	sulfur hexafluoride
SIAR	standard independent assessment report
UNFCCC Annex I inventory reporting guidelines	“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
UNFCCC review guidelines	“Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”
WDR	wetland drainage and rewetting

I. Introduction¹

1. This report covers the review of the 2018 annual submission of the EU organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the “UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention” (decision 13/CP.20). The review took place from 24 to 29 September 2018 in Bonn and was coordinated by Ms. Lisa Hanle (secretariat). Table 1 provides information on the composition of the ERT that conducted the review of the EU.

Table 1

Composition of the expert review team that conducted the review of the European Union

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Ms. Daniela Romano	Italy
	Mr. Marius Țăranu	Republic of Moldova
Energy	Ms. Ana Carolina Avzaradel Szklo	Brazil
	Mr. Hiroshi Ito	Japan
	Ms. Kristine Tracey	Canada
	Mr. Shengmin Yu	China
IPPU	Ms. Niculina Mihaela Bălănescu	Romania
	Mr. Jacek Skoskiewicz	Poland
Agriculture	Mr. Jacques Kouazounde	Benin
	Mr. Nidup Peljor	Bhutan
	Mr. Asaye Ketema Sekie	Ethiopia
LULUCF	Mr. Johannes Brötz	Germany
	Ms. Thelma Krug	Brazil
	Ms. Valentyna Slivinska	Ukraine
Waste	Mr. Jose Manuel Ramirez Garcia	Spain
	Mr. Hiroyuki Ueda	Japan
Lead reviewers	Ms. Romano	
	Mr. Yu	

2. The basis of the findings in this report is the assessment by the ERT of the Party’s 2018 annual submission in accordance with the Article 8 review guidelines. The ERT notes that the individual inventory review of the EU’s 2017 annual submission did not take place in 2017 owing to insufficient funding for the review process.

¹ At the time of publication of this report, the European Union had submitted its instrument of ratification of the Doha Amendment; however, the Amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the Amendment.

3. The ERT has made recommendations that the EU resolve the findings related to issues,² including issues designated as problems.³ Other findings, and, if applicable, the encouragements of the ERT to the EU to resolve them, are also included.
4. A draft version of this report was communicated to the EU, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.
5. Annex I shows annual GHG emissions for the EU, including totals excluding and including the LULUCF sector, indirect CO₂ emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from KP-LULUCF activities, if elected, by gas, sector and activity for the EU.
6. Information to be included in the compilation and accounting database can be found in annex II.

II. Summary and general assessment of the 2018 annual submission

7. Table 2 provides the assessment by the ERT of the annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2

Summary of review results and general assessment of the inventory of the European Union

<i>Assessment</i>	<i>Issue or problem ID#(s) in table 3 and/or 5^a</i>																								
Dates of submission	Original submission: 14 April 2018 (NIR), 14 April 2018, Version 1 (CRF tables), 14 April 2018 (SEF-CP2-2017 tables) Revised submissions: 25 May 2018 (NIR), 25 May 2018, Version 2 (CRF tables), 7 May 2018 (SEF-CP2-2017 tables)																								
Review format	Centralized																								
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (if applicable)	<ol style="list-style-type: none"> 1. Have any issues been identified in the following areas: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">(a) Identification of key categories</td> <td style="width: 15%; text-align: center;">Yes</td> <td style="width: 25%;">G.6</td> </tr> <tr> <td>(b) Selection and use of methodologies and assumptions</td> <td style="text-align: center;">Yes</td> <td>E.2, I.16, A.11</td> </tr> <tr> <td>(c) Development and selection of EFs</td> <td style="text-align: center;">No</td> <td></td> </tr> <tr> <td>(d) Collection and selection of AD</td> <td style="text-align: center;">Yes</td> <td>E.26, I.20</td> </tr> <tr> <td>(e) Reporting of recalculations</td> <td style="text-align: center;">Yes</td> <td>W.2</td> </tr> <tr> <td>(f) Reporting of a consistent time series</td> <td style="text-align: center;">Yes</td> <td>L.6</td> </tr> <tr> <td>(g) Reporting of uncertainties, including methodologies</td> <td style="text-align: center;">Yes</td> <td>G.7</td> </tr> <tr> <td>(h) QA/QC</td> <td></td> <td>QA/QC procedures were assessed in the context of the national system (see para. 2 in this table)</td> </tr> </table> 	(a) Identification of key categories	Yes	G.6	(b) Selection and use of methodologies and assumptions	Yes	E.2, I.16, A.11	(c) Development and selection of EFs	No		(d) Collection and selection of AD	Yes	E.26, I.20	(e) Reporting of recalculations	Yes	W.2	(f) Reporting of a consistent time series	Yes	L.6	(g) Reporting of uncertainties, including methodologies	Yes	G.7	(h) QA/QC		QA/QC procedures were assessed in the context of the national system (see para. 2 in this table)
(a) Identification of key categories	Yes	G.6																							
(b) Selection and use of methodologies and assumptions	Yes	E.2, I.16, A.11																							
(c) Development and selection of EFs	No																								
(d) Collection and selection of AD	Yes	E.26, I.20																							
(e) Reporting of recalculations	Yes	W.2																							
(f) Reporting of a consistent time series	Yes	L.6																							
(g) Reporting of uncertainties, including methodologies	Yes	G.7																							
(h) QA/QC		QA/QC procedures were assessed in the context of the national system (see para. 2 in this table)																							

² Issues are defined in decision 13/CP.20, annex, paragraph 81.

³ Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

<i>Assessment</i>	<i>Issue or problem ID#(s) in table 3 and/or 5^a</i>		
	(i) Missing categories/completeness ^b	Yes	A.24, L.1, L.2, L.10, L.16, KL.10, KL.18
	(j) Application of corrections to the inventory	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	No	A.21
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	No	E.13, E.14, E.19, E.20, E.25, E.27
Supplementary information under the Kyoto Protocol	2. Have any issues been identified related to the national system:		
	(a) The overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements	No	
	(b) Performance of the national system functions	No	
	3. Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry	No	
	(b) Performance of the functions of the national registry and the technical standards for data exchange	No	
	4. Have any issues been identified related to reporting of information on ERUs, CERs, AAUs and RMUs and on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the SIAR?	No	
	5. Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No	
	6. Have any issues been identified related to the reporting of LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as follows:		
	(a) Reporting requirements in decision 2/CMP.8, annex II, paragraphs 1–5	Yes	KL.19, KL.20
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14	Yes	KL.14, KL.15
	(c) Reporting requirements of decision 6/CMP.9	No	

<i>Assessment</i>			<i>Issue or problem ID#(s) in table 3 and/or 5^a</i>
	(d) Country-specific information to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34	Yes	KL.15
CPR	Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol?	NA	
	Did the Party submit a revised estimate to replace a previously applied adjustment?	NA	The Party does not have a previously applied adjustment
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for the assessment of conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	
Questions of implementation	Did the ERT list any questions of implementation?	No	

^a The ERT identified additional issues and/or problems in all sectors and for KP-LULUCF activities that are not listed in this table but are included in table 3 and/or 5.

^b Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

III. Status of implementation of issues and/or problems raised in the previous review report

8. Table 3 compiles all the recommendations made in previous review reports that were included in the previous review report, published on 14 May 2018.⁴ For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2018 annual submission and provided the rationale for its determination, which takes into consideration the publication date of the previous review report and national circumstances.

Table 3
Status of implementation of issues and/or problems raised in the previous review report of the European Union

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
General			
G.1	AD (G.1, 2016) (G.1, 2015) (15, 2014) Transparency	Provide justifications in the NIR as to why the use of international data sources to report AD at the	Resolved. The EU has provided appropriate justifications in the NIR (section 1.7.4.5).

⁴ FCCC/ARR/2017/EU. The ERT notes that the individual inventory review of the EU's 2017 annual submission did not take place in 2017. As a result, the latest previously published ARR reflects the findings of the review of the Party's 2016 annual submission.

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
		individual Party level would lead to strongly inaccurate reporting.	
G.2	Methods (G.3, 2016) (G.3, 2015) (14, 2014) Transparency	Work with member States in order to report consistent notation keys among member States for describing the completeness of the overall inventory.	Addressing. The EU has resolved the issue raised in the 2014 ARR regarding inconsistent use of notation keys for deforestation (see ID# KL.8 below). In addition, as part of its routine initial QA/QC checks on member State submissions the EU performs checks on notation keys to ensure their consistent use. Nevertheless, a couple of inconsistencies in the reporting of notation keys among member States remain from the 2014 ARR (see ID#s I.35 and KL.2 below).
G.3	Key category analysis (G.12, 2016) (G.12, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Improve collaboration with member States and provide complete reporting of the key categories for KP-LULUCF activities in CRF table NIR-3.	Resolved. The EU has provided complete reporting of the key categories for KP-LULUCF activities.
G.4	Uncertainty analysis (G.8, 2016) (G.8, 2015) (33, 2014) Transparency	Describe any changes in overall uncertainty estimates in the NIR.	Resolved. The EU has described changes in overall uncertainty estimates in the NIR (section 1.6).
G.5	National registry (G.5, 2016) (G.5, 2015) (141, 2014) Transparency	Include in the NIR all information in response to the findings in the SIAR in accordance with decision 15/CMP.1, annex, chapter I.G.	Resolved. The ERT notes that in the 2017 SIAR, part 2, the assessor determined that the required information in response to the findings in the SIAR was included in the 2017 NIR (chapter 14). Similarly, in the 2018 SIAR, part 2, the assessor determined that all previous issues identified in the SIAR had also been addressed.

Energy

E.1	1. General (energy sector) (E.2, 2016) (E.2, 2015) (40, 2014) Transparency	Present methodological summaries that are consistent among member States and categories, at least for the key categories.	Addressing. The NIR includes tables with the methodology used and EF applied for subcategories 1.A.1.a (public electricity and heat production) and 1.A.1.c (manufacture of solid fuels and other energy industries), but not for the key categories 1.A.2.g (other (manufacturing industries and construction)), 1.A.3.b (road transportation) and 1.A.5.b (mobile (other)).
E.2	1. General (energy sector) – gaseous, solid and liquid fuels – CO ₂ , CH ₄ and N ₂ O (E.9, 2016) (E.9, 2015) Accuracy	Work with member States to improve the methodology used to estimate emissions from key categories by using a methodological tier for each member State in accordance with the decision trees in the 2006 IPCC Guidelines, the key category analysis of the EU and the relative importance of the	Addressing. During the review, the EU explained that capacity-building activities to help member States improve the methodology used to estimate emissions for key categories have been carried out, and the EU foresees supporting countries in moving to higher-tier methods for key categories in the second half of 2018.

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report	ERT assessment and rationale
		contribution of member State emissions to total emissions at the EU level.	
E.3	1. General (energy sector) – gaseous fuels – CO ₂ , CH ₄ and N ₂ O (E.10, 2016) (E.10, 2015) Transparency	Provide information in the NIR on the fuel combustion categories under which the emissions from the combustion of CH ₄ recovered are included.	Not resolved. Additional information on the reporting of the recovery of emissions from coal mining and oil and gas operations is not included in the NIR. During the review, the EU explained that when a member State reports CH ₄ recovery as “IE” in the CRF tables, the NIR provides information regarding the fuel combustion categories under which the emissions from the combustion of CH ₄ recovered are included.
E.4	1. General (energy sector) – CO ₂ and CH ₄ (E.11, 2016) (E.11, 2015) Transparency	Include in the NIR summary information on emission trends, methodologies and EFs for the following key categories: (1) CO ₂ emissions from public electricity and heat production – peat (subcategory 1.A.1.a); (2) CH ₄ emissions from residential – solid fuels (subcategory 1.A.4.b); and (3) CO ₂ emissions from venting and flaring (subcategory 1.B.2.c).	Resolved. Summary information on emission trends, methodologies and EFs for the key categories is reported in the NIR (section 3.2).
E.5	Feedstocks, reductants and other non-energy use of fuels – all fuels – CO ₂ (E.3, 2016) (E.3, 2015) (45, 2014) Transparency	Provide transparent information on recalculations for CRF table 1.A(d) in the NIR.	Resolved. Recalculations for CRF table 1.A(d) are reported in NIR table 3.138.
E.6	Feedstocks, reductants and other non-energy use of fuels – all fuels – CO ₂ (E.5, 2016) (E.5, 2015) (47, 2014) Comparability	Continue with efforts to ensure the consistency of the reporting among member States, in particular with regard to the allocation of emissions between the energy and IPPU sectors.	Resolved. The ERT finds that the EU has made, and continues to make, sufficient efforts to ensure the consistency of the reporting among member States. The EU improved member States’ reporting on the non-energy use of fuels under category 2.D.3 (other (non-energy products from fuels and solvent use)) (NIR, section 4.2.4.1). Although inconsistencies remain in the allocation of emissions from ammonia production and iron and steel production, the ERT concludes that the Party has made sufficient efforts to help member States (by conducting a webinar in 2017 where these categories were specifically addressed (NIR, p.397)) and notes that the allocation of emissions for these two categories is described in the EU NIR (e.g. section 3.2.2.1 and table 3.139).
E.7	Feedstocks, reductants and other non-energy use of fuels – all fuels – CO ₂ (E.12, 2016) (E.12,	Provide in the NIR an explanation of why the information reported in CRF table 1.A(d) on feedstocks, reductants and other non-energy use of fuels is different from that	Resolved. The EU changed its approach in CRF table 1.A(d) and the information reported in the 2018 submission constitutes the sum of the data reported by its member States. Consequently, there are no inconsistencies between the EU and

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	2015) Transparency	reported by the Parties (i.e. the data in CRF table 1.A(d) are from Eurostat).	its member States in terms of the information reported in CRF table 1.A(d).
E.8	International bunkers and multilateral operations – liquid fuels – CO ₂ , CH ₄ and N ₂ O (E.6, 2016) (E.6, 2015) (44, 2014) Accuracy	Use the most recent results from the collaboration with Eurocontrol, the European Organisation for the Safety of Air Navigation, to improve the accuracy of the emission estimates for the EU and for the member States, ensuring consistency in the time series in accordance with the IPCC good practice guidance, and report on the results of the collaboration in the NIR.	Resolved. The results of the Eurocontrol collaboration are included in the NIR (sections 1.4.2 and 3.4), and Eurocontrol data have been used in member States' NIRs.
E.9	1.A Fuel combustion – sectoral approach – all fuels – CO ₂ (E.13, 2016) (E.13, 2015) Transparency	Report information regarding the choice of default EFs from the 2006 IPCC Guidelines and the reasons for particularly high or low IEFs of individual member States.	Resolved. The NIR includes figures showing the IEFs of every member State, and the EU provides explanations for particularly high or low IEFs (e.g. figure 3.9 of the NIR and the accompanying text that explains the relatively high IEF for Bulgaria and low IEF for Belgium).
E.10	1.A.1 Energy industries – all fuels – CO ₂ (E.7, 2016) (E.7, 2015) (48, 2014) Transparency	Continue to improve the QA/QC procedures to ensure consistency between the CRF tables and the NIR.	Resolved. The total CO ₂ emissions from energy industries reported for 2016 (1,184,024 kt CO ₂) are consistent across CRF table 1.A(a)s1 and NIR table 3.2 (formerly table 3.1).
E.11	1.A.3.a Domestic aviation – liquid fuels – CO ₂ (E.8, 2016) (E.8, 2015) (49, 2014) Accuracy	Promote the use of the results of the collaboration between the EU and Eurocontrol to improve the accuracy of the inventory and report on the results of the collaboration in the NIR.	Resolved. The results of the Eurocontrol collaboration are included in the NIR (section 3.4).
E.12	1.A.3.b Road transportation – liquid fuels – CO ₂ , CH ₄ and N ₂ O (E.15, 2016) (E.15, 2015) Comparability	Provide summary information on how each member State has reported the emissions from use of lubricants under the transport (1.A.3) and/or lubricant use (2.D.1) categories and work with the member States to report emissions from lubricants combusted in two-stroke engines under the transport category in accordance with the 2006 IPCC Guidelines.	Not resolved. The required summary information on emissions from lubricant use is not included in the NIR. During the review, the EU explained that for member States that have provided information in their NIR on how they reported emissions from lubricant use, the recommendation is considered to have been implemented. In the case of member States for which no clear conclusion can be drawn from the information reported, additional actions are needed by the EU, which it will carry out for the next submission.
IPPU			
I.1	2. General (IPPU) (I.1, 2016) (I.1, 2015) (56, 2014) Transparency	Provide justifications in the NIR as to why the use of international data sources to report AD at the EU level would lead to strongly inaccurate reporting.	Resolved. The EU provides the appropriate justifications in the NIR (section 1.7.4.5).
I.2	2. General (IPPU) (I.26, 2016) (I.26,	Provide consistent information on the methodologies used to	Addressing. Information on the methodologies used by member States is still inconsistent

