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Report on the individual review of the annual submission of Greece submitted in 2019*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases 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 2019 annual submission of Greece, 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 30 September to 5 October 2019 in Athens.

* In the symbol for this document, 2019 refers to the year in which the inventory was submitted, not to the year of publication.

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Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
BCEF	biomass conversion and expansion factor for expansion of merchantable growing stock volume to above-ground biomass
CER	certified emission reduction
C_f	combustion factor
CH_4	methane
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
Convention reporting adherence	adherence to the "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"
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
DOC	degradable organic carbon
EEC	European Economic Community
EF	emission factor
EMEP/EEA	European Monitoring and Evaluation Programme/European Environment Agency
ERT	expert review team
ERU	emission reduction unit
EU	European Union
EU ETS	European Union Emissions Trading System
Eurostat	the statistical office of the European Union
FAOSTAT	the statistical database of the Food and Agriculture Organization of the United Nations
F_{BL}	fraction of biomass left to decay in forest (transferred to dead organic matter)
F_{CR}	fraction of nitrogen in crop residues applied to soils
F-gas	fluorinated gas
$F_{IND-COM}$	fraction of industrial and commercial co-discharged protein into the sewer system
FM	forest management
FMP	forest management plan
FMRL	forest management reference level
$F_{NON-CON}$	fraction of non-consumed protein added to wastewater
F_{ON}	fraction of animal manure nitrogen applied to soils
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere

IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPCC good practice guidance	*Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*
IPPU	industrial processes and product use
KP-LULUCF activities	activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
MCF	methane correction factor
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NCV	net calorific value
NE	not estimated
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
ODS	ozone-depleting substance(s)
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
Revised 1996 IPCC Guidelines	*Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*
RMU	removal unit
RV	revegetation
SF_6	sulfur hexafluoride
SOC	soil organic carbon
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
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*
Ym	methane conversion factor

I. Introduction[1]

1. This report covers the review of the 2019 annual submission of Greece 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 30 September to 5 October 2019 in Athens and was coordinated by Nalin Srivastava and Kyoko Miwa (secretariat). Table 1 provides information on the composition of the ERT that conducted the review of Greece.

Table 1
Composition of the expert review team that conducted the review of Greece

Area of expertise	*Name*	*Party*
Generalist	Marcelo Theoto Rocha	Brazil
Energy	Michael Strogies	Germany
IPPU	Ingrid Person Rocha e Pinho	Brazil
Agriculture	Paul Duffy	Ireland
LULUCF and KP-LULUCF activities	Harry Vreuls	Netherlands
Waste	Ole-Kenneth Nielsen	Denmark
Lead reviewers	Ole-Kenneth Nielsen	
	Marcelo Theoto Rocha	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2019 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines. The ERT notes that the individual inventory review of Greece's 2018 annual submission did not take place in 2018 owing to insufficient funding for the review process.

3. The ERT has made recommendations that Greece resolve the findings related to issues,[2] including issues designated as problems.[3] Other findings, and, if applicable, the encouragements of the ERT to Greece to resolve them, are also included.

4. A draft version of this report was communicated to the Government of Greece, which provided no comments.

5. Annex I shows annual GHG emissions for Greece, including totals excluding and including the LULUCF sector, indirect CO_2 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 Greece, by gas, sector and activity.

6. Information to be included in the compilation and accounting database can be found in annex II.

[1] At the time of publication of this report, Greece 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, para. 6, pending the entry into force of the Amendment.

[2] Issues are defined in decision 13/CP.20, annex, para. 81.

[3] Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

II. Summary and general assessment of the 2019 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 Greece

Assessment			*Issue or problem ID#(s) in table 3 and/or 5*[a]
Date of submission	Original submission: 15 April 2019 (NIR), 15 April 2019 (CRF tables) version 1, 15 April 2019 (standard electronic format tables)		
Review format	In country		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	I.12, I.15
	(c) Development and selection of EFs?	Yes	E.18, L.2, L.13
	(d) Collection and selection of AD?	Yes	I.5, I.9, I.17, L.11, L.19, W.34
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	Yes	I.5, L.5, L.14, W.14
	(g) Reporting of uncertainties, including methodologies?	Yes	W.10, W.17
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories/completeness?[b]	Yes	L.1, L.3, L.15
	(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	G.6, A.23, W.31
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:		
	(a) 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	
	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	

Assessment			*Issue or problem ID#(s) in table 3 and/or 5*[a]
	Have any issues been identified related to reporting of information on AAUs, CERs, ERUs 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 standard independent assessment report?	Yes	G.7
	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	
	Have any issues been identified related to the following reporting requirements for KP-LULUCF activities:		
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	Yes	KL.4, KL.5
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	No	
	(c) Reporting requirements of decision 6/CMP.9?	No	
	(d) Country-specific information to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34?	No	
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?	No	
	Did the Party submit a revised estimate to replace a previously applied adjustment?	No	Greece 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	
Question of implementation	Did the ERT list any questions of implementation?	No	

[a] The ERT identified additional issues and/or problems in the general, energy, IPPU, agriculture, LULUCF and waste sectors as well as issues and/or problems related to reporting on KP-LULUCF activities that are not listed in this table but are included in table 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 9 March 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 2019 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 Greece

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	Annual submission (G.1, 2017) (G.1, 2016) (G.1, 2015) (table 3, 2014) Completeness	Estimate and report emissions from all mandatory categories.	Resolved. Greece reported emissions and removals from most mandatory categories identified as missing in the previous reviews (e.g. CSCs in all the pools in cropland converted to settlements). However, the Party did not report estimates for CSCs in any of the pools in grassland converted to forest land (see ID# L.1 below).
G.2	NIR (G.2, 2017) (G.10, 2016) (G.10, 2015) Transparency	Add text to all relevant sections of the NIR to explain the reporting of NF_3 emissions.	Resolved. Greece included information in the NIR (section 1.1.4, p.37) explaining that NF_3 emissions do not occur because there is no NF_3 use in Greece.
G.3	CRF tables (G.5, 2017) Comparability	Report complete information in CRF table 9.	Not resolved. Greece did not report complete information in CRF table 9. During the review, the Party explained that it was not able to include the relevant information on notation keys "NE" and "IE" because of constraints in the use of CRF Reporter. Greece indicated it is working with the secretariat on this matter so as to ensure that relevant information is included in CRF table 9 in the next submission.
G.4	Article 3, paragraph 14, of the Kyoto Protocol (G.6, 2017) KP reporting adherence	Report any changes in the information provided under Article 3, paragraph 14, in accordance with decision 15/CMP.1, in conjunction with decision 3/CMP.11, and clarify in the NIR if there are no such changes.	Resolved. Greece reported updated information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, including a better explanation of the impact assessment of EU policies (NIR, section 13.1, p.477). The Party also explained that no changes have been made in how it gives priority to specific actions in implementing its commitments under Article 3, paragraph 14, since the previous submission (NIR, section 13.2, p.485).
Energy			
E.1	Feedstocks, reductants and other non-energy use of fuels – liquid fuels – CO_2 (E.2, 2017) (E.3, 2016) (E.3, 2015) (31, 2014) (24, 2013) (58,	Implement the reallocation of emissions (liquid fuels that were used as feedstocks in ammonia production from the energy sector to the IPPU sector) and transparently document the impact of this reallocation in the relevant categories as well as in the	Resolved. The ERT considers the information provided in the NIR (section 3.2.3, p.115, and section 4.6, p.206) on the allocation of the emissions (see ID# E.5 below) sufficient to justify the allocation of emissions from liquid fuels used as feedstock in ammonia production for 1990–1993 and 1995–1998.

[4] FCCC/ARR/2017/GRC.

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	2012) Comparability	comparison between the reference and sectoral approaches.	
E.2	1.A.1.a.i Electricity generation – solid fuels – CO_2 (E.3, 2017) (E.14, 2016) (E.14, 2015) Transparency	Include in the NIR the rationale for using plant-specific data (oxidation factor of 98 per cent for lignite), a link to the study conducted by the Public Power Corporation (in 1994) and a general description of the development of the oxidation factor.	Resolved. Greece provided the requested information on the oxidation factor for lignite in the NIR (section 3.2.4.2, pp.124–125). However, as the Party explained during the review, it did not provide a link to the study conducted by the Public Power Corporation in the NIR owing to the confidential nature of the information. During the review, Greece provided the ERT with additional information on and access to the study.
E.3	1.A.1.b Petroleum refining – liquid fuels – CH_4 (E.4, 2017) (E.15, 2016) (E.15, 2015) Transparency	Include in the NIR a transparent explanation of the reallocation of CH_4 emissions from liquid fuels.	Resolved. The ERT noted that the original recommendation in the report on the review of the 2015 submission (FCCC/ARR/2015/GRC) was based on a statement in the 2015 NIR (section 3.2.4.3.1, p.115) that CO_2 and N_2O emissions from catalytic cracking are reported under subcategory 1.A.1.b, while the CH_4 emissions are included under fugitive emissions from fuels (1.B.2). However, on the basis of the statement in the 2019 NIR (section 3.2.4.3.1, p.127) that CH_4 and N_2O emissions for this category have been calculated using the tier 1 methodology and default EFs in the 2006 IPCC Guidelines, as well as the information reported in CRF table 1.A(a)s1, the ERT concluded that Greece has reported CH_4 emissions from petroleum refining (liquid fuels) under subcategory 1.A.1.b.
E.4	1.A.1.b Petroleum refining – liquid fuels – CO_2 (E.5, 2017) (E.16, 2016) (E.16, 2015) Transparency	Identify the reasons for the inter-annual changes in the CO_2 IEF between 2012 and 2013 of 4.2 per cent, ensure that the time series is consistent, if necessary, and include in the NIR an explanation for the changes.	Resolved. Greece explained in the NIR (section 3.2.4.3.1, p.128) that the inter-annual changes in the CO_2 IEF between 2012 and 2013 of liquid fuels are attributable to the change in the CO_2 EF of the refinery gas as a result of a technical upgrade of one of the four refineries, because of which the weighted average EF of refinery gas increased from 56.69 t/TJ in 2012 to 64.55 t/TJ in 2013. This technical upgrade included the installation of a high-pressure hydrocracking unit ('hydrocracker') and a thermal cracking unit ('flexicoker'), the latter of which produces refinery gas with a higher EF. The ERT noted that the Party ensured time-series consistency in reporting emissions for this subcategory.
E.5	1.A.2.c Chemicals – liquid fuels – CO_2 (E.17, 2017) Transparency	Include, in the NIR, the information on the difficulties in identifying the amount of liquid feedstocks associated with ammonia production that was provided to the ERTs during the reviews in 2016 and 2017 and document in the NIR where emissions from liquid fuels used as feedstocks for ammonia production are reported.	Resolved. Greece explained in the NIR (section 3.2.3, p.115) that CO_2 emissions from a small amount of liquid fuels used as feedstock in ammonia production by one plant for 1990–1993 and 1995–1998 are included in the energy sector instead of the IPPU sector (section 4.6, p.206) because the fuel amount is reported in the energy balance only, which, together with the fact that the plant has closed, makes it difficult to obtain historical AD.
E.6	1.A.2.f Non-metallic minerals – liquid fuels	Include an explanation for the inter-annual change of the CO_2 IEF	Addressing. Greece provided a general explanation in the NIR (section 3.2.4.4.1,

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	– CO_2 (E.8, 2017) (E.18, 2016) (E.18, 2015) Transparency	between 2003/2004 and 2012/2013 in the next submission.	p.132) for the inter-annual changes in the IEFs for CO_2, CH_4 and N_2O emissions, stating that they result from the fuel mix used in the industries associated with this category. However, the ERT noted that while the Party explained that the CO_2 IEF increased from 82.00 t/TJ in 2012 to 87.09 t/TJ in 2013 because of the higher share of 'petcoke' with a higher EF value in the fuel mix in 2012, it did not provide the specific reason for the change in the CO_2 IEF between 2003 (80.46 t/TJ) and 2004 (83.94 t/TJ). During the review, Greece explained that the reason for the change was the same as that for the change between 2012 and 2013. The ERT notes that the Party could resolve the issue by including this information in the next submission.
E.7	1.A.3.d Domestic navigation – liquid fuels – N_2O (E.18, 2017) Accuracy	Either provide transparent information on the reasons for the significant difference between the value of the IEF for gas/diesel oil for N_2O emissions from inland navigation and the default EF value provided in the 2006 IPCC Guidelines, or revise the EFs to make them consistent with the default EFs provided in the 2006 IPCC Guidelines.	Resolved. Greece explained in the NIR (section 3.2.5.2, p.153) that the EF for N_2O emissions from domestic navigation (gas/diesel oil) is the EF for non-road vehicles in Europe given in the Revised 1996 IPCC Guidelines (table 1.49, p.1.91), which was used because the 2006 IPCC Guidelines do not provide an EF for heavy-duty diesel oil.
E.8	1.B.1.a.2 Surface mines – gaseous fuels – CH_4 (E.13, 2017) (E.19, 2016) (E.19, 2015) Transparency	Include in the submission a transparent description of the methodology used for this category.	Resolved. Greece provided a description of the methodology used for estimating CH_4 emissions from lignite in the NIR (section 3.3.1.2, pp.165–166). The Party explained that it calculated the CH_4 emissions from lignite mining on the basis of the tier 1 methodology provided in the 2006 IPCC Guidelines (vol. 2, chap. 4, pp.4.17–4.19) using AD on lignite production from the national energy balance and combining the average default EF values for both mining (1.2 m^3/t) and post-mining activities (0.1 m^3/t).
E.9	1.B.2 Oil, natural gas and other emissions from energy production – CO_2, CH_4 and N_2O (E.14, 2017) (E.22, 2016) (E.22, 2015) Transparency	Report these emissions (oil exploration and natural gas exploration) as "NE" and explain in the NIR that these emissions are below the significance thresholds indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. Greece provided in the NIR explanations for reporting using the notation key "NE" the CO_2, CH_4 and N_2O emissions for subcategory 1.B.2.a.1 (oil exploration) (section 3.3.3.2, p.168) and the CO_2 and CH_4 emissions for subcategory 1.B.2.b.1 (gas exploration) (section 3.3.3.2, p.171). The Party explained that, as per the calculations performed using tier 1 methods in the 2006 IPCC Guidelines, both these values are less than 3 kt CO_2 eq and thus below the significance threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines (47.71 kt CO_2 eq) (see ID# G.6 in table 5).
E.10	1.B.2.a.3 Transport – liquid fuels – CO_2 (E.15, 2017) (E.23, 2016) (E.23, 2015) Transparency	Replace the "NA" and "NO" notation keys with the "NE" notation key for CO_2 emissions from category 1.B.2.a.3 (oil transport) and provide explanations in the NIR that show these	Resolved. Greece reported the CO_2 emissions for subcategory 1.B.2.a.3 (oil transport) using the notation key "NE" and explained in the NIR (section 3.3.3.2, p.168) that, as per the calculations performed using the tier 1 methodology in the 2006 IPCC Guidelines, the

