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Climate Change

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Report on the individual review of the inventory submission of Turkey submitted in 2016*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual greenhouse gas (GHG) inventory covering emissions and removals of GHG emissions for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). This report presents the results of the individual inventory review of the 2016 inventory submission of Turkey, conducted by an expert review team in accordance with 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". The review took place from 17 to 22 October 2016.

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* In the symbol for this document, 2016 refers to the year in which the inventory was submitted, and not to the year of publication.

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Contents

I. Introduction

1. This report covers the review of the 2016 inventory submission of Turkey organized by the UNFCCC secretariat, in accordance with the "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" (hereinafter referred to as the UNFCCC review guidelines) and particularly part III, "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention".[1] The review took place from 17 to 22 October 2016 and was coordinated by Ms. Sevdalina Todorova and Mr. Roman Payo (UNFCCC secretariat). Table 1 provides information on the composition of the expert review team (ERT) that conducted the review of Turkey.

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

Area of expertise	Name	Party
Generalist	Ms. Jackie Mercer	Canada
	Mr. Newton Paciornik	Brazil
Energy	Mr. Pierre Boileau	Canada
IPPU	Ms. Maria Jose Lopez	Belgium
	Mr. Ioannis Sempos	Greece
Agriculture	Mr. Steen Gyldenkaerne	Denmark
	Mr. Renato Rodrigues	Brazil
LULUCF	Ms. Ana Blondel	Canada
	Mr. Erik Karltun	Sweden
	Mr. Robert Waterworth	Australia
Waste	Mr. Cristobal Felix Diaz Morejon	Cuba
	Ms. Violeta Hristova	Bulgaria
Lead reviewers	Ms. Jackie Mercer	
	Mr. Newton Paciornik	

Abbreviations: IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry.

2. This report contains findings based on the assessment by the ERT of the 2016 inventory submission against the UNFCCC review guidelines. The ERT has made recommendations to resolve those findings related to issues.[2] Other findings, and, if applicable, the ERT's encouragements to resolve them, are also included.

3. A draft version of this report was communicated to the Government of Turkey, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

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[1] Annex to decision 13/CP.20.
[2] Issues are defined in decision 13/CP.20, annex, paragraph 81.

4. An overview of the greenhouse gas (GHG) emissions reported under the Convention for Turkey is provided in annex I; table 6 shows GHG emissions with and without indirect carbon dioxide emissions for selected years, and tables 7 and 8 show GHG emissions reported under the Convention by gas and by sector, respectively.

5. The ERT notes that Turkey's 2015 inventory submission was delayed, consistent with decision 24/CP.19, paragraph 3, and decision 13/CP.20, paragraph 13. As a result, the review of the 2016 GHG inventory submission is being held in conjunction with the review of the 2015 GHG inventory submission, in accordance with decision 20/CP.21, paragraph 1. To the extent that identical information is presented in both inventory submissions, the ERT has reviewed this information only once and, as appropriate, has replicated the findings below in both the 2015 and the 2016 annual review reports.

II. Summary and general assessment of the 2016 inventory submission

6. Table 2 provides the ERT assessment of the inventory 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 Turkey

Assessment			Issue ID number(s) in table 3 and/or 5[a]
Dates of submission	Original submission: 15 April 2016 (NIR); 15 April 2016, version 5 (regenerated version from 23 September 2016) (CRF tables)		
	Revised submission: 26 May 2016 (NIR)		
	The values from the latest submission are used in this report		
Review format	Desk review		
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?		
	1. Identification of key categories	No	
	2. Selection and use of methodologies and assumptions	Yes	E.37, E.43, I.51, I.53, A.3, A.6, A.8, A.10, A.19, L.9, L.12, L.18 and W.18
	3. Development and selection of emission factors	Yes	A.10 and W.17
	4. Collection and selection of activity data	Yes	E.9, E.19, I.40, I.42, I.48, I.54, I.55, A.14, L.5 and L.6
	5. Reporting of recalculations	Yes	G.1, E.1, E.2 and L.20

Assessment			*Issue ID number(s) in table 3 and/or 5[a]*
	6. Reporting of a consistent time series	Yes	I.58 and L.21
	7. Reporting of uncertainties, including methodologies	No	
	8. Quality assurance/quality control	Yes	E.7, A.5 and L.19
	9. Missing categories/completeness[b]	Yes	E.59, I.10, I.36(b), I.42, I.45, I.49, I.56, A.15, A.17, A.20, L.1, L.6, L.15 and L.16
	10. 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?	The Party did not report "NE" for any insignificant categories	
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	E.34
National inventory arrangements	Have any issues been identified with the effectiveness and reliability of the institutional, procedural and legal arrangements for estimating GHG emissions?	Yes	L.3
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	

Abbreviations: CRF = common reporting format, ERT = expert review team, GHG = greenhouse gas, NE = not estimated, NIR = national inventory report, UNFCCC Annex I inventory reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories", Wetlands Supplement = *2013 Supplement to the 2006 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories: Wetlands.*

[a] The ERT identified additional issues in the energy, industrial processes and product use, agriculture, land use, land-use change and forestry, and waste sectors that are not specifically listed in table 2 but are included in table 3 and/or 5.

[b] Missing categories, for which methods are provided in the Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, may affect completeness and are listed in annex II.

III. Status of implementation of issues raised in the previous review report

7.   Table 3 compiles all the recommendations made in the previous review report. Owing to the unique circumstances of the 2015 inventory submission, as described in paragraph 5 above, the latest available review report was for the 2014 inventory submission,

published on 18 February 2015. For each issue, the ERT specified whether it believes the issue has been resolved by the conclusion of the review of the 2016 inventory submission and provided the rationale for its determination, taking into consideration the publication date of the previous review report and national circumstances.

Table 3
Status of implementation of issues raised in the previous review report of Turkey

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
General			
G.1	Recalculations (9, 2014) (18, 2013) (24, 2012) Transparency	Include detailed information on the performed recalculations in the specific NIR chapters and relevant CRF tables and provide explanatory information, including the rationale for the recalculations	Addressing. Turkey has improved the description of recalculations in the category-specific NIR sections and in chapter 10. However, for some categories, lack of information was still identified (see E.1, E.2 and L.20). Table 8(b) with explanation of the recalculations is not part of the CRF tables any more
G.2	QA/QC and verification (11, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Implement the QA/QC procedures envisaged in the QA/QC plan, strengthening the quality of the reporting, paying particular attention to the general and specific QC procedures of the inventory; and fully implement the recommendations related to QA/QC procedures made in previous review reports, such as: (a) Improvement of the QC procedures at all stages of inventory preparation (b) Implementation of sector-specific QA/QC procedures	Resolved. During the review, Turkey informed the ERT that a QA/QC plan was implemented for the first time for the 2015 inventory submission. Turkey has improved the description in the NIR of its QA/QC procedures and has implemented many of the previous recommendations (see I.7 and W.3). However, the transparency of the QC procedures applied needs to be improved for some sectors (see E.7 and A.5)
G.3	QA/QC and verification (11, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Ensure that all the institutions involved in the inventory preparation process realize the importance of the QC procedures and check the quality of their inputs to the inventory	Resolved. The Party informed the ERT that all involved institutions performed QC checks
G.4	Time-series consistency (12, 2014) Transparency	Provide adequate and detailed descriptions of the key drivers for the emission trends in the country	Resolved. Detailed descriptions of the emission trends were provided in the NIR (chapter 2 and the category-specific chapters)

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
G.5	Inventory planning (12, 2014) Transparency	Fully and transparently describe actions taken and decisions made during the inventory preparation process, as well as the expert judgment used for the selection of AD, EFs and methodologies	Resolved. The transparency of Turkey's inventory has significantly improved, with a detailed description of institutional arrangements (NIR, section 1.2). However, the transparency of information for some categories still needs improvement (see G.1, E.4, E.7, E.23, E.26, E.34, E.44, E.54, E.57, E.60, A.4, A.11, L.10, L.13, L.17 and L.20)
G.6	CRF (12, 2014) (35, 2013) (58, 2012) (55, 57, 62, 63 and 108(b), 2011) Transparency	Report emissions for the categories with confidential data by aggregating them at a more appropriate category level	Resolved. The emissions for categories with confidential data were reported at the appropriate level (see I.5)
G.7	NIR (12, 2014) (74, 2013) (94, 2012) Not an issue	More closely follow the annotated NIR outline structure, including the provision of appropriate category-specific information	No longer relevant. Following the NIR outline is not a mandatory requirement according to decision 24/CP.19; however, Parties are encouraged to follow it. The outline was more closely followed by Turkey in its latest inventory submission
G.8	Key category analysis (16 and table 4, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Improve the key category analysis by providing the trend analysis, and adhere closely to the recommendations of the relevant IPCC guidance, for example by including the categories that are currently reported as "NE", and use the results to prioritize inventory improvements	Resolved. Trend analysis has been included and the completeness of the key category analysis has improved. Information on how Turkey uses the results to prioritize inventory improvements is not a mandatory requirement in decision 24/CP.19
G.9	Key category analysis (16, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Perform a qualitative key category analysis for the categories currently aggregated in the category other under the industrial processes sector for confidentiality reasons, and include the results of this analysis	No longer relevant. Turkey reported most emissions for confidential categories at a disaggregated level, and they are included separately in the key category analysis
G.10	Uncertainty analysis (17 and table 4, 2014) Adherence to UNFCCC Annex I inventory reporting	Perform the uncertainty analysis both on the total level of emissions and the trend, including and excluding LULUCF, in accordance with the recommendations in the relevant IPCC guidance, in particular by disaggregating the LULUCF sector into the relevant categories and using country-specific uncertainty values	Resolved. The uncertainty analysis was correctly performed, including for LULUCF categories. Adequate information has been provided (see NIR, section 1.6 and the

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
	guidelines	or default values, where appropriate, together with adequate expert judgment and transparently documented considerations and assumptions made during the analysis	subsections under individual categories) to support the assumptions made. The recommendation of applying the analysis without LULUCF is not a mandatory requirement in decision 24/CP.19 or in the 2006 IPCC Guidelines
G.11	Uncertainty analysis (17, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Use the results of the uncertainty analysis to prioritize improvements to the inventory	Not resolved. There is no information in the NIR on how Turkey uses the results of the uncertainty analysis to prioritize improvements to the inventory

Energy

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
E.1	1. General (energy sector) (24, 2014) Transparency	Address the problem of the unrecorded recalculation on marine bunkers by revising the CRF tables, providing sufficient explanation in the NIR and further checking the impact of this recalculation on the emission estimates for navigation and total GHG emissions	Not resolved. There is no information in the NIR on recalculations made for marine bunkers
E.2	1. General (energy sector) (24, 2014) (18, 2013) Transparency	Include a separate section in the energy chapter of the NIR providing all detailed information on, and the rationale for, recalculations	Addressing. In addition to the category-specific sections on recalculations in chapter 3, there is a separate section on energy included in chapter 10 (recalculations and improvements). However, very little information is provided in the NIR on how recalculations were made, including the results compared with previous emission estimates, the rationale and the impact of recalculations
E.3	1. General (energy sector) (25, 2014) (19, 2013) Transparency	Provide detailed data on the EFs and AD for key categories in the NIR with a clear description of the sources of these data and how and why they change throughout the time series	Resolved. Quantitative information is provided on AD (annexes 3 and 4 to the NIR) and EFs (table 3.12 of the NIR). Chapter 3 of the NIR also provides information on the IPCC or country-specific EFs used and information is provided on these EFs and why they were chosen
E.4	1. General (energy sector) (25, 2014)	Provide transparent explanations of the methodologies used to estimate the emissions from the energy sector	Addressing. The Party has provided detailed explanations of the estimation

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
	Transparency		methodologies for the categories in the energy sector. For some pending issues on the transparency of the methodologies provided, see E.54
E.5	1. General (energy sector) (27, 2014) Completeness	Include emission estimates for the mandatory categories:	Resolved. Improvements have been made to the reporting, as indicated below:
		(a) CO_2, CH_4 and N_2O emissions from liquid fuels used as auxiliary fuels in public electricity and heat production	Resolved. With the collection of plant-specific fuel consumption data, information is now available on residual fuel oil, diesel oil and biogas that is consumed at power generation facilities. Emissions were calculated accordingly using tier 2 or 3 methodologies
		(b) CO_2, CH_4 and N_2O emissions from manufacture of solid fuels and other energy industries	Resolved. The emissions are included in the submission
		(c) CO_2, CH_4 and N_2O emissions from other transportation	Resolved. The emissions from other transportation are included in the submission
		(d) CO_2, CH_4 and N_2O emissions from liquid fuels in petroleum refining	Resolved. The emissions from liquid fuels are included in the inventory
		(e) CH_4 fugitive emissions from distribution of natural gas	Resolved. The CH_4 emissions are reported
		(f) CO_2, CH_4 and N_2O emissions from other fuels (waste) co-fired in cement industry under manufacturing industries and construction	Resolved. The measurement of stack gas emissions is required under European Union incineration of waste directive 2000/76/EC. Data from this measurement and testing are used in the inventory for 2004 to 2014
		(g) CO_2, CH_4 and N_2O emissions from aviation and marine bunkers	See E.18
		(h) CO_2 fugitive emissions from coal mining activities	No longer relevant. The reporting of CO_2 emissions from coal mining is not mandatory

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
E.6	1. General (energy sector) (28, 2014) Accuracy	Use country-specific EFs and parameters for all fuels, in particular for the key categories, and particularly develop country-specific carbon content values for lignite and natural gas	Resolved. Turkey has made important efforts to use country-specific EFs for the major fuels used in the country and for the power generation and refining sectors (see E.25, E.27 and E.28)
E.7	1. General (energy sector) (29, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Implement strong QC procedures to avoid mistakes and input errors	Addressing. Turkey has made important efforts to improve QA/QC, but there is little transparency on what type of QA/QC procedures have been used. It appears that outlier testing is the main QA/QC procedure, but there is insufficient information on the implementation of the QA/QC plan for the sector
E.8	1. General (energy sector) (29, 2014) Accuracy	Ensure the correct choice of NCVs and EFs	Resolved. The Party has used more country-specific data on EFs and NCVs taken directly from end users
E.9	1. General (energy sector) (29, 2014) Accuracy	Enable and improve an appropriate data-collection system and enhance cooperation among relevant stakeholders to improve the quality of the energy balance	Addressing. During the review, Turkey reported on a capacity-building project[c] for improving the energy data from the energy balance and also approaches to integrating facility-level data from the power generation and refining sectors. More detail on this project would be needed to explain the improvements made to the national energy balance and data collection
E.10	1. General (energy sector) (10 and 30, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Revise and correct all inconsistent and incorrect uses of notation keys	Resolved. Turkey's use of the notation keys seems to have improved significantly since its previous inventory submission and the specific issues listed in paragraph 30 of the previous review report have been resolved
E.11	1. General (energy sector) (31, 2014) (20, 2013) Adherence to UNFCCC Annex I inventory reporting	Strengthen efforts to address the recommendations made in the previous review reports and implement the recommended improvements to the extent possible	Resolved. Turkey has made important improvements through the capacity-building project[c] to address previous recommendations