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	2015) Transparency	estimate GHG emissions from the IPPU sector within the NIR, while also ensuring consistency with the NIRs of member States.	within the NIR (chapter 4 versus annex III). Although there were improvements in the consistency of information between the sections on Denmark in the EU NIR, inconsistencies in the sections on Greece, Lithuania and France were identified for cement production.
I.3	2. General (IPPU) (I.27, 2016) (I.27, 2015) Transparency	Identify which tier method was used to estimate emissions under each key category of the IPPU sector, in accordance with the 2006 IPCC Guidelines, and provide the corresponding tier method when a country-specific method is used.	Addressing. The EU generally provides methodological information for key categories for all member States in annex III to the NIR. However, the previous review report specifically identified the issues listed in ID#s I.6 and I.8 below in this context, and these issues were not resolved in the NIR.
I.4	2.A.1 Cement production – CO ₂ (I.7, 2016) (I.7, 2015) (63, 2014) Transparency	Include the relevant information from the NIR of Poland in the NIR of the EU rather than just referring to the NIR of the member State.	Resolved. Methodological information on estimating emissions from cement production in Poland is included in annex III to the NIR.
I.5	2.A.1 Cement production – CO ₂ (I.28, 2016) (I.28, 2015) Transparency	Correct the information provided in the NIR on the method used by Poland to estimate CO ₂ emissions from cement production.	Resolved. Information in the NIR (table 4.4 and annex III) has been updated to reflect Poland's use of a tier 2 method and a country-specific EF to estimate CO ₂ emissions from cement production.
I.6	2.A.1 Cement production – CO ₂ (I.29, 2016) (I.29, 2015) Transparency	Provide information in the NIR on the corresponding level of complexity (IPCC tier) of the country-specific methods used by Cyprus, Greece, Hungary, the Netherlands and Sweden to estimate emissions from cement production.	Addressing. Information on the tier used to estimate emissions from cement production has been updated in the NIR only for Hungary (in chapter 4 and annex III) and Sweden (in chapter 4 only). Tiers for Cyprus, Greece and the Netherlands are missing. During the review, the EU indicated that the missing information would be addressed in a future submission.
I.7	2.A.2 Lime production – CO ₂ (I.9, 2016) (I.9, 2015) (64, 2014) Transparency	Provide more information for Italy about the methods used to estimate emissions from lime production for the entire time series; in particular, there should be transparent documentation on whether the method is based on the amount of calcium carbonate in raw material or on the amount of calcium oxide and magnesium oxide in the lime produced for each of the periods.	Resolved. Transparent documentation of the methods applied by Italy is included in the NIR (annex III). According to annex III, the CO ₂ IEF for lime production for Italy fluctuates owing to the varying calcium oxide and magnesium oxide contents of the raw material fed into the kiln. The ERT verified this information with that contained in Italy's NIR 2018 (p.129).
I.8	2.A.2 Lime production – CO ₂ (I.30, 2016) (I.30, 2015) Transparency	Provide information in the NIR on the methods and EFs used by Austria, France and Malta and the level of complexity (IPCC tier) of the country-specific methods used by Greece, Hungary and Sweden to estimate CO ₂ emissions from lime production.	Addressing. Information on the tier used to estimate emissions from lime production has been updated in the NIR for France and Hungary in both table 4.5 and annex III, and for Austria and Sweden in table 4.5 only (in annex III, the column for method and EF used is blank). No information is included for Greece, Malta or the Netherlands.
I.9	2.A.2 Lime production – CO ₂	Work with the Netherlands to report CO ₂ emissions from lime	Addressing. The Netherlands now reports CO ₂ emissions from lime production in the IPPU

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	(I.31, 2016) (I.31, 2015) Comparability	production under the lime production category (2.A.2) in accordance with the 2006 IPCC Guidelines.	sector, but under the category food industries (2.D.2) rather than lime production (2.A.2).
I.10	2.A.2 Lime production – CO ₂ (I.32, 2016) (I.32, 2015) Comparability	Indicate in the NIR the units in which the AD and IEFs for the lime production category are reported (lime production or carbonate use) and report the comparison analysis of the IEFs used by member States, including the reasons for significant deviations from the average value for the EU and from the default IPCC EFs, if such deviations occur.	Resolved. The use of units, the reasons for significant deviations in the IEFs used by member States from the EU average and the IPCC defaults are given on page 441 and a comparison of IEFs used by member States is given in table 4.7 of the NIR.
I.11	2.A.3 Glass production – CO ₂ (I.33, 2016) Comparability	Report the correct CO ₂ IEFs for glass production for Spain in the NIR and CRF tables.	Resolved. The CO ₂ IEF for glass production in Spain has been corrected in the NIR (table 4.9) and CRF table 2(I).A-Hs1.
I.12	2.A.4 Other process uses of carbonates – CO ₂ (I.34, 2016) (I.33, 2015) Transparency	Report a summary description of the methodologies, assumptions, EFs and AD used to estimate emissions from other process uses of carbonates (2.A.4) for each member State.	Resolved. A description of the assumptions, methodologies, EFs and AD used to estimate emissions from other process uses of carbonates is included in the NIR (table 4.10).
I.13	2.B.1 Ammonia production – CO ₂ (I.11, 2016) (I.11, 2015) (66, 2014) Transparency	Provide in the NIR adequate and transparent methodology overviews for France and Germany to enable the ERT to conduct a thorough review of the AD and EFs used in the ammonia production emission estimates of these countries.	Resolved. Methodological information on the six largest contributors to emissions from ammonia production (which include France and Germany) is included in the NIR (p.450), allowing for a sufficient review of AD and EFs.
I.14	2.B.1 Ammonia production – CO ₂ (I.12, 2016) (I.12, 2015) (67, 2014) Consistency	Make efforts to ensure that Greece completes the ongoing work to obtain more accurate data on the amount of liquid fuel used as feedstock and the updated AD for the emission estimates.	Resolved. The EU made efforts to address the recommendation during its initial QA/QC checks on member State submissions. The EU also had discussions with Greece and determined that it is not possible to obtain better historical data. This situation is now described in Greece's NIR (section 4.6.1).
I.15	2.B.1 Ammonia production – CO ₂ (I.35, 2016) (I.34, 2015) Comparability	Correct the reporting of the AD, CO ₂ emissions and CO ₂ IEF for ammonia production for Hungary and recalculate the aggregated values for the EU in the CRF tables, and correct the average CO ₂ IEF for the EU reported in the NIR.	Resolved. The EU clarified in NIR table 4.15 that the CO ₂ IEF for Hungary is based on natural gas consumption. As explained in the NIR (p.451) and confirmed during the review, not all member States provide AD for ammonia production, so the EU fills the gaps in the values in order to estimate a CO ₂ IEF. The CO ₂ IEF corrected on the basis of production is reported in the NIR (pp.451–452).
I.16	2.B.1 Ammonia production – CO ₂ (I.36, 2016) (I.35,	Work with Czechia to move from a tier 1 to a higher-tier method to estimate CO ₂ emissions from ammonia production, which is a	Not resolved. During the review, the EU informed the ERT that implementation of this recommendation is planned for a future submission.

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	2015) Accuracy	key category, in accordance with the 2006 IPCC Guidelines.	
I.17	2.B.2 Nitric acid production – N ₂ O (I.37, 2016) Transparency	Report in the NIR the N ₂ O IEF for nitric acid production in a transparent manner by expressing the value in kg N ₂ O/t nitric acid production, instead of t N ₂ O/t nitric acid production.	Resolved. The N ₂ O IEF for nitric acid production is reported in kg N ₂ O/t nitric acid production (NIR, table 4.17).
I.18	2.B.2 Nitric acid production – N ₂ O (I.38, 2016) (I.36, 2015) Transparency	Correct the AD for nitric acid production and recalculate the N ₂ O IEF for Lithuania.	Resolved. The AD for nitric acid production and the N ₂ O IEF for Lithuania have been corrected and recalculated, respectively (NIR, table 4.17).
I.19	2.B.3 Adipic acid production – N ₂ O (I.39, 2016) (I.37, 2015) Comparability	Recalculate and report the EU average N ₂ O IEF for adipic acid production, taking into account only N ₂ O emissions for which there are AD available and explain in the NIR the approach used to calculate the IEF.	Resolved. Although the EU continues to report a high N ₂ O IEF for adipic acid production (3.98 t/t), it explained that the IEF is calculated excluding the AD from France and Germany, which are confidential, leading to an apparently high IEF (NIR, p.457). During the review, the EU explained that all countries estimate emissions for this category using higher-tier methods, and, as the same AD are available for only 20 per cent of emissions, the use of gap-filling techniques is not appropriate. The ERT agrees with the EU's explanation.
I.20	2.B.4 Caprolactam, glyoxal and glyoxylic acid production – N ₂ O (I.40, 2016) (I.38, 2015) Accuracy	Work with Czechia to recalculate and report more accurate N ₂ O emissions from caprolactam production, taking into account the data collected under the EU ETS.	Not resolved. During the review, the EU informed the ERT that implementation of this recommendation is planned for a future submission. The ERT notes that Czechia reports annual emissions from caprolactam production of 0.25 kt N ₂ O (74.5 kt CO ₂ eq) and that emissions have been measured since 2012, so any underestimation is below the level of significance given in decision 22/CMP.1 in conjunction with decision 4/CMP.11, annex, paragraph 80(b). In response to a draft version of this report, the EU stated that it continues to work with Czechia to report more accurate emissions from caprolactam production, taking into account the data collected under the EU ETS.
I.21	2.B.7 Soda ash production – N ₂ O (I.15, 2016) (I.15, 2015) (65, 2014) Consistency	Work with Croatia to ensure the consistency of the time series of limestone and dolomite use.	Resolved. There are no inconsistencies in the time series for Croatia related to uses of limestone, dolomite and soda ash in the EU submission. The ERT notes that Croatia reports soda ash production as “NO” for the whole time series.
I.22	2.B.8 Petrochemical and carbon black production – CO ₂ (I.41, 2016) (I.39, 2015) Transparency	Include information on the methodologies, assumptions, EFs and AD used to estimate CO ₂ emissions from petrochemical and carbon black production, which is a key category.	Resolved. Relevant information on methodologies, tiers, assumptions and EFs used for petrochemical and carbon black production by each member State is included in the NIR (table 4.20) and annex III.

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
I.23	2.B.8 Petrochemical and carbon black production – CO ₂ (I.42, 2016) (I.40, 2015) Comparability	Include in the NIR the reasons why CO ₂ emissions from fuel consumption in ethylene production in France were allocated to the energy sector and work with the member State to allocate CO ₂ emissions from fuel use in ethylene production to the IPPU sector, under petrochemical and carbon black production, in accordance with the 2006 IPCC Guidelines.	Not resolved. During the review, the EU informed the ERT that implementation of this recommendation is planned for a future submission.
I.24	2.B.9 Fluorochemical production – HFCs (I.43, 2016) (I.41, 2015) Comparability	Explain in the NIR how tetrafluoromethane emissions from the production of HCFC-22 occur and work with Italy to allocate these emissions under the subcategory fluorochemical production – by-product emissions (other) (2.B.9.a.2) instead of the subcategory fluorochemical production – by-product emissions (production of HCFC-22) (2.B.9.a.1).	Not resolved. The EU continues to report tetrafluoromethane emissions as by-product emissions from the production of HCFC-22, but an explanation for how these emissions occur is not included in the NIR.
I.25	2.B.9 Fluorochemical production – HFCs and PFCs (I.44, 2016) (I.42, 2015) Transparency	Provide a description of the methodology used and information explaining the trend of emissions of unspecified HFCs and PFCs reported under the subcategory fluorochemical production – by-product emissions (other) (2.B.9.a.2).	Resolved. A description of the methodology used to estimate HFC and PFC emissions from fluorochemical production is included in table 4.23 and the trend in the emissions is explained in section 4.2.2.5 of the NIR.
I.26	2.C.1 Iron and steel production – CO ₂ (I.45, 2016) (I.43, 2015) Accuracy	Work with Romania to enable the Party to use a higher-tier method and ensure that double counting does not occur when estimating CO ₂ emissions from iron and steel production.	Resolved. Romania revised its approach to estimating CO ₂ emissions from iron and steel production to avoid double counting, and made recalculations. Relevant information is included in the EU NIR (table 3.24).
I.27	2.C.1 Iron and steel production – CO ₂ (I.47, 2016) (I.45, 2015) Transparency	Use the notation key “IE”, instead of “NA”, when reporting CO ₂ emissions from sinter production in Italy in the NIR and specify where in the inventory these emissions are included.	Resolved. The notation key for reporting CO ₂ emissions from sinter production in Italy has been changed from “NA” to “IE”, and the information that these emissions are included under pig iron production (2.B.1.b) is included in the NIR (section 4.2.3.1).
I.28	2.C.1 Iron and steel production – CO ₂ (I.48, 2016) (I.46, 2015) Accuracy	Work with Slovakia to correct the reported AD for total pig iron production used to estimate CO ₂ emissions from iron and steel production.	Resolved. The previous ERT suggested that Slovakia’s estimated production level of pig iron was lower than expected. However, the current ERT noted that Slovakia used a model for estimating CO ₂ emissions from iron and steel production in basic oxygen furnaces in which pig iron is included as an intermediate product. All pig iron production is accounted for in the estimation and the ERT did not identify any underestimation of CO ₂ emissions for this category for Slovakia.

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
I.29	2.C.1 Iron and steel production – CO ₂ (I.49, 2016) Transparency	Work with Hungary to estimate and report the CO ₂ IEF, expressed in t CO ₂ per t sinter produced.	Not resolved. The EU continues to report a comparatively high CO ₂ IEF for Hungary of 5.28 t CO ₂ /t sinter for 1990 and 5.08 t CO ₂ /t sinter for 2016 (NIR, table 4.17). During the review, the EU informed the ERT that implementation of this recommendation is planned for a future submission.
I.30	2.C.3 Aluminium production – CO ₂ and PFCs (I.19, 2016) (I.19, 2015) (73, 2014) Transparency	Provide in the NIR adequate methodological overviews to enable the ERT to conduct a thorough review of the AD and EFs used in the aluminium production emission estimates provided by Greece, the Netherlands and Sweden.	Resolved. Relevant information on the aluminium production emission estimates for Greece, the Netherlands and Sweden is included in the NIR (pp.487–488).
I.31	2.C.3 Aluminium production – CO ₂ (I.50, 2016) (I.47, 2015) Transparency	Include in the NIR information on the method, assumptions, EFs and AD used to estimate CO ₂ emissions from aluminium production.	Addressing. Some additional information on the methods used to estimate CO ₂ emissions from aluminium is included in the NIR (p.488); however, EFs and AD were not provided (AD were reported for PFC emissions).
I.32	2.C.7 Other (metal industry) – CO ₂ (I.51, 2016) (I.48, 2015) Transparency	Include in the NIR information on the sources and amount of emissions reported under the category metal industry – other (2.C.7).	Resolved. The NIR includes information on sources of emissions for this category (p.489) and presents aggregated emissions for all member States (table 4.51).
I.33	2.D Non-energy products from fuels and solvents use – CO ₂ (I.52, 2016) (I.49, 2015) Transparency	Provide in the NIR information on the methodologies, assumptions, EFs and AD used to estimate CO ₂ emissions from non-energy products from fuel and solvent use, which is a key category.	Addressing. Information on methodologies and EFs is included only for other non-energy products from fuel and solvent use (2.D.3) (NIR, table 4.40).
I.34	2.F Product uses as substitutes for ozone-depleting substances – HFCs (I.20, 2016) (I.20, 2015) (74, 2014) Transparency	Endeavour to provide in the NIR summary overviews of methodologies used to estimate emissions from the consumption of halocarbons and SF ₆ for key categories based on the relevant methodological descriptions reported in the NIRs of member States.	Addressing. The two key categories are refrigeration and air conditioning, and aerosols. Information on the methodologies used to estimate HFC emissions from refrigeration and air conditioning for all member States is included in the NIR (table 4.45). Regarding aerosols, methodological information is reported for all member States, except Cyprus, in table 4.48.
I.35	2.F Product uses as substitutes for ozone-depleting substances – HFCs, PFCs and SF ₆ (I.21, 2016) (I.21, 2015) (75, 2014) Transparency	Make the necessary corrections in the use of the notation keys to ensure the transparency of the reporting (specifically: “NE” reported by Denmark for the amount of gas remaining in products at decommissioning; “NO” reported by Finland for SF ₆ emissions from aluminium and magnesium foundries; “IE” and “NA” reported by Ireland for AD and emission estimates for HFC emissions from refrigeration and air-conditioning equipment	Addressing. The only outstanding issue of the specific issues with notation keys listed in the annual review report of the 2014 submission is that Finland still reports “NO” for SF ₆ emissions from aluminium and magnesium foundries.