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
		emissions are below the significance thresholds indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	value of these emissions is less than 3 kt CO_2 eq and thus below the significance threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines (see ID# G.6 in table 5).
IPPU			
I.1	2. General (IPPU) (I.10, 2017) Convention reporting adherence	Replace the incorrect references to the IPCC good practice guidance in the chapter on the IPPU sector in the NIR with references to the 2006 IPCC Guidelines.	Addressing. Greece replaced the incorrect references to the IPCC good practice guidance in sections 4.2.2 and 4.20.2 of the NIR. However, the NIR still contains an incorrect reference to those guidelines in section 4.7 (on nitric acid production).
I.2	2.A.2 Lime production – CO_2 (I.11, 2017) Transparency	Include in the NIR an explanation for the high IEF values for CO_2 emissions from lime production for the period 1990–2006.	Resolved. Greece explained in the NIR (section 4.3.2, p.191, and section 4.3.4, pp.192–193) that the IEF values (average of 0.82 t CO_2/t lime) for CO_2 emissions from lime production for 1990–2006 were high because the emissions for 1990–2005 were calculated using the overlap technique in the 2006 IPCC Guidelines and data available from the EU ETS for 2005–2009, which have higher EF values than data in the verified EU ETS reports of recent years.
I.3	2.B.10 Other (chemical industry) – CO_2 (I.12, 2017) Transparency	Include in the NIR the explanation of the reason for reporting the CO_2 emissions associated with hydrogen production from liquid fuels under subcategory 1.A.1.b (petroleum refining) provided during the review.	Resolved. Greece explained in the NIR (section 3.2.3, p.115) that it reported the CO_2 emissions associated with hydrogen production from liquid fuels under subcategory 1.A.1.b (petroleum refining). It did so because, while disaggregated data on the amount of liquid fuels used for hydrogen production are available from the EU ETS reports for 2005–2016, in the data for 1990–2004 available from the national energy balance, the amount of liquid fuel used for hydrogen production is reported together with the amount of fuel combusted in the refineries. Thus it is not possible to report these emissions separately for 1990–2004.
I.4	2.C.5 Lead production – CO_2 (I.13, 2017) Transparency	Explain the changes in the CO_2 IEF values for lead production by including in the NIR information on the changes in lead production across the time series.	Not resolved. Greece included in the NIR (section 4.14.3, p.236) information on the changes in lead production across the time series to explain the changes in CO_2 emissions from lead production. The Party explained that following a period of low emissions in 2003–2005 owing to the low level of lead production, CO_2 emissions from lead production increased by 66.6 per cent between 2007 and 2008 only to decrease in 2008–2010 owing to the economic recession. Greece also stated in the same section that the inter-annual variation in the CO_2 emissions from lead production stems from the changes in the production level because the same EF was used for all years of the time series. However, the ERT noted that although the information provided by the Party explains the changes in CO_2 emissions from lead production, it does not address the reasons for the changes in the IEF values, such as an increase in the share of secondary production.

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
I.5	2.F.1 Refrigeration and air conditioning – HFCs (I.2, 2017) (I.4, 2016) (I.4, 2015) (46, 2014) Consistency	Implement the results of the new survey (published in 2015) in the annual submission.	Addressing. The ERT noted that, as confirmed during the review, Greece still estimates emissions from residential refrigeration equipment flows for 2014–2017 on the basis of a survey conducted by Greek consultancy firm ICAP in 2014, as well as using expert judgment and national and international studies on the trends in this market (see ID# I.18 in table 5).
I.6	2.F.1 Refrigeration and air conditioning – HFCs (I.3, 2017) (I.6, 2016) (I.6, 2015) (48, 2014) Transparency	Improve the transparency of the NIR by including information similar to that provided to the ERT during the review on assumptions used in calculating emissions from refrigeration and air-conditioning equipment, including a plan for periodically verifying the expert judgments, because production and operating standards change over the years.	Not resolved. Greece did not provide in the NIR information on the assumptions used in calculating emissions from refrigeration and air-conditioning equipment and a plan for periodically verifying the expert judgments used. During the review, the Party explained that, given that production and operating standards change over time, the inventory team collaborates with experts from the National Association of Refrigeration Importing and Trading and National Association of Refrigeration and Cooling Techniques to collect annual data on production and sales of equipment containing F-gases and to verify, evaluate and revise, as necessary, the assumptions used in estimating emissions. The ERT notes that the Party could resolve this issue by including this information in the NIR of the next submission, together with details of assumptions used in calculating emissions from refrigeration and air-conditioning equipment.
I.7	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.4, 2017) ((I.10, 2016) (I.10, 2015) Transparency	Provide information in the NIR about recovery of HFCs, including how gases are recovered at end of life and what is done to the recovered gas.	Not resolved. Greece did not include in the NIR the information on recovery of HFCs, including how gases are recovered at end of life and what is done to the recovered gas. During the review, the Party explained that the inventory team would continue its communication with Appliances Recycling SA, the body responsible for recycling F-gases from recycled equipment, and include any new data obtained in the NIR of the next submission.
I.8	2.F.1 Refrigeration and air conditioning – HFCs (I.5, 2017) (I.11, 2016) (I.11, 2015) Accuracy	Correct the error in the data entry files input to CRF Reporter for AD and emissions for the amount of HFC-134a remaining in products at decommissioning in subcategory 2.F.1.f.	Resolved. Greece corrected the amount of HFC-134a remaining in products at decommissioning under subcategory 2.F.1.f (stationary air conditioning) in CRF table 2(II)B-Hs2 by addressing the data entry error in the file input to CRF Reporter for AD and emissions. The ERT confirmed this during the review.
I.9	2.F.1 Refrigeration and air conditioning – HFCs (I.6, 2017) (I.12, 2016) (I.12, 2015) Accuracy	Use the results of the newly published survey on refrigeration in the next annual submission.	Addressing. See ID# I.5 above.
I.10	2.F.2 Foam blowing agents – HFCs (I.7, 2017) (I.8, 2016) (I.8, 2015) (44, 2014) Accuracy	Continue the dialogue with the industry association, the Pan-Hellenic Association of Insulation Companies, in order to increase the percentage of respondents to the survey on imported foam products.	Resolved. In the NIR (section 4.20.2, pp.261–263) the Party explained that instead of having a dialogue with the Pan-Hellenic Association of Insulation Companies, which does not have import data, the inventory team has been sending Excel forms to the Association's

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
			members to obtain the amounts of imported and exported foam products. However, despite the team's efforts to encourage members to respond, the response rate has remained constant at 30 per cent. The responses, which include those from members with the biggest market share in Greece, indicate that the need for foam products with HFCs is fulfilled domestically and that the currently imported foam products do not contain HFCs. The ERT found the information provided in the NIR satisfactory and notes that until the recently launched platform on the use and trade of F-gases and ODS is fully functional and populated by users (see ID# I.18 in table 5), Greece may wish to continue this good practice of requesting companies to provide information on imports of foam products containing HFCs in Excel forms or other questionnaires.
I.11	2.F.2 Foam blowing agents – HFCs (I.9, 2017) (I.13, 2016) (I.13, 2015) Transparency	Provide an updated discussion on the time series of emissions for foam blowing agents in the submission.	Resolved. Greece included in the NIR (section 4.20.2, pp.261–262) an updated discussion on the time series of emissions for foam blowing agents. The Party explained that the fluctuations observed in the emission trend stem from different companies using HFCs and switching to substitutes for making foam products at different periods of time.
I.12	2.G.3 N_2O from product uses – N_2O (I.14, 2017) Accuracy	Estimate and report N_2O emissions from product uses using the methodology provided in the 2006 IPCC Guidelines and on the basis of the total amount of N_2O supplied in a year.	Not resolved. As described in the NIR (section 4.22.2, p.273), Greece still estimates and reports N_2O emissions from product uses using a country-specific methodology based on population and a mean ratio of N_2O emissions to population of four European countries that are Parties included in Annex I to the Convention (Austria, Italy, Netherlands and Spain). The Party explained in the NIR (section 4.22.4, p.274) that it is difficult to collect the AD required to apply the methodology provided in the 2006 IPCC Guidelines. Further, the ERT noted that the list of planned improvements (NIR, section 4.22.6, p.274) does not include a plan to use the methodology in the 2006 IPCC Guidelines in the future. During the review, the Party explained that it has applied a country-specific methodology consistent with paragraph 10 of the UNFCCC Annex I inventory reporting guidelines. The ERT noted that as per the above-mentioned provision, Parties may use country-specific methodologies if they better reflect their national situation, provided they are well documented, scientifically based and compatible with the 2006 IPCC Guidelines. The ERT considers that using the methodology in the 2006 IPCC Guidelines together with country-specific EFs and AD would likely provide a more accurate estimate of the national emissions than a country-specific methodology based on an average of IEFs of a cluster of countries.

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Agriculture			
A.1	3. General (agriculture) (A.1, 2017) (A.10, 2016) (A.10, 2015) Convention reporting adherence	Enhance the QA/QC system and correct all the identified reporting inconsistencies between the NIR and the CRF tables, specifically:	Resolved.
		(a) Ensure consistent reporting on the tier used to estimate emissions from rice cultivation, field burning of agricultural residues and agricultural soils;	(a) Greece reported consistent information in the NIR on the tiers used to estimate emissions from rice cultivation (section 5.4.2, p.303), agricultural soils (section 5.5.2, p.306) and the field burning of agricultural residues (section 5.7.2, p.316) and in the CRF tables (summary 3s2);
		(b) Ensure consistent reporting of CH_4 emissions from rice cultivation in table 5.15 of the NIR and CRF table 10.s.1.	(b) The Party reported consistent information on the CH_4 emissions from rice cultivation in NIR table 5.21 (2015 NIR, table 5.15) and CRF table 10s1.
A.2	3. General (agriculture) (A.5, 2017) (A.14, 2016) (A.14, 2015) Transparency	Improve the transparency of the reporting by including in the NIR an explanation for each category marked as "NO" (3.E (prescribed burning of savannahs), 3.D.a.5 (mineralization/immobilization associated with loss/gain of soil organic matter) and 3.G (liming)).	Resolved. Greece explained in the NIR (section 5.6, p.315) that it used the notation key "NO" for reporting emissions for category 3.E (prescribed burning of savannahs) because there are no savannahs in the country. The Party also explained in the NIR (section 5.52, p.306) that it reported emissions for subcategory 3.D.a.5 (mineralization/ immobilization associated with loss/gain of soil organic matter) as "NO" because there is no net CSC in mineral soils in cropland remaining cropland (see also ID# A.23 in table 5). Regarding category 3.G (liming), the Party reported in the NIR (section 5.8, p.318) that it used "NO" to report these emissions because Greece uses only calcium oxide and calcium hydroxide – not limestone or dolomite, as limestone is unsuitable due to its low solubility in the dry conditions in Greece – and these do not result in CO_2 emissions when applied to soils.
A.3	3.A Enteric fermentation – CH_4 (A.6, 2017) (A.3, 2016) (A.3, 2015) (57, 2014) Transparency	Provide an explanation of how the equation using country-specific values for Ym and digestibility was developed.	Resolved. Greece explained in the NIR (section 5.2.2) that rather than the country-specific values it had used previously, it used the Ym value from the 2006 IPCC Guidelines (vol. 4, table 10.12) for both dairy and non-dairy cattle (6.5 per cent) together with the feed digestibility value for Western Europe for dairy cattle from the 2006 IPCC Guidelines (vol. 4, table 10.A.1) (70 per cent) and a feed digestibility value for non-dairy cattle based on values from the 2006 IPCC Guidelines (vol. 4, tables 10.2 and 10.A.1) and from other EU member States (65 per cent).
A.4	3.A Enteric fermentation – CH_4 (A.7, 2017) (A.15, 2016) (A.15, 2015) Transparency	Report in the NIR all parameters used to estimate country-specific EFs, for example in tabular format, and provide an in-depth explanation of the method used.	Resolved. Greece reported in the NIR all parameters used for estimating country-specific EFs for cattle and sheep, including gross energy values for dairy cattle (table 5.7); mean weight, gross energy and Ym values for other cattle (table 5.9); and gross energy and Ym values for sheep (table 5.11).

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A.5	3.A Enteric fermentation – CH_4 (A.8, 2017) (A.5, 2016) (A.5, 2015) (59, 2014) Transparency	Show all EFs in tabular format, and provide detailed information to explain the reasons for using the Swiss EF for poultry.	Resolved. Greece included in the NIR the EFs used for enteric fermentation for dairy cattle (table 5.7), other cattle (table 5.9), sheep (table 5.11) and other livestock including poultry (table 5.12). The Party reported in the NIR (section 5.2.2, p.291) that to improve inventory completeness, it used an EF for CH_4 emissions from enteric fermentation for poultry from Switzerland because no default EF for poultry is provided in the 2006 IPCC Guidelines (see also ID# A.18 in table 5).
A.6	3.B Manure management – CH_4 (A.9, 2017) (A.9, 2016) (A.9, 2015) (64, 2014) Transparency	Include additional information on the CH_4 EFs and parameters used for cattle and sheep in tabular format.	Resolved. Greece included in the NIR information on the parameters used for cattle (dairy and other) and sheep (table 5.17) and the CH_4 EFs used (table 5.18) (see ID# A.18 in table 5).
A.7	3.B Manure management – CH_4 (A.10, 2017) (A.16, 2016) (A.16, 2015) Transparency	Include in the NIR all parameters used to estimate country-specific EFs, for example in tabular format, and provide an in-depth explanation of the methodology used.	Addressing. Greece reported in the NIR the allocation of manure to manure management systems (table 5.16), country-specific parameters used to estimate the EFs for dairy cattle, other cattle and sheep, such as daily volatile solid of manure excreted, maximum methane-producing capacity, and MCF (table 5.17) and CH_4 EFs for all livestock (table 5.18). The Party explained in the NIR (section 5.3.2, pp.299–300) that it estimated CH_4 emissions from manure management for cattle and sheep using the tier 2 methodology in the 2006 IPCC Guidelines and for other livestock using the tier 1 methodology in the same guidelines. However, the ERT notes that Greece did not provide references to the sources of the parameter used to estimate the country-specific EFs for the tier 2 methodology and the reasons for choosing some parameters from the 2006 IPCC Guidelines (see also ID# A.18 in table 5).
A.8	3.B.1 Cattle – N_2O (A.18, 2017) Convention reporting adherence	Correct the description of the methodology used for the calculation of annual Nex rates for dairy cattle on page 282 of the NIR to make it consistent with the description on page 284, and clarify that a tier 2 method was applied.	Resolved. Greece included in the NIR (section 5.3.2, pp.299–300) correct and internally consistent information on the methodology used for calculating annual Nex rates for dairy cattle, which clarified that it used the tier 2 methodology from the 2006 IPCC Guidelines.
A.9	3.B.1 Cattle – N_2O (A.19, 2017) Accuracy	Recalculate the N_2O emissions from manure management for dairy cattle using the correct equation for the calculation of annual Nex rates from the 2006 IPCC Guidelines.	Resolved. As reported in the 2018 NIR (section 5.3.5 and table 5.20), Greece recalculated the N_2O emissions from manure management for dairy cattle using the correct equation for calculating annual Nex rates from the 2006 IPCC Guidelines (vol. 4, equations 10.31 and 10.32).
A.10	3.B Manure management – N_2O (A.12, 2017) (A.7, 2016) (A.7, 2015) (61, 2014) Transparency	Provide all the N_2O EFs and parameters used for calculating N_2O emissions, for example in tabular format.	Addressing. Greece reported in the NIR the parameters used for calculating N_2O emissions, namely, Nex rate, typical animal mass and total Nex, for all livestock categories except dairy cattle (table 5.19) (see ID# A.11 below). The Party also reported in the NIR (section 5.3.2, p.300) that it used the default EFs provided in