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
	guidelines		
E.12	Fuel combustion – reference approach (33, 2014) Not an issue	Make the necessary efforts to understand all the reasons for the differences in the estimates between the sectoral and reference approaches and correct these estimates where necessary	No longer relevant. Comparison of the sectoral and reference approaches is not a mandatory requirement in decision 24/CP.19. The differences are explained with the AD and NCVs collected directly from end users for the sectoral approach (see E.49)
E.13	Fuel combustion – reference approach – all fuels – CO_2 (34, 2014) Comparability	Revise the reporting in the relevant cells in CRF table 1.A(c) (namely report values for apparent energy consumption (excluding NEU and feedstocks))	Resolved. Turkey has made important improvements in the reporting of CRF table 1.A(c) to ensure consistency between tables 1.A(b) and 1.A(c), and table 1.A(c) now includes values for apparent energy consumption (excluding NEU and feedstocks)
E.14	Fuel combustion – reference approach – all fuels – CO_2 (35, 2014) Accuracy	Revise the reference approach calculation for the year 2011 and include the updated information in the inventory submission, as well as improve QC procedures	Resolved. The calculations for 2011 have been revised, and the difference in estimated CO_2 emissions between the reference and sectoral approaches for 2011 in the 2016 inventory submission is 1.68% (8.11% in the 2014 inventory submission)
E.15	Fuel combustion – reference approach – (36, 2014) (23, 2013) (41, 2012) (37, 2011) Not an issue	Investigate further the reasons for discrepancies with IEA data and minimize them, make good progress in the harmonization of the national energy balance with the IEA and Eurostat data sets and provide information in this regard, and revise the relevant notation keys used in the CRF tables for the reference approach	No longer relevant. Comparison with IEA data is not a mandatory requirement in decision 24/CP.19. The Party reported ongoing work on the harmonization of the national energy balance with the IEA and Eurostat data sets. For additional information on comparison with IEA data, see E.50, E.51 and E.52
E.16	Fuel combustion – reference approach (37, 2014) Consistency	Revise the calorific value used for natural gas for the period 1990–2010 in the reference approach and ensure the consistency of these data for the complete time series	Resolved. There do not appear to be deficiencies in natural gas data in this submission. The calorific value has been revised and the time series recalculated
E.17	International bunkers and multilateral operations	Make all necessary efforts to develop a sound technical and consistent approach for disaggregating fuel use for domestic and international activities	No longer relevant. Separate reporting of international bunkers is not a mandatory

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
	(38, 2014) Not an issue		requirement according to decision 24/CP.19. Parties should make every effort to both apply and report according to the methods contained in the 2006 IPCC Guidelines and Turkey has made such efforts (see E.52 and E.53)
E.18	International bunkers and multilateral operations (27 and 38, 2014) (24, 2013) (42, 2012) (39, 2011) Completeness	Report emission estimates for international bunker fuels for the entire time series	Resolved. Emissions from both aviation and marine bunker fuels were reported for the entire time series (CRF table 1.D)
E.19	International bunkers and multilateral operations (39, 2014) (25, 2013) Accuracy	Determine a reliable data source for international bunker fuels and improve time-series consistency	Addressing. Turkey has made efforts to define a reliable data set for international bunker fuels working with all relevant institutions. It used AD from its national energy balance; however, adjustments may be necessary to provide a data series fully in line with the IPCC definitions
E.20	International bunkers and multilateral operations (39, 2014) Accuracy	Revise the EFs for CH_4 and N_2O and the calculation inputs for the emission estimates for aviation and marine bunkers for the whole time series	Resolved. Revisions have been made to the CH_4 and N_2O EFs for international bunker fuels for the entire time series
E.21	International bunkers and multilateral operations (40, 2014) (25, 2013) (43, 2012) (40, 2011) Adherence to UNFCCC Annex I inventory reporting guidelines	Improve the consistency between CRF tables 1.C and 1.A(b), harmonize and correct the information reported in these tables and apply QC measures to the estimates	Addressing. Consistency has been improved across CRF tables 1.A(b) and 1.D (CRF table 1.C previously), suggesting that QC measures have been applied
E.22	Feedstocks, reductants and other NEU of fuels – CO_2 (41, 2014) (26, 2013) (44, 2012) (41, 2011) Consistency	Revise the use of the notation key "NA" (e.g. use the notation key "IE" in CRF tables 1.A(d) and 1.A(b) for fuel types that are known to be used as feedstock but because their respective AD are not possible to disaggregate, they are reported aggregated, such as lubricants) and provide relevant information in the additional information boxes of these CRF tables	Resolved. The notation keys were correctly used in CRF tables 1.A(b) and 1.A(d)

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
E.23	Feedstocks, reductants and other NEU of fuels – CO_2 (41, 2014) Transparency	Provide information on feedstocks and NEU of coking coal	Addressing. The NEU of coking coal is reported as "NO" for the entire time series and there is no information on the NEU of coking coal in NIR section 3.2.3. However, data on other bituminous coal and coke oven/gas coke as feedstock for the metal industry were provided
E.24	1.A.1.a Public electricity and heat production – liquid, solid and gaseous fuels – CO_2 (27 and 42, 2014) Comparability	Disaggregate emissions from auto producers and manufacture of solid fuels from public electricity and heat production in line with the relevant IPCC guidance, and, if this is not possible, provide a clear description and explanations in the NIR and relevant CRF tables, including CRF table 9(a)	Resolved. Turkey reported emissions from manufacture of solid fuels and other energy industries separately, and auto-producer emissions were allocated to the correct categories rather than reported aggregated in CRF table 1.A(a)
E.25	1.A.1.a Public electricity and heat production – liquid, solid and gaseous fuels – CO_2 (43, 2014) Accuracy	Use country-specific carbon content factors consistent with the country-specific NCVs for the fuels used in the public electricity and heat production category and in the energy sector activities in general	Resolved. Country-specific EFs were used in the estimation of power generation emissions and in general for the sector
E.26	1.A. Fuel combustion – sectoral approach – liquid, solid and gaseous fuels – CO_2 (44, 2014) Transparency	Include all information on the country-specific data (NCV) used for public electricity and heat production, enabling comparison with the IPCC default values, and improve transparency and enhance efforts to ensure the consistency of the NIR (on the sources of AD)	Resolved. Further information was provided on the value and origin of the country-specific EFs and the average NCV of fuels used (NIR table 3.13) in the inventory, but more quantitative information would further enhance the transparency of the reporting of AD (see E.55)
E.27	1.A.1.a Public electricity and heat production – liquid, solid and gaseous fuels – CO_2 (45, 2014) Accuracy	Revise the emission estimates for public electricity and heat production to address the calculation mistakes leading to the instability of the CO_2 IEF, and substantially improve the corresponding QC procedures	Resolved. Turkey used plant-specific AD and EFs to calculate emissions from the public electricity and heat production sector and reported a consistent time series
E.28	1.A.1.a Public electricity and heat production – liquid, solid and gaseous fuels – CO_2 (46, 2014)	Carefully re-examine the NCV used for lignite in public electricity and heat production, provide transparent explanations and revise the emission calculations for this category	Resolved. Turkey has tested and obtained country-specific EFs for lignite and is now categorizing its lignite as "Turkey lignite" because its calorific value is much lower

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
	Accuracy		than that of other types of lignite. The entire time series has been revised
E.29	1.A.1.b Petroleum refining – liquid and gaseous fuels – CO_2 (26, 27 and 47, 2014) Accuracy	Check energy consumption (liquid fuel) for the petroleum refining category to avoid any omission, revise the estimates and provide clear explanations in the NIR	Resolved. The time series of liquid fuels for petroleum refining has been corrected and the trend for liquid fuel use was provided in the NIR (section 3.2.4.2)
E.30	1.A.1.b Petroleum refining – gaseous fuels – CO_2 (48, 2014) Accuracy	Correct the 2011 consumption values of natural gas for the petroleum refining category and improve QC procedures	Resolved. The plant-specific data reported in the submission appear to be more accurate than previous AD, and the detected errors in the previous submission have been corrected, suggesting also that QC procedures have been improved
E.31	1.A.2 Manufacturing industries and construction – liquid, solid and gaseous fuels – CO_2 (49, 2014) Transparency	Check the AD and EFs used in the emission estimates for manufacturing industries and construction, in particular for the period 2007–2012, and provide information on trends and any explainable changes (e.g. the global financial crisis in 2008)	Resolved. The ERT noted a recalculation for the category, as well as for the various subcategories and fuels affecting the emissions for the category. The NIR (section 3.1) provides information on the reasons for the observed trend in the emissions in the period 1990–2014. However, the information presented in the NIR is not sufficient to explain the influence of the recalculations on the trends (see E.2)
E.32	1.A.1.c Manufacture of solid fuels and other energy industries –gaseous fuels – CO_2 (50, 2014) Accuracy	Correct mistakes in the consumption values for natural gas, check all AD relevant to gaseous fuels across the inventory and revise these systematic problems to improve the time-series consistency and accuracy of the emission estimates	Resolved. The gaseous fuel data seem to be more accurate than in previous submissions and the CO_2 IEF time series is comparable with the IEFs reported by other Parties
E.33	1.A.2 Manufacturing industries and construction – liquid, solid and gaseous fuels – CO_2 (51, 2014) Transparency	Revise the fuel allocation among categories (petroleum coke) and the EFs and AD used across the categories under manufacturing industries and construction to improve time-series consistency, and improve QC procedures	Resolved. The AD, EFs and fuel allocation between fuel groups and across sectors have been revised, resulting in improved consistency of the time series, also suggesting that the QC procedures have been improved

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
E.34	1.A.2 Manufacturing industries and construction – liquid, solid and gaseous fuels – CO_2 (51, 2014) Transparency	Provide sufficient information on the inter-annual changes in the CO_2 EFs in the NIR	Not resolved. There is insufficient information provided in the NIR on the inter-annual changes in the CO_2 EFs
E.35	1.A.2 Manufacturing industries and construction – liquid, solid and gaseous fuels – CO_2 (52, 2014) Comparability	Maintain the comparability of CRF table 1.A(a) without too much disaggregation under the category other by reallocating fertilizer to chemicals, road motor vehicles to road transportation and sugar to food processing, beverages and tobacco, while at the same time providing information on all these disaggregated subcategories in the NIR	Resolved. The allocation of emissions across categories has been improved and the relevant information is provided in the NIR (section 3.2)
E.36	1.A.2 Manufacturing industries and construction – liquid, solid and gaseous fuels – CO_2 (10 and 53, 2014) Comparability	Revise the allocation of CO_2 emissions by disaggregating combustion and process emissions accordingly, and include a carbon mass balance for iron and steel production	Resolved. The Party provided a carbon mass balance, emission allocations for iron and steel production have been revised and the emissions are correctly allocated across the energy and IPPU sectors (see I.33)
E.37	1.A.4 Other sectors – liquid, solid and gaseous fuels – CO_2 (54, 2014) Comparability	Revise the emission estimates by reallocating the diesel oil used for agricultural purposes to this subcategory by using assumptions based on the historical trend of the ratio of diesel oil used for agriculture against the total diesel oil used in the country, and provide clear explanations in the NIR	Not resolved. The Party informed the ERT that there are problems with disaggregating diesel oil and that part of off-road diesel is still reported under road transportation
E.38	1.A.4.b Residential – solid fuels – CO_2 (55, 2014) Accuracy	Correct the errors in the CH_4 IEF (CH_4 emissions from wood and residue were aggregated under solid fuels prior to 2005, leading to significant inter-annual fluctuations in the trend) and revise the CH_4 emission estimates	Resolved. Emissions from biomass previously reported under solid fuels are now correctly allocated for the entire time series
E.39	1.A.3.a Domestic aviation – liquid fuels – CO_2 (56, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Improve the QC procedures by further checking the AD to avoid any mistyping and input errors	Resolved. Efforts are being made to improve QC, and errors and mistyping have been minimized, although there is very little detail on the new QC procedures provided in the NIR (see E.7)
E.40	1.A.3.a Domestic aviation – liquid fuels – CO_2 (56, 2014) Transparency	Provide more supporting information to explain fluctuations in AD, such as passenger and freight turnover, across the time series	Resolved. Time-series data still vary significantly but some explanation of the variations in the trends is included in the NIR (e.g. financial crisis in 2008, section 3.2.6)

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E.41	1.A.3.a Domestic aviation – liquid fuels – CO_2 (57, 2014) Accuracy	Revise the CO_2 EFs for jet kerosene for 2002 and 2003 and improve QC procedures to avoid mistakes in data input	Resolved. Corrections have been made to the CO_2 EFs for jet kerosene for 2002 and 2003, suggesting that QC procedures have been improved
E.42	1.A.3.b Road transportation – liquid fuels – CO_2 (58, 2014) Accuracy	Use country-specific NCVs and carbon content factors for the fuels used in the country in order to estimate CO_2 emissions for this category	Resolved. CO_2 emissions were calculated using country-specific data
E.43	1.A.3.b Road transportation – liquid fuels – CH_4 and N_2O (58, 2014) Accuracy	Move to a higher-tier method for calculating N_2O (and CH_4) emissions, as it is likely that this will be a key category if using appropriate EFs	Addressing. According to the information provided by the Party, country-specific carbon content factors for diesel and natural gas are already used in the estimation of GHG emissions from road transportation. To gain accurate data, the Party is working with TUVTURK Vehicle Inspection Stations, where vehicle-kilometres travelled are registered during periodic inspections of vehicles, and it is planning to use these data to estimate GHG emissions using a tier 2 method as soon as the data have been verified
E.44	1.A.3.b Road transportation – liquid fuels – CO_2, CH_4 and N_2O (58, 2014) (30, 2013) (50, 2012) (44, 2011) Transparency	Improve the transparency of the NIR on the methods applied for estimating emissions from road transportation	Not resolved. The NIR (section 3.2.6.2) does not provide enough detail on the estimation approach applied for the category, indicating only that tier 1 and 2 methods are used, without providing further information per gas or subcategory
E.45	1.A.3.b Road transportation – liquid fuels – CO_2, CH_4 and N_2O (59, 2014) Accuracy	Revise and improve the method used to estimate vehicle-kilometres travelled and all the other parameters to be used when a higher-tier estimation method is applied	Not longer relevant. The Party has not yet implemented a tier 2 method (see E.43)
E.46	1.B.1.a Coal mining and handling – solid fuels – CO_2 and CH_4 (60, 2014)	Use statistical data available from the Directorate General of Mining Affairs and Lignite Authority or any other relevant source	Resolved. Emissions have been recalculated using official data for surface and underground coal production from the