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report	ERT assessment and rationale
		(except mobile air conditioning); “NO” reported by Luxembourg for potential emissions of PFCs from refrigeration and air-conditioning equipment; “NA” and “NA and NO” reported by the Netherlands for AD and IEFs of emissions from stocks in industrial refrigeration and mobile equipment, whereas the emissions are actually estimated; and empty cells in the CRF tables for Spain as a replacement of “NA” and “NE” notation keys for reporting emissions from semiconductor manufacturing).	
I.36	2.F.3 Fire protection – HFCs, PFCs and SF ₆ (I.24, 2016) (I.24, 2015) (78, 2014) Accuracy	Work with Greece in order to implement appropriate country-specific methodologies to estimate HFC and/or PFC emissions in accordance with the IPCC good practice guidance.	Resolved. The ERT finds that the EU has worked with Greece in a sufficient manner to implement appropriate country-specific methodologies for this category. As stated in the NIR (p.841) and confirmed during the review, the implementation of this new country-specific methodology by Greece is ongoing. The EU consulted with Greece during the initial checks and Greece confirmed that data collection and methodology development are being implemented. The ERT also notes that, until data collection in Greece is completed, use of surrogate data (i.e. cluster data) when no other information is available is acceptable, especially to report emissions of a single F-gas for one of the less significant categories.
I.37	2.F.6 Other applications (product uses as substitutes for ozone-depleting substances) – HFCs, PFCs and SF ₆ (I.25, 2016) (I.25, 2015) (77, 2014) Transparency	Include an explanation in the annual submission on the reporting of the emissions from the processes related to the use of HFCs and SF ₆ in the Netherlands, and enhance the QC procedures to ensure that the information in the NIR of the EU accurately reflects the information in the NIRs of member States.	Addressing. The NIR does not include consumption data for aerosols, fire extinguishers, foams or solvents under category 2.F to address the transparency issue of the current reporting for the Netherlands. Table 4-44 of the NIR reports “IE, NA” for category 2.F.2, blank cells for 2.F.3 and 2.F.5, and “NO” for category 2.F.4. No explanation for the reporting of “IE” and blank cells for the Netherlands has been provided. During the review, the EU confirmed that, as stated in the NIR (table 10.7), a new methodology for estimating emissions for this category is being developed by the Netherlands and will be implemented for the next submission.
Agriculture			
A.1	3. General (agriculture) – CO ₂ (A.8, 2016) (A.8, 2015) Transparency	Indicate in the NIR where in the inventory of the Netherlands indirect CO ₂ emissions from the agriculture sector are included.	Not resolved. The EU has reported in the NIR (table 10.7) and confirmed during the review that the recommendation will be implemented in a future submission.
A.2	3. General (agriculture) – CO ₂ (A.8, 2016) (A.8,	Work with Slovakia to use the appropriate notation key to report indirect CO ₂ emissions from the	Not resolved. The EU has reported in the NIR (table 10.7) and confirmed during the review

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	2015) Transparency	agriculture sector or explain where in the inventory Slovakia has reported these emissions.	that the recommendation will be implemented in a future submission.
A.3	3. General (agriculture) – CH ₄ (A.9, 2016) (A.9, 2015) Transparency	Compile and report information on the methodology and CH ₄ EFs used to estimate emissions from cattle, sheep and swine for all member States and Iceland.	Addressing. The EU has reported information on the methodology and CH ₄ EFs used to estimate emissions from cattle, sheep and swine for all member States but not Iceland (NIR, tables 5.5, 5.6, 5.16 and 5.17). During the review, the EU indicated that Iceland used a tier 2 method to estimate CH ₄ emissions from sheep. For Iceland's approach to estimating emissions from cattle, see ID# A.16 in table 5.
A.4	3.A Enteric fermentation – CH ₄ (A.10, 2016) (A.10, 2015) Transparency	Include in the NIR background information on the recalculations of emissions from enteric fermentation for all member States where differences between the current and the previous submissions occur.	Resolved. The EU has provided explanations for the recalculations of emissions from enteric fermentation for all member States in the NIR (tables 5.62–5.65).
A.5	3.A.1 Cattle – CH ₄ (A.11, 2016) (A.11, 2015) Transparency	Work with the Netherlands to include the Party's milk yield for dairy cattle in the NIR of the EU, as is the case for all other member States.	Addressing. The EU reported that it has included the Netherlands' milk yield for dairy cattle in the EU NIR (table 10.7). The ERT notes, however, that the EU mentioned that, while the Netherlands does not report this milk yield in its CRF tables, the data are available in table 5.4 of the Netherlands' 2018 NIR (EU NIR, p.548). The milk yield for the Netherlands has therefore not actually been provided in the EU NIR, as acknowledged by the Party during the review.
A.6	3.B Manure management – N ₂ O (A.12, 2016) (A.12, 2015) Comparability	Work with the Netherlands to investigate whether N ₂ O emissions from manure management can be estimated and reported separately for each livestock category.	Not resolved. The EU reported that the Netherlands reports the amount of manure managed in each animal system (EU NIR, table 10.7). Nevertheless, the EU uses the notation key "IE" to report N ₂ O emissions from manure management for cattle and swine for the Netherlands in tables 5.29 and 5.30 of the NIR. The ERT notes that in CRF table 3.B(b) the EU also uses the notation key "IE" to report N ₂ O emissions from manure management for sheep and swine for the Netherlands. For 2018 the Netherlands reported manure by MMS and livestock category, but emissions in category 3.B.b were still reported under other livestock. According to the Netherlands' improvement plan, the disaggregation of emissions by livestock category is expected to be completed in time for the next submission.
A.7	3.B Manure management – N ₂ O (A.13, 2016) (A.13, 2015) Transparency	Include information on the use of the notation key "NE" to report the allocation of manure per livestock species and per MMS and work with member States to calculate such allocations on the	Resolved. The EU has not used the notation key "NE" to report the allocation of manure per livestock species and per MMS. Data have been reported in CRF table 3.B(a)s2.

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report	ERT assessment and rationale
		basis of the data provided by member States.	
A.8	3.B Manure management – N ₂ O (A.14, 2016) (A.14, 2015) Transparency	Provide information on the use of the notation key “IE” by Spain to report direct N ₂ O emissions from anaerobic lagoons in CRF table 3.B(b), indicating where in the inventory the emissions have been included.	Resolved. The notation key “IE” has been replaced by “NO” in CRF table 3.B(b) to report direct N ₂ O emissions from anaerobic lagoons, which is consistent with Spain’s use of “NO” in CRF table 3.B(b) in its 2018 submission.
A.9	3.B.1 Cattle – N ₂ O (A.15, 2016) (A.15, 2015) Comparability	Correct the reporting of the nitrogen excretion rate for non-dairy cattle for 1999.	Resolved. The EU has corrected the nitrogen excretion rate for France for 1999 (NIR, figure 5.50), which was causing the inter-annual fluctuation identified during the previous review.
A.10	3.B.3 Swine – N ₂ O (A.4, 2016) (A.4, 2015) (90, 2014) Transparency	Elaborate an explanation for the increase in the nitrogen excretion rate for swine for Sweden in the NIR.	Resolved. The ERT notes that, while the inter-annual change between 2001 (7.94 kg/head/year) and 2002 (9.17 kg/head/year) does still appear to exist, it is not evident at the EU level. The ERT considers this issue to have been resolved. During the review, the EU explained that the nitrogen excretion for sows and pigs for meat production in Sweden was updated in 2002 as a result of more intense swine production.
A.11	3.B.3 Swine – CH ₄ (A.16, 2016) (A.16 2015) Accuracy	Work with Cyprus, Czechia, Greece and Slovakia to move to a higher-tier method to estimate CH ₄ emissions from manure management for swine.	Addressing. The EU has reported that Cyprus is now using a tier 2 method to estimate CH ₄ emissions from manure management for swine, while a tier 1 method is still being used by Czechia, Greece and Slovakia (NIR, table 5.17). During the review, the EU indicated that ongoing efforts are being made together with the member States concerned to move to a higher-tier method and that the issue is included in the member States’ respective improvement plans.
A.12	3.D.b Indirect N ₂ O emissions from managed soils – N ₂ O (A.7 2016) (A.7, 2015) (92, 2014) Comparability	Work with member States to ensure more consistent reporting of the area of organic soils between the agriculture and LULUCF sectors.	Not resolved. The total area of organic cultivated soils reported in CRF table 3.D (86,174.66 kha for 2016) is more than 10 times higher than the sum of the areas reported in CRF tables 4.B and 4.C (6,084.71 kha for 2016). During the review, the EU explained that it checked if the sum of the areas reported in CRF tables 4.B and 4.C is at least as large as the area of cultivated histosols reported in CRF table 3.D. The EU found that the reporting was correct in the January 2018 submission (for all countries reporting both categories) but that there was an error in the Netherlands’ March submission to the EU in CRF table 3.D. The EU noted in its response that differences between the sum of areas reported in CRF tables 4.B and 4.C and the area reported in CRF table 3.D could be explained by non-cultivated or non-managed areas; for example, non-cultivated grassland, which needs to be reported in CRF table 4.C but not in CRF table 3.D, as CRF table 3.D includes emissions from cultivation and

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report	ERT assessment and rationale
A.13	3.I Other carbon-containing fertilizers – CO ₂ (A.18, 2016) (A.18, 2015) Transparency	Include in the NIR information explaining the trend of CO ₂ emissions from other carbon-containing fertilizers.	<p>management of cropland and grassland (as noted in its footnote 2). The ERT asked the EU to provide the area of non-cultivated grassland that is reported only under category 4.C and to explain whether this non-cultivated component of grassland is managed or not, but the EU did not provide that information. In this regard, keeping in mind the level of aggregation required in the CRF tables, during the initial QA/QC checks of member State submissions, the EU noted that the figures reported by member States are considered inconsistent only when the area under “cultivation of histosols” in CRF table 3.D is greater than the sum of the areas of organic soils reported under cropland (CRF table 4.B) and grassland (CRF table 4.C). The ERT disagrees with the assessment of the EU that the area under “cultivation of histosols” in CRF table 3.D should not be equal to the sum of the areas of cultivated organic soils reported under cropland (CRF table 4.B) and grassland (CRF table 4.C). In response to a draft version of this report, the Party indicated that it will work to better understand the reasons for the differences between category 3.D and the sum of categories 4.B and 4.C for the 2020 annual submission.</p> <p>Resolved. The EU has reported that the issue has been resolved as there are no time-series trend issues for CO₂ emissions from other carbon-containing fertilizers in the 2018 submission (NIR, table 10.7). The ERT notes that in CRF table 10 there are no significant inter-annual changes between 1996 (416.23 kt CO₂) and 1997 (390.02 kt CO₂) (a decrease of 6.3 per cent) or between 2003 (325.76 kt CO₂) and 2004 (339.58 kt CO₂) (an increase of 4.2 per cent).</p>
LULUCF			
L.1	4. General (LULUCF) (L.1, 2016) (L.1, 2015) (13, 2014) (27, 2013) (12, 2012) Completeness	Continue efforts to improve the completeness of the reporting of emissions from all mandatory source categories in the LULUCF sector.	Addressing. The EU demonstrated that improvements have been made by some member States in providing estimates for mandatory categories in the LULUCF sector (see ID# L.10 below). However, some member States are still using the notation key “NE” for reporting these emissions (see ID# L.16 below). During the review, the EU indicated that further improvements are expected to be implemented in future submissions.
L.2	4. General (LULUCF) (L.2, 2016) (L.2, 2015) (95, 2014) (76, 2013) (86, 2012) Completeness	Work with member States with a view to reporting mandatory pools and categories that are currently not estimated in order to increase the completeness of the inventory.	Addressing. See ID# L.1 above.

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
L.3	4. General (LULUCF) (L.13, 2016) (L.13, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Include in the NIR information on planned inventory improvements for the LULUCF sector and KP-LULUCF activities.	Addressing. In the NIR, the EU reports planned improvements (section 6.4.4) and implemented improvements (section 11.3.6). However, for two of the planned improvements listed in section 6.4.4, the information is not sufficient to allow the ERT to identify what type of improvements are being considered by the EU for future submissions. In particular, the EU indicates that a planned improvement is the implementation of additional sector-specific checks, without describing the planned checks. Similarly, the EU does not provide sufficient information on the required corrections it identified during the QA/QC checks, but which could not be implemented for the 2018 annual submission (p.767). During the review, the EU provided more details on the planned improvements that will be included in the next submission.
L.4	4. General (LULUCF) (L.16, 2016) (L.15, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Correct the inconsistencies in the reported areas in CRF tables 4.1 and 4.A–4.F.	Not resolved. The inconsistencies in the reported areas in CRF tables 4.1 and 4.A–4.F remain.
L.5	4. General (LULUCF) – CO ₂ (L.12, 2016) (L.12, 2015) Comparability	Use the notation key “NA” to report carbon stock changes from carbon pools where carbon stock changes are neutral (i.e. where net emissions are equal to net removals).	Addressing. The EU is continuing its inventory improvement efforts with regard to using the notation key “NA” where carbon stock changes are considered neutral (e.g. Latvia now reports “NA” for mineral soils for grassland remaining grassland). The ERT commends the EU for the fact that France provided a quantitative assessment of carbon stock changes in mineral soils for grassland remaining grassland instead of using a notation key. However, some member States continue to report “NO” for mandatory pools. For instance, Estonia, Greece, Lithuania, Luxembourg and Slovakia have reported “NO” for carbon stock changes in mineral soils for grassland remaining grassland. During the review, the EU indicated that it is working with member States to ensure use of the notation key “NA” where carbon stock changes are considered neutral. This issue was discussed with member States during the annual LULUCF workshop led by the JRC.
L.6	4.A.1 Forest land remaining forest land – CO ₂ (L.17, 2016) (L.16, 2016) Consistency	Work with Luxembourg to improve the time-series consistency of net carbon stock changes in deadwood in forest land remaining forest land.	Addressing. Luxembourg has reported an inconsistent time series of net carbon stock changes in deadwood for forest land remaining forest land (“NO” is reported for 1990–2000, and net carbon stock changes for thereafter). During the review, the EU noted that it had already held discussions with Luxembourg on this issue specifically and that the issue was included in the planned improvements section of

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report	ERT assessment and rationale
			the NIR (p.767). The Party indicated that this issue will be addressed in the 2019 submission.
L.7	4.A.2 Land converted to forest land – CO ₂ (L.4, 2016) (L.4, 2015) (97, 2014) (80, 2013) Transparency	Improve the transparency of the reporting, including the provision of updated information from member States and internal QA/QC checks, in order to ensure that the aggregated reporting is complete and consistent among member States.	Addressing. The original recommendation from the 2013 ARR related to the reporting by Italy. The EU does not provide transparent information in the NIR (section 6.2.1.3) for Italy regarding its methodological approach to improving accuracy for all forest-related subcategories. It is not clear from the description what exactly was improved in Italy's methodology.
L.8	4.B.1 Cropland remaining cropland – CO ₂ (L.18, 2016) (L.17, 2015) Completeness	Work with France to estimate the carbon stock changes in living biomass, taking into account changes in woody biomass owing to changes in crops and management practices under cropland remaining cropland.	Resolved. The carbon stock changes in living biomass have been reported by France and are included in CRF table 4.B.
L.9	4.B.2 Land converted to cropland – CO ₂ (L.6, 2016) (L.6, 2015) (99, 2014) Transparency	Provide transparent explanations in the annual submission, indicating the key drivers of the changes in the trend and recalculations.	Resolved. The NIR includes transparent explanations for trends (section 6.2.2.3) and recalculations (section 6.5 and table 6.43).
L.10	4.B.2 Land converted to cropland – CO ₂ (L.7, 2016) (L.7, 2015) (100, 2014) (81, 2013) (92, 2012) Completeness	Work with the member States to improve the completeness of their reporting and use higher-tier methods in order to enhance accuracy.	Addressing. Quantitative estimates of carbon stock changes in mineral soils for Cyprus were included in CRF table 4.B of the EU submission. However, some member States continue to use the notation key “NE” for reporting net carbon stock changes (e.g. France uses “NE” for carbon stock changes in all pools for other land converted to cropland). In addition, the EU has not reported information on methodological changes by member States or the efforts they have made to move to a higher-tier methodology in the designated section of the NIR (section 6.2.2.3).
L.11	4.F Other land – CO ₂ (L.20, 2016) (L.19, 2015) Transparency	Include in the NIR information on whether land areas reported under other land in Finland, Portugal and the United Kingdom of Great Britain and Northern Ireland are unmanaged, and if not, to work with these member States to report these areas and the associated CO ₂ emissions and removals under the appropriate land-use categories.	Addressing. The EU does not provide transparent information on whether land areas reported under other land for Finland, Portugal and the United Kingdom are unmanaged. The EU has reported, however, that Portugal intends to reallocate its estimate of carbon stock changes for other land remaining other land for shrubland to grassland in the next submission (NIR, p.738).
L.12	4.F Other land – CO ₂ (L.20, 2016) (L.19, 2015) Transparency	Update the information provided in the NIR regarding the definitions for the categorization of “other land” used by the member States.	Resolved. The EU reported updated information on the definition of other land for the United Kingdom and Ireland in the NIR (table 6.28 and p.737, respectively).

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
L.13	4.F.2 Land converted to other land – CO ₂ (L.10, 2016) (L.10, 2015) (104, 2014) (85, 2013) Transparency	Include transparent explanations in the NIR for the inter-annual variations and work with the member States to improve the consistency of their reporting.	Resolved. Relevant information is included in the NIR (section 6.2.4.3).
L.14	4.G HWP – CO ₂ (L.21, 2016) (L.20, 2015) Comparability	Correct the reporting of information on HWP in CRF table 4.G by reporting the information according to the approaches used by member States to estimate emissions/removals associated with HWP.	Resolved. The relevant information is reported in CRF table 4.G and included in the NIR (table 6.39).
L.15	4.G HWP – CO ₂ (L.21, 2016) (L.20, 2015) Transparency	Correct the information in the NIR on approaches used by member States to estimate emissions/removals associated with HWP.	Resolved. See ID# L.14 above.
L.16	4.G HWP – CO ₂ (L.22, 2016) (L.21, 2015) Completeness	Work with Belgium and Cyprus to ensure that the information on HWP in CRF table 4.G is complete for the whole time series.	Addressing. The EU has included in CRF table 4.G HWP estimates made by Cyprus in 2018 for the entire time series. Belgium is still working to provide HWP estimates for the entire time series.
L.17	4(V) Biomass burning – CO ₂ , CH ₄ and N ₂ O (L.11, 2016) (L.11, 2015) (105, 2014) Transparency	Include the reasons for the use of the notation key “NE”, where applicable, and make efforts to increase the completeness of the reporting.	Resolved. The relevant information is included in the NIR (p.754).

