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Report on the individual review of the inventory submission of Kazakhstan 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 Kazakhstan, 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 5 to 10 September 2016 in Bonn, Germany.

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

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Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Introduction	1–5	3
II. Summary and general assessment of the 2016 inventory submission	6	4
III. Status of implementation of issues raised in the previous review report	7	6
IV. Issues identified in three successive reviews and not addressed by the Party	8	21
V. Additional findings made during the 2016 technical review	9	24
Annexes		
I. Overview of greenhouse gas emissions and removals for Kazakhstan for submission year 2016		49
II. Additional information to support findings in table 2		52
III. Documents and information used during the review		55
IV. Acronyms and abbreviations		56

I. Introduction

1. This report covers the review of the 2016 inventory submission of Kazakhstan 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 5 to 10 September 2016 in Bonn, Germany, and was coordinated by Ms. Sevdalina Todorova (UNFCCC secretariat). Table 1 provides information on the composition of the expert review team (ERT) that conducted the review of Kazakhstan.

Table 1

Composition of the expert review team that conducted the review of Kazakhstan

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Mr. Nagmeldin Elhassan	Sudan
	Mr. Marcelo Rocha	Brazil
Energy	Ms. Elena Gavrilova	The former Yugoslav Republic of Macedonia
	Mr. Michael Smith	New Zealand
	Mr. Daniel Tutu Benefoh	Ghana
IPPU	Mr. Mauro Meirelles de Oliveira Santos	Brazil
	Mr. Erhan Unal	Turkey
Agriculture	Mr. Steen Gyldenkærne	Denmark
	Ms. Alice Ryan	New Zealand
LULUCF	Mr. Craig Elvidge	New Zealand
	Ms. Sanaa Enkhtaivan	Mongolia
	Mr. Sandro Federici	San Marino
	Mr. Sabin Guendehou	Benin
Waste	Mr. Martiros Tsarukyan	Armenia
	Ms. Tatiana Tugui	Republic of Moldova
Lead reviewers	Ms. Elena Gavrilova	
	Mr. Marcelo Rocha	

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

¹ Annex to decision 13/CP.20.

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 Kazakhstan which provided no comments.

4. An overview of the greenhouse gas (GHG) emissions reported under the Convention for Kazakhstan is provided in annex I; table 6 shows GHG emissions with and without indirect carbon dioxide (CO₂) 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 Kazakhstan'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 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 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 below.

Table 2

Summary of review results and general assessment of the inventory of Kazakhstan^a

Assessment		Issue ID number(s) in tables 3 and/or 5 ^a	
Dates of submission	Original submission: 2 September 2016 (NIR), 15 April 2016, version 2 (CRF tables)		
	Revised submissions: 5 September 2016 (NIR), 4 May 2016, version 3 and 8 July 2016, version 5 (CRF tables)		
	The values from the latest submission are used in this report		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	1. Identification of key categories	Yes	G.9
	2. Selection and use of methodologies and assumptions	Yes	I.16, A.13, A.15, A.16, A.21, L.3, L.8, W.8, W.9
	3. Development and selection of emission factors	Yes	E.17, E.22, E.35, E.37, A.18

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

Assessment		Issue ID number(s) in tables 3 and/or 5 ^a	
	4. Collection and selection of activity data	Yes	E.9, E.27, I.4, I.19, L.10, L.16, W.4
	5. Reporting of recalculations	Yes	E.3, I.25, L.22
	6. Reporting of a consistent time series	Yes	E.5, E.31, E.36, E.47, E.48, E.49, E.52, E.54, E.55, I.14
	7. Reporting of uncertainties, including methodologies	Yes	G.19, A.3, L.5
	8. QA/QC	Yes	G.18, E.6, E.30, E.47, I.10, I.13, I.21, A.14, L.6, L.9, L.11, L.18, L.19, W.6
	9. Missing categories/completeness ^b	Yes	G.16, E.32, E.45, E.46, E.53, E.56, E.57, I.9, I.15, I.20, I.22, I.24, I.26, A.22, L.12, L.15, L.23, W.1, W.5, W.13
	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?	No	E.32, E.42, I.20, I.23, I.26
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	No	E.52, I.13
National inventory arrangements	Have any issues been identified with the effectiveness and reliability of the institutional, procedural and legal arrangements for estimating GHG emissions, including the changes to the national inventory arrangements since the previous annual submission	No	
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?	No	E.49, E.50, E.51, E.53, E.56
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?	Yes	Please refer to annex II.B for a list of questions and issues to be considered during this in-country review

Abbreviations: CRF = common reporting format, ERT = expert review team, GHG = greenhouse gas, IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry, NIR = national inventory report, 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”, Wetlands Supplement = *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*.

^a The ERT identified additional issues in the energy, IPPU, agriculture, LULUCF 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 *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, may affect completeness and are listed in annex II to this document.

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, and the fact that Kazakhstan was not subject to an individual inventory review of its 2014 inventory submission, the latest available review report was for the review of the 2013 inventory submission, published on 21 January 2014. 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 Kazakhstan

ID#	Issue classification ^a	Recommendation made in previous review report ^b	ERT assessment and rationale
General			
G.1	Annual submission (17 and table 3, 2013) (9, 2012) (65, 95, 2011) Completeness	Improve completeness by including estimates for all mandatory categories, together with the relevant documentation supporting the estimates	Resolved. Kazakhstan has made improvements with regard to the completeness of reporting mandatory categories (e.g. in the IPPU sector). However, there are still a number of mandatory categories that have not been reported. For an update on completeness, see annex II and the specific completeness issues listed in tables 3 and 5
G.2	Transparency (table 3, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Use the notation key “NO” if the activity is not occurring and “IE” if emissions are included elsewhere	Addressing. The Party makes better use of the notation keys; however, the use of notation keys is not always in compliance with decision 24/CP.19, annex I, paragraph 37 (see G. 17)

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
G.3	Recalculations (table 3 and 23, 2013) (32, 2012) (18, 2011) Transparency	Report transparently on all recalculations (in table 8(a) and in the category-specific chapters of the NIR)	No longer relevant. Table 8(a) is no longer part of the CRF tables. The specific recommendations on recalculations per sector are covered in the sectoral parts of the report
G.4	QA/QC and verification (table 3, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Provide more information in the NIR on the category-specific QA/QC procedures	No longer relevant. Undertaking category-specific QA/QC procedures is not a mandatory requirement under decision 24/CP.19
G.5	QA/QC and verification (12, 2013)(21, 2012) Transparency	Provide a clarification in the NIR that the set of QA/QC activities is generally the same each year, but a designated person is responsible for adjusting the time frames for performing them, depending on the progress of the inventory preparation	Not resolved. The clarification mentioned in the recommendation is not included in the NIR
G.6	NIR (table 3, 2013) (13, 2012) Adherence to UNFCCC Annex I inventory reporting guidelines	Improve transparency by bringing the structure of the NIR into full accordance with the UNFCCC reporting guidelines	No longer relevant. The structure of the NIR, as provided in the appendix to decision 24/CP.19, is not a mandatory requirement; however, Parties are encouraged to follow it. The ERT noted improvements in the structure of the NIR
G.7	NIR (table 3, 2013) (13, 2012) Adherence to UNFCCC Annex I inventory reporting guidelines	Provide a list of recommendations from the previous review report with an indication of performed improvements	No longer relevant. The inclusion of a list of recommendations from the previous review report is not a mandatory requirement under decision 24/CP.19
G.8	NIR (table 3, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Provide a list of planned improvements with timelines in the NIR	No longer relevant. The inclusion of a list of planned improvements is not a mandatory requirement under decision 24/CP.19
G.9	Key category analysis (table 4, 2013) (17, 2012) Adherence to UNFCCC Annex I inventory reporting	Ensure consistency of reporting in the NIR and the CRF tables and follow the level of disaggregation described in chapter 5.4 of the IPCC good practice guidance for LULUCF	Not resolved. There is lack of consistency between the key categories reported in the NIR and CRF tables both in terms of the number of categories and the level of disaggregation.

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
	guidelines		There is a lack of information on how the IPCC methods have been applied
G.10	Key category analysis (table 4, 2013) (18, 2012) Adherence to UNFCCC Annex I inventory reporting guidelines	Include in the NIR the information on whether the key category analysis is used to prioritize the development and improvement of the inventory	No longer relevant. Inclusion of information on whether the key category analysis is used to prioritize inventory development is not a mandatory requirement under decision 24/CP.19
G.11	Uncertainty analysis (table 4, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Review the uncertainty estimates and ensure that the estimates are performed according to the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	No longer relevant. There has been a change in the reference documents. However, the reporting of uncertainties in the NIR does not provide information on how the IPCC methods have been applied, what are the assumptions used and whether uncertainty analysis has been performed at the level of AD and EFs. According to the information received during the review, the uncertainty assessment is done following the IPCC good practice guidance (see G.18)
G.12	Inventory management (15, 2013) (24, 2012) (26, 2011) Transparency	Provide, in the NIR, more information on: the archiving system, including the responsibilities of different institutions for the flow of data and archiving; whether the archiving system includes information generated through external and internal reviews, documentation on annual key category analysis, key category identification and planned inventory improvements; and how this system is maintained by KazNIEK	Addressing. Information on data archiving has been provided in the NIR (section 1.2). However, there is still a need for more clarity on national inventory arrangements and data management as requested in the previous review report
Energy			
E.1	1. General (energy sector) (21, 2013) Consistency	Ensure close cooperation between the inventory team and the statistical agency in order to minimize the difference between apparent consumption and sectoral consumption by improving the data collection for statistics, by applying appropriately documented expert estimates or by using statistical calculation tools	Resolved. The coordination with the Agency of Statistics of the Republic of Kazakhstan was improved and the Party provided disaggregated AD for most of the key categories
E.2	1. General (energy sector) (22, 2013) Transparency	Use the notation key “IE” instead of “NO” or “NA” in cases in which emissions are included elsewhere, and include appropriate explanations in CRF table 9(a) and the NIR	Not resolved. CRF table 9 contains insufficient explanatory notes on the use of the notation keys “NE” and “IE”

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
E.3	1. General (energy sector) (23 and table 3, 2013) (32, 2012) Transparency	Report in the NIR all information regarding the reasons for recalculations and the methodologies used for the recalculated categories	Addressing. Kazakhstan has made significant improvements in its reporting of the reasons and the methodologies applied for the recalculations made, but the ERT can still identify recalculated categories for which the justifications and the methodological approach are not transparently documented (e.g. CO ₂ and CH ₄ emissions from the category oil and natural gas for the year 2013 and CO ₂ , CH ₄ and N ₂ O emissions from category transport for the year 2012)
E.4	1. General (energy sector) (28, 2013) (42, 2012) (49, 2011) Transparency	Explain the underlying assumptions and the degree of expert judgment used in the applied interpolation methodology to fill in the time series for AD of national statistics and report it in the NIR	Not resolved. The methodology/procedure for how AD are derived, the assumptions and the level to which expert judgment is involved are not transparently documented in the NIR
E.5	1. General (energy sector) (28, 2013) (42, 2012) Consistency	Ensure the consistency of the entire time series and provide comparisons of AD obtained from different sources	Addressing. In the NIR (sections 3.2.5 and 3.2.6) the Party explained that for the period 1991–1998 the national fuel balances are not available and the AD were taken from different statistical reports and the data gathered were analysed, compared and checked for consistency. The energy-related data for the period 1999–2014 were mainly taken from the national energy balances issued by the Agency of Statistics of the Republic of Kazakhstan. However, no data comparisons are provided in the NIR
E.6	1. General (energy sector) (29, 2013) Transparency	Include the description of QA/QC procedures applied for transport and fugitive emissions	Not resolved. No QA/QC section is included in the NIR for transport. Regarding the fugitive emissions, there are specific chapters on the QA/QC procedures (NIR, sections 3.6.1.2 and 3.6.2.6), although the applied QA/QC procedures

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			are not explicitly described
E.7	Fuel combustion – reference approach – all fuels – CO ₂ (31, 2013) Transparency	Include information on apparent energy consumption (excluding non-energy use and feedstocks) in CRF table 1.A(c)	Not resolved. In the 2016 submission, the apparent energy consumption (excluding non-energy use and feedstocks) was reported in CRF table 1.A(c) for the period 1990–2013, but the reported values were not comparable with the total apparent energy consumption, which leads to a large difference between the energy consumption in the reference and in the sectoral approaches (about 100% difference). For 2014, the cells on apparent energy consumption (excluding non-energy use and feedstocks) are left blank (see E.28)
E.8	Fuel combustion – reference approach – all fuels – CO ₂ (33, 2013) (46, 2012) (44, 2011) Transparency	Cross-check the AD and provide explanations for the differences in inter-annual changes between the reference and sectoral approaches	Not resolved. The Party has provided in the NIR (section 3.4) a comparative assessment of CO ₂ emissions in the reference and sectoral approaches. However, only the percentage differences are provided, without giving proper justification of the reasons behind the inter-annual changes between the reference and the sectoral approaches (see E.27)
E.9	Fuel combustion – reference approach – solid fuels – CO ₂ (34, 2013) Comparability	Carry out the planned improvement to separate coking coal consumption from the total other bituminous coal consumption	Addressing. Since 2014, the Agency of Statistics of the Republic of Kazakhstan has provided separate information on the consumption of solid fuels (coal, lignite, hard coal with high ash content, coking coal and hard coal) with a calorific value of more than 23.865 MJ per kg. In the 2016 submission, the consumption of coking coal and bituminous coal are separately reported only for the year 2014
E.10	Comparison with international data – all fuels – CO ₂	Carry out a specific analysis to reduce the discrepancies between the energy consumption data reported in the inventory submission and the data reported to IEA, and	No longer relevant. The comparison with the IEA data is not a mandatory requirement