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	Accuracy		Ministry of Energy and Natural Resources
E.47	1.B.2 Oil and natural gas and other – liquid fuels – CO_2 and CH_4 (61, 2014) Transparency	Include all category-specific AD and CO_2 and CH_4 IEFs in CRF table 1.B.2 and the NIR	Resolved. CRF table 1.B.2 is now transparently completed, including information on AD and CO_2 and CH_4 IEFs. Additional information is provided in section 3.3.2 of the NIR
E.48	1.B.2 Oil and natural gas and other – gaseous fuels – CO_2 (27 and 62, 2014) (32, 2013) (52, 2012) (32, 2011) Completeness	Initially estimate and recalculate fugitive emissions from distribution of natural gas using tier 1 EFs	Resolved. Fugitive emissions from natural gas distribution have been calculated for the entire time series and reported in CRF table 1.B.2
IPPU			
I.1	2. General (IPPU) (63, 2014) Transparency	Improve the explanations for and transparency of the information provided on recalculations	Resolved. Turkey has improved its explanations of recalculations from previous inventory submissions, showing that it is committed to a continuous improvement process
I.2	2. General (IPPU) (66, 2014) Completeness	Establish data-collection methods for those categories currently missing or partly missing from the inventory and estimate and report emissions for these categories, including:	Resolved. Turkey has provided estimates for most of the missing categories:
		(a) CO_2 emissions from captive lime of sugar facilities	See I.10. See also I.49 in table 5
		(b) CO_2 emissions from soda ash production	See I.11
		(c) CO_2 emissions from steel production for 1990–2009	See I.29
		(d) CO_2 emissions from ferroalloys production	See I.36
		(e) SF_6 from aluminium and magnesium foundries	See I.38
		(f) HFCs and PFCs from foam blowing	See I.40
		(g) HFCs and PFCs from fire extinguishers	See I.43
		(h) HFCs and PFCs from aerosols/metered dose inhalers, solvents, other application using ozone-depleting substance substitutes and semiconductor	See I.40. See also I.57 in table 5

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		manufacture	
		(i) CO_2 and N_2O emissions from solvent and other product use	See I.45
I.3	2. General (IPPU) (66, 2014) Completeness	Implement the plans for new categories and F-gases	Resolved. The Party used PRODCOM[d] statistics as AD to improve the completeness of the inventory and provided estimates for new categories such as lead and zinc production. For remaining issues, see I.55 and I.56
I.4	2. General (IPPU) (67, 2014) (36, 2013) Transparency	Improve documentation on the industrial processes sector inventory by providing a clear explanation of the methods, EFs and AD applied for all categories, especially for the key categories and the categories reported as "IE" and/or "C", and replace, as far as possible, the notation keys used in the CRF tables with values	Resolved. The Party has greatly improved the transparency of its inventory by, for example, providing more detailed information on ammonia production (see I.18)
I.5	2. General (IPPU) (67, 2014) Transparency	For the categories that are confidential and the emissions or AD are reported as "IE", include in the NIR information on and explanations of the trends and the AD (e.g. in relative values) as well as a description of the methods and EFs and the sources	Resolved. The Party has greatly improved the transparency of its reporting of confidential categories, including information on the trends and methodologies used in chapter 4 of the NIR
I.6	2. General (IPPU) (68, 2014) Accuracy	Continue efforts to improve the accuracy of the inventory and use higher-tier methods for the key categories	Resolved. The Party has used higher-tier methods for some key categories, such as iron and steel production, and is currently collecting data to use higher-tier methods for other key categories such as cement production. For pending application of higher-tier methods, see I.8
I.7	2. General (IPPU) (69, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Implement QA/QC activities for the industrial processes sector by: (a) Cross-checking the emission estimates on an annual basis against independent sources (e.g. by comparing the AD with related national statistics) (b) Recording the results of such comparisons, including explanations for any discrepancies (c) Creating additional tools for QC (e.g. automatic generation of graphs with trends to detect significant or unusual changes) (d) Using staff not involved in the inventory	Resolved. QA/QC procedures are explained and applied for the most important categories of the IPPU sector in accordance with the QA/QC plan implemented for the 2015 and 2016 inventory submissions

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		compilation process to undertake checks, including additional external checks by industry or industrial associations	
I.8	2.A.1 Cement production – CO_2 (70, 2014) (37, 2013) (62, 2012) (51, 2011) Accuracy	Use a tier 2 method and collect plant-specific data (CaO content in clinker, and if possible cement kiln dust, and corresponding country-specific EFs) for estimating CO_2 emissions from cement production	Resolved. Turkey has 50 cement plants that produce clinker. In 2015, Turkey collected CaO content in clinker data from a sample and obtained an average CaO content lower than the default CaO content in the 2006 IPCC Guidelines. Thus, the default CaO content was used. Currently, data-collection studies are ongoing for all cement plants to obtain CaO content, and there is a new data source with verified emissions and EFs from all Turkish cement plants
I.9	2.A.2 Lime production – CO_2 (71, 2014) Comparability	Report CO_2 emissions from lime production separately from emissions from dolomite use	Resolved. The Party has reported CO_2 emissions from lime production separately from emissions from dolomite use
I.10	2.A.2 Lime production – CO_2 (66 and 72, 2014) Completeness	Include captive lime production emissions in the estimates for this category	Not resolved. In Turkey, lime is produced in the sugar industry and the CO_2 is used for refining sugar. It is assumed that no CO_2 is released into the atmosphere from lime production in sugar production plants. Similarly, the lime produced for soda ash production is also assumed to be non-emissive as all the CO_2 produced in the lime production is used in the process. The ERT considers that the approach is not in line with the 2006 IPCC Guidelines (see I.47). The Party informed the ERT that, for its next inventory submission, it plans to separate captive lime and marketed lime data and calculate the emissions accordingly

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I.11	2.A.4 Other process uses of carbonates – CO_2 (79, 2014) Comparability	Report emissions from the consumption of carbonates under the category where the carbonates are consumed and the CO_2 is emitted, in accordance with the relevant IPCC guidance	Resolved. The allocation of emissions is in accordance with the 2006 IPCC Guidelines
I.12	2.A.4 Other process uses of carbonates – CO_2 (79, 2014) Transparency	Report the estimates for the other sources using dolomite and limestone, where confidentiality has to be maintained, under the category other (mineral products)	Resolved. Turkey reported emissions from the consumption of carbonates under the category where the carbonates are consumed, and for other uses they are reported under other process uses of carbonates, in line with the 2006 IPCC Guidelines
I.13	2.A.4 Other process uses of carbonates – CO_2 (82, 2014) Accuracy	Check the AD and revise the estimates for soda ash use, if necessary, or provide an explanation of the emission trend in the NIR	Resolved. The Party has reported AD for and CO_2 emissions from soda ash use and provided explanations in the NIR (section 4.2.4.2)
I.14	2.A.4 Other process uses of carbonates – CO_2 (83, 2014) Comparability	Allocate emissions from soda ash use in glass production to the respective subcategory in the CRF tables and allocate emissions from soda ash use to other end-use industrial activities under the soda ash use subcategory	Resolved. The allocation follows the 2006 IPCC Guidelines and emissions from glass production were reported separately
I.15	2.A.4 Other process uses of carbonates – CO_2 (83, 2014) Transparency	Report the estimates for the other sources using soda ash, where confidentiality has to be maintained, under the category other (mineral products)	Resolved. Turkey reported emissions from the consumption of carbonates under the category where the carbonates are consumed, and for other uses they are reported under category 2.A.4, in line with the 2006 IPCC Guidelines
I.16	2.A.4 Other process uses of carbonates – CO_2 (79, 2014) Transparency	Provide more information in the NIR on the methodology applied for limestone and dolomite use, data sources used and assumptions made for estimating emissions, including graphical representations of trends (in relative values if the information is confidential)	Resolved. The Party has included methodological and trend information in the NIR (section 4.2.4)
I.17	2.A.4 Other process uses of carbonates – CO_2 (80–83, 2014) Transparency	Provide more information in the NIR on the data sources used for soda ash production and use, the methodology applied and the assumptions made for estimating emissions	Resolved. The Party has included relevant methodological information in the NIR (sections 4.2.3, 4.2.4 and 4.3.7)
I.18	2.B.1 Ammonia production – CO_2 (85, 2014) (47, 2013)	Allocate emissions under other (chemicals) in the CRF tables and provide more information in the NIR on the data sources used, the methodology applied and the assumptions made for estimating emissions, including graphical representations of trends (in relative values if	Resolved. CO_2 emissions were separately reported under ammonia production and the Party provided more information in the NIR (section

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	Transparency	the information is confidential)	4.3.1) on the data sources used, the methodology applied and the assumptions made for estimating emissions, including graphical representations of trends
I.19	2.B.1 Ammonia production – CO_2 (86, 2014) Accuracy	Collect information on natural gas used as feedstock and as fuel in the ammonia production plant and separate the process and combustion emissions	No longer relevant. In line with the 2006 IPCC Guidelines, the Party has reported all emissions under the IPPU sector and deducted the natural gas used as AD in the energy sector
I.20	2.B.2 Nitric acid production – CO_2 (87, 2014) (48, 2013) (74, 2012) (58, 2011) Transparency	Report confidential emissions aggregated under other (chemical industry)	Resolved. The Party has reported N_2O emissions from nitric acid separately
I.21	2.B.2 Nitric acid production – CO_2 (88, 2014) Accuracy	Correct the mistake in the N_2O emission estimates in the CRF tables, report the corresponding revised estimates and implement QA/QC procedures	Resolved. The Party has corrected the mistake in the CRF tables for the time series, suggesting that QA/QC procedures have been improved
I.22	2.B.2 Nitric acid production – CO_2 (88, 2014) Accuracy	Investigate the use of abatement technologies in the industrial plants and prepare accurate emission estimates accordingly	Resolved. The Party has reported emission estimates according to the technologies in use in the country; abatement is not used in two of the three plants (NIR, page 163)
I.23	2.B.2 Nitric acid production – CO_2 (89, 2014) Transparency	Provide more information in the NIR on the data sources used, methodology applied and assumptions made for estimating emissions, including graphical representations of trends (in relative values if the information is confidential)	Resolved. The information is included in the NIR (section 4.3.2)
I.24	2.B.5 Carbide production – CO_2 (90, 2014) Transparency	Reallocate the estimates for calcium carbide production to other (chemicals) in the CRF tables and provide more information in the NIR on the methodology applied, the data sources used and the assumptions made for estimating emissions, including graphical representations of trends	Resolved. CO_2 emissions from calcium carbide production were reported separately and the relevant information is included in the NIR (section 4.3.5)
I.25	2.B.5 Carbide production – CO_2 (91, 2014)	Validate and double check the AD for calcium carbide production for the complete time series, provide the missing estimates if emissions occurred in the country (for 2005 onwards) and include explanations for the	Resolved. The Party has estimated the emissions for the entire time series and included trend information in the NIR

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	Accuracy	emission trend in the NIR	(section 4.3.5)
I.26	2.B.7 Soda ash production – CO_2 (66 and 81, 2014) Completeness	Report estimates for soda ash production and provide information in the NIR on the data sources used, methodology applied and assumptions made for estimating emissions	Resolved. The Party has reported emissions from soda ash production and included relevant information in the NIR (section 4.3.7)
I.27	2.B.10 Other (chemical industry) – CO_2 and CH_4 (92, 2014) Transparency	Provide in the NIR more information on the methodology applied for carbon black, ethylene, dichloroethylene, styrene, methanol and other chemicals, the assumptions made for estimating emissions and the data sources used, including graphical representations of trends (in relative values if the information is confidential), and allocate these emissions under other (chemical industry) in the CRF tables	Resolved. The Party has separately reported CO_2 emissions from petrochemical manufacturing under category 2.B.8, including detailed explanations in the NIR (section 4.3)
I.28	2.B.10 Other (chemical industry) – CH_4 (92, 2014) Accuracy	Validate and double check the AD on styrene production for the complete time series, provide the missing estimates if emissions occurred in the country and include explanations for the emission trend in the NIR	Not resolved. The ERT notes that the 2006 IPCC Guidelines do not provide a methodology for styrene production. However, the Party has to continue reporting the CH_4 emissions reported in previous inventories
I.29	2.C.1 Iron and steel production – CO_2 (74, 2014) (41, 2013) Consistency	Carefully revise the time series for the iron and steel production category under both sectors (energy and industrial processes and product use), allocating the emissions in accordance with the UNFCCC reporting guidelines	Resolved. Emissions are allocated in accordance with the 2006 IPCC Guidelines
I.30	2.C.1 Iron and steel production – CO_2 (66 and 74, 2014) (41, 2013) Transparency	Include, in the NIR, an emission trend analysis once the entire time series of iron and steel production process emissions has been revised and estimated	Resolved. Trend information is included in the NIR (section 4.4.1)
I.31	2.C.1 Iron and steel production – CO_2 (75, 2014) Consistency	Ensure that the energy and industrial processes experts compiling the inventory for this category work together and use a single and common data source with the most accurate data available, sharing information from questionnaires from individual plants, and elaborate the estimates accordingly	Resolved. The Party has used a common data source and consistency between the energy and IPPU sector estimates was ensured
I.32	2.C.1 Iron and steel production – CO_2 (76, 2014) Accuracy	Implement a correction to the AD for coke for 2012, ensure time-series consistency and implement QA/QC procedures	Resolved. The AD for 2012 were corrected and the Party reported a consistent time series for the category, suggesting that QC procedures have been implemented

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I.33	2.C.1 Iron and steel production – CO_2 (77, 2014) (42, 2013) Transparency	Reallocate CO_2 emissions from coke production from this category to the category manufacture of solid fuels and other energy industries under the energy sector, and clearly explain the reallocation in the NIR	Resolved. CO_2 emissions were properly allocated in the CRF tables and this reallocation was documented in the NIR (page 338)
I.34	2.C.1 Iron and steel production – CO_2 (78, 2014) Transparency	Provide a quantitative and qualitative carbon mass balance for the three integrated production plants, showing all inputs and outputs of the different processes related to iron and steel production, with the aim of clearly demonstrating which reducing agents and fuel sources are consumed for coke, sinter, and iron and steel production, demonstrating that no double counting or omission of emissions has occurred, and improve the transparency of the reporting	Resolved. The Party has provided a qualitative carbon mass balance in the NIR (section 4.4.1). During the review, the confidential quantitative carbon mass balance for the three integrated production plants was provided to the ERT
I.35	2.C.2 Ferroalloys production – CO_2 (93, 2014) (51, 2013) (79, 2012) Completeness	Report the missing estimates, clearly describe in the NIR where combustion and process-related emissions are reported and also describe the methods, EFs and AD used for the estimates	Resolved. The Party has estimated CO_2 emissions from ferroalloys production and elaborated on the explanation of the estimations for the category in the NIR (section 4.4.2)
I.36	2.C.3 Aluminium production – CO_2 and PFCs (66 and 94, 2014) (52, 2013) Completeness	Allocate emissions for the whole time series under the category other (metal production) to maintain confidentiality: (a) CO_2 (b) PFCs	Resolved. CO_2 emissions from aluminium production were reported separately Not resolved. CF_4 and C_2F_6 emissions were reported as "NE"
I.37	2.C.3 Aluminium production – CO_2 and PFCs (94, 2014) (52, 2013) Transparency	Clearly describe the methods, EFs and AD used for the estimates of both CO_2 and PFC emissions, as well as provide an explanation of the trend in the IEFs in the NIR	Resolved. The Party has implemented this recommendation for CO_2 emissions. For the remaining issues with the reporting of PFC emissions, see I.53
I.38	2.C.3 Aluminium production and 2.C.4 Magnesium production – SF_6 (66 and 95, 2014) (52, 2013) (82, 2012) (63, 2011) Completeness	Estimate and report complete SF_6 emissions from aluminium and magnesium foundries, aggregated if necessary or separately if possible	Resolved. There is no magnesium production in Turkey and the 2006 IPCC Guidelines consider primary production of aluminium only
I.39	2.C.4 Magnesium production – SF_6 (95, 2014)	Correct the notation key used to report SF_6 emissions from magnesium foundries from "NA" to "NE"	Not resolved. There is no magnesium production in Turkey. However, the relevant