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			the 2006 IPCC Guidelines (vol. 4, tables 10.21 and 11.3) for estimating N_2O emissions from manure management. During the review, the Party explained that it reported all information on the parameters and EFs used for estimating the N_2O emissions from manure management in the NIR (section 5.3.2, pp.295–301) and also shared with the ERT a spreadsheet with information on the parameters and EFs used for estimating the N_2O emissions from manure management. However, the ERT noted that the spreadsheet did not include information on the parameters and EFs used for calculating indirect N_2O emissions from manure management.
A.11	3.B Manure management – N_2O (A.13, 2017) (A.18, 2016) (A.18, 2015) Transparency	Include in the NIR an explanation regarding total Nex and Nex rate as well as all the parameters used to estimate country-specific EFs, for example in tabular format.	Addressing. As noted regarding ID# A.10 above, Greece provided the requested information on the EFs and parameters used for estimating N_2O emissions from manure management except the parameters used for dairy cattle (see ID# A.18 in table 5).
A.12	3.D Direct and indirect N_2O emissions from agricultural soils – N_2O (A.20, 2017) Transparency	Include information on N inputs from sewage sludge and crop residues and the corresponding N_2O emissions in the NIR.	Resolved. Greece included in the NIR information on N inputs and corresponding N_2O emissions from sewage sludge for 2004–2017 (table 5.27) and that from crop residues for 1990–2017 (table 5.28).
A.13	3.D.a Direct N_2O emissions from managed soils – N_2O (A.14, 2017) (A.8, 2016) (A.8, 2015) (62, 2014) Transparency	Improve the transparency of reporting by including in the annual submission all equations, all factors and the N values of all AD applied to soils that are used to estimate N_2O emissions.	Resolved. Greece included in the NIR (section 5.5.2) information on all N inputs to agricultural soils (tables 5.24–5.28) together with information on the methodological approach, equations and EFs used for estimating N_2O emissions.
A.14	3.D.a Direct N_2O emissions from managed soils – N_2O (A.15, 2017) (A.19, 2016) (A.19, 2015) Transparency	Include a detailed explanation of the method used to estimate the amount of N applied to soils from each source (animal manure applied to soils and N in crop residues returned to soils), and include the equations used to estimate direct N_2O emissions from managed soils.	Addressing. Greece included in the NIR (tables 5.24–5.28) information on all N inputs to agricultural soils as well as the methodological approach, equations and EFs used for estimating N_2O emissions. However, the Party did not include detailed information on the method used for estimating the amount of N applied to soils from each source (animal manure applied to soils and N in crop residues returned to soils), namely, the sources of F_{ON} and F_{CR}, the equation used to estimate F_{CR}, and detailed information on crop type and the parameters outlined in the 2006 IPCC Guidelines (vol. 4, table 11.2) (see ID# A.22 in table 5).
A.15	3.D.a.2.b Sewage sludge applied to soils – N_2O (A.21, 2017) Transparency	Include in the NIR an explanation for the significant inter-annual variations in the values of sewage sludge applied to soils in the period 2006–2010.	Resolved. Greece explained in the NIR (section 5.5.2, p.309) that the significant inter-annual variation in the values of sewage sludge applied to soils in 2004–2009 stems from the changes in the number of research and pilot studies conducted by the Ministry of Environment and Energy because sewage application to soils in the country is largely limited to such studies. The Party also explained that the application of

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			sewage sludge was initiated as part of research studies in 2004 and continued more intensively in 2004–2006 while significantly less of such research work was conducted in 2007–2009.
A.16	3.D.a.2.b Sewage sludge applied to soils – N_2O (A.16, 2017) (A.20, 2016) (A.20, 2015) Transparency	Include in the NIR the explanation provided to the ERT regarding the application of sewage sludge in agriculture as fertilizer based on studies conducted in the period 2004–2009 in order to improve the transparency of the inventory.	Resolved. See ID# A.15 above.
A.17	3.F Field burning of agricultural residues – CH_4 and N_2O (A.17, 2017) (A.21, 2016) (A.21, 2015) Transparency	Include in the NIR the explanation provided to the ERT regarding the use of the IPCC good practice guidance and the Revised 1996 IPCC Guidelines in order to improve the transparency of the inventory.	Resolved. Greece included in the NIR (section 5.7.2) the explanation provided to the ERT of the 2015 review regarding the use of factors and methodologies from the IPCC good practice guidance and the Revised 1996 IPCC Guidelines in estimating emissions from the burning of agricultural residues. The ERT raised a follow-up issue (see ID# A.24 in table 5).
LULUCF			
L.1	4. General (LULUCF) – CO_2 (L.2, 2017) (L.3, 2016) (L.3, 2015) (70, 2014) (59, 2013) Completeness	Make efforts to collect the necessary information and report the AD and emission/removal estimates for the CSCs in the living biomass and dead organic matter pools in grassland converted to forest land, and CSCs in living biomass in cropland converted to settlements, in future annual submissions.	Addressing. Greece reported the changes in carbon stocks in living biomass in cropland converted to settlements in CRF table 4.E. The Party continued to report as "NE" CSCs in all the pools in grassland converted to forest land. During the review Greece shared with the ERT provisional estimates of AD on and emissions and removals from all pools in grassland converted to forest land since 1990. Greece also informed the ERT that it would report the CSCs from managed grassland converted to forest land for the entire time series as a new subcategory under the managed forest land category. The ERT welcomes the planned improvement.
L.2	4.A Forest land – CO_2 (L.6, 2017) (L.9, 2016) (L.9, 2015) Accuracy	Use EFs instead of IEFs from Italy and apply the method provided in the 2006 IPCC Guidelines to improve accuracy for cropland converted to forest land.	Addressing. Greece continued to use the IEF from Italy for estimating emissions and removals from cropland converted to forest land, but included in NIR table 6.9 average IEFs for CSCs in living biomass from four Italian regions (Abruzzo, Molise, Basilicata and Puglia) that were used for estimating the CSCs in living biomass in the Greek inventory. The ERT raised a follow-up issue (see ID# L.13 in table 5).
L.3	4.A Forest land – CO_2 (L.7, 2017) Completeness	Estimate and report emissions and removals from mineral and organic soils from grassland converted to forest land through natural expansion of forest over managed grassland or provide transparent information justifying why emissions and removals from managed grassland converted to forest land have not been estimated and reported, taking into account the relevant guidance provided in	Not resolved. Greece did not estimate and report removals from mineral and organic soils from grassland converted to forest land through natural expansion of forest over managed grassland or provide transparent information in the NIR justifying why that has not been done. During the review Greece shared with the ERT preliminary estimates of emissions and removals from this land-use subcategory, which it plans to report in the inventory submission of 2020.

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		the 2006 IPCC Guidelines (vol. 4, section 4.1).	
L.4	4.A Forest land – CO_2, CH_4 and N_2O (L.7, 2017) Transparency	Provide a transparent definition of managed forest land and information on how this definition has been consistently applied over time to identify areas of managed forest land.	Resolved. Greece stated in the NIR (section 6.4.2, p.339) that the inventory includes estimates of CSCs and emissions of non-CO_2 gases only from managed forests, which are forests managed with an FMP. The Party also included in NIR table 6.6 information on the classification of data sources and their use for the representation of land-use areas, which clarifies that the database on FMPs is the only source for the area of managed forest land used across the time series.
L.5	4.G HWP – CO_2 (L.8, 2017) Consistency	Provide in the NIR a transparent explanation for the large inter-annual variations in the estimates of removals from HWP produced and consumed domestically (particularly between the years 1998 and 1999, 1999 and 2000, and 2008 and 2009), including the reasons for the inter-annual variations in the inflows and outflows of sawn wood and wood panels responsible for those variations.	Addressing. Greece included in the NIR information on production, imports and exports of the HWP categories (sawn wood, wood-based panels, and paper and paper board) (figure 6.8, p.387), but did not provide an explanation for the large inter-annual variations in their inflows and outflows, which are responsible for the large inter-annual variations in the estimates of removals from HWP produced and consumed domestically. During the review the Party explained that AD for all three HWP categories have been obtained from FAOSTAT (see http://www.fao.org/faostat/en/#home), which is provided by the Hellenic Statistical Authority, an independent statistical authority in Greece. Greece plans to work with the Hellenic Statistical Authority to identify possible gaps, errors or omissions in the time series in order to report them in the next submission, as appropriate.
L.6	4.G HWP – CO_2 (L.9, 2017) Transparency	Include in CRF table 4.Gs2 the AD on sawn wood, wood-based panels, and paper and paperboard for 1961 onward.	Resolved. Greece provided the requested AD in CRF table 4.Gs2.
L.7	4.G HWP – CO_2 (L.9, 2017) Accuracy	Explore the possibility of estimating and reporting the CSCs in the HWP pool by estimating the AD since 1900 using the methodology provided in the 2006 IPCC Guidelines or a country-specific methodology consistent with it.	Resolved. Greece estimated and reported in the NIR (section 6.11, p.384) CSCs in the HWP pool using AD since 1900, using the methodology provided in the 2006 IPCC Guidelines.
Waste			
W.1	5. General (waste) (W.1, 2017) (W.1, 2016) (W.1, 2015) (78, 2014) (75, 2013) Convention reporting adherence	Enhance QC procedures to prevent incorrect or inconsistent numbers in figures and tables in the NIR (e.g. in table 8.18, the column "Total" contains incorrect values) in future annual submissions.	Resolved. Greece corrected the incorrect or inconsistent numbers in the NIR, including in the column "Total" in the table referred to in previous recommendations (table 7.17 in the 2019 NIR).
W.2	5. General (waste) – CH_4 (W.15, 2017) Transparency	Provide, in the NIR, disaggregated AD (at the calculation level) for the key categories in the waste sector for the entire time series, specifically for the key categories	Resolved. Greece included disaggregated AD for the key categories in the waste sector for the entire time series in the NIR (tables 7.11, 7.13–7.14, 7.17 and 7.20–7.22), including data on

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		5.A (solid waste disposal) (CH_4)) and 5.D (wastewater treatment and discharge (CH_4)), including data on waste generation and management.	waste generation (tables 7.7–7.8) and waste management practices (pp.396–410).
W.3	5.A Solid waste disposal on land – CH_4 (W.2, 2017) (W.2, 2016) (W.2, 2015) (79, 2014) (78 and 79, 2013) Convention reporting adherence	Enhance QC procedures to prevent inconsistencies (e.g. the solid waste amounts presented in the flow chart do not correspond to the waste amounts in CRF table 6.A, and there are similar discrepancies for other waste types (industrial, construction and demolition)) in future annual submissions.	Resolved. Greece addressed the inconsistencies identified during previous reviews by implementing improved QC procedures.
W.4	5.A Solid waste disposal on land – CH_4 (W.5, 2017) (W.8, 2016) (W.8, 2015) Transparency	Provide more detailed justifications for: (1) The daily per capita waste generation by tourists, which has been assumed to be 2.1 kg/person/day since 1990; (2) The municipal solid waste generation rate, which is assumed to change annually by 0.028 kg/person/day.	Resolved. The ERT noted that for 2001–2017, Greece used more accurate data on the quantities of municipal solid waste obtained from the Ministry of Environment and Energy, instead of the assumptions, thus there is no longer a need for the justification for that period called for in the recommendation (see ID# W.29 in table 5).
W.5	5.A Solid waste disposal on land – CH_4 (W.6, 2017) (W.9, 2016) (W.9, 2015) Transparency	Improve the documentation of the justifications for (1) the share of putrescibles, which is assumed to decrease by 0.3 per cent annually; (2) the share of paper and plastics, which is assumed to increase by 0.2 per cent annually; and (3) the share of garden waste, park waste and other non-food organic putrescibles, wood and textiles, which is assumed to be constant.	Addressing. Greece provided information on the studies underpinning the construction of the time series in the NIR (section 7.2.2, pp.401–402). However, the ERT noted that the Party did not provide justifications for the assumptions made regarding the evolution of the waste composition for 1990–1997. The ERT noted a need for further improvements in this regard (see ID# W.29 in table 5).
W.6	5.A Solid waste disposal on land – CH_4 (W.16, 2017) Transparency	Correct in the NIR the inconsistency in the DOC values and the fraction of DOC dissimilated.	Resolved. Greece corrected the inconsistency in the DOC values and the fraction of DOC dissimilated, and provided the correct value for the latter (0.5), in the NIR (section 7.2.2, p.405).
W.7	5.A Solid waste disposal on land – CH_4 (W.17, 2017) Transparency	Include in the NIR a transparent description of the methodology used to estimate the amount of industrial solid waste for the entire time series.	Resolved. Greece clarified the methodological approach used for estimating the amount of industrial waste in the NIR (section 7.2.2, pp.407–408).
W.8	5.A Solid waste disposal on land – CH_4 (W.18, 2017) Transparency	Correct in the NIR the value of the half-life used for calculating the CH_4 generation rate of sewage sludge from 9 to 12 years.	Resolved. Greece included the correct value for the half-life (nine years) used to calculate the CH_4 generation rate of sewage sludge in the NIR (section 7.2.2, p.409).
W.9	5.A Solid waste disposal on land – CH_4 (W.19, 2017) Transparency	Report in the NIR the correct value for fraction of CH_4, by volume, in generated landfill gas used for the estimation of emissions.	Resolved. Greece included the correct value for fraction of CH_4, by volume, in generated landfill gas for solid waste (50 per cent) in the NIR (section 7.2.2, p.410).
W.10	5.A Solid waste disposal on land – CH_4 (W.8, 2017) (W.11,	Correct the uncertainty values for CH_4 emissions, if necessary, or justify the low values reported.	Not resolved. Greece provided an uncertainty value for solid waste of 0.8 per cent of the total emissions in the NIR (section 7.2.3, p.411). However, the ERT noted that it is not clear whether the uncertainty value is for the total