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
	(35, 2013) (48, 2012) (44, 2011) Comparability	provide explanations in the NIR	according to decision 24/CP.19. Kazakhstan informed the ERT that it attempted to find the reasons for the discrepancies, but the ERT noted that the NIR does not provide information on the analysis made (see E.29)
E.11	International navigation – liquid fuels – CO ₂ , CH ₄ and N ₂ O (37, 2013) (50, 2012) (46, 2011) Accuracy	Obtain relevant navigation statistics and use the appropriate EFs for reporting emissions	Not resolved. The cells for international marine bunkers (all fuels) are left blank for 2014, while for the period 1990–2013, the notation key “NA” is used
E.12	International bunkers and multilateral operations – liquid fuels – CO ₂ , CH ₄ and N ₂ O (37, 2013) (50, 2012) (46, 2011) Accuracy	Correctly allocate fuel consumption to international and domestic navigation	No longer relevant. Parties are encouraged to make every effort to allocate these emissions according to the 2006 IPCC Guidelines
E.13	Feedstocks, reductants and other non-energy uses of fuels – all fuels – CO ₂ (38, 2013) Accuracy	Check the CSFs used and recalculate carbon stored, if appropriate, or provide a justification regarding the applicability of the Russian CSF values	Resolved. The Party is now using the default fractions of the carbon stored from the 2006 IPCC Guidelines
E.14	1.A. Fuel combustion – solid fuels – CO ₂ (39, 2013) (53, 2012) Accuracy	Investigate the possibility of calculating country-specific CO ₂ EFs for lignite and sub-bituminous coal as weighted average values based on information on specific coal production and CO ₂ EFs for each mining field, as the majority of coal used in Kazakhstan is from domestic production	Not resolved. The response received from the Party during the review stated that not all companies have laboratories to investigate the coal quality. Furthermore, the Agency of Statistics of the Republic of Kazakhstan does not provide disaggregated data regarding the consumption of solid fuels in the period 1990–2014, so the estimation of a consistent time series taking into consideration country-specific EFs is not possible
E.15	1.A. Fuel combustion – sectoral approach (25, 2013) (37, 2012) Transparency	Include the information in the NIR justifying the country-specific EFs for estimating CO ₂ emissions from coal mining and handling, and for combustion of liquid fuels (diesel oil, residual fuel oil and gasoline), natural gas, coke oven gas and blast furnace gas	Resolved. The Party has made significant progress in the information justifying the country-specific EFs for the solid fuels and from the fugitive

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
			emissions of solid fuels, while default EFs are used for the liquid fuels. For pending issues see E.39, E.40, E.41
E.16	1.A. Fuel combustion – Include detailed data on energy consumption by fuel sectoral approach – (26, 2013) Transparency	– Include detailed data on energy consumption by fuel for all subcategories in the energy sector	Addressing. The Party has reported detailed energy consumption data by fuel type for the latest year (2014) of the submission for categories 1.A.1, 1.A.2, 1.A.4 and 1.A.5. The detailed energy consumption data by fuel type is not provided for the other years of the submission
E.17	1.A. Fuel combustion – Investigate the possibility of separating combusted sectoral approach – all fuels – CO ₂ (27, 2013) (41, 2012) (53, 2011) Comparability	– Investigate the possibility of separating combusted fuels from other losses, including feedstocks and non-energy use of fuels, and report related emissions in the appropriate categories of the energy sector (emissions from fuel combustion or fugitive emissions) or, as appropriate, in other inventory sectors	Resolved. The combusted fuels are reported separately from the fugitive emissions, feedstocks and the non-energy use of fuels
E.18	1.A. Fuel combustion – Carefully investigate the allocation of AD and sectoral approach – all fuels – CO ₂ (40, 2013) (54, 2012) (47, 2011) Comparability	– Carefully investigate the allocation of AD and emissions from the energy sector to the industrial processes sector and correct any misallocations	Not resolved. The allocation of AD and emissions between energy and IPPU sector is not transparently presented in the NIR (e.g. for lubricants, sub-bituminous coal in the iron and steel industry)
E.19	1.A.1 Energy industries – Investigate the reasons for the low CO ₂ IEF for energy – gaseous fuels – CO ₂ (41, 2013) Accuracy	– Investigate the reasons for the low CO ₂ IEF for energy industries and provide sufficient and well-documented explanations	No longer relevant. The default EF of the 2006 IPCC Guidelines is used for the whole time series 1990–2014
E.20	1.A.2.a Iron and steel – Provide a carbon balance for the iron and steel solid fuels – CO ₂ (17 and 40, 2013) (54, 2012) (51, 2011) Transparency	– Provide a carbon balance for the iron and steel production and the non-ferrous metals industries in the NIR in order to improve transparency and demonstrate complete reporting	Resolved. The Party has provided a carbon balance for iron and steel production and the non-ferrous metals industries in the NIR (table 4.10 and table 4.11 of chapter 4 (IPPU sector))
E.21	1.A.3.b Road transportation – liquid fuels – all gases (42, 2013) Comparability	– Reallocate AD and emissions from transportation in agriculture/forestry/fisheries to the subcategory agriculture/forestry/fisheries and emissions from industrial and construction off-road transport to the category manufacturing industries and construction	Not resolved. The Party has provided information that, at the moment, it is not possible to separate the AD and the emissions, because the Agency of Statistics of the Republic of Kazakhstan does not collect disaggregated data for off-road transportation

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
E.22	1.A.3.b Road transportation – liquid fuels – N ₂ O (43, 2013) (60, 2012) Accuracy	Improve the accuracy of the N ₂ O emission estimates for gasoline consumption from this category, taking into account the pollution control technologies introduced over time in the vehicle fleet	Not resolved. The N ₂ O IEF for the road transportation has increased in the last few years, which is the opposite to what would be expected due to the latest combustion technologies of vehicle engines (see E.36)
E.23	1.B.1.a Coal mining and handling – solid fuels – CH ₄ (44, 2013) (56, 2012) Transparency	Include the background information about the measurements made and time series of the CH ₄ concentration in the NIR (underground mines)	Not resolved. During the review, the Party explained that beginning in 2016 some companies have presented data on CH ₄ measurement and a time series of CH ₄ concentration. The 2016 NIR does not contain information on these data, but the Party stated that it will present the data in its next submission
E.24	1.B.1.a Coal mining and handling – solid fuels – CH ₄ (45, 2013) (56, 2012) Transparency	Include all relevant information about the calculation of the country-specific CH ₄ EF for coal mining and handling (surface mines) in the NIR and ensure the consistency of the time series	Not resolved. The issue is identified and taken into consideration by the Party but historical data regarding the CH ₄ EF are still missing in the NIR (see E.40)
E.25	1.B.1.b Solid fuel transformation – solid fuels – CH ₄ (46, 2013) Transparency	Include in the NIR explanations of AD reported for solid fuel transformation	No longer relevant. Although AD were reported in the past, CH ₄ emissions were not reported. There is no requirement in the UNFCCC Annex I inventory reporting guidelines to continue reporting this category
E.26	1.B.1.b Solid fuel transformation – solid fuels – CH ₄ (46, 2013) Transparency	Ensure the correct use of notation keys and report the information in the documentation boxes in the CRF tables	Not resolved. The Party used the notation key “NA” to report this category, which is not the appropriate notation key to indicate that this category is existing, but not estimated (see E.43)
IPPU			
I.1	2. General (IPPU) (49, 2013) (69, 2012) Transparency	Explain in CRF table 9(a) in which category the emissions reported as “IE” are included	Not resolved. There are no explanations of the notation key “IE” used in the sector
I.2	2.A.1 Cement production – CO ₂ (50, 2013)	Provide the same detailed information about lime content in clinker and the cement kiln dust correction factor for all the years in the time series as has been	Addressing. The Party has provided detailed information (NIR, section 4.2.1.2) about lime content in clinker and the

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
	Transparency	provided in the NIR for 2011	cement kiln dust, but the information has been provided only for the year 2014 and not for the whole time series
I.3	2.A.2 Lime production – CO ₂ (17 and 51, 2013) (83 and 84, 2012) (71, 2011) Transparency	Provide more detailed information about the methodology used to estimate the emissions and revise the calculations, if appropriate	Resolved. The CO ₂ EF was explained in the NIR (section 4.2.2.2) and is applied to the entire time series
I.4	2.B.5 Carbide production – CO ₂ (52, 2013) Accuracy	Explore the use and potential imports or exports of calcium carbide and revise the EF, if necessary	Addressing. The Party has taken steps to collect AD of calcium carbide export in order to improve the accuracy of the estimates in line with the 2006 IPCC Guidelines. However, as data were obtained in 2016, the information will be used only in the next NIR
I.5	2.C.2 Ferroalloys production – CO ₂ (53, 2013) Transparency	Further improve transparency by providing the AD disaggregated by type of ferroalloy for the entire time series	Addressing. Disaggregated information per type of production has been provided for the period 2007–2014 (table 4.15 of the NIR), but not for the whole time series
I.6	2.C.3 Aluminium production – CO ₂ (54, 2013) Completeness	Obtain detailed information about the use of prebaked anodes for 2007 and recalculate the emissions for 2007	Resolved. Information for the prebaked anodes was received for the missing year (2007) in the recalculated time series and the 2007 emissions were recalculated accordingly
I.7	2.F. Product uses as substitutes for ozone-depleting substances – HFCs (55, 2013) (81, 2012) Transparency	Provide a transparent explanation in the NIR to justify the choice of the notation key “NO” for years prior to 2007, or collect AD and estimate emissions of HFC-32, HFC-125 and HFC-143a from refrigeration and air-conditioning equipment for the entire time series	Not resolved. The Party provided sufficient justification during the review week that there are no emissions of HFC-32, HFC-125 and HFC-143a prior to 2007. However, an explanation is not included in the NIR
I.8	2.F. Product uses as substitutes for ozone-depleting substances – HFCs, HFCs and SF ₆ (56, 2013) Transparency	Use the notation key “NO” for HFC, PFC and SF ₆ emissions from fire extinguishers if this activity does not occur	Addressing. Although information of no occurrence of HFCs in fire protection in Kazakhstan is available in the NIR (section 4.4.4.5, p. 157), the notation keys were still not used correctly for all F-gases, and blank cells appear in CRF

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
			table 2(II) for this source
I.9	2.G.1 Electrical equipment – SF ₆ (57, 2013) (87, 2012) Completeness	Choose the appropriate method to estimate SF ₆ emissions from electrical equipment and estimate the emissions	Not resolved. The Party continues to report the emissions as “NO”. However, it has informed the ERT that the necessary AD have been collected and the emissions will be estimated as of the next submission
Agriculture			
A.1	3. General (agriculture) (59, 2013) (90, 2012) Adherence to UNFCCC Annex I inventory reporting guidelines	Correct the following errors: (a) Report “NA” for prescribed burning of savannas instead of “NO” (b) Report “NE” for AD and the parameters for field burning of agricultural residues in the relevant CRF table instead of “NA”	Resolved. Previous errors linked to improper and inconsistent use of notation keys were corrected in the 2016 submission for the sector
A.2	3. General (agriculture) (61, 2013) (93, 2012) Transparency	Improve the transparency of the reporting by providing all supporting information on methodologies, AD, EFs and parameters in the NIR and the CRF tables	Resolved. The ERT notes the Party’s continuous efforts to improve the transparency of the reporting implemented in the sector (see A.4, A.5, A.7, A.9, A.11)
A.3	3. General (agriculture) (62, 2013) (95, 2012) (83, 2011) Transparency	Provide the sources and references for the uncertainty values used in the analysis of the agriculture sector	Addressing. References to the IPCC values have been included for the uncertainty ranges used in the NIR (chapter 5). However, not all uncertainty values are documented, and no overall uncertainty assessment has been made for the agriculture sector
A.4	3.A Enteric fermentation – CH ₄ (64, 2013) Transparency	Improve the transparency of the reporting in the NIR by providing all supporting information on the assumptions made for the selection of the EFs	Resolved. The ERT noted improvements in the transparency of the NIR in terms of justifying the EFs used (see section 5.4.2 of the NIR)
A.5	3.A Enteric fermentation – CH ₄ (65, 2013) (100, 2012) Transparency	Revise the feed intake estimates for cattle, providing accurate estimates for this category, and provide all supporting data and parameters used for the calculations in the NIR and the CRF tables	Resolved. Feed intake has been reported in accordance to the 2006 IPCC Guidelines
A.6	3.B Manure management – CH ₄ , N ₂ O	Improve the consistency of the reporting of the same data on allocation of manure per AWMS between the different CRF tables	Resolved. The Party has made improvements in the consistency of its reporting