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	Adherence to UNFCCC Annex I inventory reporting guidelines		cells for SF_6 emissions in CRF tables 2(I) and 2(II) were left blank rather than using the notation key "NO"
I.40	2.F. Product uses as substitutes for ozone-depleting substances – HFCs (66 and 96, 2014) (43, 2013) (67, 2012) Accuracy	Establish sound data-collection methods to estimate and report actual emission estimates for different F-gas applications under this category and investigate the possibility of moving to a higher-tier method (only potential emissions calculated) for refrigeration and air-conditioning equipment	Not resolved. Import and export data on HFCs are available, but they are not distinguished between final uses (refrigeration and air conditioning, aerosols and foam blowing). For this reason, emissions have been estimated and reported under category 2.F.6 other
I.41	2.F. Product uses as substitutes for ozone-depleting substances – HFCs and SF_6 (96, 2014) (44, 2013) (56, 2011) Transparency	Improve the transparency of the reporting by including information on AD and by providing more information about the method used to calculate emissions for this category	Resolved. The Party has provided additional methodological information in the NIR (section 4.7)
I.42	2.F. Product uses as substitutes for ozone-depleting substances – HFCs and SF_6 (97, 2014) Completeness	Implement the mandatory data-collection system (ministerial regulation of F-gases) as planned and increase the completeness and overall data quality of the inventory	Addressing. Import and export data on HFCs are available, but they are not distinguished between final uses (refrigeration and air conditioning, aerosols and foam blowing). For this reason, emissions have been estimated and reported under category 2.F.6. The Party is undertaking a study[c] that will be finalized in 2017 to improve the quality and completeness of these estimates
I.43	2.F. Product uses as substitutes for ozone-depleting substances – HFCs and SF_6 (66 and 98, 2014) Accuracy	Investigate and document the occurrence of different F-gas species in different applications in the country and in particular from fire extinguishers	Resolved. The Party reported F-gas species (HFC-227ea) from fire extinguishers and from other applications under this category. The estimates are documented in the NIR (section 4.7). However, Turkey is the only reporting Party providing estimates of SF_6 emissions from fire extinguishers (reported under category 2.G.2 other) (see I.44 and I.57)

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I.44	2.F. Product uses as substitutes for ozone-depleting substances – HFCs and SF$_6$ (99, 2014) Accuracy	Increase the accuracy and improve the completeness of the emission estimates under this category by using more appropriate proxies when actual AD are not available for the elaboration of the emission estimates	Resolved. The Party has increased the accuracy and improved the completeness of the emission estimates under category 2.F. However, there is an issue of transparency through misallocation of HFCs from refrigeration and air conditioning, which are reported under category 2.F other (see I.58), and SF$_6$ from fire extinguishers, which is reported under category 2.G (see I.57). In addition, proxies were still applied for SF$_6$ from fire extinguishers (see I.58)
I.45	2.G Other product manufacture and use – CO$_2$ and N$_2$O (66 and 100, 2014) Completeness	Report all likely occurring emissions, such as N$_2$O emissions from use for anaesthesia and other applications	Not resolved. The Party did not report N$_2$O emissions from N$_2$O use, owing to data unavailability

Agriculture

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A.1	3. General (agriculture) (103, 2014) (61, 2013) Transparency	Provide tables showing the time series for the emissions by category in the NIR, including interpretation of emission trends, emissions, inter-annual changes in emissions and the main drivers of emissions	Resolved. Tables showing the time series and interpretation of the emission trends have been included in the NIR (chapter 5)
A.2	3. General (agriculture) (104, 2014) Accuracy	Explain the redistribution of the cattle and buffalo populations and report dairy buffalo separately from dairy cattle	Resolved. Buffalo (including both dairy and non-diary) have been reported separately from other cattle in the NIR (table 5.5)
A.3	3. General (agriculture) (105, 2014) (65, 2013) (90, 2012) (72, 2011) Accuracy	Use the national data on milk productivity, gross energy intake and average animal mass	Not resolved. Turkey used a tier 1 method for its estimation of CH$_4$ emissions from enteric fermentation. The Party informed the ERT that, as of the next inventory submission, it will use a tier 2 method, which includes use of milk production data and gross energy intake
A.4	3. General (agriculture) (106, 2014) (61, 2013) (88, 2012)	Provide more transparent information in annexes 3 and 7 to the NIR (including information on the sources of uncertainties, any issues affecting time-series consistency and category-specific QA/QC and	Not resolved. The required information was not included in the NIR

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	Transparency	verification procedures) and provide tables showing the time series for the EFs and AD by category, as well as detailed documentation supporting the choice of EFs, including when default EFs are applied	
A.5	3. General (agriculture) (107, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Implement the QA/QC plan and provide information on category-specific planned improvements for the agriculture sector	Resolved. During the review, Turkey informed that it has implemented a QA/QC plan for the agriculture sector and category-specific planned improvements are included in the NIR, wherever applicable
A.6	3.A Enteric fermentation – CH_4 (108, 2014) (64, 2013) (89, 2012) (71, 2011) Accuracy	Estimate emissions for significant livestock categories using the tier 2 method, including enhanced livestock population characterization, taking into account the relevant IPCC guidance, or, if not possible, provide documentation supporting any expert judgment regarding estimation assumptions, taking into account that this is a key category	Not resolved. Turkey informed the ERT that it will use a tier 2 method for the next inventory submission
A.7	3.A Enteric fermentation – CH_4 (108, 2014) (64, 2013) Transparency	Provide the disaggregated time-series data for dairy cattle (culture and domestic)	Resolved. Detailed time-series data for dairy cattle are included in the NIR (table 5.6)
A.8	3.B Manure management – CH_4 (109, 2014) (67, 2013) Accuracy	Estimate emissions for significant livestock categories using the tier 2 method with country-specific EFs, including enhanced livestock population characterization, and taking into account the relevant IPCC guidance	Not resolved. Although a key category, Turkey has not implemented a tier 2 methodology for significant livestock categories. Turkey informed the ERT that it is working on more suitable data sources concerning the distribution of manure management systems
A.9	3.B Manure management – CH_4 (109, 2014) (67, 2013) Accuracy	Provide an explanation of the fluctuations in the CH_4 IEFs for dairy cattle	Resolved. The fluctuations depend on the composition change in the dairy cattle subcategory (culture, hybrid and domestic cattle), with AD and EFs included in the NIR (section 5.3)
A.10	3.B Manure management – N_2O (110, 2014) (68, 2013) Accuracy	Revise the emission estimates by applying national values of Nex and AWMS distribution	Not resolved. Turkey used average default tier 1 Nex values for Western Europe and Asia from the 2006 IPCC Guidelines to estimate national Nex values. During the review, Turkey clarified that country-

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			specific information would be requested in the upcoming agricultural survey
A.11	3.B Manure management – N_2O (110, 2014) (68, 2013) Transparency	Include documentation on Nex per AWMS, or information on the distribution of AWMS used for the different animal groups	Not resolved. CRF table 3.B(b) does not include all the required information. In response to a question raised by the ERT, Turkey provided data on Nex per AWMS. These data indicate that anaerobic lagoons, daily spread and anaerobic digesters are used in Turkey (see A.14)
A.12	3.D.a Direct N_2O emissions from managed soils – N_2O (111, 2014) Accuracy	Report revised emission estimates for synthetic fertilizers, animal manure applied to soils, crop residue and other relevant subcategories for the complete time series, considering the methods of the relevant IPCC guidance, and improve the QC procedures	Resolved. Turkey correctly applied the default EFs from the 2006 IPCC Guidelines for estimating direct N_2O emissions from agricultural soils, suggesting also that QC procedures have been improved
A.13	3.D.b Indirect N_2O emissions from managed soils – N_2O (112, 2014) Accuracy	Revise and report the emission estimates, considering the methods of the relevant IPCC guidance, and improve the QC procedures	Resolved. Turkey correctly applied the default EFs from the 2006 IPCC Guidelines for estimating indirect N_2O emissions from agricultural soils, suggesting also that QC procedures have been improved

LULUCF

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
L.1	4. General (LULUCF) (table 3, 2014) (72, 2013) (105, 2012) (91, 2011) Completeness	Use existing data, make all the necessary efforts to collect new data and report estimates for the mandatory categories, subcategories and pools identified in the review report and, for clarity, listed below:	Addressing. The status of implementation of the recommendation is provided at the level of the listed categories. For further information on completeness, see also L.15 and annex II
		(a) Carbon stock changes in mineral soils for cropland converted to forest land and grassland converted to forest land	Addressing. Carbon stock changes in mineral soils were reported for conversion from grassland but not for cropland converted to forest land
		(b) Carbon stock changes in mineral soils for grassland	Not resolved. Carbon stock changes in mineral soils for grassland remaining grassland were reported as "NE"

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
		(c) CO_2 emissions/removals from forest land converted to grassland (all pools)	Addressing. Carbon stock changes for forest land converted to grassland were reported, except for carbon stock changes in organic soils, reported as "NE"
		(d) Carbon stock changes for wetlands converted to grassland (biomass and mineral soils pools)	Not resolved. Carbon stock changes for wetlands convered to grassland were reported as "NE"
		(e) CO_2 emissions/removals from forest land converted to wetlands (all pools)	No longer relevant. There is no specific reporting on the conversion from forest land in the CRF tables
		(f) CO_2 emissions/removals from forest land, cropland and grassland converted to settlements (all pools)	Addressing. Carbon stock changes for conversion of cropland and grassland to settlements were reported (except for organic soils). Conversion of forest land to settlements was reported as "NO"
		(g) CO_2 emissions/removals from forest land and cropland converted to other land (all pools)	Addressing. Conversions previously reported as "NA" were reported as follows: conversion from forest land to other land reported as "NO" and conversion from cropland to other land reported as "NE"
		(h) N_2O emissions from disturbance associated with land-use conversion to cropland	Addressing. Direct N_2O emissions from nitrogen mineralization/immobilization associated with loss/gain of soil organic matter were reported by Turkey as "NE" for conversion from grassland to cropland in CRF table 4(III). Other conversions previously reported as "NE" were reported as "NO"
		(i) CO_2 emissions from agricultural lime application	No longer relevant. The emissions are included under the agriculture sector (see A.20)
		(j) CO_2 emissions from biomass burning on land converted to forest land	Resolved. CO_2 emissions were reported as "IE" with the explanation in CRF table 9 that

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
			they are included under forest land remaining forest land. The CO_2 emissions from forest land remaining forest land were also reported as "IE" with the explanation in CRF table 9 that they are included under carbon stock changes in biomass (losses)
		(k) CH_4 and N_2O emissions from biomass burning on land converted to forest land	Resolved. CH_4 and N_2O emissions were reported under forest land remaining forest land
L.2	4. General (LULUCF) (114, 2014) Transparency	Increase the transparency of the descriptions of the causes and effects of recalculations	Resolved. Turkey has included (chapter 6, table 6.28 of the NIR) information on recalculations in this submission, including the causes and quantitative impacts of the recalculations
L.3	4. General (LULUCF) (115, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Strengthen the institutional arrangements to improve the inventory preparation process, specifically the integration of data and information for the LULUCF sector	Not resolved. Turkey reported in the NIR (pages 282–284) that improvements to the working procedure for the production of the LULUCF reporting have been made and other improvements are planned. However, the Party stressed that the integration of land-use data remains an unresolved question. There is still a need to improve the coherence of the LULUCF chapter
L.4	4. General (LULUCF) (115, 2014) Not an issue	Improve the inventory by preparing a more coherent LULUCF chapter of the NIR, in accordance with the outline contained in the UNFCCC reporting guidelines	No longer relevant. The outline of the NIR is not a mandatory reporting requirement. The Party has declared an ambition to improve the NIR LULUCF chapter according to the UNFCCC reporting guidelines in its next inventory submission
L.5	4. General (LULUCF) (117, 2014) (74 and 75, 2013) Accuracy	Clarify the description of land categories, check the integrity of the total land area over the entire time series and report on the findings	Not resolved. Turkey has, in its 2015 and 2016 NIRs, improved the description of land categories (chapter 6). However, it did not provide complete reporting of land

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
			areas over the time series (see L.16)
L.6	4. General (LULUCF) (117, 2014) (73, 2013) Accuracy	Using domestic data and information, undertake the necessary work to develop an internally consistent land framework and harmonize the two major data sources in order to produce a spatially consistent breakdown of land-use categories for the whole country, over time, and report on progress	Not resolved. According to the NIR (section 6.2) and the responses provided during the review, Turkey cannot produce consistent reporting of land use because the two major data sources for land-use area determination, ENVANIS[e] and CORINE,[f] have not been integrated. The Party reported that the integration is included in its improvement plans
L.7	4. General (LULUCF) (119, 2014) (72, 2013) Comparability	Consistently use the notation key "NO" to report an activity that does not occur, and the notation key "NE" to report an activity that occurs but the emissions are not estimated	Not resolved. The ERT noted improvements in the use of the notation keys (e.g. in CRF table 4, "NA" has been replaced by more appropriate use of "NO" or "NE"). However, the proper use of some notation keys is still questionable. As Turkey, in most cases, did not provide any support for categorizing a category as "NO" or "NE", it is difficult to judge if the notation keys were correctly used. For example, forest land converted to settlements was reported as "NO". It is difficult to conceive that forests that occupy areas greater than 20 Mha have no areasconverted to settlements, for example through road construction, over a 20-year period
L.8	4. General (LULUCF) (120, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Calculate uncertainty estimates for each LULUCF category and for the total sector according to the relevant IPCC guidance	Addressing. Turkey has provided uncertainty estimates for the forest land category only in the NIR (page 263) and for the whole sector (page 281)
L.9	4.A Forest land – CO_2 (122, 2014) Accuracy	Conduct a thorough scientific assessment of the estimation methods used for forest land, ensuring a comprehensive and balanced approach to calculating carbon inputs and outputs for each pool, and revise the estimates if needed	Addressing. The ERT noted the recalculations of the estimates for forest land.The uptake of CO_2 in forest land is the second most important key category in the NIR of Turkey,

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
			with an uptake of 54 458.43 kt CO_2 in 2014. The net uptake increased at an almost constant rate from 28 322.86 kt CO_2 in 1990 by 92.3% upto 2014, while forest land area increased by 7.3% during the same time period. This implies a continuously increasing gap between forest growth and removals, which is somewhat difficult to reconcile, especially as the sink of harvested wood products has also been increasing rapidly since 2002 (chapter 6, figure 6.7). The rate of change and size of the sink motivates the need of a scientific validation of the methodology behind the forest increment and removal estimates and inclusion of further explanation in the NIR (see also table 5, L.17)
L.10	4.A Forest land – CO_2 (122, 2014) (77–79, 2013) (98, 2012) Transparency	Provide clear and complete information in the NIR on the data sources and estimation methodology	Addressing. Turkey has made significant improvements in providing detailed reporting and improving transparency in the NIR for the forest land category since the 2014 inventory submission (pages 247–260 of the NIR). However, the data used in these equations come from the ENVANIS system and are calculated on the basis of forest management data records (NIR, chapter 6, page 242). These calculations determine the results reported but there is no description of how ENVANIS calculates the changes, or explanations of the quality, coverage and frequency of updating the measurement of underlying data (see L.17)
L.11	4.A Forest land – CO_2 (122, 2014)	Assess the impact on emissions and removals since 1990 of the important changes that occurred in forest management practices	Resolved. Turkey has provided an explanation (NIR, chapter 6, page 246) on changes in forest