Waste

No recommendations for the waste sector were made in the previous review report.

KP-LULUCF

KL.1	General (KP-LULUCF) (L.16, 2016) (L.15, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Correct the inconsistencies in the reported areas in NIR-2 and table 11.3 of the NIR.	Resolved. The reported areas in CRF table NIR-2 and table 11.3 of the NIR are consistent.
KL.2	General (KP-LULUCF) (KL.1, 2016) (KL.1, 2015) (121, 2014) Transparency	Work with and support member States to improve consistency in the use of notation keys and further improve the transparency of future submissions.	Addressing. The EU has worked with member States to improve consistency in the use of notation keys. Every year a presentation is given on this issue during the annual JRC LULUCF workshop and a Working Group 1 meeting. Although progress has been made (see ID# KL.8 below), some inconsistency and lack of transparency in the use of notation keys by member States persist. The ERT noted that “NE” is mainly used when the “not a net source” provision is applied (decision 2/CMP.8,

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report	ERT assessment and rationale
			annex II, paragraph 2(e)), and that “NO” is used by some member States for existing activities.
KL.3	General (KP-LULUCF) (KL.6, 2016) (KL.6, 2015) Transparency	Provide summary information in the NIR on how member States ensure that land that was accounted for in the first commitment period continues to be accounted for in the second commitment period.	Resolved. The relevant information is included in the NIR (section 11.1.7).
KL.4	General (KP-LULUCF) (KL.7, 2016) (KL.7, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Correct the error found in the aggregation process of member States’ inventories to ensure the consistency of information of the EU and its member States.	Addressing. The ERT commends the EU for the efforts it has made to ensure the consistency and transparency of its reporting in this area. Some inconsistencies have been resolved and the aggregation process has been improved (e.g. consistent information is provided in NIR tables 11.3 and 11.5 and CRF tables NIR-2 and 4(KP)). However, some inconsistencies remain in the data reported within CRF tables NIR-2 and 4(KP)A.1–4(KP)B.4, and additional transparent information on approaches used to identify HWP from deforestation events is needed.
KL.5	General (KP-LULUCF) (KL.7, 2016) (KL.7, 2015) Transparency	Ensure that issues identified during the aggregation process, which affect the accuracy and completeness of the submission, are resolved.	Addressing. See ID# KL.4 above.
KL.6	General (KP-LULUCF) (KL.8, 2016) (KL.8, 2015) Completeness	Correct the information on AR, deforestation and FM for France and the Netherlands by providing the correct estimates in CRF tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.1, and ensure that the information in these tables is consistent with that reported in table 11.5 of the NIR.	Resolved. Corrected estimates have been provided for France and the Netherlands in CRF tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.1, and the data in these tables are consistent with those reported in NIR table 11.5.
KL.7	AR – CO ₂ (KL.9, 2016) (KL.9, 2015) Completeness	Work with Cyprus and Malta to estimate net CO ₂ emissions/removals from AR activities.	Resolved. Cyprus has provided estimates for the carbon stock changes in all pools for AR, except organic soils, for which “NO” is reported. Malta has reported on all pools using the notation key “NO”.
KL.8	Deforestation – CO ₂ (KL.3, 2016) (KL.3, 2015) (125, 2014) Transparency	Work with member States so that they use the appropriate notation keys and provide a synthesis in the NIR of the explanations and justifications provided by member States.	Resolved. No issues were identified in the use of notation keys for reporting deforestation. The relevant information is included in the NIR (pp.886–890).
KL.9	Deforestation – CO ₂ (KL.10, 2016) (KL.10, 2015) Completeness	Work with Cyprus to estimate net CO ₂ emissions/removals from deforestation activity.	Resolved. Cyprus estimated 1.43 kt CO ₂ eq emissions from deforestation for 2016.
KL.10	Article 3.4 activities – CO ₂ (KL.11, 2016)	Work with the United Kingdom to estimate the net carbon stock changes in the litter and	Addressing. The United Kingdom has reported “NE” for carbon stock changes in the litter and deadwood pools under CM and GM and for CO ₂

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
	(KL.11, 2015) Completeness	deadwood pools under CM and GM and CO ₂ emissions/removals from WDR.	emissions/removals from WDR. The EU provides information on the research and methodological development programme of the United Kingdom that aims to provide full estimates for these activities (NIR, p.893).
KL.11	Article 3.4 activities – CO ₂ , CH ₄ and N ₂ O (KL.12, 2016) (KL.12, 2015) Accuracy	Ensure that the reporting under Article 3, paragraph 4, includes only the areas of those activities that were voluntarily selected by the member States.	Resolved. The reporting on Article 3, paragraph 4, activities is consistent between the EU and its member States. The error identified in the previous review regarding the reporting of areas of CM and GM in Romania has been resolved.
KL.12	FM – CO ₂ (KL.5, 2016) (KL.5, 2015) (130, 2014) Completeness	Work with member States to ensure that future reporting on FM is complete and accurate.	Resolved. The underestimation of unmanaged forest has been resolved by France and all managed forests have been included in the Kyoto Protocol accounting (NIR, p.903).
KL.13	FM – CO ₂ (KL.14, 2016) (KL.14, 2015) Transparency	Work with Cyprus and Malta to estimate net CO ₂ emissions/removals from FM activities.	Addressing. Cyprus has reported estimates for FM in the 2018 submission. Malta has reported “NE” for all pools except organic soils, where “NO” was used. The EU includes in the NIR (p.888) information on the reasoning for the use of “NE” by Malta (e.g. as a result of discussions with a previous ERT during Malta’s in-country review, related to ID# KL.6 in document FCCC/ARR/2015/MLT), but does not include the explanation in table 11.17 of the NIR. The EU also has not provided transparent and verifiable information on the use of “NE” for “not a net source” for Malta, in accordance with decision 2/CMP.8, annex II, paragraph 2(e). Such information should demonstrate that the area is not changing, or that no harvesting or fires occur.
KL.14	FM – CO ₂ (KL.15, 2016) (KL.15, 2015) Transparency	Provide in the NIR and in CRF table 4(KP-1)B.1.1, as appropriate, accurate information on the value of the FMRL inscribed in decision 2/CMP.7 and the value of the technical correction for the EU as a whole and for each of the member States plus Iceland, in accordance with the requirements of decision 2/CMP.8, annex II, paragraph 5(f), and taking into consideration the changes made in the coverage of the FMRL.	Addressing. The EU has not provided in CRF table 4(KP-1)B.1.1, as appropriate, accurate information on the FMRL inscribed in decision 2/CMP.7, as was recommended by the ERT. It provided this value only in the documentation box to CRF table 4(KP-1)B.1.1 and for information purposes in the NIR (pp.905–906). The value reported in CRF table 4(KP-1)B.1.1 is –315,476.50 kt CO ₂ eq, whereas the value inscribed in decision 2/CMP.7 is –306,736 kt CO ₂ eq for the EU (27), applying the first-order decay function for HWP, and –154 kt CO ₂ eq for Iceland, assuming instantaneous oxidation. The difference between the FMRL provided for the EU in decision 2/CMP.7 and the one reported by the EU should be reflected as a technical correction and described in the NIR. The EU also has not provided the value of the technical correction for the EU as a whole, in accordance with the requirements of decision 2/CMP.8, annex II, paragraph 5(f). The EU has reported a technical correction in the CRF accounting table (16,020.40 kt CO ₂ eq). However, this value does not include all member States. For instance, the EU reports that some member States (e.g. the

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report	ERT assessment and rationale
			Netherlands and Spain) were not able to implement a technical correction owing to constraints in time and/or resources during this inventory year (NIR, p.906). The EU thus provides the technical corrections for some member States (NIR, table 11.22), while notation keys (“NA”, “NO” or “NE”) are used for others, but the reasoning for their use is not provided in the NIR.
KL.15	FM – CO ₂ (KL.16, 2016) (KL.16, 2015) Transparency	Provide transparent information on the background level of emissions associated with natural disturbances included in the FMRL of the EU and work with member States, in particular those that apply the JRC approach, in order to improve consistency between the FMRL and the reporting of FM in relation to the treatment of natural disturbances, and to calculate a technical correction where required.	Addressing. The EU has reported information on the background level of emissions and the margin associated with natural disturbances for more member States than in the 2016 submission (e.g. for France and Portugal) (NIR, section 11.4.4 and table 11.21). This demonstrates that the EU has made an effort to improve its reporting in this regard. However, the EU has not provided the background level of emissions associated with natural disturbances of its FMRL. During the review, the EU explained that it is of the view that, while the information provided on the background level at the time of FMRL setting (in accordance with decision 2/CMP.7) may appear to be imprecise, the future final background level determined by the Party, as well as methodological consistency of the value with any technically corrected final FMRL, is what will ensure the accuracy of the final accounting.
KL.16	CM – CO ₂ , CH ₄ and N ₂ O (KL.17, 2016) (KL.17, 2015) Accuracy	Correct the reporting of the area of mineral and organic soils for Italy in CRF table 4(KP-I)B.2.	Resolved. The EU has reported in CRF table 4(KP-I)B.2 the area of mineral soils as 8,994.9 kha and the area of organic soils as 24.69 kha for Italy in 2016.
KL.17	RV – CO ₂ (KL.18, 2016) (KL.18, 2015) Accuracy	Correct the reporting of the area of mineral soils under RV in Iceland in CRF table 4(KP-I)B.4.	Resolved. The EU has correctly reported in CRF table 4(KP-I)B.4 the area of mineral soils under RV as 277.06 kha for Iceland in 2016.
KL.18	HWP – CO ₂ (KL.19, 2016) (KL.19, 2015) Completeness	Work with Belgium to estimate net CO ₂ emissions/removals from HWP.	Addressing. Belgium has reported “NO” for net CO ₂ emissions and removals from HWP. The EU has provided information on its ongoing work with Belgium under the planned improvements in chapter 11.3.6 of the NIR. During the review, the EU informed the ERT that Belgium intends to report net CO ₂ emissions and removals from HWP for the entire time series in the next submission.
KL.19	HWP – CO ₂ (KL.20, 2016) (KL.20, 2015) Accuracy	Work with member States to ensure that HWP from deforestation events are accounted for on the basis of instantaneous oxidation and report explicit information regarding HWP from deforestation events in CRF table 4(KP-I)C, in accordance with	Not resolved. The EU has reported quantitative carbon stock changes in HWP for land subject to deforestation for Denmark, Hungary, Latvia and Romania. However, information on how these member States distinguish HWP from regrowth on deforested land and from deforestation events is not included in the NIR.

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
		good practice requirements in the 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol (p.2.119).	

^a References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue and/or problem was raised. Issues are identified in accordance with paragraphs 80–83 of the UNFCCC review guidelines and classified as per paragraph 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with paragraph 69 of the Article 8 review guidelines, in conjunction with decision 4/CMP.11.

^b The review of the 2017 annual submission of the EU did not take place in 2017 and, as such, the 2017 ARR was not available at the time of this review. Therefore, the recommendations reflected in table 3 are taken from the 2016 ARR. For the same reason, the year 2017 is excluded from the list of review years in which the issue has been identified.

IV. Issues identified in three successive reviews and not addressed by the Party

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues included in table 4 have been identified in three successive reviews, including the review of the 2018 annual submission of the EU, and have not been addressed by the Party.

Table 4

Issues identified in three successive reviews and not addressed by the European Union

<i>ID#</i>	<i>Previous recommendation for the issue identified</i>	<i>Number of successive reviews issue not addressed^a</i>
General	No issues identified	
Energy		
E.1	Present methodological summaries that are consistent among member States and categories, at least for the key categories	3 (2014–2018)
IPPU		
I.34	Endeavour to provide in the NIR summary overviews of methodologies used to estimate emissions from the consumption of halocarbons and SF ₆ for key categories based on the relevant methodological descriptions reported in the NIRs of member States	3 (2014–2018)
I.35	Make the necessary corrections in the use of the notation keys to ensure the transparency of the reporting (specifically: “NE” reported by Denmark for the amount of gas remaining in products at decommissioning; “NO” reported by Finland for SF ₆ emissions from aluminium and magnesium foundries; “IE” and “NA” reported by Ireland for AD and emission estimates for HFC emissions from refrigeration and air-conditioning equipment (except mobile air conditioning); “NO” reported by Luxembourg for potential emissions of PFCs from refrigeration and air-conditioning equipment; “NA” and “NA and NO” reported by the Netherlands for AD and IEFs of emissions from stocks in industrial refrigeration and mobile equipment, whereas the emissions are actually estimated; and empty cells in the CRF tables for Spain as a	3 (2014–2018)

<i>ID#</i>	<i>Previous recommendation for the issue identified</i>	<i>Number of successive reviews issue not addressed^a</i>
	replacement of “NA” and “NE” notation keys for reporting emissions from semiconductor manufacturing)	
I.37	Include an explanation in the annual submission on the reporting of the emissions from the processes related to the use of HFCs and SF ₆ in the Netherlands, and enhance the QC procedures to ensure that the information in the NIR of the EU accurately reflects the information in the NIRs of member States	3 (2014–2018)
Agriculture		
A.12	Work with member States to ensure more consistent reporting of the area of organic soils between the agriculture and LULUCF sectors	3 (2014–2018)
LULUCF		
L.1	Continue efforts to improve the completeness of the reporting of emissions from all mandatory source categories in the LULUCF sector	5 (2012–2018)
L.2	Work with member States with a view to reporting mandatory pools and categories that are currently not estimated in order to increase the completeness of the inventory	5 (2012–2018)
L.7	Improve the transparency of the reporting, including the provision of updated information from member States and internal QA/QC checks, in order to ensure that the aggregated reporting is complete and consistent among member States	4 (2013–2018)
L.10	Work with the member States to improve the completeness of their reporting and use higher-tier methods in order to enhance accuracy	5 (2012–2018)
Waste		
	No issues identified	
KP-LULUCF		
	No issues identified	

^a The review of the 2017 annual submission of the EU did not take place in 2017. Therefore, 2017 was not included when counting the number of successive years for table 4. In addition, as the reviews of the Party’s 2015 and 2016 annual submissions were held in conjunction, they are not considered successive and 2015/2016 is considered as one year.

V. Additional findings made during the individual review of the 2018 annual submission

10. Table 5 contains findings made by the ERT during the individual review of the 2018 annual submission of the EU that are additional to those identified in table 3.

Table 5

Additional findings made during the individual review of the 2018 annual submission of the European Union