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	2016) (W.11, 2015) Transparency		waste sector emissions or the total national emissions. During the review, the Party clarified that the value relates to the national total (i.e. the contribution of category 5.A to the uncertainty of the total national emissions) and indicated that it would clarify this in the next submission.
W.11	5.A.2 Unmanaged waste disposal sites – CH_4 (W.20, 2017) Convention reporting adherence	Ensure consistency in the information between the NIR and CRF tables regarding the existence of unmanaged waste disposal sites in the country.	Resolved. Greece updated the text in the NIR (section 7.2.2, pp.397–398), confirming the existence of unmanaged waste disposal sites, consistent with its reporting in CRF table 5.A.
W.12	5.B.1 Composting – CH_4 and N_2O (W.21, 2017) Transparency	Include in the NIR the explanation for the significant inter-annual changes in the annual waste amount treated by composting together with the reference to the source of AD for composting provided during the review.	Resolved. Greece explained in the NIR (section 7.5.1, p.428) that the annual waste amount treated by composting is based on official data from the Ministry of Environment and Energy and has shown an increasing trend since 2004, except when in 2009 it temporarily decreased significantly owing to operating problems in relevant industry units.
W.13	5.C.1 Waste incineration – CO_2 (W.22, 2017) Transparency	Include in the NIR the source of the values for the carbon content and fossil carbon fraction of chemical waste, together with justification for the use of those values.	Resolved. Greece indicated in the NIR (section 7.4.2, p.424) that it used the default values from the 2006 IPCC Guidelines for the carbon content and fossil carbon fraction of chemical waste.
W.14	5.C.1 Waste incineration – CO_2, CH_4 and N_2O (W.23, 2017) Consistency	Recalculate the emissions from waste incineration for the years for which AD are currently unavailable by using the AD from the national statistical authority as and when they become available. Pending the availability of such AD, recalculate these emissions by filling the gaps in AD using the good practice data splicing techniques provided in the 2006 IPCC Guidelines (vol. 1, chap. 5).	Addressing. As reported in NIR table 7.25, Greece recalculated the emissions from waste incineration for 2001–2017 using updated AD based on data splicing techniques, as recommended by the previous ERT, and incorporating new AD for 2012 and 2014. However, the ERT noted that the Party continued to use the AD for 2001 for all the years in 1990–2001 for clinical waste and the AD for 2004 for all the years in 1990–2004 for biogenic and other waste. The ERT also noted that the methodology used for generating the missing AD was not clearly described in the NIR (see ID# W.32 in table 5).
W.15	5.C.1 Waste incineration – CO_2, CH_4 and N_2O (W.24, 2017) Transparency	Provide an explanation for the significant inter-annual variation in the AD for subcategory 5.C.1.b (waste incineration of non-biogenic waste) in the NIR.	Resolved. Greece explained in the NIR (section 7.4.2, p.425) that, on the basis of the investigation carried out in collaboration with the operator of the incinerator and the Hellenic Statistical Authority, the inter-annual variation in the AD for subcategory 5.C.1.b (waste incineration of non-biogenic waste) leading to an increase in emissions for 2002, 2009 and 2014 can be attributed to the installation of new infrastructure.
W.16	5.C.1 Waste incineration – CO_2, CH_4 and N_2O (W.24, 2017) Transparency	Ensure consistency in the AD and emissions reported for all subcategories under 5.C.1 (waste incineration) between CRF table 5.C and the NIR.	Resolved. Greece ensured consistency in the AD and emissions reported for all subcategories under 5.C.1 (waste incineration) between CRF table 5.C and the NIR.
W.17	5.C.1 Waste incineration – CO_2, CH_4 and N_2O	Review the uncertainties and correct them, if necessary, or justify the reported values.	Not resolved. Greece provided a combined uncertainty for waste incineration of 1.1 per cent of the total emissions reported in the

ID#	*Issue and/or problem classification*[a]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	(W.10, 2017) (W.13, 2016) (W.13, 2015) Convention reporting adherence		chapter on the waste sector in the NIR (section 7.4.3, p.427). However, the ERT noted that the Party did not provide in the NIR a transparent justification of the reported uncertainty values. The ERT also noted that the uncertainty of category 5.C (incineration and open burning of waste) is reported as 111.8 per cent in the introductory chapter of the NIR (table 1.8). The ERT also noted that it is not clear whether the uncertainty value is for the total waste sector emissions or the total national emissions. During the review, the Party clarified that the value relates to the national total (i.e. the contribution of category 5.C to the uncertainty of the total national emissions) and indicated that it would clarify this in the next submission.
W.18	5.C.2 Open burning of waste – CO_2, CH_4 and N_2O (W.25, 2017) Transparency	Include in the NIR information substantiating the claim that open burning is not practised in the country (e.g. references to legislation).	Addressing. Greece stated in the NIR (section 7.4.1, p.424) that the open burning of waste is prohibited in the country, without providing a reference to legislation. During the review, the Party provided the ERT with a reference to relevant legislation. The ERT notes that Greece could resolve the issue by including this information in the next submission.
W.19	5.D Wastewater treatment and discharge – CH_4 (W.11, 2017) (W.3, 2016) (W.3, 2015) (80, 2014) (80, 2013) Transparency	Include in the NIR all important parameters (especially MCF) for all types of treatment in order to further increase the transparency of reporting.	Resolved. Greece included values of all important parameters for all types of treatment, including MCF values for domestic and industrial wastewater, in the NIR (section 7.3.2, p.415).
W.20	5.D Wastewater treatment and discharge – CH_4 (W.12, 2017) (W.4, 2016) (W.4, 2015) (81, 2014) Comparability	Change the reporting on CH_4 recovery either by providing an estimate of the amount of recovered CH_4 or by replacing the currently used notation key with "NE" for the case where no numerical estimate is available.	Not resolved. Greece explained during the review that it reported the amount of recovered CH_4 as "NO" in CRF table 5.D because CH_4 recovery is carried out for the entire amount of sewage sludge generated in the country before its stabilization, which is significantly greater than the amount that is finally disposed of into solid waste disposal sites, and as such, reporting this amount of recovered CH_4 in this category would lead to negative emissions. The Party therefore reported the amount of CH_4 recovered using the notation key "NO" to indicate that although emissions/removals exist, they are not reported. The ERT agrees with this explanation and notes that Greece could resolve the issue by including the explanation in the NIR.
W.21	5.D Wastewater treatment and discharge – CH_4 (W.13, 2017) (W.5, 2016) (W.5, 2015) (82, 2014) Comparability	Increase the consistency of information between the NIR and the CRF tables, preferably by also reporting the total organic waste from the relevant industries in the CRF tables.	Resolved. The ERT found no inconsistencies between the data on total organic waste reported in the NIR (section 7.3.2) and CRF table 5.D.
W.22	5.D Wastewater treatment and discharge – CH_4	Include the correct values of the MCF applied in the estimation of emissions from wastewater	Resolved. Greece included the correct MCF values applied in estimating emissions from wastewater treatment and discharge in the NIR (section 7.3.2).

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	(W.26, 2017) Transparency	treatment and discharge in all sections of the NIR.	
W.23	5.D Wastewater treatment and discharge – N_2O (W.27, 2017) Transparency	Report the correct value of $F_{IND-COM}$ used in CRF table 5.D together with a justification for the value of $F_{IND-COM}$ used in the NIR.	Resolved. Greece reported the correct value of $F_{IND-COM}$ (1.25) in CRF table 5.D, which is the default value in the 2006 IPCC Guidelines (vol. 5, table 6.11). The ERT notes that there is no need for the Party to include in the NIR a justification for using the default value.
W.24	5.D.1 Domestic wastewater – CH_4 (W.28, 2017) Comparability	Report in CRF table 5.D the quantity of biogas recovered in municipal wastewater treatment plants during anaerobic digestion before its disposal.	Resolved. See ID# W.20 above.
W.25	5.D.2 Industrial wastewater – CH_4 (W.29, 2017) Transparency	Include in the NIR (e.g. in tabular format) information on the country-specific values of the parameters (wastewater generation and chemical oxygen demand) used for the paper, oil and sugar industries, together with justification for the use of these values, any expert assumptions made and complete references to the publications supporting these values.	Resolved. Greece provided in the NIR (section 7.3.2, pp.418–419) the requested values of parameters (table 7.19) for different industrial wastewater streams, including the paper, oil and sugar industries, and the necessary information supporting the use of these values.
W.26	5.D.2 Industrial wastewater – CH_4 (W.30, 2017) Transparency	Include in the NIR an explanation of the fractions of DOC removed through primary and secondary clarifiers in industrial wastewater treatment for the industries for which there are no available data, together with the source of this information and complete references to the relevant publications.	Resolved. Greece included the requested explanation and references to the sources of information in the NIR (section 7.3.2, p.420).
W.27	5.D.2 Industrial wastewater – N_2O (W.31, 2017) Transparency	Report the correct value of $F_{NON-CON}$ used in the estimation of emissions in CRF table 5.D.	Resolved. Greece reported the correct value of $F_{NON-CON}$ (1.40) (i.e. the value applicable to countries with garbage disposal) used in estimating emissions in CRF table 5.D in line with the 2006 IPCC Guidelines (vol. 5, table 6.11).
KP-LULUCF activities			
KL.1	General (KP-LULUCF activities) (KL.3, 2017) Transparency	Provide detailed information in the NIR on the identification and tracking of land subject to KP-LULUCF activities, including how the forest definition is being consistently applied across time and how areas subject to direct human-induced or human-induced activities are identified.	Resolved. Greece included in the NIR (section 9.2.2) detailed information on the identification and tracking of land subject to KP-LULUCF activities, including the sources used for identifying and obtaining data on areas subject to the KP-LULUCF activities (table 9.1). The Party also included in the NIR information on the identification of land subject to direct human-induced afforestation and deforestation (section 9.4.1) and on human-induced FM (section 9.5.1).
KL.2	FM – CO_2, CH_4 and N_2O (KL.4, 2017) Transparency	Provide in the NIR detailed information on the methods and historical time-series data used for the calculation of the technical correction to the FMRL, including	Resolved. Greece included in the NIR detailed information on and figures for the methods and historical time-series data used for calculating the technical correction to the FMRL (section 9.5.2.3), including the treatment of natural

ID#	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
		the treatment of natural disturbances and HWP.	disturbances (section 9.5.2.1) and HWP (section 9.5.2.4).
KL.3	Deforestation – CO_2, CH_4 and N_2O (KL.5, 2017) Transparency	Provide a clear description in the NIR of how the national forest monitoring system detects and distinguishes land subject to harvesting and disturbance from deforestation, including any time interval specified for such lands to regenerate and meet the national forest definition.	Resolved. Greece included in the NIR (section 9.4.2) information on how harvesting or forest disturbance that is followed by the re-establishment of forest is distinguished from deforestation. The Party explained that the Greek legislative framework prohibits changes in the land use of forests and, as such, areas subject to harvesting and disturbance are tracked and reforested within a stipulated time frame.

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

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 2019 annual submission of Greece, and have not been addressed by the Party.

Table 4
Issues and/or problems identified in three successive reviews and not addressed by Greece

ID#	Previous recommendation for the issue identified	Number of successive reviews issue not addressed[a]
General		
	No issues identified	
Energy		
E.6	Include an explanation for the inter-annual change of the CO_2 IEF between 2003/2004 and 2012/2013 in the next submission	3 (2015/2016–2019)
IPPU		
I.5	Implement the results of the new survey (published in 2015) in the annual submission	4 (2014–2019)
I.7	Provide information in the NIR about recovery of HFCs, including how gases are recovered at end of life and what is done to the recovered gas	3 (2015/2016–2019)
I.9	Use the results of the newly published survey on refrigeration in the next annual submission	3 (2015/2016–2019)
Agriculture		
A.7	Include in the NIR all parameters used to estimate country-specific EFs, for example in tabular format, and provide an in-depth explanation of the methodology used	3 (2015/2016–2019)
A.10	Provide all the N_2O EFs and parameters used for calculating N_2O emissions, for example in tabular format	4 (2014–2019)
A.11	Include in the NIR an explanation regarding total Nex and Nex rate as well as all the parameters used to estimate country-specific EFs, for example in tabular format	3 (2015/2016–2019)

ID#	*Previous recommendation for the issue identified*	*Number of successive reviews issue not addressed*[a]
A.14	Include a detailed explanation of the method used to estimate the amount of N applied to soils from each source (animal manure applied to soils and N in crop residues returned to soils), and include the equations used to estimate direct N_2O emissions from managed soils	3 (2015/2016–2019)
A.17	Include in the NIR the explanation provided to the ERT regarding the use of the IPCC good practice guidance and the Revised 1996 IPCC Guidelines in order to improve the transparency of the inventory	3 (2015/2016–2019)
LULUCF		
L.1	Make efforts to collect the necessary information and report the AD and emission/removal estimates for the CSCs in the living biomass and dead organic matter pools in grassland converted to forest land, and CSCs in living biomass in cropland converted to settlements, in future annual submissions	5 (2013–2019)
L.2	Use EFs instead of IEFs from Italy and apply the method provided in the 2006 IPCC Guidelines to improve accuracy for cropland converted to forest land	3 (2015/2016–2019)
Waste		
W.10	Correct the uncertainty values for CH_4 emissions, if necessary, or justify the low values reported	3 (2015/2016–2019)
W.17	Review the uncertainties and correct them, if necessary, or justify the reported values	3 (2015/2016–2019)
W.20	Change the reporting on CH_4 recovery either by providing an estimate of the amount of recovered CH_4, or by replacing the currently used notation key with "NE" for the case where no numerical estimate is available	4 (2014–2019)
KP-LULUCF activities		
	No issues identified	

[a] The report on the review of the 2018 annual submission of Greece did not take place during 2018. Therefore, 2018 was not included when counting the number of successive years in table 4. As the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive and 2015/2016 is considered as one year.

V. Additional findings made during the individual review of the 2019 annual submission

10. Table 5 contains findings made by the ERT during the individual review of the 2019 annual submission of Greece that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2019 annual submission of Greece

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
General			
G.5	NIR	Greece provided in the NIR information on the sources of data, the assumptions and the methodologies used for estimating emissions and removals for all sources and categories. However, the ERT noted that information on several categories (e.g. fuel consumption, waste generated and landfilled) is presented at a high level of aggregation, and sometimes only by providing references to other publications. The ERT also noted that in many cases (e.g. in the LULUCF sector), the Party did not provide the values of default EFs or other parameters from the 2006 IPCC Guidelines used for the estimations. The lack of clear and complete category-specific information on the sources of data, the assumptions and the methodologies used for estimating emissions and removals made it difficult for the ERT to review the inventory by hindering the replication of calculations. The ERT recommends that Greece improve the transparency of its reporting by implementing the category-specific recommendations identified in the respective sectoral sections of this review report (see ID#s E.15, E.16, E.17, A.19, A.20, A.21, A.22, A.24, L.10, L.18, W.28, W.30, W.32, W.33, W.35 and W.37 below).	Yes. Transparency
G.6	Annual submission	Greece used the notation key "NE" or "NO" to report several sources it considered insignificant in line with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines (see ID#s A.23 and W.31 below). However, the ERT noted that the Party provided justifications for their exclusion in terms of the likely level of emissions (0.05 per cent of the national total GHG emissions, not exceeding 500 kt CO_2 eq) for only two such categories (see ID#s E.9 and E.10 in table 3). The ERT also noted that the Party did not provide information demonstrating that the total national aggregate of estimated emissions for all gases and categories considered insignificant remains below 0.1 per cent of the national total GHG emissions. The ERT recommends that Greece consistently use the notation key "NE" to report all sources considered insignificant in line with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines and provide in the NIR a justification for the use of notation key "NE" showing that these emissions are below the significance thresholds indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. The ERT also recommends that the Party demonstrate that the total national aggregate of estimated emissions for all gases and categories considered insignificant remains below 0.1 per cent of the national total GHG emissions, in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, and include that information in the NIR.	Yes. Completeness
G.7	National registry	As noted in the standard independent assessment report, Greece did not update the Internet address of the interface to its national registry in the NIR in line with decision 15/CMP.1, annex, paragraph 32(h), even though the Internet address of the EU registry has changed for all EU member States. During the review, the Party indicated that it would update the Internet address of the EU registry in its next submission. The ERT recommends that Greece update the Internet address of the EU registry in the NIR of its next submission.	Yes. KP reporting adherence