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
	Completeness		management and its impact on emissions and removals
L.12	4.B Cropland – CO_2 (123, 2014) (83, 2013) Accuracy	Assume biomass carbon stocks of 0 Mt/ha (tier 1) for annual crops, unless sufficient evidence is obtained to support a revision of this assumption	Not resolved. Turkey has assumed biomass stocks on annual cropland of 0.75 Mg/ha on the basis of a study[g] referenced in the NIR (chapter 6, page 270). However, there is no explanation of how the study arrived at the value of 0.75 Mg/ha and what type of biomass this stock consists of. According to the 2006 IPCC Guidelines, it is good practice to assume living biomass carbon stocks to be zero on annual cropland
L.13	4.D. Wetlands – CO_2 (124, 2014) Transparency	Explain the trends in AD, taking into consideration the recommendations on consistent land-use information and on the proper use of the notation keys	Not resolved. There is no explanation of trends in the NIR. Since 2012, the category has been reported as "NE" or "NO", without rationale for the use of the notation keys, except for lack of data

Waste

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
W.1	5. General (waste) (127, 2014) (91, 2013) (113, 2012) (95, 2011) Transparency	Provide clear and comprehensive explanations of the AD, EFs and parameters used in the estimates for all categories of the waste sector, including the provision of figures with detailed information, informative tables, information on AD acquisition and choice of EFs used	Resolved. Detailed information was provided in the NIR (chapter 7)
W.2	5. General (waste) (128, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Estimate the country-specific uncertainties of the data obtained from the questionnaire surveys and report the results of the uncertainty analysis together with supporting data and information, including the determination of the uncertainty values by expert judgment and its validation in accordance with the relevant IPCC guidance, if expert judgment is still to be used	Resolved. The uncertainty estimates have been revised and reported in the NIR (chapter 7)
W.3	5. General (waste) (129, 2014) (93, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Make the best efforts to implement the procedures of the QA/QC plan as planned	Resolved. QA/QC plan procedures have been implemented
W.4	5. General (waste) – CH_4	Estimate CH_4 emissions from industrial wastewater	Resolved. Industrial wastewater emissions have

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
	(130 and 136, 2014) (98, 2013) (118, 2012) (101, 2011) Completeness		been estimated and reported in CRF table 5.D
W.5	5. General (waste) (131, 2014) (93, 2013) Transparency	Increase the transparency and consistency of the inventory information and strengthen the QC activities during the inventory preparation process	Resolved. The transparency and consistency of the inventory information have been increased, and the QC activities for the sector have been strengthened
W.6	5.A Solid waste disposal on land – CH_4 (132, 2014) (94, 2013) (115, 2012) (98, 2011) Accuracy	Calculate and report emissions from solid waste disposal on land using the FOD method, using existing AD and the necessary parameters	Resolved. The FOD method is used for the estimation on the basis of existing AD and parameters from the 2006 IPCC Guidelines
W.7	5.A Solid waste disposal on land – CH_4 (133, 2014) Accuracy	Make the best use of the disaggregated data from the questionnaire by considering the situation of disposal types for solid waste disposal on land and categorize this information according to the IPCC disposal types, in particular considering municipal dumping sites	Resolved. The distribution of waste by IPCC disposal type (managed and unmanaged) has been calculated from surveys and used in the estimations
W.8	5.A Solid waste disposal on land – CH_4 (133, 2014) Accuracy	Assess the disaggregated data from the questionnaire surveys and use the real share of solid waste disposal sites existing in the country for the calculations in the IPCC waste model	Resolved. The country-specific shares of solid waste disposal sites have been used in the IPCC waste model
W.9	5.A Solid waste disposal on land – CH_4 (135, 2014) Transparency	Explain the landfill gas recovery details (including amount of recovered CH_4 gas and the amount of electricity produced) and report information on landfill gas flaring and emission estimates	Resolved. The landfill gas recovery details were explained and information on gas flaring is presented in the NIR (section 7.2)
W.10	5.C.1 Waste incineration – CO_2, CH_4 and N_2O (139, 2014) Transparency	Increase the transparency of the emission estimates by including detailed information on the calculation of emissions, the AD and the EFs and by using appropriate EFs	Resolved. Detailed information on the calculation of emissions, the AD and the EFs is presented in the NIR (section 7.4)
W.11	5.D Wastewater treatment and discharge – CH_4 and N_2O (136, 2014) (97 and 98, 2013) Comparability	Explain the use of the notation key "NA" for domestic sludge	Resolved. Information on domestic sludge (no specific entry for sludge in the current CRF tables) is provided in the NIR (section 7.5)
W.12	5.D Wastewater treatment and	Increase the transparency and accuracy of the information by providing a table of AD used, with	Resolved. Tables of AD used, statistical data on the rural and

ID#	Issue classification[a]	Recommendation made in previous review report[b]	ERT assessment and rationale
	discharge – CH_4 and N_2O (136, 2014) Transparency	detailed explanations, in the NIR, including the available statistical data on the rural and urban populations	urban populations, with detailed explanations, are provided in the NIR (section 7.5)
W.13	5.D Wastewater treatment and discharge – CH_4 and N_2O (136, 2014) (99, 2013) (119, 2012) (101, 2011) Adherence to UNFCCC Annex I inventory reporting guidelines	Improve the QC procedures and report the population of the country in CRF table 6.B	Resolved. Population data were reported in the additional information table to CRF table 5.D
W.14	5.D Wastewater treatment and discharge – CH_4 and N_2O (137, 2014) Accuracy	Use the amount of wastewater that enters into treatment plants instead of wastewater discharge to the environment to estimate emissions	Resolved. The amount of wastewater that enters into treatment plants instead of wastewater discharge to the environment was used in the estimates
W.15	5.D Wastewater treatment and discharge – CH_4 and N_2O (138, 2014) Consistency	Increase the consistency of the emission estimates for CH_4 recovery from domestic wastewater handling by interpolating data for the missing years for the whole time series (data are collected from a questionnaire conducted every two years)	Resolved. The quantity of CH_4 recovery has been estimated by measuring the gas recovered at the facilities recovering CH_4, starting from 1998 (the year when CH_4 recovery started to be implemented in Turkey)

Abbreviations: AD = activity data, AWMS = animal waste management system, C = confidential, CRF = common reporting format, EF = emission factor, ERT = expert review team, F-gas = fluorinated gas, FOD = first-order decay, GHG = greenhouse gas, IE = included elsewhere, IEA = International Energy Agency, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry, NA = not applicable, NCV = net calorific value, NE = not estimated, NEU = non-energy use, Nex = nitrogen excretion, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control, 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", 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue was raised. Issues are further classified as defined in decision 13/CP.20, annex, paragraph 81.

[b] For Turkey, the review of the 2016 inventory submission is being held in conjunction with the review of the 2015 inventory submission, and, as such, the 2015 annual review report was not available at the time of this review. Therefore, the recommendations reflected in table 3 are from the 2014 annual review report. For the same reason, the year 2015 is excluded from the list of years in which the issue has been identified.

[c] Technical assistance for support to mechanism for monitoring Turkey's greenhouse gas emissions (project funded by the European Union).

[d] Industrial production statistics survey of the Turkish Statistical Institute.

[e] Inventory statistical system for forests.

[f] Coordination of information on the environment (land-cover maps).

g TUBITAK 112Y096 ("Sürdürülebilir arazi planla çalışmalarını destekleyecek bir iklim değişikliği-ekosistem hizmetleri yazılımının geliştirilmesi") (Development of climate change ecosystem services software to support sustainable land plan studies).

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

8. 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 2016 inventory submission of Turkey, and have not been addressed by the Party.

Table 4
Issues identified in three successive reviews and not addressed by Turkey

ID#[a]	Previous recommendation for the issue identified	Number of successive reviews issue not addressed[b]
General	No such general issues were identified	
Energy		
E.44	Improve the transparency of the NIR on the methods applied for estimating emissions from road transportation	5 (2011–2015/2016)
IPPU		
I.36(b)*	Allocate PFC emissions for the whole time series under the category other (metal production) to maintain confidentiality	3 (2013–2015/2016)
I.40*	Establish sound data-collection methods to estimate and report actual emission estimates for different applications of fluorinated gases under this category and investigate the possibility of moving to a higher-tier method (only potential emissions calculated) for refrigeration and air-conditioning equipment	4 (2012–2015/2016)
Agriculture		
A.3*	Use the national data on milk productivity, gross energy intake and average animal mass	5 (2011–2015/2016)
A.4	Provide more transparent information in annexes 3 and 7 to the NIR and provide tables showing the time series for the EFs and AD by category, as well as detailed documentation supporting the choice of EFs, including when default EFs are applied	4 (2012–2015/2016)
A.6*	Estimate CH_4 emissions for significant livestock categories from enteric fermentation using the tier 2 method, including enhanced livestock population characterization, taking into account the relevant IPCC guidance, or, if not possible, provide documentation supporting any expert judgment regarding estimation assumptions	6 (2010–2015/2016)
A.8*	Estimate CH_4 emissions for significant livestock for manure management categories using the tier 2 method with country-specific EFs, including enhanced livestock population characterization, and taking into account the relevant IPCC guidance	3 (2013–2015/2016)
A.10*	Revise the emission estimates by applying national values of Nex and AWMS	3 (2013–2015/2016)

ID#[a]	Previous recommendation for the issue identified	Number of successive reviews issue not addressed[b]
	distribution	
A.11	Include documentation on Nex per AWMS, or information on the distribution of AWMS used for the different animal groups	3 (2013–2015/2016)
LULUCF		
L.1*	Use existing data, make all necessary efforts to collect new data and report estimates for the mandatory categories, subcategories and pools: carbon stock changes in mineral soils for grassland	5 (2011–2015/2016)
L.5*	Clarify the description of land categories, check the integrity of the total land area over the entire time series and report on the findings	3 (2013–2015/2016)
L.6*	Using domestic data and information, undertake the necessary work to develop an internally consistent land framework and harmonize the two major data sources in order to produce a spatially consistent breakdown of land-use categories for the whole country, over time, and report on progress	3 (2013–2015/2016)
L.7	Consistently use the notation key "NO" to report an activity that does not occur, and the notation key "NE" to report an activity that occurs but the emissions are not estimated	3 (2013–2015/2016)
L.12*	Assume biomass carbon stocks of 0 Mt/ha (tier 1) for annual crops, unless sufficient evidence is obtained to support a revision of this assumption	3 (2013–2015/2016)
Waste	No such issues for the waste sector were identified	

Abbreviations: AD = activity data, AWMS = animal waste management system, EF = emission factor, IPCC = Intergovernmental Panel on Climate Change, IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry, NE = not estimated, Nex = nitrogen excretion, NIR = national inventory report, NO = not occurring.

[a] An asterisk is included after any issue ID# where the underlying issue is related to accuracy or completeness of a key category, a missing category or a potential key category, as indicated in decision 13/CP.20, annex, paragraph 83.

[b] For Turkey, the review of the 2016 inventory submission is being held in conjunction with the review of the 2015 inventory submission. Since the reviews of the 2015 and 2016 inventory submissions are not successive reviews, but are rather being held in conjunction, for the purpose of counting successive years in table 4, 2015–2016 is considered as one year. The ERT noted that this table 4 is the same as that in the 2015 annual review report for Turkey, modified to reflect the combined 2015/2016 review.

V. Additional findings made during the 2016 technical review

9.   Table 5 contains findings made by the ERT during the technical review of the 2016 inventory submission of Turkey that are additional to those identified in table 3.

Table 5
Additional findings made during the 2016 technical review of the inventory submission of Turkey

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
General			
G.12	Key category analysis	In Turkey's key category analysis, some categories are more disaggregated than suggested in table 4.1 of the 2006 IPCC Guidelines (e.g. categories 1.A.1, 1.A.2 and 1.A.4 in the energy sector), while other categories are less disaggregated than suggested in the same table (e.g. category 2.F). The fact that the uncertainty analysis is performed at a more disaggregated level is not in itself a reason to perform the tier 1 key category analysis at the same disaggregated level	Not an issue
		The ERT encourages Turkey to perform the key category analysis at the level of disaggregation suggested in table 4.1 of the 2006 IPCC Guidelines, further disaggregating only when subcategories are particularly significant. In case a category cannot be disaggregated to the recommended level, a qualitative approach may also be applied	
G.13	Annual submission	The UNFCCC Annex I inventory reporting guidelines state that the Party shall include in its NIR an assessment of completeness, including information and explanations in relation to categories reported as "NE" or "IE", and information related to the geographical scope. The section on completeness in the body of the NIR is quite short, just referring to table A7 in annex 5. Table A7 lists the categories reported as "NE", but does not provide an explanation for the non-estimation as was done in the 2014 inventory submission. Furthermore, the table does not show the categories reported as "IE", although CRF table 9 provides such information	Yes. Transparency
		The ERT recommends that Turkey further develop the assessment of completeness reported in the NIR, providing more information in the body of the NIR on the categories reported as "NE" and "IE" as well as improving the information presented in the annex on completeness, including explanations for the use of the notation keys	
Energy			
E.49	Fuel combustion – reference approach – gaseous, liquid, solid and other fuels – CO_2	The ERT noted that in the previous annual review report the differences between the sectoral and reference approaches were investigated and the Party was suggested to make the necessary efforts to understand all the reasons for the differences in the estimates between the sectoral and reference approaches and to correct these estimates where necessary, ensuring that the sectoral approach estimates are complete, consistent and accurate. In the current submission, there are still important differences between the reference and sectoral approaches (above 5%) for some of the years at the beginning of the time series (1990–2007), which the Party reports it is still investigating (section 3.2.1 of the NIR). These seem to stem in part from differences between the NCVs used for CRF table AD and those used in the national energy balance. However, improvements have been made over time to the comparison,	Not an issue

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
		with the difference for CO_2 emissions significantly reduced in recent years (1.25% for 2014)	
		The ERT encourages the Party to continue investigating the differences between the CO_2 emissions calculated by the reference and sectoral approaches as a verification tool for the accuracy and completeness of the estimates for the sector	
E.50	Comparison with international data – gaseous, liquid, solid and other fuels – CO_2	The ERT noted that, for many years, the comparison of apparent consumption between the CRF tables and IEA data for liquid fuels seems problematic, particularly for fuels such as other kerosene (more than 100% difference), refinery feedstocks (more than 100% difference) and other oil (more than 300% difference). There is also a significant difference for coal tar, where IEA reports exports and Turkey does not, and for jet kerosene and petroleum coke for some years. In addition, the CRF crude oil production data are generally higher than and always different to the amounts reported to IEA, with differences observed in NCVs and physical units. During the review, the Party informed the ERT that work is ongoing on the harmonization of the national energy balance (which is the main source of inventory AD for the energy sector) with the IEA and Eurostat data sets. On the basis of the output of the harmonization work, the national energy balance is expected to be revised by the end of 2016 in order to minimize differences between those data sets	Not an issue
		The ERT welcomes this information and encourages Turkey to work to understand the reasons for the differences in the reported data between the CRF tables and IEA data and to recalculate emission estimates as necessary in order to improve the accuracy and comparability of the estimates	
E.51	Comparison with international data – liquid and solid fuels – CO_2	The ERT noted that the stock change data comparison between the CRF tables and IEA data for crude oil shows large differences for many years. In some cases, stock draws may be shown in one data source, while stock builds are shown in another. This is shown particularly for residual fuel oil and for refinery feedstocks; therefore, the differences may be mainly due to the facility-level reporting from refineries. The ERT also noted that the stock change data comparison between the CRF tables and IEA data for almost all solid fuels have been of opposite signs for many years. This indicates that there is a difference in methodology for the reporting of stock changes between Turkey's statistical office and the reporting under the facility-level reporting system for power generation facilities and refineries. Fluctuations in these data can lead to significantly different emission calculations for liquid fuels and also issues with the comparability of these data with other countries' data	Not an issue
		The ERT encourages Turkey to work to understand the reasons for the differences in the reported data on stock changes for liquid and solid fuels between the CRF tables and IEA data and to recalculate emission estimates as necessary in order to improve the accuracy and comparability of the estimates	
E.52	International aviation – liquid fuels –	The ERT noted that, owing to differences in NCVs, consumption of jet kerosene in international aviation is 3% higher reported in the CRF tables than reported to IEA for 1990–2006. However, for 2007 onwards, the CRF table values are up to 150% higher, owing to additional discrepancies in	Not an issue