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
	(67, 2013) (104, 2012) (2011) Consistency		between CRF tables 3.B(a)s2 and 3.B(b)
A.7	3.B Manure management – N ₂ O (67, 2013) Transparency	Improve the transparency of the reporting by providing all supporting information for AD and relevant parameters in the NIR and the CRF tables	Resolved. The Party has improved the reporting for the category by providing corrected information in CRF tables 3.B(b) and 3.B(a)s2. Additional information is needed in the NIR for the nitrogen input to soils (see A.13 and A.21)
A.8	3.D.a Direct N ₂ O emissions from managed soils – N ₂ O (68, 2013) (105, 2012) Transparency	Provide a justification for the use of the default EFs (0.01 kg N ₂ O-N/kg N) from the 2006 IPCC Guidelines in the NIR	No longer relevant. The Party correctly applies the default EFs from the 2006 IPCC Guidelines
A.9	3.D.a Direct N ₂ O emissions from managed soils – N ₂ O (69, 2013) Transparency	Provide more thorough information on the methodologies and parameters used for the estimation of N ₂ O emissions from N-fixing crops and crop residue subcategories in the NIR and the CRF tables	Resolved. The ERT considers the information provided in the NIR (and particularly in table 5.4) and in the CRF tables sufficient input on the parameters used for the estimates
A.10	3.D.a Direct N ₂ O emissions from managed soils – N ₂ O (70, 2013) (106, 2012) Consistency	Correctly report the fraction of manure excreted on pasture (0.59 in 1990 and 0.58 in 2011)	No longer relevant. The fraction is not reported in the new CRF tables
A.11	3.D.b Indirect N ₂ O emissions from managed soils – N ₂ O (71, 2013) Transparency	Improve the transparency of the reporting by providing all supporting information used for the estimation of emissions from agricultural soils (parameters involved)	Resolved. References to the 2006 IPCC Guidelines are included in the NIR (section 5.2.2)
A.12	3.D.b.2 Nitrogen leaching and run-off – N ₂ O (72, 2013) (108, 2012) Completeness	Estimate indirect N ₂ O emissions from leaching and run-off using the readily available AD to improve completeness	Resolved. Emission estimates are provided according to the 2006 IPCC Guidelines
A.13	3.D.a.5 Mineralization/immobilization associated with	Conduct further research to obtain verifiable data for the estimation of N ₂ O emissions from the mineralization of soils and report these emissions in the land converted to cropland category in the LULUCF	Addressing. All N ₂ O emissions owing to mineralization in cropland are reported in CRF table 3.D. However, the ERT

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
	loss/gain of soil organic matter – N ₂ O (73, 2013) (109, 2012) Accuracy	sector	noted that the estimated release of nitrogen owing to mineralization seems very high compared with other nitrogen sources available for plants (see L.8)
LULUCF			
L.1	4. General (LULUCF) (table 3, 2013) (113, 2012) (95, 2011) Completeness	Improve completeness by including estimates for all mandatory categories, together with the relevant documentation supporting the estimates: (a) Net CO₂ from forest land remaining forest land – mineral soils; (b) Net CO₂ emissions from grassland converted to forest land – mineral soils; (c) Net CO₂ emissions from wetlands converted to forest land – organic soils; (d) Net CO₂ emissions from cropland remaining cropland – soils; (e) Net CO₂ emissions from grassland remaining grassland – mineral soils; (f) Net CO₂ emissions from forest land converted to grassland – dead organic matter and mineral soils; (g) Net CO₂ emissions from other land converted to wetlands; (h) N₂O emissions from disturbance associated with land-use conversion to cropland – grassland converted to cropland – mineral soils; (i) CO₂, CH₄ and N₂O emissions from biomass burning – grassland remaining grassland – wildfires	Addressing. The ERT noted that in the current submission the Party has included some estimates previously reported as “NE”, such as: net CO ₂ emissions from mineral soils under cropland remaining cropland (d) and grassland remaining grassland (e); and CO ₂ , CH ₄ and N ₂ O emissions from biomass burning from grassland remaining grassland – wildfire (i). However, the reporting in the sector continues to be incomplete (see L.15)
L.2	4. General (LULUCF) (75, 2013) (115, 2012) (96, 2011) Consistency	Develop annual land-use change matrices and improve land representation	Resolved. Although the Party has submitted a time series for CRF table 4.1, the information provided does not build a consistent land representation (see L.15 and L.16)
L.3	4. General (LULUCF) (75, 2013) (116, 2012) Consistency	Make efforts to convert existing statistics into the IPCC land-use categories, taking into consideration, among other issues, that: (a) Even if land use results in no emissions, it is good practice to report its area and use appropriate notation keys for net emissions and IEFs; (b) Where relevant, forest land, grassland, wetlands and other land should be divided into “managed” and “unmanaged”. Although net	Addressing. The Party has continuously attempted to translate/convert the country-specific land categories into the IPCC land-use categories, for example subcategories of pasture land. However, the land representation reported by the Party continues to demonstrate inconsistencies between the

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
		emissions of unmanaged lands do not need to be reported, reporting the area would allow the consistency of data to be transparently justified;	NIR and the CRF tables, as well as within CRF tables between years (see L.15 and L.16)
		(c) The definitions of land-use categories in the IPCC good practice guidance for LULUCF are rather flexible, and this should facilitate the use of available statistics, with the help of proxy data, expert judgment and justified assumptions, which should be documented in the NIR;	
		(d) Lands that do not change land use should be reported separately from lands with land-use conversion;	
		(e) Kazakhstan may choose to report aggregated estimates for all land conversions to a particular land use, when data are not available to report them separately. This should be clearly stated in the documentation boxes and documented in the NIR;	
		(f) The category other land remaining other land is intended to allow the total reported land area to match the total area of the country	
L.4	4. General (LULUCF) (76, 2013) Completeness	Report areas of conversion from forest land to other land-use categories in land-use change matrices and provide estimations of GHG net emissions from deforestation in appropriate subcategories	Not resolved. The CRF tables do not report any AD or GHG estimates for deforestation
L.5	4. General (LULUCF) (77, 2013) (119, 2012) (99, 2011) Adherence to UNFCCC Annex I inventory reporting guidelines	Provide a complete set of uncertainty estimates for carbon stock changes and other emissions covering all mandatory categories, using country-specific values, where possible	Not resolved. Although the NIR (section 5.5.3) includes a section on uncertainties, information is limited to errors associated with different parameters of the national forest inventory and with the default values given in the IPCC good practice guidance for LULUCF
L.6	4. General (LULUCF) (78, 2013) (120, 2012) (100, 2011) Adherence to UNFCCC Annex I inventory reporting guidelines	Implement its QA/QC plan for the sector	Addressing. Although the NIR includes a section on QA/QC in each land-use category, several inconsistencies have been found demonstrating that the QA/QC plan is not adequately implemented (examples included in L.18)
L.7	4.A.1 Forest land remaining forest land – CO ₂ (80, 2013) (124,2012)	Report carbon stock changes separately for all the pools; report both biomass gains and biomass losses separately	Not resolved. Only net aggregate change in biomass and dead wood pools have been

<i>ID#</i>	<i>Issue classification^a</i>	<i>Recommendation made in previous review report^b</i>	<i>ERT assessment and rationale</i>
	(101 and 105, 2011) Accuracy		reported
L.8	4.B.1 Cropland remaining cropland – CO ₂ (82, 2013) (129, 2012) Comparability	Exclude abandoned lands from cropland and report this category under cropland converted to grassland or cropland converted to other land	Not resolved. Abandoned cropland is neither identified nor tracked in the land representation. However, according to the response of the Party during the review, arable land which, for a short period of time, periodically moves to fallow lands and pastures is classified as “arable and arable suitable land” and remains in this category as a separate subcategory
L.9	4.B.1 Cropland remaining cropland – CO ₂ (83, 2013) (128, 2012) Transparency	Apply the necessary procedures for the verification of emissions from soils, including any procedures in accordance with the QA/QC plan, and include these emissions in the CRF tables	Addressing. The net carbon stock changes from mineral soils are reported. However, no information on verification of SOC changes is provided
L.10	4.C.1 Grassland remaining grassland – CO ₂ (84, 2013) (125, 2012) Consistency	Check the reliability of the AD for the degree of grassland degradation for the entire time series	Addressing. The Ministry of Agriculture is completing a study to clarify the areas of agricultural land and their ecological state. The results of the study will be used in the next NIR for additional verification of data on the degree of pasture degradation
L.11	4.C.1 Grassland remaining grassland – CO ₂ (85, 2013) (126, 2012) (111, 2011) Adherence to UNFCCC Annex I inventory reporting guidelines	Implement the procedures included in the QA/QC plan and correct the error leading to inconsistent reporting of areas of grassland	Addressing. Although the NIR includes a section on QA/QC in each land-use category, several inconsistencies have been found demonstrating that the QA/QC plan is not adequately implemented (examples are included in L.18)
L.12	4.C.2 Land converted to grassland – CO ₂ (86, 2013) (130, 2012) Completeness	Include AD in the CRF tables and estimate carbon stock changes in all pools	Not resolved. No land conversions to grassland are reported, and the notation key “NO” is used for all conversions
L.13	4 (V) Biomass burning –	Collect AD and report emissions from wildfires on grassland	Resolved. CRF table 4(V) contains estimates for CH ₄ and

ID#	Issue classification ^a	Recommendation made in previous review report ^b	ERT assessment and rationale
	CO ₂ , CH ₄ and N ₂ O (87, 2013) (132, 2012) Completeness		N ₂ O emissions from wildfires
L.14	4 (V) Biomass burning – CO ₂ , CH ₄ and N ₂ O (88, 2013) (134, 2012) Completeness	Collect AD and report emissions from wildfires on land converted to wetlands	No longer relevant. There is no evidence that grassland converted to wetlands is subject to wildfires. The 2006 IPCC Guidelines does not provide a method to estimate emissions from biomass burning from grassland converted to wetlands
Waste			
W.1	5.A Solid waste disposal on land – CH ₄ (90, 2013) Completeness	Provide a justification, based on statistical data, that confirms how industrial waste is treated and disposed, and estimate and report the emissions from industrial waste, if applicable	Not resolved. The ERT noted that such information is not presented in the NIR
W.2	5.A Solid waste disposal on land – CH ₄ (91, 2013) Accuracy	Continue country-specific studies or use relevant DOC values from a country with similar economic and geographical conditions as a reference, and recalculate the emissions based on updated DOC values for 1990–2011 (instead of the constant value of 0.21 for DOC for the 1990–2011 time series)	Addressing. The ERT noted that new DOC values are used, but no values of waste composition are presented in the NIR and justification of the DOC values is not provided
W.3	5.A Solid waste disposal on land – CH ₄ (92, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Enhance QA/QC procedures to avoid the following errors: wrong AD for annual MSW at the SWDS for shallow unmanaged waste disposal sites (in CRF table 6.A); inconsistent values for MCF in CRF table 6.A (0.6) and in the NIR (0.4)	Resolved. The ERT noted that the listed errors have been corrected
W.4	5.D Wastewater treatment and discharge – CH ₄ (93, 2013) (144, 2012) Accuracy	Collect available statistical data in order to increase the accuracy and transparency of reporting and provide more detailed information in the NIR on the parameters used (e.g. share of aerobic wastewater treatment), justifying the approach taken	Not resolved. The ERT noted that the NIR does not provide the necessary information to allow the replication of emission estimations. The Party further reported that tier 1 is applied owing to a lack disaggregated data in the country

Abbreviations: AD = activity data, AWMS = animal waste management system, CRF = common reporting format, CSF = fraction of carbon stored, DOC = degradable organic carbon, EF = emission factor, ERT = expert review team, F-gases = fluorinated gases, GHG = greenhouse gas, IE = included elsewhere, IEA = International Energy Agency, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = *Good Practice Guidance and Uncertainty Management*

in *National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, IPPU = industrial processes and product use, KazNIEK = Kazakh Scientific Research Institute of Ecology and Climate, LULUCF = land use, land-use change and forestry, MCF = methane correction factor, MSW = municipal solid waste, NA = not applicable, NE = not estimated, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control, SOC = soil organic carbon, SWDS = solid waste disposal sites, 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 Kazakhstan, 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. In addition, Kazakhstan was also not subject to an individual inventory review in 2014. Therefore, the recommendations reflected in table 3 are from the 2013 annual review report. For the same reason, the years 2014 and 2015 are excluded from the list of years in which the issue has been identified.

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 or more successive reviews, including the review of the 2016 inventory submission of Kazakhstan, and have not been addressed by the Party.