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
Energy			
E.11	1.A Fuel combustion – sectoral approach – all fuels – CO_2	To estimate emissions from some subcategories under fuel combustion (e.g. 1.A.1.a (lignite consumed for electricity production), 1.A.1.b (all fuels used in refineries), 1.A.2.f (petcoke and solid fuels consumed in mineral industries)), Greece used information gathered from monitoring installations under the EU ETS, which is available only from 2005 onward; data for the years before 2005 were taken from the energy balance. The ERT noted that this could lead to consistency issues across the time series. During the review, the Party explained that it undertakes checks to address potential consistency issues stemming from the use of two different sources of data across the inventory time series while noting that, based on an analysis of the effect of the collection and use of EU ETS data on energy statistics, it believes the use of those data has significantly improved the accuracy of the Greek inventory. The ERT commends Greece for its efforts to improve the accuracy of its inventory by using EU ETS data. The ERT recommends that Greece include in the NIR detailed information on the results of consistency checks of data across the inventory time series for the subcategories under category 1.A (fuel combustion – sectoral approach) for which it used EU ETS data.	Yes. Transparency
E.12	1.A.1.a Public electricity and heat production – solid fuels – CO_2	Greece calculated the emissions from public electricity and heat production from lignite combustion by applying a country-specific oxidation factor for lignite (98 per cent) derived from studies conducted by the Public Power Corporation in 1993 and 2004, which were based on monthly measurements taken at all lignite-fired power plants in Greece in 1993 and 1998–2002, respectively. The ERT noted that, given the length of time since the measurements were taken, the oxidation factor may no longer be valid for the entire time series. The ERT also noted that in the NIR (section 3.2.4.2, pp.124–125) the Party does not mention the second study (2004), but instead incorrectly provides a reference to verified EU ETS reports as the source of the oxidation factor. During the review, the Party explained that it continues to apply the oxidation factor derived from the above-mentioned studies because the properties of fuel and the combustion technology applied have remained practically unchanged since the studies were performed. The ERT recommends that Greece update in the NIR the description of the sources used to derive the oxidation factor for the combustion of lignite in public electricity and heat production by including a reference to the study conducted by the Public Power Corporation in 2004 and by deleting the references to verified EU ETS reports. In addition, the ERT encourages Greece to undertake a new study of lignite-fired power plants in the country to derive the oxidation factor for public electricity and heat production from lignite combustion given that the last study was performed 17 years ago.	Yes. Transparency
E.13	1.A.1.b Petroleum refining – liquid fuels – CO_2, N_2O and CH_4	Greece reported in the NIR (section 3.2.4.3.1, p.127) that it calculated the emissions from flaring using plant-specific EU ETS data and reported these emissions under subcategory 1.A.1.b (petroleum refining). However, the ERT noted that the 2006 IPCC Guidelines (vol. 2, table 4.2.1) require the reporting of these emissions under subcategory 1.B.2.c (venting and flaring). During the review, the Party explained that it reported emissions under 1.A.1.b to ensure, to the extent possible, time-series consistency of pre-2005 data with data reported under the EU ETS (from 2005 onward), and to reflect reporting requirements under other EU legislation (e.g. the monitoring mechanism regulation).	Yes. Comparability

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		The ERT recommends that Greece reallocate the CO_2 and CH_4 emissions from flaring under subcategory 1.A.1.b (petroleum refining) to subcategory 1.B.2.c (venting and flaring), while ensuring time-series consistency given that EU ETS data are not available for before 2005.	
E.14	1.A.2 Manufacturing industries and construction – solid fuels – CO_2	Greece included in NIR table 3.14 an overview of the NCVs of lignite (in TJ/kt) by sector for 1990–2017. The ERT noted that while the NCVs used for estimating emissions from the combustion of lignite in energy industries and from other sources are relatively similar in magnitude (4,915–5,740 TJ/kt) and show only slight inter-annual variation, the NCVs used for estimating emissions for category 1.A.2 (manufacturing industries and construction) are generally much higher and show large inter-annual variation (7,435–11,380 TJ/kt). Greece explained in the NIR (section 3.2.4.2, pp.124–125) that this is because the lignite used in industry originates from a single mining field; the NCV of this lignite is higher and its EF lower than those of other types of lignite used for electricity generation because of its superior quality. During the review, the Party further explained that the inter-annual variation in the NCV of the coals used in manufacturing industries stems from the fact that they are used in small quantities and are mixed with coals of other origin.	Yes. Transparency
		The ERT recommends that Greece include in the NIR the explanation for the inter-annual variation in the NCV of lignite used for manufacturing industries and construction provided to the ERT during the review.	
E.15	1.A.3.b Road transportation – all fuels – CH_4 and N_2O	The ERT noted that Greece included in the NIR (section 3.2.5.2, pp.144–152) limited information on the estimation of emissions from road transportation, which does not allow a complete assessment of the calculated emissions. While the Party provided in the NIR information on the methods applied, it included AD on fuel consumption aggregated over all fuels used in road transportation (table 3.23) and references to COPERT (the software tool for calculating road transport emissions) for information on EFs used for the calculation of CH_4 and N_2O emissions. The ERT noted that the NIR also does not include an overview of the evolution of fleet composition over time in terms of the annual breakdown of the fleet into different abatement technologies (catalyst categories). During the review, the Party provided this information, which further enhanced the transparency of reporting for this subcategory.	Yes. Transparency
		The ERT recommends that Greece include in the NIR detailed information on the estimation of emissions from road transportation, including annual fleet composition by abatement technology (catalyst categories), fuel consumption and the EFs used for estimating CH_4 and N_2O emissions to the same level of disaggregation.	
E.16	1.A.3.c Railways – all fuels – CH_4 and N_2O	The ERT noted that Greece provided in the NIR (section 3.2.5.2, p.159) limited information on the estimation of non-CO_2 emissions from fuel combustion in railways, which does not allow a complete assessment of the calculated emissions. The Party stated that the method applied is from the EMEP/EEA air pollutant emission inventory guidebook, which is based on relative energy consumption per fuel and typical EFs, but did not provide information on fuel consumption by fuel type, EFs used for estimating CH_4 and N_2O emissions disaggregated by fuel type. During the review, Greece explained that the information provided in the NIR on the methodology applied is incorrect and that it actually applied the tier 1 methodology together with default EFs for CH_4 and N_2O emissions provided in the 2006 IPCC Guidelines.	Yes. Transparency
		The ERT recommends that Greece include in the NIR correct information on the methodology followed for estimating emissions for subcategory 1.A.3.c (railways) together with fuel consumption and EFs used for estimating the CH_4 and N_2O emissions for this subcategory, disaggregated by fuel type.	

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
E.17	1.A.4 Other sectors – all fuels – CH_4 and N_2O	The ERT noted that the description of the estimation of emissions for category 1.A.4 (other sectors) in the NIR (section 3.2.4.5, p.136) is not transparent as it does not allow a complete assessment of the calculated CH_4 and N_2O emissions. This category includes mobile and stationary emissions occurring in commercial/institutional, residential and agriculture sectors. The Party did not provide information on the fuel consumption and EFs used for estimating emissions, disaggregated by fuel and sector, or an explanation for the trend in emissions. The ERT recommends that Greece include in the NIR information on fuel consumption and EFs, disaggregated by fuel and sector, used for estimating CH_4 and N_2O emissions for this category, and provide an explanation for the trend in emissions.	Yes. Transparency
E.18	1.B.1.a Coal mining and handling – solid fuels – CH_4	Greece used national production data and a tier 1 EF (0.87 kg CH_4/t) from the 2006 IPCC Guidelines (vol. 2, chap. 4) for estimating CH_4 emissions from the surface mining of lignite, which is a key category. Noting that higher tier methods should be used for key categories, Greece explained in the NIR (section 3.3.1.4, p.166) that, based on a comparison with IEFs for CH_4 from the surface mining of lignite reported by other Parties to the Kyoto Protocol in 2010 (Germany, Poland and Spain), which range from 0.01 to 0.31 kg CH_4/t, it believes that the use of the tier 1 EF from the 2006 IPCC Guidelines is conservative and would result in an overestimation of the actual emissions. The Party further explained in the NIR and during the review that it has approached the Public Power Corporation, the operator of all lignite mines in Greece, to initiate its own measurements for developing a country-specific EF, but so far it has not had much success owing to the high cost of measurements and the lack of necessary know-how. The ERT welcomes the planned improvement. The ERT recommends that Greece, in regard to the EF for the surface mining of lignite, (1) continue exploring the possibility of conducting its own measurements to develop a country-specific EF and (2) initiate an analysis of the possibility of updating the EF and report on its progress in the NIR, noting that this analysis could include the age of the coal layer (very old in Greece) and its depth (very close to the surface) and correlate with the CH_4 content of the coal layer.	Yes. Accuracy
E.19	1.B.2 Oil, natural gas and other emissions from energy production – liquid and gaseous fuels – CO_2 and CH_4	The ERT noted that, based on the key AD for estimating GHG emissions from the oil and gas systems provided in the NIR (tables 3.29a and 3.29b), the values for primary production of crude oil, natural gas liquids and natural gas for 1999 are outliers compared with all other years, decreasing by nearly 95 per cent in 1999 relative to 1998 before increasing by nearly the same amount in the following year. During the review, Greece explained that the decrease in production between 1998 and 1999 is attributable to the suspension of the operation of the only plant producing oil and natural gas in Greece owing to a gradual decline in domestic oil production, a significant decline in crude oil and gas prices and the withdrawal of a foreign joint-venture partner. Production resumed in 2000 following the reopening of the plant, whose operation was taken over by the Government. The ERT recommends that Greece include in the NIR the explanation regarding the outlying data on oil and gas production in 1999 provided to the ERT during the review.	Yes. Transparency
E.20	1.B.2.a Oil – liquid fuels – CO_2 and CH_4	The ERT noted that, according to CRF table 1.B.2, only domestically produced oil is transported in Greece because the same value of AD is reported for both the production and transport of oil (i.e. 141.57 kt). No details are provided regarding the transport of the large amount of imported crude oil. During the review, the Party informed the ERT that because all four large refineries in Greece are located close to the shore, and therefore have	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a]
		their own harbours and are equipped with deloading installations, imported crude oil is not transported in the pipeline network. The ERT recommends that Greece include in the NIR the information that imported crude oil is not transported using the domestic pipeline network.	
IPPU			
I.13	2.B.10 Other (chemical industry) – CO_2	Greece stated in the NIR (section 4.10, p.218) that CO_2 emissions from hydrogen production are included under category 2.B.10 (other (chemical industry)). However, on the basis of the description of the methodology used for estimating the emissions (NIR section 4.10.1, p.218) and information provided during the review, the ERT determined that these emissions relate only to hydrogen production from natural gas, while the emissions from hydrogen production from liquid fuels are allocated to the energy sector. The energy sector chapter in the NIR (section 3.2.4.3.1, pp.127–128) contains a more transparent description of the estimation of CO_2 emissions from the production of hydrogen from natural gas and liquid fuels. The ERT recommends that Greece consistently allocate the CO_2 emissions from hydrogen production from all fuel types under the energy sector or provide in the NIR transparent information on the allocation of CO_2 emissions from hydrogen production from natural gas and liquid fuels in the IPPU sector chapter, including a cross reference to the relevant section in the energy sector chapter.	Yes. Transparency
I.14	2.C.1 Iron and steel production – CO_2	Greece stated in the NIR (section 4.11.2, p.222) that limestone is used for iron and steel production using electric arc furnaces. However, the ERT noted that limestone consumption is not included in the carbon balance parameters provided in the same section. During the review, the Party provided the ERT with confidential information from EU ETS verified reports on iron and steel production and clarified that lime, not limestone, is consumed in electric arc furnaces. The ERT recommends that Greece include in the NIR correct information on iron and steel production by replacing the reference to limestone consumption with lime consumption as a carbon input parameter in the carbon balance description.	Yes. Transparency
I.15	2.C.2 Ferroalloys production – CO_2	Greece stated in the NIR (section 4.12.2, p.226) that EU ETS verified reports are the source of AD for estimating CO_2 emissions from ferroalloys production. During the review, when checking the verified EU ETS reports and the Excel spreadsheet used as input to CRF Reporter, the ERT found a case of double counting of liquefied petroleum gas consumption by the only ferroalloys producer in the country between the IPPU (category 2.C.2) and energy (category 1.A.2.b (non-ferrous metals)) sectors. The ERT noted that as per the 2006 IPCC Guidelines (vol. 2, table 2.1), the liquefied petroleum gas consumption in the production of non-ferrous metals should be reported in the energy sector and thus this error resulted in an overestimation of CO_2 emissions for the IPPU sector. The Party acknowledged this error and indicated that it would be corrected in the next submission. The ERT recommends that Greece recalculate the CO_2 emissions from ferroalloys production for the entire time series without including liquefied petroleum gas consumption given that it is accounted for in the energy sector.	Yes. Accuracy
I.16	2.C.3 Aluminium production – PFCs	Greece stated in the NIR (section 4.13.1, p.229) that the average annual rate of increase in PFC emissions from aluminium production is 2.2 per cent. However, the ERT noted that according to NIR table 4.19, PFC emissions have fallen from 190.26 kt CO_2 eq in 1990 to 82.19 kt CO_2 eq in 2017. During the review, the Party confirmed that	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
		PFC emissions decreased rather than increased between 1990 and 2017, and indicated that it would correct the error in the next submission. The ERT recommends that Greece correct in the NIR the error relating to the trend in PFC emissions from aluminium production.	
I.17	2.D.2 Paraffin wax use – CO_2	Greece stated in the NIR (section 4.17.2, p.244) that the AD used for estimating CO_2 emissions from paraffin wax use for the entire time series are derived from the energy balance. However, the ERT noted that the AD on paraffin wax use do not take into consideration the import and export of paraffin wax. On the basis of apparent consumption calculated using production data and data from Eurostat on the import and export of candles (assuming they were made from paraffin wax), together with default values of carbon content and NCV from the 2006 IPCC Guidelines (vol. 2, table.1.2), the ERT made an approximate estimation of CO_2 emissions from paraffin wax use of 14.49 kt CO_2, which is different from the 0.59 kt CO_2 eq reported by the Party. During the review, the Party acknowledged that its reported estimate of CO_2 emissions from paraffin wax use is based solely in paraffin wax production and does not include the import and export of candles, and hence could be an underestimation of emissions. The ERT noted that, based on its approximate calculation, the likely underestimation of the CO_2 emissions for this category (13.90 kt CO_2 eq) is below the significance threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines (47.71 kt CO_2 eq). The ERT recommends that Greece recalculate the CO_2 emissions from paraffin wax use for the entire time series using the apparent consumption as well as data on the import and export of paraffin wax, noting that the Party may wish to consider for this purpose Eurostat data on the import and export of candles.	Yes. Accuracy
I.18	2.F Product uses as substitutes for ODS – HFCs	Greece provided in the NIR (section 4.20.2, p.260) and during the review new information regarding the recently launched web platform "Maintenance and monitoring F-gases and ODS", which aims to serve as a tracking tool and a database for users of F-gases and ODS to register their regular checks of maintenance refilling records, and for F-gas traders to register their transactions from 2019 onward (no historical data will be available on the platform) under the new Greek regulation on F-gases. The ERT noted that until all users and traders are able to populate this database with information on the use and trade of F-gases and ODS, the Party should continue using ICAP surveys to obtain data on residential refrigeration and air-conditioning equipment flows (see ID# I.5 in table 3). The ERT recommends that Greece provide in the NIR information on the online platform "Maintenance and monitoring F-gases and ODS" in the section on planned improvements for category 2.F subcategories (2.F.1–2.F.6). In addition, the ERT, noting the usefulness of the online platform even before it is ready to serve as a database for F-gases, encourages Greece to use the platform to perform QC checks on data obtained through ICAP surveys.	Yes. Transparency
I.19	2.G.3 N_2O from product uses – N_2O	Greece stated in the NIR (section 4.22.4, p.274) that N_2O emissions from product uses are estimated using AD acquired from the national energy balance and the default EF from the 2006 IPCC Guidelines. The ERT noted that this statement is not consistent with that in another section of the NIR (section 4.22.2, p.273), where the Party stated that these emissions are estimated using the population of Greece and the ratio of N_2O emissions to the	Yes. Transparency