<i>ID#</i>	<i>Finding classification</i>	<i>Description of the finding with recommendation or encouragement</i>	<i>Is finding an issue and/or a problem?^a If yes, classify by type</i>
General			
G.6	Key category analysis	<p>The ERT noted discrepancies in the total figures used for the calculation of the key categories and the totals reported in the CRF tables. In the Excel file of the key category analysis provided by the EU during the review, for instance, the value reported for total emissions for 1990, excluding LULUCF and indirect CO₂ emissions, used in the key category analysis is 5,653,399.40 CO₂ eq, whereas the value reported in the CRF table Summary2 is 5,652,249.73 CO₂ eq. Discrepancies were also observed in the total emissions (excluding indirect CO₂ emissions) reported for 2016, which are 4,295,862.27 CO₂ eq in the key category analysis and 4,298,569.36 CO₂ eq in CRF table Summary2 excluding LULUCF, and 4,003,573.43 CO₂ eq in the key category analysis and 4,007,313.10 CO₂ eq in CRF table Summary 2 including LULUCF. There is no transparent reason given for these differences. A note under the table reporting the key category analysis results (NIR, table 1.12) explains that the totals may not include data for Sweden owing to confidentiality concerns. During the review, the EU explained that data from all member States, including Sweden, are considered in the analysis. Nevertheless, the ERT found that the overall figures used for the key category analysis and those reported in the corresponding CRF tables do not match.</p> <p>The ERT recommends that the EU conduct QA/QC checks on the database used for the calculation of key categories, and ensure that all key category analyses are carried out using the same set of data. The ERT also recommends that the EU include in the NIR transparent information on the use of confidential data, including from which key category analysis such data have been excluded.</p>	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
G.7	Uncertainty analysis	<p>The tier 1 uncertainty analysis of the EU is performed on the basis of the information on uncertainties and corresponding emissions provided by member States. Because not all member States report their emissions and uncertainties at the category level owing to confidentiality concerns, the emission estimates do not match those reported in the CRF tables, neither by sector nor in total. This situation is clearly explained in the NIR (section 1.6). However, for consistency and to ensure completeness and accuracy, the uncertainty analysis should be carried out on the same data as those reported in the CRF tables.</p> <p>The ERT recommends that the EU attribute the uncertainty values and category groupings derived from its analyses of data reported by member States to the same level of emissions reported at the category level in the CRF tables.</p>	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
G.8	Methods	<p>The ERT welcomed the annex on methodologies (annex III to the NIR). During the review, the ERT found that the sectoral Excel files in the annex had not been updated with the latest information available at the member State level (e.g. for categories 2.A.2 and 5.A). In response, the EU provided the ERT with an updated version of annex III.</p> <p>The ERT recommends that the EU ensure that annex III to the NIR, which includes summaries of the descriptions of the methodologies used by member States for the estimation of EU key categories, reflects the latest submissions of member States and is coherent with the information in the NIR and CRF tables.</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
Energy			
E.13	1.A.1.a Public electricity and heat production – peat – CO ₂	<p>The ERT noted that CO₂ emissions from peat consumption in public electricity and heat production show some relatively large inter-annual fluctuations; for example, a 13.3 per cent decline between 2003 (13,403.65 kt CO₂) and 2004 (11,618.63 kt CO₂), and a 16.1 per cent increase between 2009 (10,865.03 kt CO₂) and 2010 (12,615 kt CO₂). During the review, the EU explained that the trend is dominated by Finland’s emissions and that there might be several reasons for the fluctuations, such as price competition with other fuels (some of the peat plants also use wood biomass or natural gas) or environmental issues related to peat collection.</p> <p>The ERT recommends that the EU include in the NIR clear reasons for the inter-annual fluctuation in CO₂ emissions from peat consumption in public electricity and heat production.</p>	Yes. Transparency
E.14	1.A.1.a Public electricity and heat production – other fossil fuels – CO ₂	<p>The ERT noted that other fossil fuels are not included in figure 3.6 of the NIR, which presents the emission trends and AD for public electricity and heat production. During the review, the EU provided the ERT with a revised figure 3.6 that includes the emission trends and AD for other fossil fuels.</p> <p>The ERT recommends that the EU include in the NIR an updated version of figure 3.6 that includes the emission trends and AD for other fossil fuels.</p>	Yes. Transparency
E.15	1.A.1.a Public electricity and heat production – liquid, solid and gaseous fuels –CO ₂ , CH ₄ and N ₂ O	<p>Under NIR tables 3.7, 3.8 and 3.9 for liquid fuels, solid fuels and gaseous fuels, respectively, there is a note stating that the total figures do not include data from Sweden owing to confidentiality concerns. This explains why the data reported in these tables do not match those reported in the CRF tables. The ERT noted that the total figures for 2015, for which emissions from Sweden are reported as “C”, are the same values as those in CRF table 1.A(a) (e.g. 803,105.58 kt CO₂ for solid fuels), but the total figures for 2016, for which emissions from Sweden are reported in the tables, are different from those in CRF table 1.A(a) (e.g. for solid fuels, the value reported in NIR table 3.8 is 713,314 kt CO₂, whereas the value reported in CRF table 1.A(a) is 715,805.59 kt CO₂). During the review, the EU explained that the confidential emission data from Sweden for 2015 for liquid, solid and gaseous fuels consumed in public electricity and heat production (1.A.1.a) and all fuels consumed in petroleum refining (1.A.1.b) and manufacture of solid fuels and other energy industries (1.A.1.c) are included under other fossil fuels in subcategory 1.A.1.a. Owing to the inclusion of confidential data from Sweden, the value in CRF table 1.A(a)s1 for other fossil fuels for 2015 (43,485.64 kt CO₂) is higher than the value in NIR table 3.10 (37,621 kt CO₂).</p> <p>The ERT recommends that the EU clarify whether confidential emission data from Sweden have been included in NIR tables 3.7–3.10.</p>	Yes. Transparency
E.16	1.A.1.a Public electricity and heat production – other fossil fuels – CO ₂ , CH ₄ and N ₂ O	<p>According to the NIR (p.127), other fossil fuels covers mainly the fossil fuel component of MSW incineration, including plastics, where there is energy recovery. During the review, in response to a question from the ERT about additional types of fuel, the EU clarified that incinerated waste may include hazardous waste, bulky waste and waste sludge.</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
E.17	1.A.1.c Manufacture of solid fuels and other energy industries – solid fuels – CO ₂	<p>The ERT recommends that the EU include in the NIR all types of fuel consumed in MSW incineration, including hazardous waste, bulky waste and waste sludge.</p> <p>The EU states in the notes under NIR tables 3.16 and 3.17 that the figures in those tables do not include confidential emission data from Sweden. The ERT noted that the total emissions for 2016 reported in NIR table 3.17 (manufacture of solid fuels and other energy industries – solid fuels (1.A.1.c)) (31,227 kt CO₂ eq), in which the emissions from Sweden are reported, are different from the total emissions reported in CRF table 1.A(a) (31,802.82 kt CO₂ eq). However, for 2015, NIR table 3.16 (manufacture of solid fuels and other energy industries – all fuels (1.A.1.c)) has the same value for total emissions as CRF table 1.A(a) (53,610.55 kt CO₂), although the same note appears under both NIR tables 3.16 and 3.17. During the review, the EU explained that Sweden frequently uses the notation key “C” for 2015 in subcategories of energy industries (1.A.1). The EU noted that confidential emission data from Sweden for 2015 for liquid, solid and gaseous fuels consumed in public electricity and heat production (1.A.1.a) and all fuels consumed in petroleum refining (1.A.1.b) and manufacture of solid fuels and other energy industries (1.A.1.c) are included under other fossil fuels in subcategory 1.A.1.a.</p> <p>The ERT recommends that the EU remove from the NIR the note under table 3.16 referring to confidential emission data from Sweden being excluded from the table.</p>	Yes. Transparency
E.18	1.A.1.c Manufacture of solid fuels and other energy industries – biomass – CO ₂	<p>The ERT noted significant inter-annual fluctuations in the consumption of biomass, in particular between 2012 (20,344.54 TJ) and 2013 (37,625.43 TJ) an increase of 84.9 per cent. During the review, the EU informed the ERT that the main cause for this trend is the data from Germany, which reported emissions from biomass of about 1.1 Mt for 2012 and about 2.7 Mt CO₂ for 2013 and an increase in AD from 8 PJ in 2012 to 25.6 PJ in 2013. The EU also explained that the energy balance of Germany indicates that its biomass mainly consists of biogas that is used in gasification plants.</p> <p>The ERT recommends that the EU include in the NIR information on the types of biomass consumed and any particular impact they have on the overall trend.</p>	Yes. Transparency
E.19	1.A.2.a Iron and steel – liquid fuels – CO ₂	<p>The ERT noted that the CO₂ IEFs for liquid fuels reported for 2008–2012, which range from 76.21 to 78.71 t CO₂/TJ, are higher than those reported for 1990–2007, which ranged from 73.46 to 76.50 t CO₂/TJ. The ERT noted increases between 2007 (73.46 t CO₂/TJ) and 2008 (76.58 t CO₂/TJ), and between 2015 (70.51 t CO₂/TJ) and 2016 (124.54 t CO₂/TJ), the latter constituting an increase of 76.6 per cent. During the review, the EU explained that the large increase between 2015 and 2016 is due to the confidential data of Sweden – emissions were reported under this category but AD were aggregated elsewhere, increasing the CO₂ IEF given in the NIR. The EU further explained that the high CO₂ IEF reported for 2008–2012 is mainly due to the contribution of Spain’s CO₂ emissions to the EU total (up to 36 per cent, in 2010) and its high CO₂ IEF (ranging from 92.4 to 96.1 t CO₂/TJ) for those years, which is attributable to the consumption of petroleum coke in those years (from a low of 8 PJ to a high of 12 PJ, in 2010). Petroleum coke has a much higher carbon content (97.5 t CO₂/TJ) than the usual liquid fuels reported under this</p>	Yes. Transparency

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		<p>category. In contrast, from 2005 to 2007 and 2013 to 2016, Spain's CO₂ IEF ranged from 74.1 to 75.6 t CO₂/TJ and its contribution of CO₂ emissions to the EU total was only 7–12 per cent.</p> <p>The ERT recommends that the EU include in the NIR the reasons for the high CO₂ IEF for liquid fuels for 2008–2012 and for the large increase in the IEF observed between 2015 and 2016.</p>	
E.20	1.A.2.a Iron and steel – solid fuels – CO ₂	<p>The ERT noted that the CO₂ IEF for solid fuels increased from 120.06 t CO₂/TJ in 2011 to 130.50 t CO₂/TJ in 2016. During the review, the EU explained that the reason for the increasing CO₂ IEF is the high variability in member State IEFs and iron production (and consequent CO₂ emission) trends. The main reason for the increase in the CO₂ IEF from 2012 (121.16 t CO₂/TJ) to 2013 (128.55 t CO₂/TJ) is Italy's decrease in CO₂ emissions. For these years, the share of Germany's CO₂ emissions in the EU total increased from 27 to 29 per cent, and Germany's CO₂ IEF was one of the highest reported, increasing from 155.17 t CO₂/TJ in 2012 to 158.47 t CO₂/TJ in 2013.</p> <p>The ERT recommends that the EU include in the NIR an explanation for the trend in the CO₂ IEF for solid fuels, particularly for 2011 onward.</p>	Yes. Transparency
E.21	1.A.2.b Non-ferrous metals – biomass – CO ₂	<p>The ERT noted that CO₂ emissions from biomass consumption rapidly increased from 2010 (2.32 kt CO₂) to 2016 (123.08 kt CO₂). During the review, the EU explained that the increase in CO₂ emissions from biomass was mainly due to the increase in these emissions reported by Slovakia; however, the EU has not yet explored the reason for the increase in Slovakia's emissions under this category. The ERT noted that, in contrast, Slovakia's CO₂ emissions from solid fuels decreased during this period, from 132.33 kt CO₂ in 2011 to 36.48 kt CO₂ in 2016.</p> <p>The ERT encourages the EU to work with Slovakia to determine the reason for the increase in CO₂ emissions from biomass consumption beginning in 2011, and to include a corresponding explanation in the NIR.</p>	Not an issue/problem
E.22	1.A.2.f Non-metallic minerals – liquid fuels – CO ₂	<p>The footnote below NIR table 3.45 states: "EU trends in this table do not include Sweden for confidentiality reasons and to preserve time-series consistency for the EU. The EU explains the differences between the numbers in this table and the CRF". According to the EU (see ID# E.15 above), confidential data from Sweden have been included in other fossil fuels in the subcategory public electricity and heat production (1.A.1.a). Sweden states in its NIR 2018 (p.70) that "several data sources that are used for producing emissions estimates for the inventory are confidential at a micro level (e.g. company or plant level)".</p> <p>The ERT recommends that the EU include in the NIR the reason for the emissions from liquid fuels in Sweden being reported as confidential and how time-series consistency at the EU level has been preserved.</p>	Yes. Transparency
E.23	1.A.2.f Non-metallic minerals – other fossil fuels – CO ₂	<p>The ERT noted that Poland reported a CO₂ IEF of 126.50 t CO₂/TJ in 2016, which is within the IPCC default values for industrial waste. However, the CO₂ IEFs of the other member States (NIR, figure 3.75) are lower than the IPCC default values (110–183 t CO₂/TJ). During the review, the EU explained that the member States included CO₂ emissions from cement kilns, whose operators have had to report under the EU ETS since 2005. The lower end of the IPCC default EF range (110 t CO₂/TJ) is much higher than the typical values for the waste fractions of waste oil,</p>	Yes. Transparency

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		<p>waste tyres and plastics incinerated in cement kilns, which are typically around 80 t fossil CO₂/TJ fossil energy (according to EU ETS data from Austria).</p> <p>The ERT recommends that the EU include in the NIR information on the main components incinerated in cement kilns by member States to support the low CO₂ IEFs reported for other fossil fuels.</p>	
E.24	1.A.2.g Other (manufacturing industries and construction) – liquid fuels – CO ₂ , CH ₄ and N ₂ O	<p>Member States have variously reported emissions from liquid fuels for off-road vehicles in the subcategories other (manufacturing industries and construction) (1.A.2.g), other transportation (1.A.3.e) or off-road vehicles and other machinery (1.A.4.c ii). The ERT noted that Greece, Ireland, Portugal and Slovakia have reported these emissions as “IE”, while Cyprus, Czechia, Estonia, France, Italy, Malta, Poland, Romania and Spain have left the relevant table cells blank (NIR, table 3.49). During the review, the EU provided detailed information on off-road machinery for the member States for which the relevant NIR table 3.49 cells are blank.</p> <p>The ERT recommends that the EU include in NIR table 3.49 a note explaining why cells for CO₂, CH₄ and N₂O emissions from liquid fuels for off-road vehicles are left blank (i.e. for Cyprus, Czechia, Estonia, France, Italy, Malta, Poland, Romania and Spain).</p>	Yes. Transparency
E.25	1.A.4.b Residential – biomass – CH ₄	<p>The ERT noted that the CH₄ IEF for biomass in this subcategory decreased from 335.26 kg CH₄/TJ in 1990 to 232.50 kg CH₄/TJ in 2016, a decrease of 30.7 per cent. The ERT further noted that, according to the NIR, boilers and stoves have been replaced by modern technologies (p.317). During the review, the EU explained that it has not yet gathered information from member States on the biomass combustion technologies considered in their inventories. However, modern boilers are mostly automated, allowing their continuous operation and thus avoiding the high emissions of carbon monoxide, volatile organic compounds and particulate matter generated from incomplete combustion during the ignition and cooling phases of their operation (in contrast, for example, to wood stoves). It is generally assumed that lower carbon monoxide and volatile organic compound emissions correlate with lower CH₄ emissions, which arise mainly due to incomplete combustion in manually operated boilers and stoves and as a result of low fuel quality (e.g. high water content of fuelwood).</p> <p>The ERT recommends that the EU include in the NIR information on the characteristics of modern biomass boilers and stoves, which would explain the decrease in the CH₄ IEF for biomass in this subcategory for the period 1990–2016.</p>	Yes. Transparency
E.26	1.A.5.a Stationary – solid fuels – CO ₂ , CH ₄ and N ₂ O	<p>In CRF table 1.A(a)s4 and in the NIR (p.333) the EU reports “IE” for Poland’s emissions for this subcategory. The ERT noted that there is no explanation, either in the NIR or in CRF table 9, as to where these emissions are reported. During the review, the EU explained that it could not find any explanation in the CRF tables or the NIR of Poland’s submission as to where these emissions are included, and indicated that it will include this information in the next NIR.</p> <p>The ERT recommends that the EU ensure that Poland’s CO₂, CH₄ and N₂O emissions for this category are included in the EU inventory, and that it include in the NIR a description of where these emissions are included.</p>	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
E.27	1.B.1.a Coal mining and handling – solid fuels – CH ₄	<p>The ERT noted that CH₄ emissions from underground coal mining decreased between 1990 (3,526.48 kt CH₄) and 1993 (3031.76 kt CH₄) by 14.0 per cent. In the same period, the CH₄ IEF exhibited a steep increase (287.0 per cent): from 2.54 kg/t in 1990 to 9.84 kg/t in 1993. According to the NIR, the increase in the CH₄ IEF was due to a strong decrease in CH₄ emissions in Belgium, which was responsible for 73 per cent of CH₄ emissions in 1990 (p.353). The ERT found that, according to figure 3.158 of the NIR, Belgium was responsible for less than 73 per cent of EU CH₄ emissions in 1990. During the review, the Party clarified that Belgium was responsible for 73 per cent of the AD for the EU in 1990, but only 0.44 per cent of its CH₄ emissions. In response to the question from the ERT, the EU contacted Belgium regarding the low CH₄ IEF. Belgium clarified that the AD in CRF table 1.B.1 of the EU submission were erroneously reported in kt instead of Mt; therefore, the AD need to be corrected by a factor of 1,000 (e.g. for 1990 the correct AD are 1.036 Mt, not 1,036 kt). The EU indicated that corrected values will be reported in the next submission and that the explanation on page 353 of the NIR will also be corrected.</p> <p>The ERT recommends that the EU work with Belgium to ensure the correct reporting of AD for underground coal mining in CRF table 1.B.1, and that it correct the explanation of the trend for this subcategory in the NIR (i.e. that Belgium was responsible for 73 per cent of AD, not CH₄ emissions, in 1990).</p>	Yes. Transparency
E.28	1.C CO ₂ transport and storage gaseous fuels – CO ₂ , CH ₄ and N ₂ O	<p>The EU reports an amount of 133.85 kt CO₂ captured for storage in 2016. The ERT noted, however, that the transport of CO₂ is reported as “NO” and injection and storage of CO₂ are reported as “IE, NO”. During the review, the EU explained that only Finland reported the amount of CO₂ captured and that France reported fugitive emissions from CCS as “IE”. The ERT noted that fugitive emissions from CCS are reported by the EU as “NO”, although Finland reported captured CO₂. The EU explained that Finland reported fugitive emissions from CCS as “NA” in its submission, but, owing to an error in the software used by the EU to aggregate member State data, the correct notation key has not been reported in CRF table 1.C. The EU indicated that “NA” will be used in the next submission, but that the total amount of CO₂ captured (e.g. 133.85 kt in 2016) is less than 0.05 per cent of the EU’s national total, and therefore any fugitive emissions from CCS must be less than the threshold of significance.</p> <p>The ERT recommends that the EU use in CRF table 1.C the notation key for fugitive emissions from CCS reported by Finland (i.e. “NA”) and explain in the NIR why its use is appropriate.</p>	Yes. Transparency
IPPU			
I.38	2. General (IPPU) – CO ₂	<p>The EU described the gap-filling procedure for AD for the categories lime production (2.A.2), glass production (2.A.3) and ammonia production (2.B.1) (NIR, p.521). The procedure includes three steps: (1) aggregation of the emissions of those member States using the same type of AD; (2) calculation by the EU of the IEF for the member States included in step 1; and (3) multiplication of the IEF by the emissions of the 28 member States in order to derive a gap-filled estimate for AD for the EU. The ERT assumes that multiplying the IEF by emissions is an error, and that instead, in step 3 of the procedure, the EU should estimate its AD by dividing the total CO₂ emissions by the IEF estimated in step 2.</p>	Yes. Transparency