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
	general	physical unit data. The consumption of jet kerosene for international aviation in 2014 is reported as 138 775 TJ in the CRF tables and 109 220 TJ in the IEA data (difference of 21.3%)	
		The ERT encourages Turkey to investigate the reasons for the differences between the CRF tables and IEA data and to include an explanation in the NIR, as well as to revise its definitions and estimates for international aviation, if found necessary	
E.53	International navigation – liquid fuels – general	The ERT noted that data on international marine bunkers between the CRF tables and data reported to IEA agree closely, except for 2007 (CRF table data are 13% lower than IEA data) and 2008–2012 (CRF table data are up to 400% higher than IEA data). Comparison with IEA data shows that, for this time period, consumption of residual fuel oil reported in the CRF tables is far higher than that reported to IEA, while consumption of gas/diesel oil is significantly lower	Not an issue
		The ERT encourages Turkey to investigate the reasons for the differences between data reported in the CRF tables and IEA data and provide explanations in the NIR, as well as to revise its definitions and estimates for international navigation, if found necessary	
E.54	Feedstocks, reductants and other NEU of fuels – gaseous, solid and liquid fuels – CO_2	The ERT noted that there are inconsistencies between the emissions reported from NEU under the energy sector and the emissions reported under the IPPU sector (e.g. CO_2 emissions from metallurgical coke used in carbide production are not reported in CRF table 1.A(d)). Emissions from NEU of bitumen and naphtha are reported in CRF table 1.A(d) as "NA". During the review, the Party explained that emissions from bitumen, refinery feedstocks and naphtha are not estimated as there is no methodology provided in the 2006 IPCC Guidelines and their applications are not considered to be carbon emission sources	Yes. Transparency
		The ERT recommends that Turkey include relevant explanations in the documentation box of the CRF table and in the NIR for fuels with NEU consumption reported without any associated emissions reported in the inventory. In addition, the ERT recommends that the Party further improve the explanations in the NIR on the reporting of emissions from NEU between the energy sector and the IPPU sector	
E.55	1.A.1.a Public electricity and heat production – gaseous, solid and liquid fuels – CO_2, CH_4 and N_2O	In its NIR (section 3.2.4.1), Turkey indicates that plant-level data are used for emission estimates for the public electricity and heat production category. During the review, the Party explained that it compares data gathered from plants and from energy balance tables and examines and reports probable reasons for differences, and that it will, for future inventory submissions, further improve the comparison of AD from facility-level reporting and its national energy balance	Yes. Transparency
		The ERT recommends that Turkey include in the NIR a comparison of facility-level energy data and the sectoral totals from its national energy balance, with the aim of ensuring the transparency of the reported estimates	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
E.56	1.A.1.b Petroleum refining – gaseous and liquid fuels – CO_2, CH_4 and N_2O	For emission estimation for petroleum refining, the national energy balance was used until the 2015 inventory submission. Petroleum refining was a key category and needed to be estimated using a higher tier. Therefore, as indicated in the NIR (section 3.2.4.2), for the 2015 inventory submission onwards, plant-level AD, NCVs and carbon content have been compiled from all refineries and a tier 2 method has been applied. As a result, there are some differences between the energy balance data and the aggregated plant-level data. During the review, Turkey informed the ERT that it is coordinating communication between refineries and the energy balance team on these issues, to improve the comparison of AD from facility-level reporting and its national energy balance	Yes. Transparency
		The ERT recommends that Turkey improve the transparency of its reporting by including a comparison of facility-level data and the sectoral totals from its national energy balance in its NIR	
E.57	1.A.2.a Iron and steel – liquid fuels – CO_2, CH_4 and N_2O	The consumption of liquid fuels for the category shows large variations, reaching inter-annual changes of 3 752.5% (2009–2010). The increase between 2013 and 2014 is 161.2%. The trend in N_2O and CH_4 IEFs after the constant values used for the 1990–2007 period shows inter-annual changes within the range of −49.5% (2011–2012) to +172.9% (2012–2013) for N_2O and within the range of −35.9% (2011–2012) to +98.8% (2012–2013) for CH_4. During the review, Turkey explained that the fluctuation was caused by the type and share of oil products changing for different years, particularly the share of gas diesel oil and liquid petroleum gas (mainly auxiliary fuels) used for this category	Yes. Transparency
		The ERT recommends that Turkey improve the transparency of the NIR by including information on significant changes in the trend in AD composition for the different share of oil products and on how these impact the CH_4 and N_2O IEFs	
E.58	1.A.3.d Domestic navigation – liquid fuels – CO_2, CH_4 and N_2O	The ERT noted that data on domestic navigation agree (within 2% from 1996 to 2008) with IEA data, but show larger discrepancies for other years. For 2014, the residual oil consumption according to IEA (9 880 TJ) is 704.3% above the value reported in the CRF tables (1 228 TJ). IEA data for gas/diesel oil (10 352 TJ) were 38.6% below the CRF table value of 16 854.42 TJ. For 2013, IEA reported 13 320 TJ of residual fuel oil consumption, which is 1 277% above the CRF table value of 967 TJ	Not an issue
		The ERT encourages Turkey to investigate the reasons for the differences between the data reported in the CRF tables and IEA data and to revise its definitions and estimates for domestic navigation, as appropriate	
E.59	1.B.1 Solid fuels – solid fuels – CH_4	The ERT noted that CH_4 emissions from abandoned mines are reported by Turkey as "NE", explained as due to insufficient data available	Yes. Completeness
		The ERT recommends that Turkey conduct surveys of abandoned mines to gather AD and estimate CH_4 emissions for this mandatory category to ensure the completeness of the inventory	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
E.60	1.B.2.a Oil – gaseous fuels – CO_2 and CH_4	The ERT noted that CO_2 and CH_4 emissions for the category distribution of oil products are reported as "NA" across the time series. According to paragraph 37(c) of the UNFCCC Annex I inventory reporting guidelines, this notation key is appropriate for activities taking place in the country that do not result in emissions. There is no information in the NIR to justify the notation key used	Not an issue
		Noting that there are no default EFs for the subcategory in the 2006 IPCC Guidelines, the ERT encourages Turkey to attempt to estimate and report relevant CO_2 and CH_4 emissions. If a notation key is used, the ERT encourages the Party to use the notation key "NE" for this non-mandatory category	

IPPU

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue?
I.46	2. General (IPPU) – general	Turkey reported AD for all subcategories of chemical industry, such as ammonia production, nitric acid production, calcium carbide production, soda ash production, ethylene production, ethylene dichloride and vinyl chloride monomer, acrylonitrile and carbon black production, as confidential. Aluminium production is also reported as confidential. However, emissions for all mentioned categories are separated and included in the CRF tables in the appropriate categories and AD trends are presented in the NIR in relative values	Not an issue
		The ERT commends the Party for the more transparent reporting of the emissions from this sector, allowing the share of the emissions per subcategory and the trend in the emissions across the time series to be checked	
I.47	2.A.2 Lime production – CO_2	AD used for the lime production category include marketed lime production only, although lime is also produced as an intermediate product in several industries in the country. During the review, Turkey clarified that lime is produced in the sugar industry and the CO_2 is used for refining sugar, and it is assumed that no CO_2 is released into the atmosphere from lime production in sugar production plants. In addition to the 2006 IPCC Guidelines, scientific literature suggests that in sugar refineries not all CaO is recarbonated to limestone in the refining process	Yes. Transparency
		As the assumption that 100% of the lime used in the sugar industry is precipitated as $CaCO_3$ has not been supported by any evidence, the ERT recommends that Turkey provide evidence of the 100% CO_2 recovery rate associated with lime use during sugar refining and precipitate production in the NIR (as evidence, the Party can provide any proven and validated methods used to calculate the amount of CO_2 that reacts with lime to reform $CaCO_3$ or the amount of CO_2 that is not recarbonated to limestone in the refining process). If Turkey cannot demonstrate 100% CO_2 recovery, the ERT recommends that Turkey report the CO_2 emissions from the lime produced in sugar mills together with the emissions from marketed lime under the lime production category, as described in I.10. In addition, if proven and validated methods are used to calculate the amount of CO_2 that reacts with lime to reform $CaCO_3$, the ERT encourages the Party to report these CO_2 captured emissions under the category other (2.H) in line with the 2006 IPCC Guidelines	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
I.48	2.A.4 Other process uses of carbonates – CO_2	Turkey reports emissions from ceramics production, other uses of soda ash and non-metallurgical magnesia production under other process uses of carbonates (category 2.A.4). During the review, the Party clarified that dolomitic lime is produced in iron and steel plants in small amounts and used in blast furnaces. The emissions are considered under iron and steel production. Moreover, dolomite is also used as a raw material for ceramics production and the emissions resulting from the use of dolomite are reported under the ceramics production subcategory	Yes. Accuracy
		The ERT noted that there could be other uses of carbonates in the country (such as dolomite use reported in previous inventories under the lime production category) and recommends that Turkey undertake limestone and dolomite mass balances to cross-check the estimates in order to increase the accuracy of the inventory	
I.49	2.A.4 Other process uses of carbonates – CO_2	The ERT noted that the AD for non-metallurgical magnesia production are provided only for 2005–2014, owing to a lack of data, so emission estimation could not be conducted for the period 1990–2004. Therefore, Turkey assumes that non-metallurgical magnesia production does not occur between 1990 and 2004 and plans to search for any mining sector reports or academic reports regarding the history of magnesite production	Yes. Completeness
		The ERT commends the Party for its plans to improve the completeness of the estimates and recommends that it either estimate CO_2 emissions from non-metallurgical magnesia production or use the appropriate gap filling procedures suggested by the 2006 IPCC Guidelines to report the complete time series	
I.50	2.B Chemical industry – HFCs, PFCs and SF_6	There are no numerical data and no notation keys used to report emissions of F-gases from the chemical industry and the cells are left blank. The NIR (section 4.3.9) indicates the reason as the absence of fluorochemical production in Turkey	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
		The ERT recommends that Turkey use the notation key "NO" to report fluorochemical production	
I.51	2.B.1 Ammonia production – CO_2	For ammonia production (category 2.B.1), in order to calculate CO_2 emissions, the total fuel requirement is multiplied by a country-specific carbon content and a carbon oxidation factor, according to the tier 2 method of the 2006 IPCC Guidelines. The CO_2 emissions recovered for downstream use are then deducted from the total CO_2 emissions. During the review, the Party clarified that the carbon oxidation factor used is 0.9, the amount of CO_2 recovered for downstream use is not reported separately, and the CO_2 emissions reported have the amount of downstream use for urea production subtracted (therefore, only the net amount is reported). In the next inventory submission, the Party is planning to report the amount of CO_2 recovered separately	Yes. Accuracy
		The ERT recommends that Turkey justify the use of a carbon oxidation factor of 0.9 or apply 1.0 as the oxidation factor, unless country-specific information is available (table 3.1, page 3.15, volume 3,	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
		chapter 3 of the 2006 IPCC Guidelines). The ERT also recommends that Turkey clarify if the CO_2 emissions used for urea production are included under category 2.D.3 (other (non-energy products from fuels and solvent use)) or under the agriculture sector in line with the 2006 IPCC Guidelines, and transparently report the emissions between the two sectors	
I.52	2.B.5 Carbide production – CO_2	The ERT notes that the CO_2 EF for carbide production (category 2.B.5) is calculated by multiplying metallurgical coke carbon content and a carbon oxidation factor, following the tier 1 method of the 2006 IPCC Guidelines. During the review, the Party clarified that the carbon oxidation factor used is 0.9	Yes. Accuracy
		The ERT recommends that Turkey justify the use of a carbon oxidation factor of 0.9 or apply 1.0 as the oxidation factor, unless country-specific information is available, in line with the 2006 IPCC Guidelines (table 1.4, volume 2, chapter 1), and check if metallurgical coke is included in NEU under the energy sector and the CO_2 emissions from the feedstock use reported under the IPPU sector are deducted from combustion use in the energy sector, in order to improve the accuracy and comparability of the estimates	
I.53	2.C.3 Aluminium production – PFCs	The ERT noted that CF_4 and C_2F_6 emissions (by-product emissions) from aluminium production are reported for the 1990–2006 period, and that for the following years the notation key "NE" is used. Estimates of PFC emissions from the single aluminium production plant in Turkey are available following a tier 3 method, but they are confidential for 2007 onwards	Yes. Transparency
		The ERT recommends that the Party report the estimates as described in I.36 (for instance, by aggregating them with the PFC emissions of other categories to keep the confidentiality), indicating in the CRF tables "IE" for the category aluminium production, together with information on the methodology used for their estimation across the time series, in order to increase the transparency of its reporting while keeping the confidentiality of the estimates	
I.54	2.C.5 Lead production – CO_2	The trend in AD for lead production shows significant inter-annual variations, such as: 2005–2006 (144.9%), 2007–2008 (267.4%), 2008–2009 (−73.9%), 2009–2010 (214.5%), 2011–2012 (−59.9%) and 2012–2013 (75.2%). The Party has indicated that AD for lead production are based on PRODCOM[b] statistics, in which lead production data were mixed with lead trading data, thus explaining the outlier trend. In addition, during the review, in response to a question raised by the ERT on the technologies in use for lead production, the Party clarified that it is not possible to separate lead production data by technology in the existing statistics. While analysing the PRODCOM statistics from industry, the Party found that there is no primary lead production in Turkey. However, there is a secondary type of production from the recycling of vehicle accumulators. Waste statistics of the Turkish Statistical Institute provide the amount of batteries recycled in 2012 and 2014. For the next inventory submission, the Party plans to use this data set as the AD for the calculation of secondary lead production estimates	Yes. Accuracy
		The ERT commends the Party for its improvement plans and recommends that the Party report CO_2	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
		emission estimates based on the current technologies in use in the country in order to improve the accuracy of the inventory	
I.55	2.C.6 Zinc production – CO_2	The ERT notes that emission estimates for zinc production (category 2.C.6) are calculated assuming that all zinc produced in Turkey comes from primary production. During the review, the Party explained that zinc production data are gathered from PRODCOM. However, it is not possible to separate zinc production data by technology using PRODCOM statistics. While analysing the PRODCOM statistics from industry, the Party found that there is no primary or secondary zinc production in Turkey. In Turkey, zinc is imported and then converted to zinc oxide for use in the chemical industry or it is used for the production of zinc alloys. Therefore, the Party informed the ERT that, for the next inventory submission, the notation key "NO" will be used to report zinc production	Yes. Accuracy
		The ERT recommends that the Party reassess the AD for zinc production and, if it finds that zinc production does not occur in the country, it should use the appropriate notation key, explaining the reasons for the recalculations in the NIR, in order to improve the accuracy of the inventory	
I.56	2.E Electonics industry – HFCs, PFCs, SF_6 and NF_3	There are no numerical data and no notation keys used to report emissions of F-gases from the electronics industry and the cells are left blank. The NIR (section 4.6) indicates the reason as the absence of AD for the electronics industry, for which category studies on data collection are ongoing	Yes. Completeness
		The ERT commends Turkey for its plans to collect data and recommends that the Party provide the resulting estimates of emissions from the electronics industry in its next inventory submission. If Turkey assesses that these emissions are insignificant in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, it should use the appropriate notation key "NE" for reporting the emissions, providing a qualitative and quantitative justification in the NIR	
I.57	2.F. Product uses as substitutes for ozone-depleting substances – SF_6	Emissions of SF_6 from fire extinguishers are currently reported under the category other product manufacture and use (category 2.G), using assumptions in agreement with the single importing company	Yes. Comparability
		The ERT recommends that Turkey report these emissions under category 2.F.3 fire protection, in order to increase the comparability and transparency of its reporting	
I.58	2.G Other product manufacture and use – SF_6	Emissions of SF_6 from electrical equipment and fire extinguishers and other product use were reported for 2013 in the original 2015 inventory submission. The values were replaced by the notation key "IE" in the 2016 inventory submission. The reporting of SF_6 emissions for the category is inconsistent: "NE" is reported for the 1990–1995 period; values are reported for 1996–2012; and the notation key "IE" is reported for 2013 and 2014. During the review, the Party explained that until 2013 there was no official	Yes. Consistency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
		record for SF_6 and calculations were conducted according to basic assumptions such as annual growth rates. However, trade data for SF_6 are available for the years 2013 and 2014 and the corresponding estimates for these years were reported under category 2.G.4 other categories. The Party indicated that time-series consistency will be ensured from the next inventory submission onwards. The ERT notes that no information is reported in the CRF tables under category 2.G.4 or in the NIR	
		The ERT recommends that the Party provide a consistent time series of emissions of SF_6 under the appropriate categories of electrical equipment (2.G.1), fire protection (2.F.3) and SF_6 and PFCs from other product use (2.G.2)	