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		population. During the review, the Party acknowledged the error and agreed to correct it in the next submission by deleting the incorrect statement. The ERT recommends that Greece delete from the NIR the incorrect statement regarding N_2O emissions from product uses being estimated using AD from the national energy balance and the default EF from the 2006 IPCC Guidelines.	
Agriculture			
A.18	3. General (agriculture) – CH_4 and N_2O	In response to recommendations from previous reviews (see ID#s A.4, A.5, A.6, A.7, A.10 and A.11 in table 3), Greece included additional tables in its NIR with parameters and EFs, including those from the 2006 IPCC Guidelines, used for estimating CH_4 and N_2O emissions from enteric fermentation and manure management (NIR tables 5.7, 5.9, 5.11, 5.12, 5.17, 5.18 and 5.19). However, the ERT noted that the Party did not provide references to the specific sources of the parameters and EFs used (e.g. tables from the 2006 IPCC Guidelines) or the reasons for their choice in these tables. The ERT recommends that Greece provide in the relevant tables of the NIR references to the specific sources of the parameters and EFs, including those from the 2006 IPCC Guidelines, used for estimating CH_4 and N_2O emissions from enteric fermentation and manure management, together with explanations for their choice.	Yes. Transparency
A.19	3.A.2 Sheep – CH_4 and N_2O	Greece included detailed data on sheep population in NIR table 5.10. The ERT noted that the population in the subcategory "Milking ewes – Only suckling" is identical to that of the subcategory "Males > 1 year old", and that the ratio of female lambs to male lambs is always 4:1. During the review, the Party provided the ERT with additional information from the Hellenic Statistical Authority on the percentages of sheep population in subcategories of age and sex, and explained that only 25 per cent of lambs live past the lactation period and that four female lambs are kept for every one male lamb for reproduction in the mature phase of their lives. The ERT recommends that Greece include in the NIR the description of the sheep population data provided to the ERT during the review regarding the ratio of female lambs to male lambs.	Yes. Transparency
A.20	3.B.3 Swine – CH_4	Greece reported in NIR table 5.18 an EF for CH_4 emissions from manure management applicable to swine of 16 kg CH_4/head/year, without providing a reference to the source of this EF. The ERT noted that this value corresponds to the value of the EF for breeding swine (18 °C) for Western Europe from the 2006 IPCC Guidelines (vol. 4, table 10.14). However, during the review, the Party explained that because most of the large swine breeding facilities in the country are located in level communes at lower altitudes above the mean sea level, which are characterized by relatively low altitudinal differences and where the mean annual temperature is close to 23 °C, it used the EFs corresponding to that temperature for Western Europe from the 2006 IPCC Guidelines. The Party then calculated a weighted average value of the EF (16 kg CH_4/head/year) assuming the swine population to be composed of approximately 90 per cent market swine (EF: 15 kg CH_4/head/year) and 10 per cent breeding swine (EF: 23 kg CH_4/head/year). The ERT recommends that Greece provide in the relevant table of the NIR a reference to the EFs from the 2006 IPCC Guidelines (vol. 4, table 10.14) used in deriving the EF for CH_4 emissions from manure management for swine, and include in the NIR the detailed explanation regarding the derivation of the EF provided to the ERT during the review.	Yes. Transparency

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A.21	3.B.4 Other livestock – CH_4	Greece reported in NIR table 5.18 an EF for CH_4 emissions from manure management for buffalo of 9 kg CH_4/head/year, without providing a reference to the source of this EF. The ERT noted that this value corresponds to the value of the EF for buffalo (19 °C) for Western Europe from the 2006 IPCC Guidelines (vol. 4, table 10.14). However, during the review, the Party explained that it used the EF for Eastern Europe for buffalo (18 °C) (9 kg CH_4/head/year) because in Greece, similarly to in Eastern Europe, solid-based systems are mostly used for the management of buffalo manure rather than the liquid/slurry and pit storage systems commonly used for the management of cattle manure in Western Europe. The ERT recommends that Greece provide in the relevant table of the NIR a reference to the EF from the 2006 IPCC Guidelines (vol. 4, table 10.14) used for estimating CH_4 emissions from manure management for buffalo, and include in the NIR the detailed explanation regarding the EF provided to the ERT during the review.	Yes. Transparency
A.22	3.D.a Direct N_2O emissions from managed soils – N_2O	In response to a recommendation from previous reviews (see ID# A.12 in table 3), Greece included in its NIR additional tables with information on all N inputs to agricultural soils (NIR tables 5.24–5.28). However, the ERT noted that the Party did not include the sources of F_{ON} or F_{CR} and detailed information on crop type and the parameters outlined in the 2006 IPCC Guidelines (vol. 4, table 11.2).The ERT also noted that Greece did not provide the equation used to estimate F_{CR}. The ERT recommends that Greece include in the NIR the sources of F_{ON} and F_{CR}, detailed information on crop type and the parameters outlined in the 2006 IPCC Guidelines (vol. 4, table 11.2), and the equation used to estimate F_{CR}, including by providing a table with N flows/balance for all N inputs to agricultural soils.	Yes. Transparency
A.23	3.D.a.5 Mineralization/immobilization associated with loss/gain of soil organic matter – N_2O	Greece reported N_2O emissions from mineralization/immobilization associated with loss/gain of soil organic matter as "NO" in CRF table 3.D. During the review, the Party explained that it reported these emissions as "NO" because, as explained in the NIR (section 6.5.2.1, pp.354–355), there is no mineralization/immobilization associated with loss/gain of soil organic matter in the country because there is no change in carbon stocks in mineral soils. However, the ERT noted a net change in carbon stocks in mineral soils stemming from a loss of soil carbon due to the conversion of perennial crops to annual crops (see ID# L.15 below). During the review, Greece acknowledged the issue and provided a preliminary estimate of the amount of N mineralized in mineral soils as a result of loss of soil carbon through change in land use or management equal to 5,427,544 kg N/year, which would result in emissions of 0.085 kt N_2O/year, or 25.41 kt CO_2 eq/year. The ERT noted that this amount is below the significance threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines (47.71 kt CO_2 eq/year). The ERT recommends that Greece either provide in the NIR an estimate of N_2O emissions for this category or report the emissions as "NE" by considering them as insignificant as per paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, providing a justification for the reporting that is based on the approximate level of emissions.	Yes. Completeness
A.24	3.F Field burning of agricultural residues – CH_4 and N_2O	Greece estimated CH_4 and N_2O emissions from the field burning of agricultural residues using the methodology from the IPCC good practice guidance and the Revised 1996 IPCC Guidelines, explaining in the NIR (section 5.7.2) that it did so owing to the lack of accurate data on areas of crops burned. However, the ERT noted that Greece did not include in the NIR information on the amounts of dry matter burned by crop type (as reported in	Yes. Transparency

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		CRF table 3.F) and how these amounts were calculated or on the EFs used for estimating CH_4 and N_2O emissions. During the review, the Party shared an Excel spreadsheet containing this information with the ERT. The ERT recommends that Greece include in the NIR information on the amount of dry matter burned by crop type and estimate CH_4 and N_2O emissions from the field burning of agricultural residues using the EFs provided in the 2006 IPCC Guidelines (vol. 4, table 2.5).	
LULUCF			
L.8	4. General (LULUCF)	The ERT noted that Greece did not provide in the NIR transparent information on planned or future improvements for the LULUCF sector. The NIR (section 6.1.4, p.329) lists a few potential improvements for the sector in the section on category-specific QA/QC procedures, but does not specify which of those are planned. During the review, the Party provided the ERT with an overview of planned improvements included in the QA/QC plan for the LULUCF sector for 2019. The ERT recommends that Greece include in the NIR information on planned improvements for the LULUCF sector.	Yes. Transparency
L.9	4.A.1 Forest land remaining forest land – CO_2	Greece stated in the NIR (section 6.4.2, p.339) that it estimated and reported emissions and removals only from forests managed with an FMP. During the review, the Party provided the ERT with information on FMPs, which include general information on the forest (e.g. an FM map, the division of the forest, a general description of the forest) together with information on FM relating to the forest's purpose, parameters, planning and products. However, the ERT noted that the information on the FMPs did not include the forest map or more disaggregated information on each forest class relating to the growing stock, diameter distribution, condition and characteristics. In response, Greece explained that it is considering using a web-based tool to make it easier to access the relevant information in the database for the FMPs. The ERT welcomes the Party's planned efforts in this regard and notes that pending the establishment of such a web-based tool, the Party may consider storing the maps of the FMPs in a central database to help in compiling the GHG inventory. The ERT recommends that Greece include in the NIR disaggregated information on forests from the FMP database that is relevant for the GHG inventory, such as a general description of the forest together with the information on its purpose, parameters, planning and products, and provide a link to the web-based tool for the FMP database or any central database containing the FMP maps once they become available.	Yes. Transparency
L.10	4.A.1 Forest land remaining forest land – CO_2	Greece estimated the change in carbon stocks in living biomass in forest land using equation 2.8 (vol. 4) and default parameters from the 2006 IPCC Guidelines, including the ratio of below-ground biomass to above-ground biomass for each forest species (NIR, section 6.4.2.1, p.340). However, the ERT noted that the Party did not specify the values for the ratio from the 2006 IPCC Guidelines (vol. 4, table 4.4) it used for its calculations. The ERT also noted that the 2006 IPCC Guidelines provide below-ground biomass/above-ground biomass ratios for various forest species, which are disaggregated by above-ground biomass stock levels, and as such, it is important to specify the ratio values used as well as their appropriateness with respect to the above-ground biomass stock levels of the forest. During the review, the Party explained that it would provide detailed information on the ground biomass/above-ground biomass ratios for various forest species, disaggregated by above-ground biomass stock levels in the next submission.	Yes. Transparency

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		The ERT recommends that Greece include in the NIR the default below-ground biomass to above-ground biomass ratio values from the 2006 IPCC Guidelines (vol. 4, table 4.4) it used for various forest species and information on their appropriateness with respect to the above-ground biomass stock levels of the forest.	
L.11	4.A.1 Forest land remaining forest land – CO_2	Greece reported in CRF table 4.A the areas of forest land remaining forest land divided into two subcategories: managed and unmanaged land. The Party reported in the NIR (section 6.3, pp.336–337) that it obtained the total areas of forest land (including both managed and unmanaged) for 1990 (3,359.2 kha) from the first NFI and for 2000 (3,401.9 kha) from the decennial survey of the distribution of the country's area conducted by the Hellenic Statistical Authority, while deriving the areas for all other years using interpolation and extrapolation. During the review, Greece explained that for 1990 it used the area of forest land from the NFI even though its fieldwork was completed in 1985 because it considered it more accurate than the Hellenic Statistical Authority data. However, the ERT noted that the area of forest land for 1990 from the first NFI is likely to be less accurate because of the length of time since the completion of the fieldwork of the NFI, which is supported by the fact that, for 1990, the area of forest land from the Hellenic Statistical Authority is lower than that from the first NFI. In response to a request by the ERT, Greece provided the ERT with information showing that the interpolation and extrapolation performed with 1985 as the starting year would result in 0.3 and 0.5 per cent lower areas of forest land in 1990 and 2017, respectively, than those reported in CRF table 4.A. The Party also showed the ERT that the interpolation and extrapolation using 1985 as the starting year would result in 12.5 and 13.0 per cent lower areas of forest land in 2000 and 2017, respectively, than the areas from the Hellenic Statistical Authority. The ERT noted that, as the area of managed forest land is derived from the FMPs, using 1985 as the starting year for the interpolation and extrapolation of forest land areas only affects the areas of unmanaged forest land. The ERT also noted that using more accurate information on forest land areas is important for ensuring the accuracy of the land-transition matrices.	Yes. Accuracy
		The ERT recommends that Greece use 1985 as the starting year in order to calculate, by interpolation and extrapolation, more accurate areas of forest land remaining forest land; use the areas calculated to develop land-transition matrices; and use these land-use change matrices in the QC activities for the LULUCF sector.	
L.12	4.A.1 Forest land remaining forest land – CO_2	During the review, Greece informed the ERT that new forest maps have been completed for 54 per cent of the national territory. Maps for 44 per cent of the territory have been ratified. Forest maps covering the whole country will be completed by the beginning of 2020. The Ministry of Finance is undertaking a scheduled work programme for the second NFI.	Yes. Transparency
		The ERT recommends that Greece include in the NIR updated information on its efforts to generate accurate information on forest areas in the country.	
L.13	4.A.2.1 Cropland converted to forest land – CO_2	As reported in NIR table 6.9, to estimate the CSCs in living biomass in cropland converted to forest land, Greece applied the average of the IEFs from four Italian regions on the basis of the similarity of their climatic and ecological conditions with those in Greece. During the review, the Party explained that it did not have detailed information on the management of forests in those regions of Italy. However, the ERT noted that Greece reported as cropland converted to forest land only the areas that have been under EEC regulations 2080/92 and 1257/99 since 1994, which provide financial subsidies for the conversion of cropland to forest land, while the IEFs from the afforested areas in Italy relate to conversions of cropland to forest land, but not only to the cropland subject to	Yes. Accuracy

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		EEC regulations 2080/92 and 1257/99 – this could have an impact on the IEF. The ERT also noted in this regard that it might be more appropriate to assess the applicability of the IEFs for CSCs in living biomass in cropland converted to forest land from cropland converted to forest land in Italy subject to EEC regulations 2080/92 and 1257/99, if available. The ERT recommends that Greece make efforts to develop country-specific EFs to estimate CSCs in living biomass in cropland converted to forest land. The ERT further recommends that, pending the development of such country-specific EFs, Greece investigate the appropriateness of the IEFs chosen from Italy for estimating the CSCs in living biomass in cropland converted to forest land, including by making efforts to obtain the relevant IEFs for cropland converted to forest land in Italy subject to EEC regulations 2080/92 and 1257/99, and report on such efforts in the NIR.	
L.14	4.B.1 Cropland remaining cropland – CO_2	On the basis of the information provided by Greece in NIR figure 6.1, the ERT noted that net CO_2 emissions from cropland remaining cropland increased by 264.4 and 491.0 per cent in 2013 and 2014, respectively, compared with the 2012 level, before decreasing in 2015 to nearly the same level as in 2012 (net removals in 2015 were 4.2 per cent above the 2012 level). During the review, the Party explained that this stemmed from methodological changes made in 2014 to the collection of data on areas under perennial crops, which resulted in decreases in the estimated areas under certain perennial crops. Greece provided the ERT with a document ("Single Integrated Metadata Structure (SIMS v2.0)") containing detailed information on the methodological changes. Greece informed the ERT that it is working on a revision of the methodology for data collection and expects to finish the data collection within the next five years. The ERT recommends that Greece include in the NIR information on the methodological changes made in 2014 to the collection of data that resulted in an increase in the area under cropland remaining cropland, as well as updated information on the changes to the methodology for data collection currently being implemented. In addition, the ERT encourages Greece to investigate the possibility of using the appropriate data splicing methods from the 2006 IPCC Guidelines to recalculate the AD before 2014 to ensure time-series consistency.	Yes. Consistency
L.15	4.B.1 Cropland remaining cropland – CO_2	Greece reported in the NIR (section 6.5.2.1, pp.354–355) information on the method used for estimating the CSCs in mineral soils for cropland remaining cropland. The Party reported the CSCs in the SOC pool in mineral soils for cropland remaining cropland as "NO" on the basis of the tier 1 methodology in the 2006 IPCC Guidelines (vol. 4, section 5.2) and the assumption that there were no changes in the land-use, input and management regimes. However, the ERT noted that conversions from perennial cropland to annual cropland do occur, which would result in CSCs in the SOC pool in mineral soils. During the review, Greece provided the ERT with preliminary estimates of the CSCs in mineral soils for cropland remaining cropland, which the ERT noted were above the significance threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. The Party also informed the ERT that it plans to estimate these emissions for the next annual submission as part of its planned improvements. The ERT welcomes these planned improvements. The ERT recommends that Greece report in CRF table 4.B the CSCs in the SOC pool in mineral soils for cropland remaining cropland.	Yes. Completeness