Table 4

Issues identified in three successive reviews and not addressed by Kazakhstan

ID# ^a	Previous recommendation for the issue identified	Number of successive reviews issue not addressed ^b
General		
G.5	Provide a clarification in the NIR that the set of QA/QC activities is generally the same each year, but a designated person is responsible for adjusting the time frames for performing them, depending on the progress of the inventory preparation	3 (2012–2015/2016)
G.9	Ensure consistency of reporting in the NIR and the CRF tables for key category analysis and follow the level of disaggregation described in chapter 5.4 of the IPCC good practice guidance for LULUCF	3 (2012–2015/2016)
G.12	Provide, in the NIR, more information on: the archiving system, including the responsibilities of different institutions for the flow of data and archiving; whether the archiving system includes information generated through external and internal reviews, documentation on annual key category analysis, key category identification and planned inventory improvements; and how this system is maintained by KazNIEK	4 (2011–2015/2016)
Energy		
E.4	Explain the underlying assumptions and the degree of expert judgment used in the applied interpolation methodology to fill in the time series for AD of national statistics and report it in the NIR	4 (2011–2015/2016)
E.5	Ensure the consistency of the entire time series and provide comparisons of AD obtained from different sources	3 (2012 – 2015/2016)

<i>ID#^a</i>	<i>Previous recommendation for the issue identified</i>	<i>Number of successive reviews issue not addressed^b</i>
E.8	Cross-check the AD and provide explanations of the differences in inter-annual changes between the reference and sectoral approaches	3 (2012–2015/2016)
E.14	Obtain relevant navigation statistics and use the appropriate EFs for reporting emissions	4 (2011–2015/2016)
E.17*	Investigate the possibility of calculating country-specific CO ₂ EFs for lignite and sub-bituminous coal as weighted average values based on information on specific coal production and CO ₂ EFs for each mining field, as the majority of coal used in Kazakhstan is from domestic production	3 (2012–2015/2016)
E.18	Carefully investigate the allocation of AD and emissions from the energy sector to the industrial processes sector and correct any misallocations	4 (2011–2015/2016)
E.22*	Improve the accuracy of the N ₂ O emission estimates for gasoline consumption for road transportation, taking into account the pollution control technologies introduced over time in the vehicle fleet	3 (2012–2015/2016)
E.23	Include the background information about the measurements made and time series of the CH ₄ concentration in the NIR (underground mines)	3 (2012–2015/2016)
E.24	Include all relevant information about the calculation of the country-specific CH ₄ EF for coal mining and handling (surface mines) in the NIR and ensure the consistency of the time series	3 (2012–2015/2016)
IPPU		
I.1	Explain in CRF table 9(a) in which category the emissions reported as “IE” are included	3 (2012–2015/2016)
I.7	Provide a transparent explanation in the NIR to justify the choice of the notation key “NO” for years prior to 2007, or collect AD and estimate emissions of HFC-32, HFC-125 and HFC-143a from refrigeration and air-conditioning equipment for the entire time series	3 (2012–2015/2016)
I.9*	Choose the appropriate method to estimate SF ₆ emissions from electrical equipment and estimate the emissions	3 (2013–2015/2016)
Agriculture		
A.3	Provide the sources and references for the uncertainty values used in the analysis of the agriculture sector	4 (2011–2015/2016)
LULUCF		
L.1*	Improve completeness by including estimates for all mandatory categories, together with the relevant documentation supporting the estimates	4 (2011–2015/2016)
L.3	Make efforts to convert existing statistics into the IPCC land-use categories	3 (2013–2015/2016)
L.5	Provide a complete set of uncertainty estimates for carbon stock changes and other emissions covering all mandatory categories, using country-specific values, where possible	4 (2011–2015/2016)
L.6	Implement its QA/QC plan for the sector	4 (2011–2015/2016)

<i>ID#^a</i>	<i>Previous recommendation for the issue identified</i>	<i>Number of successive reviews issue not addressed^b</i>
L.7	Report carbon stock changes separately for all the pools; report both biomass gains and biomass losses separately	4 (2011–2015/2016)
L.8	Exclude abandoned lands from cropland and report this category under cropland converted to grassland or cropland converted to other land	3 (2012–2015/2016)
L.12*	Include AD in the CRF tables and estimate carbon stock changes in all pools for land converted to grassland	3 (2012–2015/2016)
Waste		
W.4*	Collect available statistical data to increase the accuracy and transparency of its reporting on wastewater treatment and discharge and provide more detailed information in the NIR on the parameters used (e.g. share of aerobic wastewater treatment), justifying the approach taken	3 (2012–2015/16)

Abbreviations: AD = activity data, CRF = common reporting format, EF = emission factor, ERT = expert review team, IE = included elsewhere, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance for LULUCF = *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, IPPU = industrial processes and product use, KazNIIK = Kazakh Scientific Research Institute of Ecology and Climate, LULUCF = land use, land-use change and forestry, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control.

^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 Kazakhstan, the review of the 2016 inventory submission is being held in conjunction with the review of the 2015 inventory submission. As 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. In addition, Kazakhstan was also not subject to an individual inventory review in 2014. Therefore, 2014 is excluded in this table. The ERT noted that this table 4 is the same as that in the 2015 annual review report for Kazakhstan, 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 Kazakhstan that are additional to those identified in table 3 above.

Table 5

Additional findings made during the 2016 technical review of the inventory submission of Kazakhstan

<i>ID#</i>	<i>Finding classification</i>	<i>Description of the finding with recommendation or encouragement</i>	<i>Is finding an issue^a? If yes, classify by type</i>
General			
G.13	Annual submission	The ERT noted that there was a delay in the submission of the 2016 annual inventory. Although Kazakhstan submitted its CRF tables for its 2016 inventory submission on 15 April 2016 (followed by two resubmissions of the CRF tables in May and July), the NIR was only submitted on 2 September 2016. The ERT requested clarification from Kazakhstan on whether the national inventory arrangements put in place are not able to ensure annual submissions in due time. Kazakhstan responded that its NIR 2016 submission was delayed because of the delay is the development of its CRF reporting tables and also as a result of late preparation and sending the NIR for review by the relevant government bodies The ERT encourages Kazakhstan to ensure that it has effective national inventory arrangements able to meet the agreed deadline for annual inventory submissions and encourages Kazakhstan to submit its next and future NIRs in accordance with the agreed deadline for submission	Not an issue
G.14	National system	From the NIR 2016, it is not clear whether there is a change in the designated entity with the overall responsibility for the national GHG inventory of Kazakhstan (i.e. whether it is still the Ministry of Environment Protection as in the last submission or it has been changed to the Ministry of Energy). It is also mentioned in the NIR 2016 that after 2014 “Zhasyl Damu” of the Ministry of Energy of Kazakhstan became the legal successor to the “KazNIEK” in performing the technical preparation of the inventory. During the review, the ERT requested clarification on whether there were changes in the national inventory arrangements and legal and procedural arrangements for the national inventory of Kazakhstan. In case there are such changes, the ERT also requested information on whether there are changes or new legal and procedural arrangements replacing the previous ones and affecting the role of other institutions related to the annual inventory preparation In response to the question raised by the ERT, Kazakhstan clarified that in August 2014 there was a reform in the national authorities in Kazakhstan. As a result, the Ministry of Environment Protection joined the Ministry of Energy that took the climate change responsibilities. The national inventories are conducted by the same organization “Green	Not an issue

		development” (Zhasyl Damu), which is the successor of the former state company “KazNIEK” and is a subordinate enterprise of the Ministry of Energy. Kazakhstan further explained that there are no significant changes in the national inventory arrangements and in the legal and procedural arrangements affecting the role of other institutions related to the annual inventory preparations and the group of the inventory preparation institutions maintained almost the same composition, as it was in “KazNIEK” The ERT encourages Kazakhstan to report in the NIR the changes in the national institutional arrangements owing to the reform in the national authorities in Kazakhstan in 2014, including the description of the legal and procedural arrangement for the GHG inventory together with clear information on the roles and responsibilities of all organizations contributing to the preparation of the annual inventories	
G.15	Inventory management	One of the main tasks under inventory management is responding, in a timely manner, to requests for clarifying inventory information resulting from the different stages of the process of review of the inventory information and information on the national inventory arrangements (decision 24/CP.19, annex, para. 27(c)). The ERT noted the delay in the response to some of the questions of the ERT before and during the review week The ERT encourages Kazakhstan to further strengthen its institutional arrangements allowing for timely responses to review-related questions	Not an issue
G.16	Completeness	The issue of the incomplete reporting of mandatory categories has been raised by the ERTs in the previous ARRs. The ERT noted that Kazakhstan has made improvements with regard to the completeness of reporting mandatory categories (for example in the IPPU sector). However, there are still a number of categories that have not been reported as indicated in the sector-specific completeness findings listed below (see E.32, E.45, E.46, E.53, E.56, E.57, I.15, I.22, I.24, I.26, A.22, L.11, L.14, L.22, W.5, W.13) and in annex II to this report. During the review, Kazakhstan indicated that it had significantly improved the reporting of mandatory categories in the 2016 submission compared to its 2014 submission and will continue addressing the issue in its next submissions The ERT recommends that the Party provide detailed information on the assessment of completeness (e.g. in an annex) in the NIR. The ERT also encourages Kazakhstan to make efforts to report non-mandatory categories in its future submissions	Yes. Completeness
G.17	Transparency	The ERT noted that Kazakhstan has made improvements in its use of notation keys; however, there are still some cells that are blank (e.g. CRF table 1.C) and there are cases of incorrect use of notation keys or lack of explanatory information in the NIR on the use of some notation keys as described in the sectoral part of this report. Thus, Kazakhstan uses notation key “NA” in a number of categories in all sectors and some of these activities do occur within the country and result in emissions (e.g. CH₄ and N₂O emissions from chemicals (manufacturing industries and construction) (1999, 2004, 2005 and 2006)) and therefore should be estimated and reported or otherwise other notation keys such as “NE”, “IE”, “NO” should be used, as	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines

appropriate, to report these categories. In response to the questions raised by the ERT, Kazakhstan indicated that this issue will be addressed, and the ERT comments will be taken into account more strictly

In addition, Kazakhstan has not provided in the NIR detailed information or explanations on the assessment of completeness. In CRF table 9, the Party reports an explanation on the use of notation key “IE” for three categories from the energy sector. However, apart from that, Kazakhstan has not provided in the CRF tables or in the NIR any information on the use and justification of use of notation keys “NE” and “IE” used in the inventory

The ERT recommends that the Party complete all cells and not leave blank cells in the CRF tables and ensure the correct use of the notation keys (including “NA”) in the CRF tables in line with decision 24/CMP.19, annex, paragraph 37. The ERT further recommends that the Party provide justification on the use of notation keys, particularly the notation keys “NE” and “IE”, in the NIR and in CRF table 9

G.18 QA/QC and verification	The information reported in NIR 2016 does not provide clear details of the QA/QC arrangements of the Party and how these arrangements relate to the IPCC methods and good practices (2006 IPCC Guidelines), whether there is a plan with specific QA/QC objectives, activities, time frame, and defined institutional responsibilities, what is the role of QA/QC arrangement in the inventory planning and improvements, and whether external review (QA) has been performed for this submission and by whom. During the review, Kazakhstan responded to the ERT’s questions on the issue by explaining that its QA/QC procedures are conducted according to the 2006 IPCC Guidelines and follow the Order of the Minister of Energy of Kazakhstan No.214 dated 18 March 2015 titled “Regulations for the control of completeness, transparency and credibility of the state inventory of emissions and removals of greenhouse gases”. After an internal cross-validation, the inventory report is sent to the ministries and interested organizations involved in the process of inventory preparation and to data providers for review, and their comments are addressed in the report, which are mostly corrections related to AD and in some cases the results are recalculated The ERT recommends that the Party provide detailed information in the NIR on the QA/QC arrangements in place in accordance with the UNFCCC Annex I inventory reporting guidelines, including information on the QA/QC plan and on QA/QC procedures already implemented or to be implemented in the future	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
G.19 Uncertainty analysis	The information reported on uncertainty analysis in the general part as well as in the category level sections of NIR 2016 is very limited and does not enable the ERT to understand how the Party has conducted the analysis, what are the assumptions used, what are the sources of uncertainty data, how the IPCC methods have been applied and whether the results of the analysis are used to improve on the main source/sink categories. During the review, Kazakhstan explained that the uncertainty analysis was conducted on the basis of the IPCC good practice guidance and the Party is planning to improve the analysis in its next inventory	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines