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I.39	2.B.1 Ammonia production – CO ₂	<p>The ERT recommends that the EU include in the NIR a corrected description of the three-step procedure used to fill gaps in AD for the categories lime production (2.A.2), glass production (2.A.3) and ammonia production (2.B.1).</p> <p>The EU has reported the total AD (17,216 kt ammonia) and the estimated CO₂ emissions (23,935 kt CO₂) for ammonia production in NIR table 4.15. The CO₂ IEF (1.39 t CO₂/t ammonia) is calculated as the ratio of CO₂ emissions to AD. The EU describes the AD gap-filling procedure for this category (NIR, p.521). The ERT noted that Germany and France, which contribute significantly (22.4 per cent combined) to the total CO₂ emissions reported by the EU under this category, report CO₂ emissions from ammonia production in both the energy and the IPPU sector (NIR, p.450). In its estimation of the CO₂ IEF, however, the EU includes only CO₂ emissions reported under ammonia production. Not including CO₂ emissions reported in the energy sector by Germany and France results in a lower IEF, affecting comparability with other reporting Parties and also affecting the results of the estimation of AD by the gap-filling procedure. During the review, the EU informed the ERT that it was not possible to obtain detailed data from the published national energy balances of France and Germany to estimate CO₂ emissions from ammonia production reported in the energy sector, and that the EU could not change member States' reported estimates. The EU noted that EU ETS verified CO₂ emissions from ammonia production for 2016 (21,167 kt) are reasonably close to, but less than, the amount in the EU's GHG inventory (23,935 kt). The ERT acknowledged the EU's clarifications. In response to a draft version of the ARR, the EU stated that it will include a table in the NIR that includes the ammonia production combustion-related EU ETS emission values for France and Germany rather than only the process-related emissions reported for ammonia production.</p> <p>The ERT recommends that the EU improve the comparability of its CO₂ IEF estimates with those of other Parties by including in the NIR a table that includes the combustion-related EU ETS emission values for France and Germany rather than only the process-related emissions reported for ammonia production. The ERT notes that a similar table for iron and steel production (table 4.34) is already included in the EU NIR.</p>	Yes. Comparability
I.40	2.F.1 Refrigeration and air conditioning – HFCs and PFCs	<p>In CRF table 2(II)B-Hs2, the EU has reported emissions from an unspecified mix of HFCs and PFCs for the subcategories commercial refrigeration (2.F.1.a) and industrial refrigeration (2.F.1.c). For 2016, the reported product manufacturing factor is 594 per cent and the product life factor is 99,000 per cent. According to information provided in table 7.9 of the 2006 IPCC Guidelines, the potential release of F-gases should not exceed 100 per cent. During the review, the ERT requested clarification from the EU on the reported EFs. The EU informed the ERT that in its technical opinion, for commercial refrigeration, the product life factor of a particular system can exceed 100 per cent if leakage occurs, no repairs are performed and the refrigerant is refilled several times per year. Product life factors of several hundred per cent have been observed for developing countries and ships, where low-quality servicing is available and refilling keeps refrigeration systems running. Furthermore, a system within the EU that is subject to total refrigerant loss (e.g. because of an accident) but which is refilled and begins leaking again would have an operational EF of more than 100 per cent in a given year. The EU acknowledged, however, that it is unlikely that such high operational EFs would relate to the entire stock of a country.</p> <p>Further, the EU explained that “unspecified mix of HFCs and PFCs” and “unspecified mix of HFCs” are reported for refrigeration and air conditioning (2.F.1) by several member States. A high amount of “unspecified mix of</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
I.41	2.F.1 Refrigeration and air conditioning – HFCs	<p>HFCs” in operating systems is, for example, reported by Denmark. A possible explanation for the high EFs reported is that some member States report “unspecified mix of HFCs and PFCs” from disposal in manufacturing or operating stocks because the refrigerants are not separated during end-of-life treatment and hence disposal emissions cannot be reported by substance. In some cases, “unspecified mix of HFCs” and “unspecified mix of HFCs and PFCs” are reported in a particular subcategory for confidentiality reasons. The EU indicated that it would need to follow up with member States to obtain more information on these matters and possibly the data on both “unspecified mix of HFCs” and “unspecified mix of HFCs and PFCs” in order to further analyse the F-gases reported.</p> <p>While the ERT recognizes that some types of equipment can be filled more than once a year, it notes that, to reach a 99,000 per cent product life factor the equipment would need to be refilled more than twice a day, which is not a realistic scenario, especially for large commercial and industrial applications. The ERT considers that if equipment is filled more than once a year, it should be reflected in increased AD, such as the amount of HFCs and PFCs used in operating stock, and not in the product life EF.</p> <p>The ERT recommends that the EU further analyse the F-gases reported as “unspecified mix of HFCs and PFCs” for commercial and industrial refrigeration applications, focusing on the practices related to refilling, and reflecting these refilling practices in the AD and not in the EFs (i.e. if equipment is filled more than once a year, it should be reflected in increased AD, such as the amount of HFCs and PFCs used in operating stock, and not in the product life EF).</p> <p>The EU reported HFC-134a emissions from disposal in the subcategory mobile air conditioning (2.F.1.e) in CRF table 2(II)B-Hs2. The ERT noted that in 1995 the disposal loss factor was 100 per cent. This value is high compared with the values for 1996–2016, which range from 36.3 per cent (1997) to 51.1 per cent (2008).</p> <p>During the review, in response to the request of the ERT for more information on the 1995 disposal loss factor, the EU provided information showing that HFC-134a was introduced in the early 1990s, and 1995 was the first year in which it was used on a large scale for mobile air conditioning in passenger cars. The reported (very small) disposal emissions in 1995 relate to particularities of the inventories of France and Latvia: both of these member States run models of the vehicle stock that assume end of life of a certain share of vehicles each year, in line with a Gaussian normal distribution. Thus, some cars reached their end of life in the first year of widespread use of HFC-134a in mobile air conditioning. Because at that time no measures were in place in these countries to recover the refrigerant during end-of-life treatment, a disposal loss factor of 100 per cent was applied. The ERT considers realistic the assumption that not every car reaches an average lifespan and that some are disposed of earlier (e.g. owing to damage in an accident). The ERT also considers acceptable the assumption that in the first year when disposal emissions occurred there was no recovery of emissions.</p> <p>The ERT recommends that the EU include information in the NIR to explain the rationale for its reporting of a 100 per cent disposal loss factor in 1995 for the subcategory mobile air conditioning (2.F.1.e).</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
I.42	2.F.1 Refrigeration and air conditioning – HFCs and PFCs	<p>The ERT noted that to assess F-gas emissions member States are using statistics on the import and export of HFCs and PFCs, but EU customs information is available only for EU borders. During the review, the ERT asked the EU whether data on the production, import and export of HFCs and PFCs reported by member States are verified at the EU level. In response, the EU informed the ERT that, within the reporting under the EU F-gas regulation (517/2014) (Article 19), companies are obliged to annually submit data on their production, import and export of F-gases, by gas, for the preceding year. Large companies have their data verified by an independent auditor (Article 19, paragraph 6). However, as indicated by the EU, these data are not available to member States, because most companies obliged to report these data are active throughout the EU. In the current action plan of the European Topic Centre on Air Pollution and Climate Change Mitigation the possibility of using the reported and aggregated EU F-gas data for plausibility checks for UNFCCC reporting is being investigated (task 1.3.2.7, “Using F-gas data for UNFCCC inventory plausibility checks”). Preliminary outcomes of this investigation are expected in the fourth quarter of 2018.</p> <p>The ERT encourages the EU to continue its efforts to establish a verification procedure at the EU level for the assessment of F-gas estimates and assumptions provided by member States.</p>	Not an issue/problem
I.43	2.F.1 Refrigeration and air conditioning – HFCs and PFCs	<p>Some member States do not report emissions from the disposal of transport refrigeration equipment at the end of the equipment’s expected lifetime. For example, in CRF table2(II)B-Hs2, the EU reports “NO” for HFC-125 emissions from disposal for Slovenia. According to Slovenia’s 2018 NIR (section 4.6.2), old cars are being sold to other countries. The ERT is of the view that this cross-border activity is often not accurately reflected in the national statistics of member States. Noting that customs information is available at the EU level and not to member States, the ERT asked the EU whether its inventory compilers have any procedures in place to cross-check data reported by member States with the EU-level data in order to avoid double counting or omitting part of these emissions. In response, the EU confirmed that the export of second-hand or end-of-life equipment is usually not covered by national statistics and related data are often not available. Most of such exports are to countries outside the EU, in particular to Balkan and African countries, and are often not quantified. The EU underlined that, on the basis of its discussions with member States over the years, it has determined that they often calculate and report end-of-life emissions at the end of an estimated lifetime whether or not the vehicles are dismantled in the country or exported (for further use or dismantling). Only a few of the older vehicles now reaching their end of life are equipped with air-conditioning or refrigeration units (i.e. in the past there was a lower rate of air-conditioned or refrigerated vehicles in the total vehicle stock). It is the opinion of the EU compilers that these exports cause negligible amounts of emissions, but the issue should be addressed further in the future.</p> <p>The ERT noted that, in the EU’s approach to estimating emissions, disposal emissions from a single unit containing F-gases can be calculated more than once if equipment is sold to another country. The ERT also noted that some member States report that all transport refrigeration equipment in the country is exported and do not calculate emissions (e.g. Slovenia). The ERT did not find evidence of an underestimation of emissions and considers that there is no direct obligation for the EU to introduce a specific mechanism to account for cross-border activity within the EU.</p>	Not an issue/problem

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
I.44	2.F.4 Aerosols – HFCs	<p>The ERT encourages the EU to apply a consistent approach among member States to account for cross-border activity at the end of the equipment’s expected lifetime, as far as possible, to avoid double counting or omitting part of the emissions from the disposal of transport refrigeration equipment.</p> <p>The EU reported that HFC emissions from aerosols (2.F.4) (which mainly concerns the use of metered-dose inhalers) occur in all member States except the Netherlands (i.e. the Netherlands reported the emissions as “NO”) (NIR, table 4.44). Taking into account the EU open market, the ERT would expect some emissions to occur in the Netherlands. During the review, the ERT requested clarification as to whether the reporting of “NO” by the Netherlands had been verified by the EU. In response, the EU informed the ERT that emissions from aerosols do occur in all member States and the Dutch NIR states (p.163) that emissions from this category (2.F.4) are included in the category other applications (2.F.6). The EU acknowledged that use of the notation key “NO” for the Netherlands was an error and “IE” should be used.</p> <p>The ERT recommends that the EU use the correct notation key to report HFC emissions from aerosols for the Netherlands in NIR table 4.44 and CRF table 2(II)B-Hs2, that is to use “IE” rather than “NO”, and include information in the NIR as to where these emissions have been allocated.</p>	Yes. Comparability
Agriculture			
A.14	3. General (agriculture) – CO ₂	<p>The previous ERT (which conducted the review of the 2015 and 2016 submissions) noted that the EU used the notation key “IE” to report indirect CO₂ emissions from the agriculture sector in CRF table 6 for Slovakia. As the previous ERT did not find any indication in the NIR of Slovakia that indirect CO₂ emissions had been estimated, it concluded that the correct notation key for reporting indirect CO₂ emissions from the agriculture sector would be “NE” (see ID# A.2 in table 3). During the current review, the EU indicated that Slovakia had explained that indirect CO₂ emissions are reported in the documentation box of its CRF table 3s2, so the EU could report this as a resolved issue in its next submission. The ERT noted, however, that indirect CO₂ emissions are reported by Slovakia in CRF table 3s2 and CRF table 3.G-I, and that the information in the documentation box of CRF table 3s2 is not linked to the issue.</p> <p>The ERT recommends that the EU work with Slovakia to clarify where indirect CO₂ emissions from the agriculture sector are reported and to ensure those emissions are included in the EU NIR.</p>	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
A.15	3.A.1 Cattle – CH ₄	<p>The CH₄ IEF reported by the EU for dairy cattle in 2015 (128.82 kg CH₄/head/year) and 2016 (129.22 kg CH₄/head/year) is higher than the IPCC default value (99 kg CH₄/head/year for Eastern Europe, 117 kg CH₄/head/year for Western Europe and 128 kg CH₄/head/year for North America). The comparatively high average appears to be driven by several member States. During the review, the EU confirmed that the high average CH₄ IEF for dairy cattle is driven by several member States but mostly by Denmark and Sweden. These countries use a national methodology for estimating the IEF that assumes the cattle are fed sugar beet and employs the gross energy feed per unit estimated by the Danish Centre for Food and Agriculture (the Danish Normative System). Use of this method leads to a very high milk yield (26 l/day in Denmark and similar in Sweden) and accordingly a high CH₄</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
		<p>IEF. The ERT noted that the contributions of Denmark and Sweden to the EU dairy cattle population and CH₄ emissions are too low to drive the average CH₄ IEF for dairy cattle of the EU – the cattle population of Denmark comprises 2.4 per cent of the EU cattle population, and Denmark’s CH₄ emissions represent just 2.9 per cent of the EU total for 2016, while Sweden is not among the 10 countries with the highest population of cattle or CH₄ emissions. In response to a question from the ERT on how the EU determines that these two countries drive the high average CH₄ IEF for dairy cattle, the EU explained that all member States report a higher IEF than the default value for Eastern European countries and 15 member States report a higher IEF than the default value for Western European countries. The CH₄ IEF of the EU is influenced most by those countries with a high cattle population, and those with the highest deviation from the average IEF. Germany, Italy and the Netherlands have a great influence as they have high CH₄ IEFs and shares of CH₄ emissions of 18.9, 8.6 and 7.4 per cent, respectively. The highest IEFs are reported by Denmark (156 kg CH₄/head/year) and Finland (151 kg CH₄/head/year) and they contribute shares of 2.9 and 1.4 per cent, respectively, to the total EU CH₄ emissions. As requested, the EU provided the ERT with the member States’ contributions to the EU dairy cattle population and CH₄ emissions and their CH₄ IEFs. On the basis of the clarifications and the documentation provided, the ERT acknowledges that the high average CH₄ IEF for dairy cattle is driven by several member States, but disagrees that Denmark and Sweden are the predominant drivers.</p> <p>The ERT recommends that the EU consider the share of each member State’s contribution to the EU’s total dairy cattle population and the CH₄ IEF of each member State to determine the factors driving the average CH₄ IEF for dairy cattle of the EU, and report on those factors in the NIR.</p>	
A.16	3.A.1 Cattle – CH ₄	<p>In NIR table 5.5 the EU reports that Iceland used a tier 2 method to estimate CH₄ emissions from cattle but did not provide any information on the EF (see ID# A.3 in table 3). During the review, the EU explained that Iceland used livestock population characterization to calculate GE of cattle (Iceland NIR 2018, pp.102–103). The values for GE were used to calculate the CH₄ EFs for enteric fermentation (using equation 10.21 from the IPCC good practice guidance). The CH₄ conversion rate depends on several interacting feed and animal factors. The ERT concluded that Iceland used a country-specific CH₄ EF for cattle, but this information is missing from Iceland’s NIR and CRF tables.</p> <p>See ID# A.3 in table 3 for the outstanding recommendation from the previous review report on this issue.</p>	Yes. Transparency
A.17	3.A.2 Sheep – CH ₄	<p>In NIR table 5.6 the EU reports that Denmark used a tier 2 method to estimate CH₄ emissions from sheep with default EFs. The ERT noted that the use of a tier 2 method suggests the use of a country-specific EF. During the review, in response to a question from the ERT on how Denmark used a tier 2 method with a default EF, the EU explained that Denmark used a tier 2/country-specific method for enteric fermentation, which is different from the IPCC tier 2 method in the calculation of GE (Denmark NIR 2018, pp.367–370). GE is estimated as gross energy per feed unit. The feed unit is based on the composition of feed intake and the energy content in proteins, fats and carbohydrates, and the actual efficacy of feeding controls or actual feeding plans at the farm level, data on which are collected by the Danish Agricultural Advisory Service or the Danish Centre for Food and Agriculture. For horses, heifers, suckling cattle, sheep and goats, an average winter feed plan is provided on the basis of information from</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
		<p>the Danish Centre for Food and Agriculture and SEGES, on which the calculation of GE is based. The ERT concluded that Denmark used a country-specific EF to estimate CH₄ emissions from sheep and not a default EF.</p> <p>The ERT recommends that the EU report accurately in the NIR the method and CH₄ EF used by Denmark to estimate CH₄ emissions from sheep.</p>	
A.18	3.B Manure management – N ₂ O	<p>The EU used the notation key “IE” to report N₂O emissions from manure management for cattle and swine for the Netherlands in NIR tables 5.29 and 5.30. In CRF table 3.B(b), the EU used the notation key “IE” to report N₂O emissions from manure management for sheep and swine for the Netherlands. The ERT noted that no explanation is provided, either in the documentation box of CRF table 3.B(b) or in the NIR, as to where in the inventory the emissions have been included. During the review, the EU explained that the Netherlands reported manure in CRF table 3.B(b) in the different MMS without distinguishing among livestock categories until the last inventory year, and the EU had no data for individual animal types; it therefore assigned all manure to the category other. The EU has been working with the Netherlands on this issue for a few years, and the Netherlands is now advancing in the recommended calculations. For 2018 the Netherlands reported manure by MMS and livestock category (see ID#s A.6 and A.7 in table 3), but emissions for category 3.B.b were still reported under other livestock. According to the Netherlands’ improvement plan, the disaggregation of emissions by livestock category is expected to be finished in time for the next submission.</p> <p>See ID# A.6 in table 3 for the outstanding recommendation from the previous review report on this issue.</p>	Yes. Transparency
A.19	3.B Manure management – N ₂ O	<p>In CRF table 3.B(b), the EU used the notation key “NA” to report direct N₂O emissions from manure management for liquid systems for Bulgaria and for daily spread for Bulgaria, Czechia and Poland. The ERT noted that no explanation is provided in the NIR as to why this notation key is used. During the review, the EU explained that Bulgaria reported manure managed in liquid systems for swine and buffalo, but used an EF of zero for this MMS; Czechia reported manure in the daily spread system for cattle, but used an EF of zero; and Bulgaria and Poland did not report manure managed in the daily spread system.</p> <p>The ERT recommends that the EU work with Bulgaria and Poland to clarify why they use “NA” to report N₂O emissions from MMS when manure is not reported in those MMS in their NIR.</p>	Yes. Transparency
A.20	3.B Manure management – N ₂ O	<p>In CRF table 3.B(b) the EU uses the notation key “NA” to report direct N₂O emissions from manure management for composting systems for Croatia, Poland and Slovenia. The ERT noted that no explanation is provided in the NIR as to why this notation key is used. The ERT also noted that composting is practiced in these countries, as shown in figure 7.2 of the NIR. During the review, the EU explained that Croatia, Poland and Slovenia reported in their NIRs that only urban waste is composted; composting of manure waste is not mentioned.</p> <p>The ERT recommends that the EU work with Croatia, Poland and Slovenia to clarify in their NIRs the use of the notation key “NA” to report direct N₂O emissions from manure management for composting systems.</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
A.21	3.B Manure management – N ₂ O	<p>In CRF table 3.B(b), the EU used the notation key “NE” to report direct N₂O emissions from manure management for composting systems for Finland and the United Kingdom. The ERT noted that no explanation is provided in CRF table 9 or in the NIR as to why this notation key is used. During the review, the EU explained that in Finland emissions from manure composting are negligible (Finland 2018 NIR, table 5.3.1). In chapter 7 of its 2018 NIR the United Kingdom reports household and non-household waste as composting sources, but does not mention manure. The ERT considers it incorrect to use the notation key “NE” to report direct N₂O emissions from manure management for composting systems for the United Kingdom.</p> <p>The ERT recommends that the EU work with the United Kingdom to clarify the use of the notation key “NE” to report direct N₂O emissions from manure management for composting systems, or replace “NE” with “NO” if these emissions do not occur, always reporting in the NIR the rationale for using this notation key.</p>	Yes. Transparency
A.22	3.B.3 Swine – CH ₄	<p>In NIR table 5.17 the EU reports that Cyprus and the United Kingdom used a tier 2 method to estimate CH₄ emissions from manure management for swine. The EU also reports that these member States used default information for the CH₄ EF. As the use of a tier 2 method for CH₄ emissions from manure management implies the use of a country-specific EF estimated using country-specific data, the ERT asked the EU to explain how Cyprus and the United Kingdom used default information for the CH₄ EF for manure management when applying a tier 2 method. During the review, the EU explained that Cyprus and the United Kingdom estimated the CH₄ EF from manure management for swine on the basis of the IPCC tier 2 method using country-specific values for the manure managed in each MMS and that the EU had incorrectly interpreted these member States’ explanations of how they calculate the EFs.</p> <p>The ERT recommends that the EU report accurately in the NIR the method and CH₄ EF used by Cyprus and the United Kingdom to estimate CH₄ emissions from manure management for swine.</p>	Yes. Transparency
A.23	3.D.a.2 Organic nitrogen fertilizers – N ₂ O	<p>In CRF table 3.D the EU uses the notation key “NE” to report direct N₂O emissions from other organic fertilizers applied to soils for Croatia and Finland, and did not report on these emissions for Iceland. The ERT noted that no explanation is provided in CRF table 9 or in the NIR as to why this notation key is used. During the review, the EU explained that, in the case of Croatia, the Party reported “NA” for these emissions in CRF table 3.D, although it also referred to composting activities in the waste sector. The EU raised the issue with the Party and suggested that Croatia make efforts to find data related to other organic fertilizers applied to soils for CRF table 3.D, and in the meantime use the notation key “NE” rather than “NA” to report these emissions. The EU noted that Croatia has included this issue in its improvement plan and might be in a position to report those emissions soon. Regarding Finland, the EU explained that the Party stated in its NIR (p.252) that it did not report N₂O emissions from “other organic fertilizers applied to fields (for example, composted household waste and industrial waste) under the agriculture sector as there is no register from which to obtain the data and the amounts applied to fields are considered insignificant (most is used in landscaping and not in fields) and that the emissions of the composted waste types are reported in the waste sector (5.B.1)”. Finally, the ERT noted that the EU did not report direct N₂O</p>	Yes. Completeness