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L.16	4(V) Biomass burning – CO_2, CH_4 and N_2O	Greece reported in the NIR (section 6.4.2.1, p.344) the equation used to estimate carbon loss in living biomass from wildfires, which was the same as equation 2.14 in the 2006 IPCC Guidelines (vol. 4). However, the ERT noted that the Party included an additional parameter in its equation that is not part of the equation in the 2006 IPCC Guidelines. During the review, Greece, while acknowledging that it included the parameter erroneously in the equation in the NIR, provided information demonstrating that the calculations were performed correctly and the error in the NIR does not have an impact on the emission estimates. The ERT recommends that Greece correctly present in the NIR the equation from the 2006 IPCC Guidelines (vol. 4, equation 2.14) that it used to estimate carbon loss in living biomass from wildfires by including the correct set of parameters.	Yes. Transparency
L.17	4(V) Biomass burning – CO_2, CH_4 and N_2O	Greece reported in the NIR (section 6.4.2.1, p.345) values from the 2006 IPCC Guidelines (vol. 4, table 2.6) for the fraction of biomass transferred to dead organic matter in forests and scrublands. However, the ERT noted that while table 2.6 in the 2006 IPCC Guidelines provides values for C_f, Greece provided values for the parameter F_{BL} (equal to $1 – C_f$), which is not used in equation 2.27 in the 2006 IPCC Guidelines (vol. 4). During the review, the Party explained that for C_f it used the values of 0.45 and 0.72 for "all 'other' temperate forests" and for "all shrublands", respectively, from table 2.6 in the 2006 IPCC Guidelines. The ERT recommends that Greece provide in the NIR a reference to the correct parameter (C_f) and its values from the 2006 IPCC Guidelines (vol. 4, table 2.6) that it used to estimate carbon loss in living biomass from wildfires.	Yes. Transparency
L.18	4(V) Biomass burning – CO_2, CH_4 and N_2O	Greece reported in the NIR (section 6.4.2.1, p.345) that to calculate the average biomass stock of understorey vegetation in order to calculate, in turn, carbon loss in living biomass from wildfires, it used the appropriate default values for the ratio of below-ground biomass to above-ground biomass and for BCEF from the 2006 IPCC Guidelines (vol. 4, tables 4.4 and 4.5, respectively). However, the ERT noted that the Party did not specify the values of the parameters selected and provided no explanation as to why it used default values for BCEF from the 2006 IPCC Guidelines for calculating the emissions from biomass burning of understorey vegetation, even though it used the BCEF values for Mediterranean species from Catalonia (NIR table 6.8) for calculating CSCs in living biomass. The ERT recommends that Greece provide in the NIR (1) the specific default values for BCEF and the ratio of below-ground biomass to above-ground biomass from the 2006 IPCC Guidelines (vol. 4, tables 4.4–4.5) that it used to calculate the average biomass stock of understorey vegetation in order to calculate, in turn, carbon loss in living biomass from wildfires; and (2) an explanation as to why it used default values for BCEF from the 2006 IPCC Guidelines for calculating the emissions from biomass burning of understorey vegetation, even though it used the BCEF values for Mediterranean species from Catalonia (NIR table 6.8) for calculating CSCs in living biomass.	Yes. Transparency
L.19	4(V) Biomass burning – CO_2, CH_4 and N_2O	Greece reported in the NIR (section 6.4.2.1, p.345) that, owing to the lack of data available on the burned areas of managed forest land, it used a weighted average based on the total forest area burned and the percentage of managed forests in each prefecture to calculate the emissions from biomass burning due to wildfires. The Party also reported (NIR, section 9.4.2, p.452) that areas affected by wildfires are declared to be instantly reforested following a decision published in the Official Government Gazette. During the review, Greece explained that the Gazette contains a map with the geographical location of the area affected by a wildfire, but because this	Yes. Accuracy

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		information is not stored in a unified database the Party did not use it in estimating emissions from wildfires. The ERT noted that such maps of burned forest areas would significantly enhance the accuracy of the estimates for this category. The ERT recommends that Greece explore the possibility of collecting information on the burned areas of managed forest land from the Official Government Gazette, including by making efforts to store maps of burned areas in a unified database, and use this information to calculate the emissions from biomass burning due to wildfires in managed forest land, as well as report on such efforts in the NIR.	
Waste			
W.28	5. General (waste)	The ERT noted that Greece did not provide in the NIR transparent information on the treatment of sludge along different pathways. Although the Party provided information on the amount of landfilled sludge (NIR table 7.11), the biochemical oxygen demand in sludge from domestic wastewater treatment (NIR table 7.17) and the chemical oxygen demand in sludge from industrial wastewater treatment (NIR table 7.21), it was not possible for the ERT to check the consistency of the information across the different treatment pathways. During the review, Greece provided the ERT with a table showing, for 2017, the amounts of total sludge removed from domestic and industrial wastewater treatments, the amount of sludge landfilled, the amount of sludge used for spreading on agricultural soils and the amount of other sludge disposed. The ERT recommends that Greece include in the NIR transparent information on the amounts of sludge treated along different pathways by providing a table presenting the amounts of sludge treated along different pathways.	Yes. Transparency
W.29	5.A Solid waste disposal on land – CH_4	The ERT noted that it was not completely clear from the information provided in the NIR how various sources of waste data had been used together with assumptions to construct the time series of the amount of solid waste disposed of in landfills. During the review Greece explained that, to calculate the amount of solid waste generation, it used data on population and per capita solid waste generation rates based on coherent assumptions in 1960–2000 and actual waste statistics from 2000 onward. As explained in the NIR (section 7.2.2, pp.397–401), for 1960–1990 the per capita waste generation rate was assumed to increase from 0.573 to 0.785 kg/person/day with a mean annual increase of 0.0085 kg/person/day/year, and for 1990–2000 the per capita waste generation rate was assumed in increase from 0.8 to 1.1 kg/person/day. The Party provided the ERT with information on how it used the data for 1997 and 2009 obtained from national studies on waste generation to calculate the per capita waste generation rate for before 2000 using trend extrapolation. As reported in the NIR (section 7.2.2, p.398 and table 7.7), Greece assumed a rate of waste generation by tourists of 2.1 kg/capita/day since 1990. However, during the review, the Party explained that from 2000 onward it did not make any assumptions in this regard because it used actual waste statistics on waste generation by tourists. The ERT agreed with this approach, noting that the assumed value of per capita waste generation by tourists before 2000 is likely to have a minor impact on the current emission estimates. The ERT recommends that Greece provide in the NIR transparent information on (1) the sources of data and assumptions used for constructing the time series for the amount of solid waste disposed of in landfills, including a description of the solid waste statistics system currently in place; (2) the data used for different years in the time series, either in textual or graphical format; and (3) an explanation that per capita solid waste generation rates are used only until 2000.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
W.30	5.A Solid waste disposal on land – CH_4	Greece reported the amount of generated and landfilled solid waste in NIR table 7.8. The ERT noted that the share of waste landfilled has decreased over time, which is to be expected owing to an increase in recycling. However, the Party did not provide information on the sources of data and the amount of solid waste recycled before actual waste statistics started being used in 2000. During the review, Greece provided data on recycling from official statistics for 2000–2017, in which the ERT noted a large increase in the recycling of paper between 2006 and 2007. The Party could not conclusively provide the reasons for this but presented some working theories. The ERT recommends that Greece include in the NIR (1) a table containing the amounts of recycled solid waste, divided into the same waste fractions as those in the tables on waste composition, together with references to the relevant data sources; and (2) an explanation for the significant change in the amount of paper recycled between 2006 and 2007.	Yes. Transparency
W.31	5.B.2 Anaerobic digestion at biogas facilities – CH_4	Greece reported CH_4 emissions from anaerobic digestion at biogas facilities as "NO" in CRF table 5.B. However, the ERT noted that, as per the energy statistics available from Eurostat that are also referred to in the NIR (annex II, p.527), of the three sources of biogas (landfill gas, sewage sludge gas and other biogases from anaerobic fermentation), in 2017, Greece had a biogas production of other biogases from anaerobic fermentation of 929 TJ. During the review, the Party acknowledged the existence of biogas plants in the country and explained that it did not report the associated CH_4 emissions because the plants were relatively new, and using the default EF (5 per cent of CH_4 production) from the 2006 IPCC Guidelines (vol. 5, chap. 4, p.4.4) would likely lead to an overestimation of emissions. Greece provided the ERT with information demonstrating that an estimate of these emissions made using the default EF from the 2006 IPCC Guidelines (23 kt CO_2 eq or 0.02 per cent of the national total) is below the significance threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines (47.71 kt CO_2 eq) and is thus considered insignificant. The ERT noted that the appropriate notation key to be used in this case is "NE", not "NO". The ERT recommends that Greece either provide in CRF table 5.B a CH_4 emission estimate for anaerobic digestions at biogas facilities or report the category as not estimated using the notation key "NE", including in the NIR a justification for the exclusion in terms of the likely level of emissions, as indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Yes. Completeness
W.32	5.C.1 Waste incineration – CO_2, CH_4 and N_2O	As reported in the NIR (section 7.4.2), Greece recalculated the emissions from waste incineration for 2001–2017 using updated AD based on data splicing techniques, as recommended by the previous ERT (see ID# W.14 in table 3). Greece also provided information in the NIR (section 7.4.2, p.425) relating to time-series consistency in emissions from waste incineration. However, the ERT noted that the Party did not include in the NIR transparent information on the method used for generating the AD after 2010. During the review, Greece explained that owing to time constraints it could not update the NIR to include the AD for 2012 and 2014 that had recently become available and which had been used in the inventory estimates; thus, only the AD for 2015–2017 were based on trend extrapolation. The ERT agreed with this explanation. The ERT recommends that Greece include in the NIR updated and transparent information on the AD and the extrapolation method used to generate the AD used for estimating emissions from waste incineration.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
W.33	5.D.1 Domestic wastewater – CH_4	As described in the NIR (section 7.3.2, p.415), Greece used an MCF of 0.5 for estimating CH_4 emissions from domestic wastewater treatment, which is based on a recommendation made during an EU review of the GHG inventory in 2016. In the NIR, Greece also stated that 9 per cent of the population is not connected to the sewer system. The ERT noted that the Party did not provide in the NIR transparent information on the types of domestic wastewater treatment and discharge pathways or the system used in the country, and it provided no information on any changes in the share of the population not served by a wastewater treatment system over time. During the review, Greece explained that it used the default MCF of 0.5 for anaerobic treatment of domestic wastewater in septic systems from the 2006 IPCC Guidelines (vol. 5, table 6.3) for the 9 per cent of the population that is not connected to the sewer system, justifying it as a conservative assumption. The Party provided the ERT with a time series of the share of the population not connected to the sewer system for 1990–2017. The ERT recommends that Greece include in the NIR a table providing a time series of the share of the population connected to the sewer system, including references to the sources of information, and a clarification that it applied an MCF of 0.5 to the share of wastewater from the population not connected to the sewer system, assuming septic tanks to be the wastewater treatment system, including the reasoning behind this assumption.	Yes. Transparency
W.34	5.D.1 Domestic wastewater – N_2O	The ERT noted inconsistencies between the data on protein consumption used for estimating N_2O emissions from domestic wastewater treatment in the NIR (table 7.18) and those available from FAOSTAT. For example, Greece used a value of protein consumption of 42.23 kg/person/year for 2013 (i.e. the latest year of FAOSTAT data) while the value provided by FAOSTAT is 108.8 g/person/day corresponding to 39.71 kg/person/year. During the review, Greece explained that it used the FAOSTAT data available at the time of preparation of the inventory, and indicated that any inconsistencies would be addressed in the next submission. The ERT noted that given that the differences between the two sets of data on protein consumption are small, with the values used by Greece being slightly higher, the potential impact on the estimated emissions would be small. The ERT recommends that Greece use updated data on protein consumption data for estimating N_2O emissions from domestic wastewater treatment (e.g. those available from international data sources such as FAOSTAT).	Yes. Accuracy
W.35	5.D.2 Industrial wastewater – CH_4	As described in the NIR (section 7.3.2, p.415), Greece used an MCF of 0.8 for estimating CH_4 emissions from industrial wastewater treatment, which is based on a recommendation made during an EU review of the GHG inventory in 2016. The ERT noted that the Party did not provide in the NIR transparent information on the types of industrial wastewater treatment and discharge pathways or systems used in the country. During the review, Greece explained that it used the default MCF of 0.8 for the treatments "anaerobic digester for sludge" and "anaerobic reactor" from the 2006 IPCC Guidelines (vol. 5, table 6.8), assuming those to be the treatments practised in the country. Further, the Party provided the ERT with access to a study by the Ministry of Environment and Energy (Ministry of Environment, Energy and Climate Change, 2001) that was used to estimate the distribution of industrial wastewater between aerobic and anaerobic treatments for each industrial sector. On the basis of this information, the ERT noted that Greece assumed two types of treatment of industrial wastewater, namely, centralized aerobic treatment plants and anaerobic reactors. The ERT recommends that Greece include in the NIR an explanation of the types of treatment of industrial wastewater assumed (i.e. centralized aerobic treatment plants and anaerobic reactors) when estimating CH_4 emissions for the category and the shares of the wastewater treated anaerobically in each industrial sector.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
W.36	5.D.2 Industrial wastewater – CH_4	Greece included in NIR table 7.19 information on some parameters used for estimating CH_4 emissions from industrial wastewater treatment (i.e. m^3 wastewater/t product and kg chemical oxygen demand/m^3 wastewater). The ERT noted that while the Party reported the values for the paper, vegetable oil and sugar industries as "CS" (country specific), it listed "IPCC" as the source of data for the remaining industries, including textiles. The 2006 IPCC Guidelines (vol. 5, table 6.9) do not, however, provide values for these parameters for textiles. In addition, the Party did not provide values for the parameters for the wine and vinegar industry, which are included in the 2006 IPCC Guidelines. During the review, Greece explained that it obtained the parameter values for the textiles industry from the IPCC good practice guidance and that, although it estimated the CH_4 emissions from the wine and vinegar industry using the default parameter values provided by the 2006 IPCC Guidelines in the calculations, it did not include them in NIR table 7.19. The ERT recommends that Greece include in the NIR correct references to the IPCC guidelines that are the sources of the parameters used for estimating CH_4 emissions from industrial wastewater treatment as well as the values of such parameters for all industries occurring in Greece that are included in the estimates.	Yes. Transparency
W.37	5.D.2 Industrial wastewater – CH_4 and N_2O	Greece provided in NIR table 7.19 data on industrial wastewater generation per tonne of product for various industries. However, the ERT noted that while the Party also provided the total wastewater generation in various industries in NIR table 7.22, it did not provide any information on production in those industries. During the review, Greece provided the ERT with the production data for each industry for 2017. The ERT recommends that Greece include in the NIR information on annual production in various industries in tabular format.	Yes. Transparency
KP-LULUCF activities			
KL.4	AR – CO_2	Greece reported in the NIR (section 9.2.2, p.439) that it obtained the area of land subject to AR from the afforestation registry maintained by the Ministry of Environment and Energy. The registry provides the areas of cropland that have been converted to forest land since 1994 under EEC regulations 2080/92 and 1257/99. Greece also reported in the NIR (section 9.3.1.1, p.442) that the methods used for estimating the CSCs and GHG emissions and removals from AR and deforestation under Article 3, paragraph 3, and from FM under Article 3, paragraph 4, of the Kyoto Protocol, are the same as those used for the GHG inventory reported under the Convention. Further, in NIR table 6.9, the Party applied the average of the IEFs from four Italian regions for estimating the CSCs in living biomass in cropland converted to forest land in Greece on the basis of similarity of the regions' climatic and ecological conditions with those in Greece. Owing to the reasons outlined in ID# L.13 above, the ERT noted, however, that those IEFs may not be representative of the AR land in Greece and that it might be more appropriate to assess the applicability of the IEFs for CSCs in biomass for cropland converted to forest land in Italy subject to EEC regulations 2080/92 and 1257/99, if this information is available. The ERT recommends that Greece investigate the appropriateness of the IEFs chosen from Italy for estimating the CSCs in living biomass in land subject to AR, including by making efforts to obtain the relevant IEFs for cropland converted to forest land in Italy subject to EEC regulations 2080/92 and 1257/99, and report on such efforts in the NIR.	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?*[a]
KL.5	Biomass burning – CO_2, CH_4 and N_2O	Greece reported in the NIR (section 6.4.2.1, p.345) that, owing to the lack of data available on the burned areas of managed forest land, it used a weighted average based on the total forest area burned and the percentage of managed forests in each prefecture to calculate the emissions from biomass burning due to wildfires. Greece also reported in the NIR (section 9.4.2, p.452) that the Ministry of Environment and Energy tracks and records every forest fire event, and forest land affected by wildfires is declared to be instantly reforested following a decision published in the Official Government Gazette. The ERT noted that the use of AD obtained from the maps showing the geographical location of the managed forest areas affected by wildfires, which are published in the Gazette, would significantly improve the accuracy of the estimates of emissions from biomass burning in land subject to AR, deforestation and FM, especially in cases of exceptionally large areas being burned during the commitment period (see also ID# L.19 above). The ERT recommends that Greece investigate the possibility of collecting AD on the burned areas in managed forest land from the Official Government Gazette, including by making efforts to store the maps of burned areas in a unified database, and use this information to estimate and report the emissions from biomass burning in land subject to AR, deforestation and FM, and report on such efforts in the NIR.	Yes. Accuracy