		submission The ERT recommends that the Party improve on the reporting of uncertainty, in its next submission, by including information on the quantitative estimates of the uncertainty of data used for all source and sink categories using the 2006 IPCC Guidelines, and report uncertainties for the base year and the latest inventory year as well as the methods and underlying assumptions used, and how the analysis helps in prioritizing efforts to improve the accuracy of national inventories in the future, in line with decision 24/CP.19, annex, paragraph 42	
G.20	Follow-up to previous reviews	The ERT noted that NIR 2016 contains no information on addressing the previous recommendations. The ERT concludes that the reporting is not completely transparent in regard to the follow-up to previous reviews. In response to a question by the ERT, Kazakhstan stated that NIR 2016 was prepared taking into account the recommendations and issues of improvement raised in previous ARRs in line with the UNFCCC Annex I inventory reporting guidelines; however, this is not always directly noted in the NIR The ERT recommends that Kazakhstan provide summary information on addressing the recommendations raised in previous ARRs in line with the UNFCCC Annex I inventory reporting guidelines both in the sector-specific sections and in chapter 10 (Recalculations and improvements) of the NIR	Yes. Transparency
Energy			
E.27	Fuel combustion – reference approach – all fuels – CO ₂	There are significant differences between the emissions estimated by the reference approach and the sectoral approach in the whole time series, reaching over 25%. The ERT considers that the differences are mainly due to the discrepancies in the carbon stored/excluded and the consumption of the international bunkers The ERT recommends that the Party reconsider the accuracy of the data concerning the combusted fuels and the fuels used as feedstocks in order to further reduce the level of difference between the sectoral and reference approaches across the time series and include additional information in the NIR explaining the observed differences in the CO₂ emission estimates from the two approaches	Yes. Accuracy
E.28	Fuel combustion – reference approach – all fuels – CO ₂	The value for carbon and CO₂ excluded from the reference approach for non-energy use of fuels differs significantly between CRF tables 1.A(b), 1.A(c) and 1.A(d). Specifically, the cells in the “Apparent consumption (excluding non-energy use, reductants and feedstocks)” column in CRF table 1.A(c) should contain the energy units in PJ (with reference to the data in the first column of CRF table 1.A(d), which are in TJ). The data that are provided in CRF table 1.A(c) for the period 1990–2013 are converted to EJ (instead in PJ), which is a unit higher by a factor of 1 000 and that is the reason why the energy consumption in the reference and in the sectoral approach is so significant and incomparable. In addition, the ERT noted that the differences reported for the CO₂ emissions from the two approaches do not match the values reported in	Yes. Accuracy

		annex II of the NIR. During the review, the Party explained that the problems in the reference approach reporting in the CRF tables are due to a technical error The ERT recommends that the Party improve the accuracy and consistency of its reporting of energy consumption in the reference approach, particularly paying attention to the correct completion of cells for “Apparent consumption (excluding non-energy use, reductants and feedstocks)” and ensure that the differences between the approaches are reasonable. The ERT further recommends that Kazakhstan ensure consistent reporting of the comparison of the reference and sectoral approaches in annex II of the NIR and in the CRF tables	
E.29	Comparison with international data – all fuels – CO ₂	The apparent consumption based on the national energy balance and data from the Statistical Committee to the Agency of Statistics of the Republic of Kazakhstan (including the solid, liquid, gaseous, other and biomass data) and the data reported to the IEA differ significantly within the range of 11% annually. In addition, the overall trend of consumption for the 1990–2014 period shows significant divergence: from a decrease by 12% according to the CRF tables to an increase of 7% according to IEA data The ERT encourages the Party to investigate the differences between the IEA data and the data produced by the national Statistical Committee with a view to improving the consistency between the data included in the national energy balances, the data reported under the CRF tables and the data reported to the IEA. The ERT further encourages Kazakhstan to report the result of the analysis and any changes applied to the estimates in the next submission. Furthermore, on the question raised by the Party as to how the data from the national Statistical Committee and the IEA can be aligned, the ERT encourages the Party to investigate what institution is reporting the national data to the IEA and identify the differences between data reported nationally and internationally	Not an issue
E.30	Feedstocks, reductants and other non-energy uses of fuels – all fuels – CO ₂	The value for carbon and CO₂ excluded from the reference approach for lubricants differs significantly between CRF tables 1.A(b) and 1.A(d) for the inventory year 2014. (The value in CRF table 1.A(b) is 14.56 kt C while the value in table 1.A(d) is 1,456 kt C.) The Party confirmed that the difference is due to a technical error The ERT recommends that the Party improve the QA/QC procedures relevant to the estimation of the use of the feedstocks, reductants and non-energy use of fuels and ensure consistent reporting across CRF table 1.A(b) and table 1.A(d)	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
E.31	1.A. Fuel combustion – sectoral approach – other fuels – CO ₂ and N ₂ O	Emissions from other fuels are inconsistently reported across the time series. They are reported for the period 1990–2008 and for 2014. For the period 2009–2013, the notation keys “IE”, “NA” and “NO” are reported. The IEFs for CO₂ and N₂O differ substantially between the period 1990–2008 and 2014. The N₂O IEF changed from 0.59 kg/TJ in 2008 to 0.19 kg/TJ in 2014 and the CO₂ IEF changed from the constant value of 73.33 t/TJ to 74.39 t/TJ in 2014. During the review, the Party explained that the Statistical Committee does not provide data on other fuels	Yes. Consistency

		The ERT recommends that the Party further explain the fuels covered under “other fuels”, and the changes in their contributions that may affect the IEF. Furthermore, the ERT recommends that Kazakhstan investigate the data gap regarding the consumption of other fuels for the period 2009–2013 and describe in the NIR the appropriateness of any notation keys applied during this period. Finally, the ERT recommends that Kazakhstan ensure the consistency of the time series of reported estimates from other fuels	
E.32	1.A.2.d Pulp, paper and print – all fuels – CH ₄ and N ₂ O	The ERT noted that while CO₂ emissions are estimated for the category, the emissions of CH₄ and N₂O have not been estimated for the whole time series, and the notation keys “NA”, “NO” and “IE” are provided. The NIR does not contain any information about the usage of the notation keys. In response to the questions raised by the ERT, the Party stated that these emissions are insignificant The ERT recommends that the Party include these emissions in the national GHG inventory or provide justification to support that the emissions of CH₄ and N₂O from the category “1.A.2.d Pulp, paper and print” are insignificant and use a notation key in accordance to decision 24/CP.19, annex I, paragraph 37	Yes. Completeness
E.33	1.A.3.a Domestic aviation – liquid fuels – general	Data for domestic aviation agree, within 4%, with the IEA data for the period 1991–1998 and differ significantly for all other years. During the review, the Party confirmed that it is using data from the national energy balances and data gathered by domestic aviation companies The ERT encourages the Party to investigate if the data in the national energy balances and the data reported by domestic aviation companies are comparable and consistent, and to investigate and report the reasons for the differences between the national data and IEA data	Not an issue
E.34	1.A.3.a Domestic aviation – liquid fuels – CH ₄ and N ₂ O	The ERT noted that the CH₄ and N₂O IEFs for aviation gasoline are not consistent within the time series (e.g. change of the constant value of CH₄ IEF from 0.5 kg/TJ to 5 kg/TJ in 1993 and 0.05 kg/TJ in 2014) and are not in line with the 2006 IPCC Guidelines (default value of 0.5 kg/TJ). The Party confirmed that the issue was due to technical errors The ERT recommends that the Party correct the identified errors in the CH₄ and N₂O IEFs for aviation gasoline	Yes. Consistency
E.35	1.A.3.b Road transportation – liquid fuels – CO ₂	The ERT noted that Kazakhstan reported diesel oil consumption by cars only in 2014 and that the 2014 CO₂ IEF (23.32 t/TJ) is lower than the range provided in the 2006 IPCC Guidelines (72.6–74.8 t/TJ). As a result, between 2013/2014 the CO₂ IEF for liquid fuels changed from 71.38 t/TJ to 66.94 t/TJ, while justification and background information was not presented in the NIR The ERT recommends that the Party verify the road transport-related AD for diesel oil consumption with a view to being able to report the emissions for the entire time series. The ERT further recommends that Kazakhstan investigate the technology used and the background information on road transport activities within the country, and that it justify the EF used or	Yes. Accuracy

		use the default EF suggested by the 2006 IPCC Guidelines	
E.36	1.A.3.b Road transportation – liquid fuels – N ₂ O	The N₂O IEF for diesel oil changed by 550.5% across the 1990/2014 time series, which is the highest increase reported among Annex I Parties. During the review, the Party explained the change of the IEF with the changed share of diesel oil used by heavy duty vehicles and buses The ERT recommends that the Party provide in its NIR explanatory information on the trend of the N₂O IEF between 1990 and 2014	Yes. Transparency
E.37	1.A.3.b.i Cars – liquid fuels – CH ₄	The 2014 CH₄ IEF (33.00 kg/TJ) for gasoline for cars is the highest in the range reported by Annex I Parties (3.03–33.00 kg/TJ) and it keeps increasing over the time series, while the general tendency across reporting Parties is the opposite. The Party explained that the IEF could be due to the low quality of gasoline used in Kazakhstan when compared with other Parties and some problems with the quality of the AD. This question is still under investigation The ERT recommends that the Party verify the road transport-related AD for gasoline consumption, the technology used and the background information about road transport and justify the relatively high, and increasing, CH₄ IEF	Yes. Accuracy
E.38	1.B.1.a Coal mining and handling – solid fuel – CH ₄	In the NIR (section 3.6.1), the Party stated that 1% of the CH₄ of underground mines is recovered and used as an energy source for heating. In CRF table 1.B.1 that information is not provided (for the whole time series 1990–2014 “NO” or “NA” are reported). During the review, the Party stated that the information on the recovered CH₄ was provided by coal companies for the period 1994–2014 and these emissions are reported under the category “Energy and heat production” The ERT recommends that the Party report the recovery/flaring of CH₄ from underground mines in CRF table 1.B.1 or use the relevant notation key in accordance with decision 24/CP.19, annex I, paragraph 37	Yes. Comparability
E.39	1.B.1.a Coal mining and handling – solid fuels – CH ₄	The CH₄ IEF (0.65 kg/t) for the post-mining activities of the underground mines is significantly lower than the range of the CH₄ EF provided in the 2006 IPCC Guidelines (0.9–4 m³/t or default value of 1.675 kg/t), and the Party has not transparently documented the usage of the lower CH₄ EF for post-mining activities. In response to the question raised by the ERT, the Party provided a document regarding the CH₄ content of the coal, but the document did not provide any additional information on the calculation method used for the CH₄ EF of the post-mining activities The ERT recommends that the Party investigate and transparently document the use of the country-specific CH₄ EF for the post-mining activities of the underground mines	Yes. Comparability
E.40	1.B.1.a Coal mining and handling – solid fuels – CH ₄	The 2014 CH₄ IEF (7.60 kg/t) for the mining activities of the surface mines is significantly higher than the value provided in the 2006 IPCC Guidelines (range of 0.3–2.0 m³/t or default value of 0.804 kg/t). Furthermore, the Party has not transparently documented the usage of the higher CH₄ EF for the surface mining activities, as well as the inconsistency of the IEF in the	Yes. Comparability

period 1990–2014 (stable values for 1990–1999 (9.30 kg/t) and 2000, 2002–2012 (7.16 kg/t) and a value of 5.88 kg/t for 2000). During the review, the Party explained that the reason behind this is the characteristics of the national coal and provided a document regarding the CH₄ content of the coal, but the document did not provide any additional information on the calculation method of the CH₄ EF of the surface mining activities

The ERT recommends that the Party assess and verify the data provided by the coal mining companies and verify if the conversion between the volume and mass units is properly done, and recommends that it justify the country-specific EF in its NIR and the changes in the IEF for the period 1990–2014

E.41	1.B.1.a Coal mining and handling – solid fuels – CO ₂	The Party has not provided any information regarding the methodology and the background data regarding the calculation of the CO₂ EF for surface mining activities. In response to the question raised by the ERT, the Party stated that this information was submitted in the previous submission and in its next submission the Party will provide the necessary reference material The ERT recommends that the Party transparently document in each NIR the methodology and the background information used for the estimation of the CO₂ EF from surface mining activities	Yes. Transparency
E.42	1.B.1.a Coal mining and handling – solid fuels – CO ₂ and CH ₄	The CH₄ and CO₂ emissions from the post-mining activities of surface mines are not estimated and the notation key “NO” is used for the whole time series 1990–2014. In response to the question raised by the ERT, the Party stated that the emissions of this category are assumed to be negligible, because the gas content of surface coal is typically very low The ERT recommends that the Party determine if the level of CH₄ emissions/removals would meet the definition of “insignificant” as contained in decision 24/CP.19, annex I, paragraph 37(b) and report the appropriate notation keys. Furthermore, the ERT encourages the Party to estimate the CO₂ emissions from the post-mining activities of the surface mines	Yes. Completeness
E.43	1.B.1.b Solid fuel transformation – general	Kazakhstan has reported the transformation of solid fuels occurring in the country (in its NIR and CRF table 1.A(b), “carbon excluded” column), but the fugitive CH₄ emissions of the solid fuel transformational process are not included in the national inventory The ERT encourages the Party to provide consistency in the reporting of its national GHG emissions in respect to the carbon stored and to consider a country-specific methodology for the estimation of fugitive CH₄ emissions from the process of solid fuel transformation	Not an issue
E.44	1.B.2 Oil and natural gas and other – all fuels – CO ₂ , and CH ₄	There are no descriptions (e.g. oil production/consumption/pipeline length) and units specified for the AD of reported subcategories in CRF table 1.B.2. During the review, the Party indicated that the unit of the AD is Gg The ERT recommends that the Party ensure that the description and units regarding the AD for the calculation of fugitive CO₂ and CH₄ emissions are provided in a consistent and complete	Yes. Transparency