Agriculture

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
A.14	3.B Manure management – CH_4 and N_2O	The ERT noted that while in the previous inventory submission Turkey did not provide any distribution of nitrogen excretion per MMS, the current submission provides data for solid storage and dry lot and other MMS. AD for daily spread, pasture range and paddock, and burned for fuel as waste MMS are reported as "IE". During the review, Turkey presented more detailed data on manure handled in different management systems, including the use of anaerobic lagoons, anaerobic digesters, large amounts of animal manure spread daily and relatively large amounts of burning of animal manure, than previously provided in CRF table 3.B(b)	Yes. Accuracy
		The ERT recommends that Turkey validate the AD on manure handled in different MMS and include the relevant information in the NIR and in CRF tables 3.B(a)s2 and 3.B(b). The ERT further recommends that the Party include further explanation of the sources and assumptions used for deriving the AD, including information on why all AD and the distribution to the MMS reported for the "dairy cattle – hybrid" category always represent the mean values of the categories "dairy cattle – culture" and "dairy cattle – domestic"	
A.15	3.D.a.2.b Sewage sludge applied to soils – N_2O	Turkey reported N_2O emissions from sewage sludge applied to agricultural soils as "NE". CRF table 9 explains the omission as being due to insufficient AD available	Yes. Completeness
		The ERT recommends that Turkey collect AD for this source and include the N_2O emissions from sewage sludge applied to soils in its inventory submission	
A.16	3.D.a.5 Mineralization/ immobilization associated with loss/gain of soil organic matter –	Turkey reports N_2O emissions from mineralization/immobilization associated with loss/gain of soil organic matter in CRF table 3.D for the agriculture sector. For the LULUCF sector (CRF table 4.B.2), Turkey reports carbon gains from mineral soils for cropland remaining cropland and loss of carbon due to land-use changes. In CRF table 4(III), "NE" is reported for direct N_2O emissions from nitrogen mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils. The omission is explained as due to lack of available data. During the review, the Party explained that, for the calculation of the value for agriculture, it uses	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
	N_2O	−28.64 kt carbon in 2014 for net carbon stock change in mineral soils on grassland converted to cropland and applies equation 11.8 from the 2006 IPCC Guidelines (volume 4, chapter 11, page 11.16). The ERT notes that the proper allocation of N_2O emissions across the agriculture and LULUCF sectors would be to report N_2O emissions from cropland remaining cropland under the agriculture sector and N_2O emissions from land-use conversion to cropland under the LULUCF sector (see footnote 2 to CRF table 4(III))	
		The ERT recommends that Turkey report N_2O emissions from land-use changes under the LULUCF sector in CRF table 4(III) and not under the agriculture sector and include N_2O emissions under the agriculture sector only from loss of soil carbon on cropland remaining cropland	
A.17	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O	Turkey reports N_2O emissions from agricultural organic soils as "NE" and CRF table 9 explains the omission as being due to insufficient AD available. However, the ERT noted that, for the LULUCF sector, in CRF tables 4.B and 4.C, Turkey reports that organic soils are occurring and carbon stock change is reported	Yes. Completeness
		The ERT recommends that Turkey make use of available AD on organic soils and include the N_2O emissions from agricultural use of organic soils in its inventory submission	
A.18	3.D.b.1 Atmospheric deposition – N_2O	The ERT noted that Turkey reports volatilized nitrogen under the Convention on Long-range Transboundary Air Pollution (367.4 kt NH_3-N in 2014) and under the UNFCCC (356.3 kt N volatilized), including ammonia and nitrogen oxides. For the inventory, Turkey uses the methodology from the 2006 IPCC Guidelines. During the review, it was clarified that the responsible institution for the Convention on Long-range Transboundary Air Pollution emission estimates in Turkey is the Ministry of Environment and Urbanization. In response to a question raised by the ERT during the review, Turkey informed of a plan for collaboration and coordination of the work on related AD for its next inventory submission	Not an issue
		The ERT encourages Turkey to verify and harmonize the AD used for its reporting under the UNFCCC and the Convention on Long-range Transboundary Air Pollution and commends Turkey for the planned collaboration	
A.19	3.D.b.2 Nitrogen leaching and run-off – N_2O	For estimating indirect N_2O emissions from nitrogen leaching from agricultural soils, Turkey uses the default EF from the 2006 IPCC Guidelines combined with a $Frac_{LEACH-(H)}$ of 0.3. In the footnote to table 11.3 of the 2006 IPCC Guidelines, there is an estimation methodology for $Frac_{LEACH-(H)}$ for areas where the soil water-holding capacity is not exceeded. Taking into account the dry conditions in Turkey and the use of a $Frac_{LEACH-(H)}$ of 0.3, a likely overestimation is taking place	Yes. Accuracy
		The ERT recommends that Turkey investigate the actual leaching conditions in Turkey and estimate the most likely $Frac_{LEACH-(H)}$ for its national conditions and include justification of the $Frac_{LEACH-(H)}$ value used in its NIR	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
A.20	3.G Liming – CO_2	Turkey reports "NE" for CO_2 emissions from liming, with the justification for the omission being that there are no data available to estimate the emissions. In addition, the NIR (section 5.8) indicates that the Party plans to estimate emissions from liming	Yes. Completeness
		The ERT recommends that the Party include estimates for the CO_2 emissions from liming in order to improve the completeness of the inventory, or justify further the use of the "NE" notation key in case the emissions are assessed to be insignificant, in accordance with decision 24/CP.19, annex I, paragraph 37(b)	
A.21	3.I Other carbon-containing fertilizers – CO_2	Turkey reports "NE" for CO_2 emissions from other carbon-containing fertilizers. The NIR (section 5.10) indicates that there are insufficient AD available to estimate the emissions	Not an issue
		The ERT encourages Turkey to investigate the use of other carbon-containing fertilizers in the country with the aim of including the emissions for the category in its inventory	

LULUCF

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
L.14	4. General (LULUCF)	The ERT noted that Turkey, in several cases, calculates and presents disaggregated data for land uses in its NIR but not in its CRF tables. For example, the NIR (pages 237 and 238) reports on subdividing the country into climatic zones and that calculations are made separately for these zones. However, in the CRF tables, the categories are reported at an aggregated level. During the review, Turkey explained that the calculations were made at a disaggregated level according to climatic zones for the last four inventory submissions, but did not explain why it does not report by subdivision in the CRF tables	Not an issue
		The ERT encourages Turkey to report data for subdivisions of land-use categories in the CRF tables when available	
L.15	4. General (LULUCF) – CO_2, CH_4 and N_2O	The ERT noted some improvements in the completeness of reporting (see L.1), but found that the notation key "NE" continues to be used by Turkey for a large number of reporting categories in the LULUCF sector (see annex II). Apart from the categories listed under L.1, the following mandatory categories were not reported: carbon stock changes in DOM, mineral soils and organic soils for forest land remaining forest land; carbon stock changes for cropland converted to forest for biomass, DOM and organic soils; carbon stock changes in organic soils for grassland converted to forest land; carbon stock changes for all pools for wetlands converted to forest land; carbon stock changes for all pools for settlements converted to forest land; carbon stock changes for all pools for other land converted to forest; carbon stock changes for biomass for grassland remaining grassland; carbon stock changes for all pools for settlements converted to grassland; carbon stock changes for all pools for other land converted to grassland; carbon stock changes in organic soils for grassland converted to cropland; carbon stock changes in mineral and organic soils for flooded land remaing flooded land, cropland converted to flooded land and grassland converted to flooded land; carbon stock changes for all pools	Yes. Completeness

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
		for grassland converted to other land; direct N_2O emissions from nitrogen inputs to forest land remaing forest land and land converted to forest land; emissions from biomass burning (CO_2, CH_4 and N_2O) for cropland remaining cropland and land converted to cropland and for grassland remaing grassland and land converted to grassland; and direct N_2O emissions from nitrogen mineralization/immobilization associated with loss/gain of soil organic matter for all land-use categories apart from cropland remaining cropland, which is reported under agriculture	
		In the NIR (section 6.1, page 240), Turkey provides brief comments on the completeness of the LULUCF sector with an explanation of the reasons for the omissions. However, many categories for which "NE" has been used are not mentioned in the section and the listed categories are not included with their CRF category identifications and with all relevant pools. Further, in the NIR (annex 5, table A7), a comprehensive compilation of not-estimated categories is provided, but without explaining why the "NE" notation key is used. In CRF table 9, 69 instances of the use of "NE" are explained, but the list is not complete. The ERT underlines that, according to paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, when the notation key "NE" is used, Parties shall indicate in both the NIR and the CRF completeness table why such emissions or removals have not been estimated. During the review, Turkey responded that it aims to increase the completeness of the inventory in the next submission and that it will add all the notation keys to the completeness table	
		The ERT recommends that Turkey improve the completeness of the reporting by providing, in addition to the categories listed under L.1, estimates for the land-use categories and transitions listed above that occur in the country and for which there are default IPCC methods. The ERT recommends, in cases where the notation key "NE" is used, that Turkey indicate in both the NIR and the CRF completeness table why the emissions and removals have not been estimated consistent with the provisions in paragraph 37 of the UNFCCC Annex I inventory reporting guidelines	
L.16	Land representation area	The ERT commends Turkey for improving the description of land-use categories and for reporting more land-use transition classes than in previous inventory submissions (see L.5). Thus, the ERT noted that, in CRF table 4.1 (land-transition matrix), Turkey reports areas for forest land remaining forest land, cropland remaining cropland, forest land converted to grassland, grassland converted to forest land, cropland converted to grassland, cropland converted to settlements and grassland converted to settlements. However, all other land-use or land-use transition classes are reported as "NE" or "NO". Further, there are inconsistencies in the reported areas, for example: cropland remaining cropland in CRF table 4.B (548.23 kha) is not the total cropland area for the category but only a small fraction of the area (see NIR, page 265); and the overall country area reported in CRF table 4.1 differs between years (e.g. 22 902.40 kha in 2013 versus 23 074.05 kha in 2014) and is less than a third of Turkey's total land area. The ERT also noted that Turkey, in table 6.20 of the NIR, provides two detailed land-use transition matrices for 1990–2000 and 2000–2006 for all land-use categories except forest land,	Yes. Completeness

demonstrating the availability of the land-use information needed to improve the land-use matrix further. The ERT also took note of the problems of integration of the data from ENVANIS[c] for forest land and the data from the CORINE[d] land-cover maps covering other land uses

Consistent reporting of areas for all land uses and land-use transitions in the CRF tables and in the NIR is mandatory and essential for the completeness and transparency of the LULUCF reporting. Therefore, the ERT recommends that Turkey treat with priority the issue of land representation under the LULUCF sector and provide a complete land-use matrix for the entire time series (see L.5). The ERT welcomes the information that the integration of ENVANIS and CORINE is included in the improvement plans of Turkey and recommends that the Party prioritize the integration of the data sources and include information on the progress with the integration and data validation in the next inventory submission