[a] Recommendations made by the ERT during the review are related to issues as defined in para. 81 of the UNFCCC review guidelines, or problems as defined in para. 69 of the Article 8 review guidelines.

VI. Application of adjustments

11. The ERT did not identify the need to apply any adjustments to the 2019 annual submission of Greece.

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

12. Greece has elected commitment period accounting and therefore the issuance and cancellation of units for KP-LULUCF activities is not applicable to the 2019 review.

VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2019 annual submission.

Annex I

Overview of greenhouse gas emissions and removals for Greece for submission year 2019 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by Greece in its 2019 annual submission

1. Tables 1–4 provide an overview of total GHG emissions and removals as submitted by Greece.

Table 1
Total greenhouse gas emissions for Greece, base year[a]–2017
(kt CO_2 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 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								–1 830.00
Base year	103 841.05	105 948.96	NA	NA	NA		NA	
1990	100 993.41	103 101.31	NA	NA				
1995	106 283.60	109 155.97	NA	NA				
2000	124 405.08	126 346.42	NA	NA				
2010	115 393.41	118 436.49	NA	NA				
2011	112 322.71	115 453.96	NA	NA				
2012	109 060.16	112 146.28	NA	NA				
2013	100 964.42	102 546.57	NA	NA		–88.52	NA	–1 964.66
2014	98 987.33	99 113.11	NA	NA		–99.61	NA	–1 964.66
2015	91 611.18	95 330.37	NA	NA		–79.51	NA	–1 953.56
2016	88 224.47	91 697.73	NA	NA		–82.25	NA	–1 922.38
2017	92 211.69	95 420.78	NA	NA		–27.73	NA	–1 952.18

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 CO_2, CH_4 and N_2O, 1995 for HFCs, PFCs and SF_6, and 2000 for NF_3. Greece has not elected any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

[b] The Party did not report indirect CO2 emissions in CRF table 6.

[c] The value reported in this column refers to 1990.

[d] Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

Table 2
Greenhouse gas emissions by gas for Greece, excluding land use, land-use change and forestry, 1990–2017
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	83 375.36	10 906.80	7 443.14	1 182.82	190.26	NA, NO	2.93	NA, NO
1995	86 945.64	11 303.62	6 683.06	4 157.38	62.85	NA, NO	3.42	NA, NO
2000	102 982.30	11 629.75	6 346.44	5 261.86	122.26	NA, NO	3.81	NA, NO
2010	97 342.98	11 001.20	5 489.25	4 467.76	129.44	NA, NO	5.86	NA, NO
2011	94 531.70	10 816.34	5 243.04	4 747.22	110.53	NA, NO	5.13	NA, NO
2012	91 417.80	10 609.70	4 812.03	5 153.93	147.77	NA, NO	5.05	NA, NO
2013	81 722.58	10 390.29	4 514.52	5 741.48	172.56	NA, NO	5.15	NA, NO
2014	78 649.89	10 174.61	4 306.10	5 842.95	134.63	NA, NO	4.92	NA, NO
2015	74 959.05	10 003.21	4 243.70	5 999.84	119.52	NO, NA	5.06	NO, NA
2016	71 367.43	9 665.03	4 301.04	6 223.86	135.17	NO, NA	5.20	NO, NA
2017	74 844.84	9 914.82	4 351.00	6 179.32	125.79	NO, NA	5.01	NO, NA
Per cent change 1990–2017	**–10.2**	**–9.1**	**–41.5**	**422.4**	**–33.9**	**NA**	**71.1**	**NA**

Note: Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions.
[a] Greece did not report indirect CO_2 emissions in CRF table 6.

Table 3
Greenhouse gas emissions by sector for Greece, 1990–2017
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	76 870.29	11 226.96	10 140.24	–2 107.91	4 863.82	NO
1995	80 948.21	13 569.65	9 487.90	–2 872.37	5 150.20	NO
2000	96 674.35	15 176.41	9 146.79	–1 941.35	5 348.87	NO
2010	93 078.01	11 741.12	8 838.65	–3 043.08	4 778.71	NO
2011	91 899.13	10 406.05	8 596.46	–3 131.25	4 552.32	NO
2012	88 118.78	11 232.89	8 468.43	–3 086.12	4 326.18	NO
2013	77 766.77	11 953.25	8 404.56	–1 582.16	4 421.99	NO
2014	74 323.24	12 317.77	7 989.56	–125.78	4 482.53	NO
2015	71 024.67	11 996.39	7 846.02	–3 719.19	4 463.30	NO

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2016	66 826.79	12 502.23	7 855.69	–3 473.26	4 513.02	NO
2017	70 153.57	12 786.81	7 850.33	–3 209.10	4 630.06	NO
Per cent change 1990–2017	**–8.7**	**13.9**	**–22.6**	**52.2**	**–4.8**	**NA**

Notes: (1) Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions. (2) Greece did not report emissions/removals in the sector other (sector 6). (3) Greece did not report indirect CO_2 emissions in CRF table 6.

Table 4

Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year[a]–2017, for Greece

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[b]	*Activities under Article 3, paragraph 3, of the Kyoto Protocol*		*FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				–1 830.00				
Technical correction				210.40				
Base year	NA				NA	NA	NA	NA
2013		–135.85	47.33	–1 964.66	NA	NA	NA	NA
2014		–146.89	47.28	–1 964.66	NA	NA	NA	NA
2015		–124.41	44.90	–1 953.56	NA	NA	NA	NA
2016		–138.41	56.17	–1 922.38	NA	NA	NA	NA
2017		–80.13	52.39	–1 952.18	NA	NA	NA	NA
Per cent change base year–2017								

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

[a] Greece has elected not to report on any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol, and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

[b] The value reported in this column refers to 1990.

2. Table 5 provides an overview of key relevant data from Greece's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 5
Key relevant data for Greece under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in the 2019 annual submission

Key parameters	*Values*
Periodicity of accounting	(a) AR: commitment period accounting (b) Deforestation: commitment period accounting (c) FM: commitment period accounting (d) CM: not elected (e) GM: not elected (f) RV: not elected (g) WDR: not elected
Election of activities under Article 3, paragraph 4	None
Election of application of provisions for natural disturbances	Yes, for AR and FM
3.5% of total base-year GHG emissions, excluding LULUCF	3 764.745 kt CO_2 eq (30 117.958 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	NA
2. Deforestation	NA
3. FM	NA
4. CM	NA
5. GM	NA
6. RV	NA
7. WDR	NA

Annex II

Information to be included in the compilation and accounting database

Tables 1–5 include the information to be included in the compilation and accounting database for Greece. 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 1
Information to be included in the compilation and accounting database for 2017, including on the commitment period reserve, for Greece
($t CO_2 eq$)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
CPR	432 712 049	–	–	432 712 049
Annex A emissions for 2017	–	–	–	–
CO_2[a]	74 844 845	–	–	74 844 845
CH_4	9 914 819	–	–	9 914 819
N_2O	4 350 995	–	–	4 350 995
HFCs	6 179 319	–	–	6 179 319
PFCs	125 794	–	–	125 794
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	5 011	–	–	5 011
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources	**95 420 782**	–	–	**95 420 782**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2017	–	–	–	–
AR	–80 128	–	–	–80 128
Deforestation	52 395	–	–	52 395
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2017	–	–	–	–
FM	–1 952 175	–	–	–1 952 175

[a] The Party did not report indirect CO_2 emissions in CRF table 6.

Table 2
Information to be included in the compilation and accounting database for 2016 for Greece
($t CO_2 eq$)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions for 2016	–	–	–	–
CO_2[a]	71 367 429	–	–	71 367 429
CH_4	9 665 030	–	–	9 665 030
N_2O	4 301 043	–	–	4 301 043
HFCs	6 223 862	–	–	6 223 862
PFCs	135 168	–	–	135 168
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	5 202	–	–	5 202
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources	**91 697 733**	–	–	**91 697 733**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2016	–	–	–	–

	Original submission	*Revised estimate*	*Adjustment*	*Final*
AR	–138 411	–	–	–138 411
Deforestation	56 166	–	–	56 166
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2016	–	–	–	–
FM	–1 922 383	–	–	–1 922 383

[a] The Party did not report indirect CO_2 emissions in CRF table 6.

Table 3
Information to be included in the compilation and accounting database for 2015 for Greece
(t CO_2 eq)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions for 2015	–	–	–	–
CO_2[a]	74 959 045	–	–	74 959 045
CH_4	10 003 205	–	–	10 003 205
N_2O	4 243 697	–	–	4 243 697
HFCs	5 999 844	–	–	5 999 844
PFCs	119 522	–	–	119 522
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	5 060	–	–	5 060
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources	**95 330 374**	–	–	**95 330 374**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2015	–	–	–	–
AR	–124 406	–	–	–124 406
Deforestation	44 896	–	–	44 896
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2015	–	–	–	–
FM	–1 953 555	–	–	–1 953 555

[a] The Party did not report indirect CO_2 emissions in CRF table 6.

Table 4
Information to be included in the compilation and accounting database for 2014 for Greece
(t CO_2 eq)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions for 2014	–	–	–	–
CO_2[a]	78 649 889	–	–	78 649 889
CH_4	10 174 612	–	–	10 174 612
N_2O	4 306 098	–	–	4 306 098
HFCs	5 842 951	–	–	5 842 951
PFCs	134 634	–	–	134 634
Unspecified mix of HFCs and PFCs	NA, NO	–	–	NA, NO
SF_6	4 922	–	–	4 922
NF_3	NA, NO	–	–	NA, NO
Total Annex A sources	**99 113 106**	–	–	**99 113 106**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014	–	–	–	–
AR	–146 890	–	–	–146 890
Deforestation	47 277	–	–	47 277
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014	–	–	–	–

	Original submission	*Revised estimate*	*Adjustment*	*Final*
FM	–1 964 656	–	–	–1 964 656

[a] The Party did not report indirect CO_2 emissions in CRF table 6.

Table 5
Information to be included in the compilation and accounting database for 2013 for Greece
($t\ CO_2\ eq$)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions for 2013	–	–	–	–
CO_2[a]	81 722 580	–	–	81 722 580
CH_4	10 390 287	–	–	10 390 287
N_2O	4 514 517	–	–	4 514 517
HFCs	5 741 476	–	–	5 741 476
PFCs	172 562	–	–	172 562
Unspecified mix of HFCs and PFCs	NA, NO	–	–	NA, NO
SF_6	5 151	–	–	5 151
NF_3	NA, NO	–	–	NA, NO
Total Annex A sources	**102 546 572**	–	–	**102 546 572**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013	–	–	–	–
AR	–135 854	–	–	–135 854
Deforestation	47 334	–	–	47 334
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013	–	–	–	–
FM	–1 964 657	–	–	–1 964 657

[a] The Party did not report indirect CO_2 emissions in CRF table 6.

Annex III

Additional information to support findings in table 2 in this report

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) CO_2 emissions from CSCs in the living biomass, dead organic matter and SOC pools in grassland converted to forest land (see ID#s L.1 and L.3 in table 3 in this report);

(b) CO_2 emissions from CSCs in the SOC pool in cropland remaining cropland (see ID# L.15 in table 5 in this report).

Annex IV

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 1997. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. JL Houghton, LG Meira Filho, B Lim, et al. (eds.). Paris: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency. Available at https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html.

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

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2013, 2014, 2015, 2016 and 2017 annual submissions of Greece, contained in documents FCCC/ARR/2013/GRC, FCCC/ARR/2014/GRC, FCCC/ARR/2015/GRC, FCCC/ARR/2016/GRC and FCCC/ARR/2017/GRC, 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%202019.pdf.

Annual status report for Greece for 2019. Available at https://unfccc.int/sites/default/files/resource/GRC.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Dimitris Niavis (Ministry of Environment and Energy of Greece), including additional material on the methodology and assumptions used. The following references are reproduced as received:

Hellenic Statistical Authority. 2019. *Single Integrated Metadata Structure (SIMS v2.0)*. Available at: http://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_0qObWqzRnXSG&p_p_lifecycle=2&p_p_state.

Ministry of Environment, Energy and Climate Change. 2001. *Development of a registry on air emissions, liquid and solid wastes from industry and on air emissions from central heating installations, Final Report*. Athens: Ministry of Environment, Energy and Climate Change, Greece.

Tzamtzis I. 2019. *QA/QC Plan for the LULUCF GHG Inventory of Greece*.