		manner in CRF table 1.B.2	
E.45	1.B.2.a Oil – liquid fuels – CO ₂ and CH ₄	For the whole time series 1990–2014, the notation key “NA” is used for oil exploration AD and “NO” for emissions. This category should contain the fugitive emissions (excluding venting and flaring) from oil well drilling, drill stem testing and well completions. As reported in the NIR, this issue remains unresolved, because not all companies are providing the necessary information The ERT recommends that the Party estimate and include emissions from oil exploration in Kazakhstan’s national GHG emissions or, if data for the estimation of the emissions from this category are not available, use the notation key “NE” with the relevant explanation in the CRF tables and in the NIR	Yes. Completeness
E.46	1.B.2.a Oil – liquid fuels – CO ₂	The CO₂ emissions from oil production and oil transport (except for 2014) are reported as “NA” whereas AD and CH₄ emissions are reported for the entire time series. The amount captured is reported in 2014, which results in having an IEF for CO₂ in table 1.B.2 The ERT recommends that the Party estimate the fugitive emissions of CO₂ from the oil production and oil transport processes for the period 1990–2014 (table 1.B.2). If country-specific EFs are not available, the ERT recommends that the Party use the tier 1 EFs from the 2006 IPCC Guidelines (vol. 2, tables 4.2.4 and 4.2.5) for oil production and oil transport processes	Yes. Completeness
E.47	1.B.2.a Oil – liquid fuels – CH ₄	The trend of CH₄ emissions from oil production has been identified as being inconsistent. There was a drop from 8.42 kt in 2012 and 2013 to 0.18 kt in 2014. The IEF is constant in the 1990–2012 period (106.32 kg/unit) and changes to 99 398.80 kg/unit in 2013 and 2 720.15 kg/unit in 2014 (a change of 2 458.5%) The ERT recommends that the Party improve the QA/QC procedures to verify the CH₄ EF for oil production and ensure the time series consistency for the IEF for the whole time series	Yes. Consistency
E.48	1.B.2.a Oil – liquid fuels – CH ₄	The CH₄ IEF for refining/storage is constant for the 1990–2013 period (3.53 kg/unit) and dropped to 0.10 kg/unit in 2014. The AD used for 2012 and 2013 are identical. Further, the emissions in 1999 and 2014 are significantly lower (0.02 kt) compared with the estimated CH₄ emissions for the refining/storage processes for the period 1990–2014 (range 0.22–0.64 kt) The ERT recommends that the Party verify the time-series consistency of the CH₄ estimates and the IEF for refining/storage processes for the period 1990–2014, and that it provide appropriate justification/documentation in the NIR	Yes. Consistency
E.49	1.B.2.a Oil – liquid fuels – CH ₄	The notation key “NA” is used for CH₄ emissions from the transport category for the period 1990–1996 without any justification. Furthermore, in the last reported year, the ERT noted a sudden decrease in the total CH₄ estimates of this category and of the CH₄ IEF from transport (from 29.89 kg/unit in 2013 to 5.45 kg/unit in 2014). The Party did not provide a response to	Yes. Consistency

		this issue during the review The ERT recommends that the Party ensure consistency in the estimation of the CH₄ emissions from transport (1.B.2.A.3) and that it fill the gaps for the period 1990–1996. Furthermore, the ERT recommends that the Party verify the CH₄ IEF for the year 2014 and that it ensure consistency in the IEF for the entire time series	
E.50	1.B.2.a Oil – liquid fuels – CO ₂ and CH ₄	CO₂ and CH₄ emissions from distribution of oil products are reported as “NO”, while CH₄ emissions from the subcategories production and refining/storage are reported. The Party did not provide an appropriate response to this question during the review The ERT encourages the Party to ensure the completeness of the CO₂ and CH₄ emission estimates and include the emissions from distribution of oil products in the national GHG inventory	Not an issue
E.51	1.B.2.b Natural gas – gaseous fuels – CO ₂ and CH ₄	The CO₂ and CH₄ emissions from natural gas exploration are reported as “NA” for the entire time series. In the NIR (section 3.6.2.3) it is stated that the information on the emissions associated with the natural gas exploration and the number of wells drilled are not available. The Party did not provide further clarification in response to this question during the review Taking into consideration that this activity is occurring in the country, the ERT encourages the Party to estimate fugitive CO₂ and CH₄ emissions from natural gas exploration	Not an issue
E.52	1.B.2.b Natural gas – gaseous fuels – CO ₂ and CH ₄	There is a significant decrease in the CO₂ emissions from the production of natural gas, caused by the rapid decrease in the CO₂ IEF in the years 2013 and 2014. Moreover, the CO₂ IEF has remained constant for the 1991–2012 period (16 kg/unit) and changed to 0.10 kg/unit in 2013 and 2014 The AD for production have increased during the time series, with the CH₄ emissions from natural gas production following the trend until 2012. However, there is a large decrease in CH₄ emissions for 2013 and 2014 (from 84.63 kt to 0.12 and 0.13 kt, respectively). The IEF has remained constant for the period 1991–2012 (2 100 kg/unit) and changed to 2.9 kg/unit in 2013 and 2014 The ERT recommends that the Party verify the CO₂ and CH₄ IEF for the production of natural gas for the years 2013 and 2014 and ensure time series consistency of the EFs. The ERT further recommends that the Party describe the emission trends in the NIR	Yes. Consistency
E.53	1.B.2.b Natural gas – gaseous fuels – CO ₂ and CH ₄	The CO₂ and CH₄ emissions from the processing of natural gas are not reported and the notation key “NA” is used without further justification. The ERT notes that the 2006 IPCC Guidelines (vol. 2, table 4.2.5) provide default EFs for CO₂ and CH₄. The Party did not provide a response to this issue during the review The ERT recommends that Kazakhstan provide a complete estimate of the fugitive CH₄ and CO₂ emissions from the processing of natural gas in the country	Yes. Completeness

E.54	1.B.2.b Natural gas – gaseous fuels – CO ₂ and CH ₄	The inter-annual changes for CO₂ and CH₄ emissions of transmission and storage of natural gas show big deviations in the last few years. The CH₄ emissions are reported as constant for 2012 and 2013 (58.56 kt) and decreased to 0.08 kt in 2014. The CH₄ IEF changed from 568.94 kg/unit in 2013 to 0.88 kg/unit in 2014. The CO₂ emissions were reported as “NA” for the 1990–2013 period and a value is reported for 2014 (0.0004 kt CO₂) The ERT recommends that the Party verify the CH₄ emission estimates for 2014 for the transmission and storage of natural gas and provide a consistent time series for the period 1990–2014. Furthermore, the ERT recommends that the Party estimate the CO₂ emissions for the same category for the period 1990–2013 and provide a consistent time series for the CO₂ emissions	Yes. Consistency
E.55	1.B.2.b Natural gas – gaseous fuels – CO ₂ and CH ₄	The CO₂ and CH₄ emissions for distribution of natural gas for 2014 are not consistent with the emission trend for 1990–2013. Specifically, the CH₄ emissions are reported as constant for 2012 and 2013 (191.19 kt) and dropped to 0.02 kt in 2014. The CO₂ emissions were reported as “NA” for the 1990–2013 period and a value is reported for 2014 (0.00032 kt CO₂) The ERT recommends that the Party verify the CH₄ emission estimate for 2014 for the distribution of the natural gas and ensure time-series consistency for the period 1990–2014. Furthermore, the ERT recommends that the Party estimate the CO₂ emissions for the same category for the period 1990–2013 and provide a consistent time series for the CO₂ emissions	Yes. Consistency
E.56	1.B.2.c Venting and flaring – liquid fuels, gaseous fuels – CO ₂ and CH ₄	The reporting of emissions of CO₂ and CH₄ from flaring and venting is not complete for the period 1990–2014 and justification regarding the incompleteness is not provided. The AD have been reported as “NA”, and CO₂ and CH₄ emissions have been estimated for the period 1990–2013 and reported as “NA” for the year 2014. Furthermore, the CH₄ emissions for 2013 have changed between the original 2015 and 2016 submissions by 949.43% (from 0.87 to 9.17 kt). The Party did not provide a response to this issue during the review The ERT recommends that the Party review and estimate the CO₂ and CH₄ emissions from the relevant venting and flaring of the liquid and gaseous fuels for the years 2013 and 2014 and provide a complete and consistent estimate of the emissions from this category	Yes. Completeness
E.57	1.C Carbon dioxide transport and storage – CO ₂	CRF table 1.C for 2014 is left blank. The NIR does not contain any information on this activity, and CRF table 1.C for the period 1990–2013 is filled with the notation key “NA”. During the review, the Party informed the ERT that the activity is not occurring in the country The ERT recommends that the Party either estimate CO₂ emissions for this category or ensure the correct use of notation keys in CRF table 1.C. Furthermore, the ERT recommends that the Party include a category-specific discussion in the NIR for this activity, in accordance with paragraph 50 of the UNFCCC Annex I inventory reporting guidelines	Yes. Completeness
E.58	International aviation – liquid fuels – CO ₂ , CH ₄	Emissions from international aviation are reported for 2014 only. The notation key “NA” has been used for the 1990–2013 period	Not an issue

	and N ₂ O	The ERT encourages the Party to estimate the CO ₂ , CH ₄ and N ₂ O emissions from international aviation and to ensure the consistency of emissions for the entire time series 1990–2014	
E.59	International aviation – liquid fuels, general	For the year 2014, the use of the jet kerosene as a bunker fuel in aviation is reported in CRF table 1.D. while in CRF table 1.A(b), the international bunker fuels are not reported (the notation keys “NO” and “NA” are used). During the review, the Party responded that this issue is due to a technical error in the CRF Reporter The ERT recommends that the Party ensure consistency between CRF table 1.D (fuel consumption of the international aviation/international bunkers) and CRF table 1.A(b) (reference approach – fuel consumption of the international bunkers)	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
E.60	Multilateral operations – all fuels, general	The cells for multilateral operations in CRF table 1.D. are left blank for 2014, while for the period 1990–2013, the notation key “NA” is used. During the review, the Party stated that this issue is due to a technical error in the CRF Reporter The ERT encourages the Party to report CO ₂ , CH ₄ and N ₂ O emissions from multilateral operations or report the proper notation keys for the entire time series	Not an issue

IPPU

I.10	2. General (IPPU) – general	The ERT noted that some cells in the CRF tables are making reference to the NIR from old submissions. Thus in CRF table 2(I)A-Hs1 for 2.A.4.d.Other, in the CO ₂ emissions cell, there is a reference to NIR 2014. Another example of inconsistency between the NIR and the CRF tables is table 4.22 of the NIR, which is not updated with the latest data on HFC-134a emissions reported in the CRF tables The ERT recommends that Kazakhstan strengthen its QA/QC procedures and update all comments in the CRF tables, and that it make the reporting consistent between the NIR and the CRF tables of the same submission	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
I.11	2. General (IPPU) – general	The ERT noted that the Party has not included descriptions of the AD for the categories reported in CRF table 2(I)A-H, which makes it difficult to compare the IEFs generated in the table with those of other Parties The ERT recommends that Kazakhstan include the relevant AD descriptions in CRF table 2(I)A-H in order to improve the comparability and transparency of reported data	Yes. Transparency
I.12	2. General (IPPU) – general	The ERT noted the use of outdated text in the NIR, such as “‘Industrial Processes’ category, subcategory 2B5.6 ‘Coke’” on page 108, which is not appropriate regarding the new reporting guidelines. The sector and category names have been changed in the 2006 IPCC Guidelines and UNFCCC Annex I Inventory reporting guidelines and in the CRF tables. The same applies to “Solvent and other product use”, which is still used in the NIR, while related emissions are now to be reported under the categories 2.D. Non-energy products from fuels and solvent use and 2.G. Other product manufacture and use	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines

		The ERT recommends that Kazakhstan apply the structure and names of the inventory categories in the NIR following the UNFCCC Annex I inventory reporting guidelines, as per decision 24/CP.19	
I.13	2.A.1 Cement production – CO ₂	The CO₂ IEF for cement production shows an unexpected trend, with values starting from around 0.53 t CO₂/t clinker in the period 1990–1999 and moving to as high as 0.68 t CO₂/t clinker in the period 2000–2006. Then in 2007 a sudden drop is observed followed by a decreasing trend, except for 2011. The IEFs from 2007 onwards have also changed between the last three inventory submissions. The ERT noticed the improved transparency on lime content in clinker and the cement kiln dust correction factor, as contained in NIR table 4.3 for 2014. During the review, Kazakhstan acknowledged a minor error in the coefficient of cement kiln dust for one plant for the year 2011, and explained that AD in the category have been directly provided by the plants since 2000, and in the 2006–2009 period, six new plants started production The ERT recommends that Kazakhstan strengthen its QA/QC procedures and correct the value for cement kiln dust used to estimate the 2011 emissions, and provide in the NIR the same detailed information as for 2014 for all the years in the time series, in order to explain the large variations in the IEFs across the time series	Yes. Consistency
I.14	2.A.2 Lime production – CO ₂	In NIR table 4.4, the figure for CO₂ emissions for lime production in 2010 is 677.95 kt CO₂, while the value in CRF table 2(I)A-H is 659.19 kt CO₂. During the review, the Party confirmed the value reported in the CRF table to be the correct one The ERT recommends that Kazakhstan report the correct value for CO₂ emissions for 2010 in the NIR, consistent with the value reported in the CRF tables	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
I.15	2.A.4 Other process uses of carbonates – CO ₂	The ERT noted that the reallocation of emissions related to limestone and dolomite use from NIR 2013 (Revised 1996 IPCC Guidelines) to NIR 2016 (2006 IPCC Guidelines) is not clearly reported for the period 1990–2011, and part of them may be missing in the present report. During the review, the Party explained that the data sources for limestone and dolomite use have changed between the submissions, and indicated that further information on the allocation of related emissions will be included in the next submission The ERT recommends that Kazakhstan provide in its NIR a clear explanation on how limestone and dolomite use, and the related CO₂ emissions from the use of those carbonates, have been allocated in the new CRF structure	Yes. Completeness
I.16	2.B.1 Ammonia production – CO ₂	The ERT noted that Kazakhstan is using the tier 1 approach for estimating CO₂ emissions from ammonia production. In the NIR (page 136), Kazakhstan reported, as a planned improvement, the application of the tier 2 method, by using the amount of natural gas used in production for calculating the emissions. During the review, Kazakhstan reported the amount of natural gas used in ammonia production for the years 2010–2014, indicating progress in data collection. The ERT commends the Party for this development	Yes. Accuracy