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
		<p>emissions from other organic fertilizers applied to soils for Iceland, which used the notation key “NE” in CRF table 3.D.</p> <p>The ERT concluded that Croatia partially estimated N₂O emissions from other organic fertilizers applied to soils (only for composted household waste and industrial waste) and reported them under the waste sector. Therefore, the appropriate notation key to be used for this Party is “IE, NE”.</p> <p>The ERT recommends that the EU work with Croatia and Iceland to estimate and report direct N₂O emissions from other organic fertilizers applied to soils under the agriculture sector (organic nitrogen fertilizers (3.(II).D.A.2)). If N₂O emissions are determined to be insignificant, the ERT recommends that the EU work with the countries so that they can explain the use of the notation key “NE” to report these emissions in their NIRs, in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.</p>	
A.24	3.D.a.5 Mineralization/immobilization associated with loss/gain of soil organic matter – N ₂ O	<p>In CRF table 3.D the EU used the notation key “NA” to report direct N₂O emissions from mineralization/immobilization associated with loss/gain of soil organic matter for Finland, Germany and Spain, and “NE” for Iceland. The ERT noted that no explanation is provided in the NIR, or in the case of Iceland in CRF table 9, as to why these notation keys are used.</p> <p>During the review, in response to a question raised by the ERT on the reason for not using the notation key “NE” for Finland, Germany and Spain, the EU explained that for Finland numerical values were reported for direct N₂O emissions in this category for some years (those in which loss of organic carbon takes place), and “NA” was used when no loss of organic carbon took place (Finland NIR, table 5.4-2). Regarding Germany, the EU explained that the soils pool was not a source of emissions given that there have been no changes in management practices in the country since 1990, as reported in the documentation box of Germany’s CRF table 3.D. Finally, the EU noted that Spain indicated in CRF table 3.D that the net carbon stock change in mineral soils in cropland remaining cropland was positive (a gain) for the entire time series, and therefore equation 11.8 from the 2006 IPCC Guidelines is not applicable. The ERT concluded that reporting for Finland, Germany and Spain is consistent with the UNFCCC Annex I inventory reporting guidelines, but reporting for Iceland is not because the rationale for the use of “NE” is not transparent.</p> <p>The ERT recommends that the EU, in reporting direct N₂O emissions from mineralization/immobilization associated with loss/gain of soil organic matter in CRF table 3.D, work with Iceland to include in its NIR and CRF table 3.D the justification for the use of “NE” for reporting direct N₂O emissions from mineralization/immobilization associated with loss/gain of soil organic matter.</p>	Yes. Transparency
A.25	3.D.b Indirect N ₂ O emissions from managed soils – N ₂ O	<p>When responding to the ERT regarding a previous recommendation (see ID# A.12 in table 3), the EU indicated that the Netherlands reported a different (higher) value in its March submission to the EU for the area of cultivated histosols in the subcategory indirect N₂O emissions from managed soils (3.D.b) from its January submission, which, according to the EU, was probably due to a reporting error. The EU explained that it would address the issue with</p>	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
		<p>the Netherlands in the next reporting period. It also indicated it would continue with consistency checks between the agriculture and LULUCF sectors for organic soils.</p> <p>The ERT recommends that the EU work with the Netherlands to correct the error made in reporting the area of cultivated histosols in CRF table 3.D and report the correct value in the EU CRF table 3.D.</p>	
	LULUCF	<p>No new issues related to the LULUCF sector were identified by the ERT during the review of the Party's 2018 annual submission.</p>	
	Waste		
W.1	5.A Solid waste disposal on land – CH ₄	<p>In annex III to the NIR, under the category managed waste disposal sites (5.A.1), the EU reported that no information on industrial waste landfilled was available for Cyprus, Czechia, Denmark, the Netherlands or Spain. During the review, the ERT requested the EU to clarify whether this means that emissions from this category are not occurring or that they were not estimated owing to a lack of data. In response, the EU informed the ERT that the version of annex III that the ERT consulted, which was included in the EU's submission and available on the European Environment Agency website at the start of the review week, was not the latest version. In the latest version, information on methodological issues regarding industrial waste had been updated and there was information for all member States. The EU provided the ERT with the final version of annex III for review. The ERT was able to confirm that industrial waste was included under waste landfilled for all member States.</p> <p>See ID# G.8 above for the recommendation of the ERT on this finding.</p>	Not an issue/problem
W.2	5.B Biological treatment of solid waste – CH ₄	<p>In NIR table 7.13 the EU reported the recalculations carried out for CH₄ emissions. The ERT noted that the data provided for Denmark include a recalculation for 1990 (base year) attributable to an increase in emissions associated with the category anaerobic digestion at biogas facilities (5.B.2) (0.08 kt CH₄). Detailed information on the driver of this recalculation is not provided in NIR table 7.13.</p> <p>During the review, the EU explained that for Denmark differences due to changes in manure-based biogas appear throughout the entire time series. In response to a question generated by the European Environment Agency Emission Review Tool during the initial checks upon submission, Denmark explained that an error had been corrected for category 5.B.2. Previously the emissions for this category had been calculated using energy production data taken from the Danish Energy Agency, the CH₄ content of the biogas and the net calorific value for CH₄. Using the CH₄ content of the biogas and the net calorific value for pure CH₄ led to an underestimation of emissions – Denmark determined that it had reported only 65 per cent of the actual emissions in its previous submission. This error was corrected by dividing the energy production data by the net calorific value and then multiplying by the EF. This error was also corrected in the methodological description in the NIR (i.e. equation 7.3.1 and the accompanying text).</p>	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem? ^a If yes, classify by type
W.3	5.B.1 Composting – CH ₄ and N ₂ O	<p>The ERT recommends that the EU improve the transparency of the NIR by including more detailed information in NIR table 7.13 on the drivers of significant recalculations.</p> <p>In CRF table 5.B the EU reported two types of waste treated by composting: MSW and other waste. However, the ERT noted that in the NIR (section 7.2.2.1) the EU reported information only on MSW. No information regarding the type of waste contained in other waste is included in the NIR. During the review, the EU explained that in 2016 10 member States reported CH₄ and N₂O emissions for the subcategory other (5.B.1.b). Many member States apply the same EFs for category 5.B.1.b as for MSW (5.B.1.a) (IPCC defaults: 4 g CH₄/kg wet waste and 0.24 g N₂O/kg wet waste). Other member States report emissions from composting only under subcategory 5.B.1.b. Still others use IPCC default EFs but report different waste categories under category 5.B.1.b and differentiate between dry and wet waste. Some member States report industrial solid waste and construction waste as well as municipal sludge and industrial sludge under category 5.B.1.b using IPCC default EFs. The ERT considers that the explanation provided by the EU highlights the potential issue related to the comparability of data among member States; it is clear they are not reporting each type of waste under the correct subcategories (5.B.1.a and 5.B.1.b). According to the specifications provided in CRF table 5.B, subcategory 5.B.1.a should include emissions from MSW and subcategory 5.B.1.b should include emissions from all organic waste sources not covered by MSW.</p> <p>The ERT recommends that the EU report the CH₄ and N₂O emissions of each type of composting waste in the correct subcategory: 5.B.1.a (for MSW) or 5.B.1.b (for other organic waste). The ERT also recommends that the EU improve the transparency of the NIR by including more information on both types of waste composted, including AD, EFs and the type of waste included under other (5.B.1.b).</p>	Yes. Comparability
W.4	5.B.2 Anaerobic digestion at biogas facilities – CH ₄ and N ₂ O	<p>In CRF table 5.B the EU has reported the AD for waste treated by anaerobic digestion at biogas facilities (category 5.B.2) as “NE” for the entire time series. However, CH₄ emissions have been estimated and reported for all years. No information regarding category 5.B.2 is included in the NIR. During the review, the EU explained that the reporting of AD and emissions for this category varies among member States. While some report AD as well as CH₄ and N₂O emissions, others report emissions but not AD. This would lead to unreliable CH₄ and N₂O IEFs in CRF table 5.B. The EU noted that in the CRF Reporter software it is not possible to report “NE” for the IEFs; therefore AD have been reported as “NE” in order to avoid the reporting of unreliable IEFs for this category. The Party also noted that because information on AD for each member State is included in the commenting field of the CRF table cell, information is not lost. The ERT considers that the explanation provided by the EU highlights the potential issue related to comparability of data among member States; it is clear they are not reporting all of the information required in the CRF tables.</p> <p>The ERT recommends that the EU improve the comparability of the inventory by working with member States to ensure that AD on the annual amount of waste treated through anaerobic digestion at biogas facilities (category 5.B.2) are reported for all Parties, thereby allowing the correct calculation and reporting of the CH₄ and N₂O IEFs for this category. The ERT also recommends that the EU improve the transparency of the NIR by including</p>	Yes. Comparability

<i>ID#</i>	<i>Finding classification</i>	<i>Description of the finding with recommendation or encouragement</i>	<i>Is finding an issue and/or a problem?^a If yes, classify by type</i>
		information on the AD and EFs used, as well as the calculation methodology followed, for the estimation of CH ₄ and N ₂ O emissions for this category.	
W.5	5.C Incineration and open burning of waste – CO ₂ , CH ₄ and N ₂ O	<p>The ERT noted that a section for the category incineration and open burning of waste (5.C) is not included in the NIR. During the review, the EU explained that the chapter for category 5.C was mistakenly deleted from the May submission of the 2018 NIR, but had been included in the April 2018 submission and was therefore available for the ERT to review.</p> <p>The ERT recommends that the EU ensure that the section for the category incineration and open burning of waste (5.C) is included in the NIR and that the EU conduct a quality check of the NIR before submission.</p>	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
W.6	5.D.1 Domestic wastewater – CH ₄	<p>The ERT noted that figure 7.15 in the NIR shows only the total fractions of CH₄ emissions, CH₄ recovered and CH₄ flared from domestic wastewater treatment facilities at the EU level. The ERT also noted that the amounts of CH₄ recovered and CH₄ flared are more than double the CH₄ emissions in recent years. Given this situation, the ERT considers that the technologies and practices related to CH₄ recovery and CH₄ flaring in individual member States need to be more clearly explained in the NIR.</p> <p>The ERT recommends that the EU include in the NIR a table reporting the amount of CH₄ emissions, CH₄ recovered and CH₄ flared by member State, and provide the results of an analysis of major trends related to CH₄ recovery and flaring practices.</p>	Yes. Transparency
KP-LULUCF			
KL.20	CM – CO ₂	<p>The ERT noted that for Italy the EU has reported net carbon stock changes in mineral soils in CRF table 4(KP-D)B.2 using the notation key “NE”, while reporting an area of mineral soils (8,994.9 kha) for 2016. During the review, the EU explained that the notation key “NE” was used for carbon stock changes in mineral soils following a recommendation in the 2016 annual review report of Italy (see ID# KL.2 in document FCCC/ARR/2016/ITA). While the ERT acknowledges the Party’s reporting of “NE”, it notes that transparent and verifiable information indicating that this pool is not a net source of emissions is not provided in the NIR as required by paragraph 2(e) of annex II to decision 2/CMP.8.</p> <p>The ERT recommends that the EU provide transparent and verifiable information on the use of notation key “NE” to report CM for Italy in order to increase transparency.</p>	Yes. Completeness

^a Recommendations made by the ERT during the review are related to issues as defined in paragraph 81 of the UNFCCC review guidelines, or problems as defined in paragraph 69 of the Article 8 review guidelines. Encouragements are made to the Party to address all findings not related to such issues or problems.

VI. Application of adjustments

11. The ERT did not identify the need to apply any adjustments to the 2018 annual submission of the EU.

VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol

12. The EU stated in its NIR (chapter 11, p.868) that member States and Iceland will account individually for net emissions and removals for each activity under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by issuing RMUs or by cancelling AAUs, ERUs, CERs and/or RMUs on the basis of the corresponding reported emissions and removals from these activities in the national registry of each member State and Iceland. The EU will neither issue nor cancel units on the basis of the reported emissions and removals from KP-LULUCF activities. The EU also stated that it will report the sum of the cumulative accounting quantities of member States and Iceland for these activities at the end of the second commitment period.

13. The EU member States and Iceland have different accounting frequencies; in particular, Hungary has annual accounting for AR, deforestation and FM, and Denmark has annual accounting for AR, deforestation, FM, CM and GM, whereas all other member States and Iceland have commitment period accounting for their KP-LULUCF activities.

VIII. Questions of implementation

14. No questions of implementation were identified by the ERT during the individual review of the EU's 2018 annual submission.