ID#	*Finding classification*	Description	Issue
L.17	4.A Forest land – CO_2	Forest land is the second most important key category for Turkey, accounting for 10.2% of its total emissions/removals, and constituted a net removal of 54 458.43 kt CO_2 eq in 2014. In its NIR (section 6.2), Turkey provides a detailed presentation of changes in forested area and biomass stock for the entire reporting period (1990–2014). The ERT commends Turkey for the significant improvements in detail and transparency made in the NIR for the forest land category since the 2014 inventory submission. The data are compiled from two national forest inventories (1972 and 1999) and since 2004 the ENVANIS database has been used for the estimates. The ERT noted that the underlying data and calculations made before 2004 and after that using the ENVANIS database are not transparently described in the NIR. The NIR is limited in information on how data were collected in the forest management plans that were used to compile the forest inventories (e.g. how data for these records were sampled and which variables were collected) and how these data were aggregated into the information that has been used in the final biomass stock calculations presented in the NIR tables. Turkey reports that since 2004 forest biomass stock, forest biomass increment and forest area have been calculated annually in ENVANIS, but it is also unclear how the data records are updated: are they updated through annual submissions of forest management plans or by extrapolation of older records? During the review, Turkey declared an ambition to further explain the ENVANIS system in the next inventory submission	Yes. Transparency
		The ERT recommends that Turkey continue its efforts to improve the transparency of underlying forest data and the methods used for determination and calculation of forest stock and increment as well as data on removals in the ENVANIS system	
L.18	4.A.2.2 Grassland converted to forest land – CO_2	The ERT noted that the value reported for 2014 for the implied carbon stock change factor for mineral soils (2.41 t C/ha) (range of 2.37–2.41 t C/ha over the time series) for grassland converted to forest land is the highest reported by Parties (range of −1.27 to +2.41 t C/ha). During the review, Turkey replied to a question regarding this issue that it used the national soil carbon stock values to calculate the EF. However, the calculation is not described in the NIR. The values of soil carbon stocks for pasture provided in NIR table 6.21 suggest that the IEF could be considerably lower than the one used for the	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
		reporting	
		The ERT recommends that Turkey verify the accuracy of the estimates for mineral soil net carbon stock change and apply a recalculation if deemed necessary. The ERT also recommends that Turkey include in the NIR a section on grassland converted to forest land under section 6.4, report in the NIR the background data used for the calculation of net emission/removals from soil and further document the country-specific values used	
L.19	4.B Cropland areas	The ERT noted that, for 1990–2014, the area for cropland (category 4.B total cropland) is reported to be in the range of 970.35 kha (in 1990) to 769.32 kha (in 2014), of which cropland remaining cropland ranges from 724.75 kha (in 1990) to 548.23 kha (in 2014). These values are not in accordance with the text in the NIR (page 265), where the total cropland area for 1990 is given as 31 259.93 ha, and in the graph presented in figure 6.4, where the area of cropland is given as about 32 000 kha for 1990. During the review, Turkey clarified that the area reported as cropland remaining cropland is just a fraction of the total cropland	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
		The ERT recommends that Turkey correct detected inconsistencies and as part of its QA/QC routines, check that data presented in the NIR in tables, text and figures are consistent and match the latest data reported in the CRF tables	
L.20	2.B Cropland – CO_2	Page 264 of the 2016 NIR states that "carbon stock changes in the above-ground, below-ground, organic and mineral soil pools have been calculated and reported. The cropland category was a large source in the last submission but has diminished with the change in EFs and AD". The text does not identify the "last" submission and the ERT noted that the reported values in the original submission of 2015 and the 2016 submission for the year 2013 are identical, with no changes in emissions or uptake, and there is no recalculation reported for cropland in the section on recalculation for the sector (page 282). There is a change between the 2014 and 2016 inventory submissions (430.77 kt net CO_2 removals in the 2014 submission and 47.63 kt net CO_2 removals in the 2016 submission from cropland in 1990). A check of the original 2015 NIR submission shows the same text included, but no further details on the recalculations implemented for the category	Yes. Transparency
		The ERT recommends that Turkey clearly explain the rationale for and impact of any performed recalculation and provide clear numerical information on such recalculation in the NIR. In addition, the ERT recommends that the Party check that the NIR text is updated to reflect the content of the present year's reporting in the CRF tables, with a view to ensuring the consistency of the reported information between the CRF tables and the NIR	
L.21	4.G Harvested wood products – CO_2	Turkey provides a time series used for calculation of harvested wood products in CRF table 4.Gs2. However, the time series is not complete and starts from 1990 instead of containing data at least from 1960. Additionally, the values for production of sawn wood (4 658.43 m^3) and wood panels (5 780.89	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
		m^3) for 2014 are well below the values for the other years of the reported time series (ranges of 2 659 911.48–6 909 736.79 m^3 and 696 726.76–5 825 342.00 m^3, respectively, excluding 2014), which indicates that they might be incorrect	
		The ERT recommends that Turkey check that data presented in the CRF tables for harvested wood products are complete and correct and report a corrected time series for the category in the next inventory submission	

Waste

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
W.16	5.A Solid waste disposal on land – CH$_4$	The ERT noted that Turkey reports AD for annual waste at solid waste disposal sites for managed and unmanaged disposal sites separately. However, CH$_4$ emissions from unmanaged waste disposal sites are reported as "IE" and included together with emissions from managed waste disposal sites. During the review, Turkey informed the ERT that disaggregated emission estimates can be provided in the next inventory submission	Yes. Comparability
		The ERT recommends that Turkey ensure comparability of reporting and provide estimated emissions from unmanaged waste disposal sites and managed waste disposal sites disaggregated	
W.17	5.C.2 Open burning of waste – CO$_2$	The ERT noted that, in the NIR (page 313), it is stated that CO$_2$ emissions from open burning of waste are estimated on the basis of waste type/material (e.g. paper, wood and plastics) in the waste open-burned, in line with equation 5.2 of the 2006 IPCC Guidelines, volume 5, chapter 5. During the review, in response to a request of the ERT, the Party provided the calculation spreadsheets for open burning of waste. The ERT concluded that equation 5.2 of the 2006 IPCC Guidelines was misapplied. Dry matter content, total carbon content and fossil carbon fraction in municipal solid waste are calculated using equations 5.8, 5.9 and 5.10, respectively, of the 2006 IPCC Guidelines. However, the calculation does not take into account that equations 5.8, 5.9 and 5.10 are part of equation 5.2, and the fraction of components in the municipal solid waste in equation 5.2 is cubed. As a result, the emissions for the entire time series are underestimated	Yes. Accuracy
		The ERT recommends that Turkey improve the accuracy of the reporting and recalculate the CO$_2$ emissions from open burning of waste, correctly applying equation 5.2 of the 2006 IPCC Guidelines	
W.18	5.D.1 Domestic wastewater – N$_2$O	The ERT noted that Turkey used a constant value (36.83 kg/person/year) of protein consumption for the whole time series. The constant value of protein consumption is the average of the available data for the periods 1990–1992, 1995–1997, 2000–2002 and 2005–2007, provided by FAO. During the review, Turkey informed the ERT that, as country-specific information is not available, the Party applied an average value for the years from the FAO data set	Yes. Accuracy
		The ERT recommends that Turkey improve the accuracy of the reporting using available data from the	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue[a]? If yes, classify by type
		FAO *Country Profile: Food Security Indicators* for Turkey for corresponding years of the inventory and IPCC gap filling techniques for the years with missing data while country-specific information is not available	

Abbreviations: AD = activity data, CRF = common reporting format, EF = emission factor, ERT = expert review team, FAO = Food and Agriculture Organization of the United Nations, IE = included elsewhere, IEA = International Energy Agency, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry, MMS = manure management system, NA = not applicable, NCV = net calorific value, NE = not estimated, NEU = non-energy use, NIR = national inventory report, NO = not occurring, QA/QA = quality assurance/quality control, 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", 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

[a] Recommendations are related to issues as defined in decision 13/CP.20, annex, paragraph 81, identified by the ERT during the review. Encouragements are made to the Party to address all findings not related to such issues.

[b] Industrial production statistics survey of the Turkish Statistical Institute.

[c] Inventory statistical system for forests.

[d] Coordination of information on the environment (land-cover maps).

Annex I

Overview of greenhouse gas emissions and removals for Turkey for submission year 2016 as submitted by the Party

Table 6 shows total greenhouse gas (GHG) emissions, including and excluding land use, land-use change and forestry and, for Parties that have decided to report indirect carbon dioxide (CO_2) emissions, with and without indirect CO_2. Tables 7 and 8 show GHG emissions reported under the Convention by Turkey by gas and by sector, respectively.

Table 6
Total greenhouse gas emissions for Turkey, 1990–2014[a]
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		Total GHG emissions including indirect CO_2 emissions[b]	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*
1990	177 544.12	207 773.32	177 544.12	207 773.32
1995	208 871.82	239 039.79	208 871.82	239 039.79
2000	260 596.01	296 810.84	260 596.01	296 810.84
2010	348 089.05	395 282.51	348 089.05	395 282.51
2011	366 521.43	415 868.81	366 521.43	415 868.81
2012	396 881.90	447 452.33	396 881.90	447 452.33
2013	380 398.45	438 819.58	380 398.45	438 819.58
2014	407 670.12	467 550.38	407 670.12	467 550.38

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.
[a] Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.
[b] The Party has not reported indirect CO_2 emissions in common reporting format table 6.

Table 7

Greenhouse gas emissions by gas for Turkey, excluding land use, land-use change and forestry, 1990–2014[a]

(kt CO_2 eq)

	$CO_2{}^b$	CH_4	N_2O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF_6	NF_3
1990	146 750.64	43 820.36	16 509.56	NO	692.77	NO	NE, NO	NO
1995	178 812.41	43 881.32	15 753.18	NO	592.88	NO	NE, NO	NO
2000	232 549.19	44 821.50	18 425.08	115.66	591.38	NO	308.03	NO
2010	320 356.66	51 415.14	19 620.89	3 054.34	NE, NO	NO	835.48	NO
2011	338 094.41	53 909.35	19 525.88	3 432.69	NE, NO	NO	906.49	NO
2012	363 126.01	58 027.01	21 116.02	4 256.86	NE, NO	NO	926.43	NO
2013	354 961.04	56 177.47	23 210.82	4 470.25	NE, NO	NO	NE, NO, IE	NO
2014	382 213.40	57 137.71	23 282.71	4 916.55	NE, NO	NO	NE, NO, IE	NO
Per cent change								
1990–2014	**160.5**	**30.4**	**41.0**	**NA**	**NA**	**NA**	**NA**	**NA**

Abbreviations: IE = included elsewhere, NA = not applicable, NE = not estimated, NO = not occurring.

[a] Emissions/removals reported in the sector other (sector 6) are not included in total greenhouse gas emissions.

[b] Turkey did not report indirect CO_2 emissions in common reporting format table 6.

Table 8
Greenhouse gas emissions by sector for Turkey, 1990–2014[a, b]
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	132 477.27	23 124.39	41 226.85	−30 229.20	10 944.82	NO
1995	160 054.86	26 985.54	39 773.22	−30 167.97	12 226.18	NO
2000	214 364.82	28 410.05	39 649.97	−36 214.83	14 385.99	NO
2010	286 049.30	51 784.73	39 328.51	−47 193.46	18 119.97	NO
2011	298 163.17	58 232.96	41 077.55	−49 347.38	18 395.13	NO
2012	321 315.16	62 404.93	45 770.45	−50 570.43	17 961.78	NO
2013	310 037.19	63 212.57	49 320.18	−58 421.14	16 249.65	NO
2014	339 104.68	62 809.54	49 521.76	−59 880.26	16 114.39	NO
Per cent change						
1990–2014	**156.0**	**171.6**	**20.1**	**98.1**	**47.2**	**NA**

Abbreviations: IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring.

[a] Emissions/removals reported in the sector other (sector 6) are not included in total greenhouse gas emissions.

[b] Turkey did not report indirect CO_2 emissions in common reporting format table 6.

Annex II

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which methods are included in the Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* that were reported as "NE" (not estimated) or for which the expert review team otherwise determined that there may be an issue with the completeness of reporting in the Party's inventory are the following:

(a)   Methane (CH_4) emissions from abandoned underground mines (category 1.B.1.a.1.iii) (see E.59);

(b)   Carbon dioxide (CO_2) emissions from captive lime of sugar facilities (category 2.A.2 lime production) (see I.10);

(c) CH_4 emissions from styrene (category 2.B.10 other (chemical industry)) (see I.28);

(d) CO_2 emissions from non-metallurgical magnesia production (category 2.A.4, other process uses of carbonates) (1990–2004) (see I.49);

(e)   Nitrous oxide (N_2O) emissions from product use (category 2.G.3) under other product manufacture and use (category 2.G) (see I.45);

(f)   Perfluorocarbon (PFC) emissions from aluminium production (category 2.C.3) (see I.36(b));

(g)   Hydrofluorocarbons (HFCs), PFCs, sulphur hexafluoride (SF_6) and nitrogen trifluoride emissions from electronics industry (category 2.E) (see I.56);

(h)   HFCs, PFCs and SF_6 emissions for subcategories under category 2.F product uses as substitutes for ozone-depleting substances (see I.42);

(i) N_2O emissions from sewage sludge applied to soils (category 3.D.a.2.b) (see A.15);

(j) N_2O emissions from cultivation of organic soils (category 3.D.a.6) (see A.17);

(k) CO_2 emissions from liming (category 3.G) (see A.20);

(l)   Net carbon stock change for forest land remaining forest land (category 4.A.1) (all pools except for living biomass) (see L.15);

(m)   Net carbon stock change for land conversion to forest land (category 4.A.2) (all pools and subcategories except living biomass, mineral soils and litter for grassland converted to forest land) (see L.1 and L.15);

(n)   Net carbon stock change in organic soils for grassland converted to cropland (category 4.B.2.2) (see L.15);

(o)   Net carbon stock for grassland remaining grassland (category 4.C.1) (all pools except for organic soils) (see L.1 and L.15);

(p)   Net carbon stock change for land converted to grassland (category 4.C.2) (only organic soils for conversion from forest land and grassland and all pools for conversion from wetlands, settlements and other land) (see L.1 and L.15);

(q)   Net carbon stock change for wetlands (category 4.D) (all pools and subcategories) (see L.1 and L.15);

(r)   Net carbon stock change for cropland converted to other land (category 4.F.2.2) and grassland converted to other land (category 4.F.2.3) (see L.1 and L.15);

(s) CH_4 and N_2O emissions from the LULUCF sector (except from wildfires on forest land) (see L.1 and L.15).

(t) CO_2 emissions from biomass burning for cropland remaining cropland and land converted to cropland and for grassland remaing grassland and land converted to grassland (see L.15).

Annex III

Documents and information used during the review

A.   Reference documents

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 <http://unfccc.int/resource/webdocs/agi/2015.pdf>.

Status report of the annual inventory of Turkey for 2016. Available at <http://unfccc.int/resource/docs/2016/asr/tur.pdf>.

FCCC/ARR/2014/TUR. Report on the individual review of the inventory submission of Turkey submitted in 2014. Available at <http://unfccc.int/resource/docs/2015/arr/tur.pdf>.

FCCC/ARR/2013/TUR. Report of the individual review of the inventory submission of Turkey submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/tur.pdf>.

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FCCC/ARR/2011/TUR. Report of the individual review of the inventory submission of Turkey submitted in 2011. Available at <http://unfccc.int/resource/docs/2012/arr/tur.pdf>.

"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". Annex to decision 24/CP.19. Available at <http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf#page=4>.

"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". Annex to decision 13/CP.20. Available at <http://unfccc.int/resource/docs/2014/cop20/eng/10a03.pdf#page=6>.

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. Available at <http://www.ipcc-nggip.iges.or.jp/public/wetlands/index.html>.

B.   Additional information provided by the Party

Responses to questions during the review were received from Ms. Aynur Tokel (Turkish Statistical Institute), including additional material on the methodology and assumptions used and calculation sheets.

Annex IV

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management system
C	confidential
$CaCO_3$	calcium carbonate
CaO	calcium oxide
CF_4	carbon tetrafluoride
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
C_2F_6	hexafluoroethane
DOM	dead organic matter
EF	emission factor
ERT	expert review team
FAO	Food and Agriculture Organization of the United Nations
FOD	first-order decay
$Frac_{LEACH-(H)}$	fraction of nitrogen input to managed soils that is lost through leaching and run-off
F-gas	fluorinated gas
GHG	greenhouse gas
ha	hectare
HFC	hydrofluorocarbon
HWP	harvested wood product
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
kha	kilohectare
kt	kilotonne (1 kt = 1 gigagram (Gg))
LULUCF	land use, land-use change and forestry
Mg	megagram
Mha	megahectare
MMS	manure management system
NA	not applicable
NCV	net calorific value
NE	not estimated
NEU	non-energy use
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
N_2O	nitrous oxide
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
SF_6	sulphur hexafluoride
TJ	terajoule
UNFCCC	United Nations Framework Convention on Climate Change