		The ERT recommends that Kazakhstan move to a tier 2 method to calculate CO ₂ emissions from ammonia production, based on the amount of natural gas used, as already provided during the review and that it ensure consistent reporting of the category across the time series	
I.17	2.C.1 Iron and steel production – CO ₂	The ERT noted that the CO₂ IEF for pig iron production has decreased by 18.8% since 2012 (from 2.03 t/t in 2012 to 1.65 t/t in 2014). During the review, the Party acknowledged this information and informed the ERT that it would investigate it along with the producer The ERT recommends that Kazakhstan include in the NIR a justification for the decreasing trend of the CO₂ IEF since 2012	Yes. Transparency
I.18	2.C.1 Iron and steel production – CH ₄	The ERT noted that CH₄ emissions from pig iron production are reported as “NO”. However, according to the NIR (page 141) and acknowledged by the Party during the review, these emissions are reported under the subcategory 2.C.1.f Other, without specific indication in the CRF tables The ERT recommends that Kazakhstan report CH₄ emissions where they are expected for the reason of comparability, or change the notation key in subcategory 2.C.1.b to “IE” (with a relevant explanation) and specify the AD under subcategory 2.C.1.f as coke use in pig iron production	Yes. Comparability
I.19	2.C.1 Iron and steel production – CO ₂ and CH ₄ ?	The ERT noted that the ratio regarding AD of sinter+pellets to steel+pig iron (167%) seems too high in comparison with other countries (in general, well below 100%) The ERT recommends that Kazakhstan investigate the ratio of sinter+pellets to steel+pig iron and describe the reasons for the observed ratio in the NIR, including the possibility of exports of sinter and/or pellets, which could explain the ratio. The ERT further recommends that the Party review the AD for the whole time series, if found necessary	Yes. Accuracy
I.20	2.C.2 Ferroalloys production –CH ₄	Kazakhstan reports “NO” for CH₄ emissions from ferroalloys production in CRF table 2(I).A-Hs2 and in the NIR (page 148). During the review, the Party explained that the CH₄ emissions from ferroalloy production in the country are very small The ERT recommends that Kazakhstan estimate CH₄ emissions from this category or, if they are insignificant, use the notation key “NE” and provide evidence in the NIR to show the insignificance of this category, in line with decision 24/CP.19, annex I, paragraph 37(b)	Yes. Completeness
I.21	2.C.3 Aluminium production – CO ₂	The ERT noted that the percentage of anode consumption to aluminium production, as derived from NIR tables 4.18 and 4.19 does not match the national proportions reported in table 4.20 of the NIR. In addition, the text of the NIR contains an incorrect reference to the consumption of anode paste in the Soderberg process in the section on uncertainty, while in other places of the NIR it is reported that the technology is not used in the country. During the review, Kazakhstan confirmed that the only process used for aluminium production is the prebaked anodes process and confirmed that the CO ₂ EF used in the estimates is correct	Yes. Transparency

		The ERT recommends that Kazakhstan improve its reporting of information on aluminium technology and parameters provided in the NIR and strengthen its QA/QC procedures in preparing the report with a view to eliminating internal inconsistencies in the NIR	
I.22	2.C.6 Zinc production – CO ₂	Regarding AD for zinc production, the ERT found conflicting information between the values in the NIR and those provided on the website of the only Kazakhstan company(Kazzinc) using CO₂-emitting technology, the Waelz process, according to the NIR. On average, values for zinc production in the NIR are 61% lower than those reported on the Kazzinc website,^b for the period 1997–2014. During the review, the Party explained that it gets the production data directly from the company, but it could not solve the difference regarding the company site The ERT recommends that Kazakhstan demonstrate in the NIR that complete AD for zinc production are reported in the CRF tables, providing an explanation for any differences between the data in the CRF tables and the data on the website of the only zinc producing company in the country using CO₂-emitting technology. If an error is identified in the AD reported in the CRF tables, the ERT recommends that the Party recalculate the AD and update the whole time series for this category, as appropriate	Yes. Completeness
I.23	2.D Non-energy products from fuels and solvents use – N ₂ O	The ERT noted that subcategories under non-energy products from fuels and solvent use are reported as “NA”, except for N₂O emissions used in anaesthesia, under the subcategory “Other”, for which “NE” is reported. During the review, Kazakhstan informed the ERT that this last category is insignificant The ERT recommends that the Party provide estimates for the emissions from the category or evidence to show the insignificance of this category, in accordance with decision 24/CP.19, annex I, paragraph 37(b). The ERT further recommends that Kazakhstan include clear information of the subcategory included under Other in CRF table 2(I)A-H	Yes. Completeness
I.24	2.D.1 Lubricant use – CO ₂	The ERT noted that emissions from lubricant use are not reported under 2.D.1, but the notation key “NA” is reported. During the review, Kazakhstan explained that these emissions were included in CRF table 1.A(d). However, the ERT noted that this table refers only to CO₂ emissions excluded from the reference approach and provides no evidence that emissions from lubricant use are considered part of the energy sector The ERT recommends that Kazakhstan include in category 2.D.1 the CO₂ emissions related to the use of lubricants, consistent with the allocation of these emissions in the 2006 IPCC Guidelines. If the emissions from lubricants cannot be separately reported under category 2.D.1 and are reported under the energy sector, the ERT recommends that the Party report the notation key “IE” for category 2.D.1 with the relevant explanations in the NIR and CRF table 9. The ERT recommends that the allocation of emissions is consistently reported in table 1.A(d)	Yes. Completeness
I.25	2.F.1 Refrigeration and	The ERT noted that the NIR is not informative about the methods applied for estimating the F-gases from refrigeration and air conditioning, noting that this category has undergone	Yes. Accuracy

	air conditioning – HFCs	significant recalculation since the 2013 submission (e.g. values for 2011 of 843.56, 1 143.88 and 966.32 kt CO₂ eq in the 2013, 2014 and 2015/2016 submissions, respectively). In addition, the ERT noted that emissions from this category are reported under disposal rather than as emissions from stock or manufacturing, which are reported as “NO”. Practically all emissions are reported under commercial refrigeration (just a small amount in transport refrigeration), with none under domestic, industrial refrigeration, and mobile and stationary air conditioning. During the review, Kazakhstan clarified that before the year 2012 (i.e. the 2014 submission), HFC consumption was estimated, while in 2014 data were obtained from the companies and used in the submission in 2016. Furthermore, a national ‘cold conference’ is held every year, being attended by all suppliers of refrigeration equipment and agents, where additional data are obtained (other than national statistical data) on the sales of refrigeration and air-conditioning equipment. The Party also informed the ERT that the reporting of the category will be corrected in the next submission The ERT recommends that Kazakhstan provide transparent information on methods, AD and EFs for this category in its next submission. The ERT further recommends that the Party provide information on how time-series consistency is ensured for the category and provide clear information on the recalculations made across the entire time series. In addition, the ERT recommends that the Party correct the reporting of the emissions in the CRF tables by providing data per subcategory, and clearly distinguish emissions from manufacturing, from stocks and from disposal	
I.26	2.G.1 Electrical equipment – SF ₆	The ERT noted that SF₆ emissions from electrical equipment were reported as “NO”. However, the ERT considers that emissions may occur related to leakage from electrical equipment, since Kazakhstan seems to base its report on partial information on the injection of SF₆. During the review, the Party informed the ERT that additional information was collected that indicates that the source is insignificant in accordance with decision 24/CP.19, annex I, paragraph 37(b) The ERT recommends that Kazakhstan collect information on the total charge in electrical equipment using SF₆ and apply the default EF provided in the 2006 IPCC Guidelines if a complete mass balance is not possible. Otherwise, the ERT recommends that the Party use the notation key “NE” and provide arguments that the category is insignificant, as per decision 24/CP.19, annex I, paragraph 37(b)	Yes. Completeness
Agriculture			
A.14	3. General (agriculture) – general	The ERT noted some technical errors in the CRF tables. Specifically, there are some errors in the distribution of animals on different manure management systems in CRF table 3.B(a)s2, since for each MMS used, 100% allocation is reported; in CRF table 3.As2, the gross energy intake should be in MJ/head/day and not in MJ/day; the AD in CRF table 3.D.b.2 are entered incorrectly and do not reflect the actual activity The ERT recommends that the Party implement a specific QC procedure to correct the	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines

		allocation of manure to different manure management systems, the units for gross energy intake and the AD in CRF table 3.D (3.D.b.2)	
A.15	3.A.1 Cattle – CH ₄ and N ₂ O	According to the data reported in the NIR (table 5.29) and in the CRF tables, non-dairy cattle are grazing 70% of the year. This is a high share taking into account the relatively harsh conditions in Kazakhstan. During the review, Kazakhstan explained that in the northern part of its territory, grazing normally takes place from May to October. This is only 50% of the year. The ERT therefore considers that an underestimation of manure handled in manure management systems is likely to take place The ERT recommends that Kazakhstan investigate the housing and grazing period for all cattle in detail and include information on which different manure management types are occurring in Kazakhstan. If the analysis shows a different picture of manure management practices than is currently reported, the ERT recommends that Kazakhstan recalculate its emission estimates for both CH₄ and N₂O emissions from manure management for all relevant cattle groups	Yes. Accuracy
A.16	3.A.2 Sheep – CH ₄	To estimate the CH₄ emissions from enteric fermentation from sheep, Kazakhstan uses an average Y_m of 4.5%. The default Y_m value in the 2006 IPCC Guidelines for mature sheep is 6.5% and for lambs is 4.5%. The ERT considers that the use of Y_m for lambs for the whole population may result in an underestimation of the CH₄ emission from enteric fermentation As CH₄ emissions from enteric fermentation from sheep is a key category, the ERT recommends that Kazakhstan develop a tier 2 methodology where the emission estimate is based on a subdivision of the sheep population into mature sheep and lambs where actual growth rates and slaughter weights of the lambs are taken into account	Yes. Accuracy
A.17	3.B.3 Swine – CH ₄	Kazakhstan is using the default tier 1 value of 4 kg CH₄ per swine per year for Eastern European conditions in estimating its manure management emissions from swine. The ERT noted that this default value is based on a certain amount of the manure handled and stored under liquid manure management systems, which have a higher CH₄ emission rate than solid handled manure. In response to the ERT's question on the applied manure management practices, Kazakhstan explained that all swine manure is handled under solid manure management systems. The ERT concluded that the use of the default EF for Eastern European conditions results in an overestimation of CH₄ emissions The ERT therefore recommends that the Party investigate its manure management systems and justify the EF used. The ERT further encourages the Party to make efforts to apply a country-specific tier 2 approach as it has done for cattle. A simple approach for tier 2 could be estimating the CH₄ emissions by applying the default values for Bo, volatile solids (VS) as included in table 10.A-7 and the EF in table 10.17 of the 2006 IPCC Guidelines	Yes. Accuracy
A.18	3.B Manure management –	In its current submission, Kazakhstan is using the default Nex for all animal categories from the Revised 1996 IPCC Guidelines despite the fact that the 2006 IPCC Guidelines include an updated methodology. During the review, the Party acknowledged the situation and provided	Yes. Accuracy