Annex I

Overview of greenhouse gas emissions and removals for the European Union for submission year 2018 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by the European Union in its 2018 annual submission

1. Tables 6–9 provide an overview of total GHG emissions and removals as submitted by the EU.

Table 6
Total greenhouse gas emissions for the European Union, base year^a–2016
(kt CO₂ eq)

	Total GHG emissions excluding indirect CO ₂ emissions		Total GHG emissions including indirect CO ₂ emissions ^b		Land-use change (Article 3.7 bis as contained in the Doha (Article 3.3 of the Amendment) ^c	KP-LULUCF activities (Article 3.3 of the Kyoto Protocol) ^d	KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)	
	Total including LULUCF	Total excluding LULUCF	Total including LULUCF	Total excluding LULUCF			CM, GM, RV, WDR	FM
FMRL								–315 476.50
Base year	5 622 338.57	5 858 337.59	5 626 619.26	5 862 618.28	5 560.49		60 313.88	
1990	5 402 545.89	5 652 249.73	5 406 826.59	5 656 530.42				
1995	5 029 126.36	5 303 698.29	5 032 818.47	5 307 390.40				
2000	4 861 496.06	5 166 737.31	4 864 154.25	5 169 395.51				
2010	4 466 588.36	4 783 095.99	4 468 550.40	4 785 058.03				
2011	4 319 479.98	4 625 033.78	4 321 329.12	4 626 882.92				
2012	4 256 850.12	4 562 368.65	4 258 627.04	4 564 145.58				
2013	4 155 959.78	4 467 618.23	4 157 583.15	4 469 241.60		–16 819.27	53 457.15	–431 845.70
2014	3 986 711.26	4 296 415.28	3 988 287.35	4 297 991.37		–19 010.26	50 855.12	–424 855.81
2015	4 017 887.36	4 325 276.99	4 019 450.05	4 326 839.68		–20 480.09	49 865.13	–414 992.60
2016	4 007 313.10	4 298 569.36	4 008 802.81	4 300 059.07		–13 619.09	49 005.03	–402 669.20

Note: Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions.

^a “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O for all member States except Bulgaria (1988), Hungary (1985–1987), Poland (1988), Romania (1989) and Slovenia (1986); 1995 for HFCs, PFCs and SF₆ for all member States except Austria, Croatia, France, Italy, Malta and Slovakia (1990), Romania (1989) and Iceland (1990); and 1995 for NF₃ for all member States except Austria, Croatia, Greece, Poland, Portugal, Romania and Slovakia (2000). CO₂, CH₄ and N₂O emissions included for the base year do not include the emissions from deforestation that were included in the EU’s initial report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol for the base year and subsequently used for the calculation of the assigned amount. The EU has not elected any activities under Article 3, paragraph 4, of

the Kyoto Protocol because these activities are elected by each member State and Iceland. The values reported refer to the sum of the cumulative accounting quantities of the member States and Iceland for the activities and are for information purposes only. For activities under Article 3, paragraph 3, of the Kyoto Protocol and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

^b The Party reported indirect CO₂ emissions in CRF table 6.

^c The value reported in this column refers to 1990.

^d Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely AR and deforestation.

Table 7

Greenhouse gas emissions by gas for the European Union, excluding land use, land-use change and forestry, 1990–2016

(kt CO₂ eq)

	CO ₂ ^a	CH ₄	N ₂ O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF ₆	NF ₃
1990	4 480 505.76	720 490.57	383 126.77	29 127.45	26 365.01	5 840.87	11 050.21	23.78
1995	4 221 240.94	658 118.94	345 481.05	44 012.74	17 347.90	5 895.38	15 193.67	99.77
2000	4 184 840.46	600 959.61	303 442.84	54 938.88	12 330.27	2 193.31	10 586.68	103.44
2010	3 946 269.77	485 225.36	238 173.23	104 206.12	4 050.70	488.35	6 524.90	119.59
2011	3 800 249.21	475 561.14	233 997.98	105 934.31	4 319.57	383.64	6 309.26	127.81
2012	3 741 504.76	471 149.33	231 447.90	109 039.57	3 790.03	763.62	6 358.15	92.22
2013	3 653 506.67	460 912.49	231 640.04	111 871.27	4 043.04	936.57	6 265.45	66.08
2014	3 484 062.00	453 861.36	234 625.54	114 907.40	3 558.85	729.72	6 176.40	70.10
2015	3 517 671.16	453 696.40	234 249.64	110 260.69	3 691.85	724.29	6 481.00	64.65
2016	3 496 070.94	448 914.39	233 136.94	110 113.30	4 227.60	741.34	6 799.10	55.48
Per cent change 1990–2016	–22.0	–37.7	–39.1	278.0	–84.0	–87.3	–38.5	133.3

Note: Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions.

^a CO₂ emissions include indirect CO₂ emissions reported in CRF table 6.

Table 8

Greenhouse gas emissions by sector for the European Union, 1990–2016

(kt CO₂ eq)

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
1990	4 357 176.59	519 977.40	542 916.06	–249 703.83	236 460.37	NO
1995	4 090 033.26	500 231.98	472 537.09	–274 571.93	244 588.08	NO
2000	4 023 582.77	457 501.18	458 969.73	–305 241.26	229 341.83	NO
2010	3 800 955.80	396 966.71	420 599.05	–316 507.63	166 536.47	NO
2011	3 652 339.29	392 438.91	421 065.42	–305 553.80	161 039.30	NO

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
2012	3 608 643.47	379 667.89	418 923.07	-305 518.54	156 911.15	NO
2013	3 519 003.31	378 302.75	422 164.05	-311 658.46	149 771.49	NO
2014	3 340 165.45	384 490.83	429 323.12	-309 704.02	144 011.97	NO
2015	3 375 897.67	379 426.68	430 422.19	-307 389.63	141 093.15	NO
2016	3 353 070.83	377 050.02	430 904.55	-291 256.26	139 033.67	NO
Per cent change 1990–2016	-23.0	-27.5	-20.6	16.6	-41.2	NA

Notes: (1) Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions. (2) Totals include indirect CO₂ emissions reported in CRF table 6.

Table 9

Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year^a–2016, for the European Union
(kt CO₂ eq)

	<i>Article 3.7 bis as contained in the Doha Amendment^b</i>		<i>Article 3.3 of the Kyoto Protocol</i>					<i>FM and elected Article 3.4 activities of the Kyoto Protocol</i>		
	<i>Land-use change</i>		<i>AR</i>	<i>Deforestation</i>	<i>FM</i>	<i>CM</i>	<i>GM</i>	<i>RV</i>	<i>WDR</i>	
FMRL					-315 476.50 ^c					
Technical correction					16 020.40					
Base year	5 560.49					34 454.50	27 939.84	-2 080.46	NO, NE, IE, NA	
2013		-56 852.66	40 033.39	-431 845.70	31 897.81	23 319.63	-1 760.29	NO, NE, IE, NA		
2014		-58 790.61	39 780.35	-424 855.81	29 592.27	23 042.42	-1 779.57	NO, NE, IE, NA		
2015		-59 448.13	38 968.03	-414 992.60	28 744.40	22 948.88	-1 828.16	NO, NE, IE, NA		
2016		-58 498.53	44 879.44	-402 669.20	28 352.31	22 558.02	-1 905.30	NO, NE, IE, NA		
Per cent change base year–2016						-17.7	-19.3	-8.4	NA	

Note: Values in this table include emissions on lands subject to natural disturbances, if applicable.

^a The EU has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol because these activities are elected by each member State and Iceland. The values reported refer to the sum of the cumulative accounting quantities of member States and Iceland for these activities and are for information purposes only. For activities under Article 3, paragraph 3, of the Kyoto Protocol, and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

^b The value reported in this column refers to 1990.

^c See ID# KL.14 in table 3.

2. Table 10 provides an overview of key relevant data for the EU's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 10

Key relevant data for the European Union under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in the 2018 annual submission

<i>Key parameters</i>	<i>Values</i>
Periodicity of accounting	<p>(a) AR: commitment period accounting for Iceland and all member States except Denmark and Hungary</p> <p>(b) Deforestation: commitment period accounting for Iceland and all member States except Denmark and Hungary</p> <p>(c) FM: commitment period accounting for Iceland and all member States except Denmark and Hungary</p> <p>(d) CM: elected by Denmark, Germany, Ireland, Italy, Portugal, Spain and the United Kingdom, with commitment period accounting for all indicated member States except Denmark</p> <p>(e) GM: elected by Denmark, Germany, Ireland, Italy, Portugal and the United Kingdom, with commitment period accounting for all indicated member States except Denmark</p> <p>(f) RV: elected by Romania and Iceland, with commitment period accounting for both Parties</p> <p>(g) WDR: elected by the United Kingdom, with commitment period accounting</p>
Election of activities under Article 3, paragraph 4	<p>The EU has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol because these activities are elected by each member State and Iceland. Member State elections are as follows:</p> <p>(a) CM: elected by Denmark, Germany, Ireland, Italy, Portugal, Spain and the United Kingdom</p> <p>(b) GM: elected by Denmark, Germany, Ireland, Italy, Portugal and the United Kingdom</p> <p>(c) RV: elected by Romania and Iceland</p> <p>(d) WDR: elected by the United Kingdom</p>
Election of application of provisions for natural disturbances	<p>Yes, elections made by member States are as follows:</p> <p>(a) AR: elected by Bulgaria, Croatia, France, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Romania, Spain, Sweden and the United Kingdom</p> <p>(b) FM: elected by Austria, Belgium, Bulgaria, Croatia, Cyprus, Estonia, Finland, France, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Romania, Spain, Sweden and the United Kingdom</p>
3.5% of total base-year GHG emissions, excluding LULUCF and including indirect CO ₂ emissions	205 454.627 kt CO ₂ eq (1 643 637.017 kt CO ₂ eq for the duration of the commitment period)
Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for:	
1. AR in 2016	NA
2. Deforestation in 2016	NA
3. FM in 2016	NA
4. CM in 2016	NA
5. GM in 2016	NA
6. RV in 2016	NA
7. WDR in 2016	NA

Annex II

Information to be included in the compilation and accounting database

Tables 11–14 include the information to be included in the compilation and accounting database for the EU. Data shown are from the original annual submission of the Party, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table 11

Information to be included in the compilation and accounting database for 2016, including the commitment period reserve, for the European Union

(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
CPR	14 231 780 406			14 231 780 406
Annex A emissions for 2016				
CO ₂ ^a	3 496 070 935			3 496 070 935
CH ₄	448 914 387			448 914 387
N ₂ O	233 136 945			233 136 94
HFCs	110 113 298			110 113 298
PFCs	4 227 595			4 227 595
Unspecified mix of HFCs and PFCs	741 337			741 337
SF ₆	6 799 095			6 799 095
NF ₃	55 478			55 478
Total Annex A sources	4 300 059 071			4 300 059 071
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2016				
3.3 AR	–58 498 533			–58 498 533
3.3 Deforestation	44 879 444			44 879 444
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2016				
3.4 FM	–402 669 199			–402 669 199
3.4 CM	28 352 306			28 352 306
3.4 CM for the base year	34 454 504			34 454 504
3.4 GM	22 558 022			22 558 022
3.4 GM for the base year	27 939 836			27 939 836
3.4 RV	–1 905 299			–1 905 299
3.4 RV in the base year	–2 080 459			–2 080 459
3.4 WDR	IE, NA, NE, NO			IE, NA, NE, NO
3.4 WDR in the base year	IE, NA, NE, NO			IE, NA, NE, NO

^a CO₂ emissions include indirect CO₂ emissions reported in CRF table 6.

Table 12

Information to be included in the compilation and accounting database for 2015 for the European Union

(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
Annex A emissions for 2015				
CO ₂ ^a	3 517 671 160			3 517 671 160
CH ₄	453 696 401			453 696 401

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
N ₂ O	234 249 636			234 249 636
HFCs	110 260 694			110 260 694
PFCs	3 691 851			3 691 851
Unspecified mix of HFCs and PFCs	724 292			724 292
SF ₆	6 480 999			6 480 999
NF ₃	64 651			64 651
Total Annex A sources	4 326 839 685			4 326 839 685
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2015				
3.3 AR	-59 448 127			-59 448 127
3.3 Deforestation	38 968 035			38 968 035
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2015				
3.4 FM	-414 992 597			-414 992 597
3.4 CM	28 744 404			28 744 404
3.4 CM for the base year	34 454 504			34 454 504
3.4 GM	22 948 880			22 948 880
3.4 GM for the base year	27 939 836			27 939 836
3.4 RV	-1 828 157			-1 828 157
3.4 RV in the base year	-2 080 459			-2 080 459
3.4 WDR	IE, NA, NE, NO			IE, NA, NE, NO
3.4 WDR in the base year	IE, NA, NE, NO			IE, NA, NE, NO

^a CO₂ emissions include indirect CO₂ emissions reported in CRF table 6.

Table 13

Information to be included in the compilation and accounting database for 2014 for the European Union(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
Annex A emissions for 2014				
CO ₂ ^a	3 484 061 997			3 484 061 997
CH ₄	453 861 359			453 861 359
N ₂ O	234 625 538			234 625 538
HFCs	114 907 404			114 907 404
PFCs	3 558 851			3 558 851
Unspecified mix of HFCs and PFCs	729 716			729 716
SF ₆	6 176 404			6 176 404
NF ₃	70 101			70 101
Total Annex A sources	4 297 991 370			4 297 991 370
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014				
3.3 AR	-58 790 606			-58 790 606
3.3 Deforestation	39 780 345			39 780 345
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014				
3.4 FM	-424 855 812			-424 855 812
3.4 CM	29 592 265			29 592 265
3.4 CM for the base year	34 454 504			34 454 504
3.4 GM	23 042 419			23 042 419
3.4 GM for the base year	27 939 836			27 939 836

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
3.4 RV	-1 779 566			-1 779 566
3.4 RV in the base year	-2 080 459			-2 080 459
3.4 WDR	IE, NA, NE, NO			IE, NA, NE, NO
3.4 WDR in the base year	IE, NA, NE, NO			IE, NA, NE, NO

^a CO₂ emissions include indirect CO₂ emissions reported in CRF table 6.

Table 14

Information to be included in the compilation and accounting database for 2013 for the European Union

(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimate</i>	<i>Adjustment</i>	<i>Final</i>
Annex A emissions for 2013				
CO ₂ ^a	3 653 506 673			3 653 506 673
CH ₄	460 912 491			460 912 491
N ₂ O	231 640 041			231 640 041
HFCs	111 871 274			111 871 274
PFCs	4 043 036			4 043 036
Unspecified mix of HFCs and PFCs	936 567			936 567
SF ₆	6 265 445			6 265 445
NF ₃	66 078			66 078
Total Annex A sources	4 469 241 605			4 469 241 605
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013				
3.3 AR	-56 852 664			-56 852 664
3.3 Deforestation	40 033 392			40 033 392
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013				
3.4 FM	-431 845 699			-431 845 699
3.4 CM	31 897 810			31 897 810
3.4 CM for the base year	34 454 504			34 454 504
3.4 GM	23 319 626			23 319 626
3.4 GM for the base year	27 939 836			27 939 836
3.4 RV	-1 760 290			-1 760 290
3.4 RV in the base year	-2 080 459			-2 080 459
3.4 WDR	IE, NA, NE, NO			IE, NA, NE, NO
3.4 WDR in the base year	IE, NA, NE, NO			IE, NA, NE, NO

^a CO₂ emissions include indirect CO₂ emissions reported in CRF table 6.

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which methods are included in the 2006 IPCC Guidelines that were reported as “NE” or for which the ERT otherwise determined that there may be an issue with the completeness of reporting in the Party’s inventory are the following:

- (a) Direct N₂O emissions from other organic fertilizers applied to soils for Croatia, Finland and Iceland (see ID# A.23 in table 5);
- (b) Carbon stock change for other land converted to cropland for France (all pools) (see ID# L.10 in table 3);
- (c) Net carbon stock change in the litter and deadwood pools under CM and GM for the United Kingdom (see ID# KL.10 in table 3);
- (d) CO₂ emissions and removals from WDR for the United Kingdom (see ID# KL.10 in table 3);
- (e) CO₂ emissions and removals from HWP for Belgium (1990–1999) (see ID#s L.16 and KL.18 in table 3).

Annex IV

Documents and information used during the review

A. Reference documents

Reports of the Intergovernmental Panel on Climate Change

IPCC. 2000. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. J Penman, D Kruger, I Galbally, et al. (eds.). Hayama, Japan: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency/Institute for Global Environmental Strategies.

Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl>.

IPCC. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies.

Available at <http://www.ipcc-nggip.iges.or.jp/public/kpsg>.

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva, Switzerland: IPCC. Available at <http://www.ipcc-nggip.iges.or.jp/public/wetlands/>.

Annual review reports

Reports on the individual reviews of the 2012, 2013, 2014, 2015 and 2016 annual submissions of the European Union, contained in documents FCCC/ARR/2012/EU, FCCC/ARR/2013/EU, FCCC/ARR/2014/EU, FCCC/ARR/2015/EU and FCCC/ARR/2016/EU, respectively.

Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at https://unfccc.int/sites/default/files/resource/AGI%20report_2018.pdf.

Standard independent assessment report, part 2, for the European Commission for 2017. Available at

https://unfccc.int/files/kyoto_protocol/registry_systems/independent_assessment_reports/application/pdf/siar_part_2_eu_v1.0_2017.pdf.

Standard independent assessment report, part 2, for the European Commission for 2018. Available at

<https://unfccc.int/sites/default/files/resource/SIAR%20Part%202%20EU%202018%20v1.0.pdf>.

Status report on the annual inventory of the European Union for 2018. Available at https://unfccc.int/sites/default/files/resource/asr2018_EU.pdf.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Ana Danila (European Commission, Directorate-General for Climate Action), Mr. Ricardo Fernandez and Ms. Claire Qoul (European Environment Agency), including additional material on the methodology and assumptions used.