	N ₂ O	information that the updated estimates would be included in the next submission thanks to new information collected allowing the Party to use the methodology from the 2006 IPCC Guidelines The ERT welcomes the planned improvement and recommends that Kazakhstan update its Nex according to the newest knowledge in Kazakhstan. This can be done, preferably, either by using equations 10.30 to 10.32 in the 2006 IPCC Guidelines where national data on crude protein content in the feed is used or by using the methodology in the EMEP/EEA guidebook if coordination with the Convention on Long-range Transboundary Air Pollution (CLRTAP) reporting is taking place (see issue A.20). Alternatively, the Party may apply the Nex factors described in table 10.19 of the 2006 IPCC Guidelines	
A.19	3.B Manure management – N ₂ O	The ERT noted that in CRF table 3.B(b), nitrogen excretion is only reported for solid storage and pasture, range and paddock. For other MMSs, the notation key “NA” is reported. The ERT noted that this notation key is appropriate for activities taking place in the country that do not result in emissions, but that the Party reports that such manure management practices do not occur in the country The ERT recommends that Kazakhstan check the use of the notation key “NA” in CRF table 3.B(b) and that it make use of the notation key consistent with decision 24/CP.19, annex I, paragraph 37	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
A.20	3.B.5 Indirect N ₂ O emissions – N ₂ O	The emission estimates of indirect N₂O from volatilized nitrogen reported in both CRF table 3.B(b) and CRF table 3.D use default nitrogen volatilization factors from the 2006 IPCC Guidelines. However, the ERT noted that Kazakhstan has signed CLRTAP and is thereby reporting nitrogen volatilization from agricultural sources which result in different nitrogen volatilization values, compared with those reported under the UNFCCC. For example, for 2014, the reported N₂O emissions under CLRTAP were 218.75 kt N compared with 206.35 kt N reported under the UNFCCC The ERT encourages Kazakhstan to coordinate the nitrogen volatilization estimates reported under CLRTAP and the UNFCCC in its future reporting by choosing the most appropriate methodology and documenting it as necessary	Not an issue
A.21	3.D.a.2.a Animal manure applied to soils – N ₂ O	The ERT noted that in the current submission Kazakhstan reports in CRF table 3.D that the amount of nitrogen in animal manure applied to soil from MMSs is less than 1% of the nitrogen excreted in MMSs. Based on a question from the ERT, Kazakhstan explained that part of the manure can be stored in piles for several years. This may occur, but as this low share of manure applied to the fields has been reported for all years since 1990, these piles should now consist of 25 years of manure production. Based on the experience of the ERT, this is not likely to occur The ERT recommends that Kazakhstan verify the amount of nitrogen in animal manure that has been piled up in the country over the years and how much is applied to soil (as reported in	Yes. Accuracy

		CRF table 3.D) and include in the NIR the justifications explaining the assumptions used in the inventory or make the necessary recalculations of emission estimates in its next submission	
A.22	3.H Urea application – CO ₂	Kazakhstan is reporting fertilization with urea as “NO” and confirmed during the review that urea application is not practised in the county. The ERT notes that urea is one of the cheapest nitrogen fertilizers and it is often used in Eastern Europe Therefore, the ERT recommends that Kazakhstan investigate further the use of mineral fertilizer in order to verify if some part of the reported consumption of mineral fertilizer is urea and include any potential emissions	Yes. Completeness
LULUCF			
L.15	4. General (LULUCF) – general	Improvement of completeness by including estimates for all mandatory categories in the LULUCF sector is a recommendation that is repeated in most of the previous review reports for Kazakhstan (see L.1). The ERT noted some improvement in the completeness of reporting; however, the reporting in the sector continues to be incomplete and “NE” is reported, for example, for net carbon stock change from litter and mineral soils for forest land remaining forest land. In addition, Kazakhstan reports land conversions in all categories (besides other land converted to settlements) using the notation key “NO”, which implies that no land conversion occurs between land-use categories The ERT recommends that the Party further improve the completeness of its reporting for the sector by providing estimates for all mandatory categories and pools (as listed in L.1 and for the relevant land conversions, currently reported as “NO”)	Yes. Completeness
L.16	4. General (LULUCF) – general	In table 6.2 of the NIR, Kazakhstan provided some data on the land categorization for 1991, 2013 and 2014 and NIR tables 6.3 and 6.4 provide data on land transition for the period 1989–2014. Noting the data included in the NIR and the data presented in the CRF tables, the ERT concluded that the information is insufficient to demonstrate consistent land representation In order to further improve the transparency and consistency of reporting, the ERT recommends that, in the NIR, the Party include information on: (a) Ancillary data used for land classification comprising: timing and methodology of data collection, and any further elaboration before their use for land classification; (b) The methodology applied for classifying land under land categories; (c) Explanations on how consistency is maintained when different sources of data and/or different methodologies are used for preparing the land representation	Yes. Consistency
L.17	4. General (LULUCF) – general	Kazakhstan provided sections in the NIR with methodological information for each calculated category. However, the ERT noted that the sections do not provide sufficient information on the assumptions used for the estimates or detailed AD for the time series used in the estimates	Yes. Transparency

The ERT recommends that, in its NIR, the Party improve the methodological information for the estimated categories by including:

(a) The definition of the “boundaries” of the category, which elements are included and which are not (e.g. forest land includes all lands that meet the forest definition of the country);

(b) Definitions of all elements included in the category (e.g. forest is a land that spans for a minimum area of x ha);

(c) A description of the methodology applied, which includes: assumptions (and for each assumption its logical basis and evidence of its reliability with regard to the condition to which it is applied); the equations applied (noting that when an IPCC method is used information on assumptions is not needed and equations may simply be quoted);

(d) A description of the AD and its quality, including information on data collection (methodology and timing), data compilation (methodology) and uncertainties;

(e) A description of EFs and of carbon stock change factors, parameters and other ancillary data applied

L.18	4. General (LULUCF) – general	The ERT noted that the sections on QA/QC for the sector include information on the organizations conducting the checks. However, there is no information on the specific checks performed or on any of the results of the checks The ERT recommends that the Party include in its NIR a description of any QA/QC checks undertaken, and the results of such checks	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
L.19	Land representation – general	The ERT notes that the land representation is affected by several inconsistencies as reported in the time series of CRF table 4.1. For instance: (a) The total area reported for the country changes year by year (e.g. in 1990 the figure is 309 684.80 kha, while in 2014 it is 306 879.40 kha), although the total country area must be constant across the entire time series. Furthermore, the total area of the country reported in NIR table 6.2 is equal to 272 490.20 kha; (b) Only conversions from grassland (managed) to grassland (unmanaged), from grassland (managed) to wetlands (managed) and from grassland (unmanaged) to settlements, have been reported; (c) Although no conversions from other land-use categories to forest land are reported, the area of forest land continuously increases across the time series (from 10 191.70 kha in 1990 to 12 580.00 kha in 2014). The same consideration applies to unmanaged wetlands and to settlements; (d) Although land conversions to unmanaged grassland, and to managed wetlands, are reported across the entire time series, the area of unmanaged grassland remaining unmanaged grassland	Yes. Accuracy

		and the area of managed wetlands remaining managed wetlands are not reported; (e) The area of grassland remaining grassland (managed) does not decrease between consecutive years by an amount equivalent to the area that, between the two years, has been transferred to another land use. For instance, in the year 2014, the area of managed grassland remaining grassland is reported to be 187 210.10 kha, and in the same year, an area of 4 170.00 kha of managed grassland is reported as converted to unmanaged grassland and an area of 0.40 kha as converted to unmanaged wetlands. Considering that no conversion to managed grassland occurred in the year before, the area of managed grassland remaining grassland in 2013 should be equal to 187 210.10 kha + 4 170.00 kha + 0.40 kha = 191 380.50 kha; however, the value reported in CRF table 4.1 for the year 2013 is 187 248.00 kha During the review, the Party agreed that there were several errors in the land representation compilation The ERT recommends that Kazakhstan revise its methodology according to good practice provided in the 2006 IPCC Guidelines(vol. 4, chapter 3) in order to build a consistent land representation. Furthermore, the ERT recommends that Kazakhstan develop and implement QA/QC procedures in order to check the consistency of conversions between land uses, to ensure total land area is constant over time and to ensure that its GHG inventory estimates are not affected by technical mistakes	
L.20	4.A Forest land – CO ₂	The ERT noted a number of unlikely data reported in NIR table 6.5. In particular, the amount of dead wood reported is very high (almost one-third of the total woody carbon stock); the biomass carbon stock of the forest subcategories hardwood (“Твердолиственные”) and other trees (“Прочие деревья”) is extremely low (i.e. smaller than the carbon stock of savannahs and shrubland). During the review, Kazakhstan explained some of the detected peculiarities with the national circumstances (e.g. the high share of mature and over mature forests (up to 36% of the total forest area) and the small proportion of young trees (15.5%)) The ERT recommends that Kazakhstan verify its reported values of dead wood and biomass carbon stock of the forest subcategories hardwood and other trees and revise them, as needed, as well as include the relevant explanations on the national circumstances in its NIR	Yes. Transparency
L.21	2.B Cropland – CO ₂	The SOC changes estimated for cropland are based on country-specific values. However, information on the methodology applied for calculating the country-specific values, as well as the background data used, are not reported The ERT recommends that Kazakhstan report all information on the method and background data used for calculating the country-specific SOC, as well as the country-specific factors	Yes. Transparency
L.22	2.B.1 Cropland remaining cropland – CO ₂ and N ₂ O	Comparing the last four inventory submissions (including the original 2015 submission), the values reported for 2011 for net CO₂ emissions/removals from cropland are as follows: “NE”, net removals of 25.67 kt CO₂ eq, and net emissions of 10 868.00 and 22,432.67 kt CO₂ eq (in the 2013, 2014, 2015 (original) and 2015/2016 submissions, respectively). The NIR does not	Yes. Transparency

		provide sufficient information to justify these recalculations. During the review, Kazakhstan informed the ERT that cropland soils have been dramatically losing soil fertility since 1990 and that recalculations are related to the updating of data obtained from the Ministry of Agriculture in 2015. The ERT also noted that the use of this new data source has had an impact on the GHG estimates of the grassland and settlements land-use categories The ERT recommends that Kazakhstan report in its next NIR complete information in order to justify any recalculations, including information on the impact of the recalculations on the trend in emissions across the time series	
L.23	2.B.1 Cropland remaining cropland – CO ₂	The biomass carbon stock changes estimated for cropland are based on constant net incremental rates applied across areas of subcategories, and biomass carbon stock losses are reported as “NO”. Information on the methodology applied for calculating the carbon stock constant rates, as well as, the background data used are not reported in the NIR. During the review, Kazakhstan stated that it will be reporting on the carbon stock change from biomass on cropland in the next submission The ERT recommends that Kazakhstan estimate carbon stock losses from biomass in cropland and report all information on the method and background data used for calculating the rates used for estimating the carbon stock changes	Yes. Completeness
L.24	4.C.1 Grassland remaining grassland – CO ₂	The ERT noted that the NIR does not contain information on the methodology applied for calculating the values of biomass and soil carbon stocks contained in NIR table 6.11. During the review, the Party noted mistakes in reporting pasture area and confirmed that information on methodology applied for calculation biomass carbon stock changes will be provided in the next submission The ERT recommends that Kazakhstan consistently report grassland area in its submission and report information on the methodology applied for calculating the values contained in NIR table 6.11, as well as on information on the data used to validate them	Yes. Transparency

Waste

W.5	5. General (waste) – CO ₂ , CH ₄ and N ₂ O	The ERT notes that Kazakhstan reports blank cells in the waste sector, namely for CH₄ and N₂O emissions from composting, and CO₂, CH₄ and N₂O emissions from waste incineration and biogenic open burning The ERT recommends that the Party provide estimates for the CH₄ and N₂O emissions from composting, and CO₂, CH₄ and N₂O emissions from waste incineration and biogenic open burning, or report the appropriate notation keys in line with decision 24/CP.19, annex I, paragraph 37	Yes. Completeness
W.6	5. General (waste) – CO ₂ , CH ₄ and N ₂ O	While comparing the values in the CRF tables and the information in the NIR the ERT detected some inconsistencies. Specifically, table 7.1 in the NIR reports the total emissions for 2014 for the sector as 5 712.72 kt CO₂ eq, while the value in CRF table Summary 2 is 5 715.69	Yes. Adherence to UNFCCC Annex I inventory reporting

		kt CO₂ eq. The inter-annual change 2013/2014 is reported as a decrease of 1.99% according to the NIR (p. 256) and in the CRF tables as an increase of 1.95%. In addition, the figures on contribution of emissions from subsectors presented in table 7.1. of the NIR are not consistent with the values reported in the CRF tables: in the NIR (p. 256), it is reported that the contribution of the categories within the waste sector are 52.8% for solid waste disposal, 17.7% for wastewater treatment and discharge, and 0.5% for the incineration and open burning of waste, which totals 71% instead of 100%. The Party explained that the inconsistencies were due to the figures in the NIR not being updated and errors, and that the figures will be corrected in its subsequent submissions The ERT recommends that the Party implement a QA/QC check to ensure that data provided in the NIR are consistent with the latest data in the submitted CRF tables	guidelines
W.7	5. General (waste) – general	The ERT noted that the overview section of the waste sector in the NIR does not provide appropriate information on methodological tiers by category, as required by the UNFCCC Annex I inventory reporting guidelines. In addition, for the method applied for estimating CH₄ emissions from solid waste disposal the CRF table Summary 3 indicates “NA” and gives “M” (model) for the EF used Noting the fact that Kazakhstan provided a reference to the FOD model in the category-specific section of the report, the ERT recommends that the Party provide consistent information on the methods applied in the CRF tables and the NIR, as well as detailed information on the tiers used for the estimated categories in the sector and how they are consistent with the IPCC decision trees used for method selection	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
W.8	5.A Solid waste disposal on land – CH ₄	The ERT noted that the CH₄ IEF for managed waste disposal sites – anaerobic was 0.03 t/t waste; and for uncategorized waste disposal sites the CH₄ IEF was 0.04 t/t waste. The ERT questioned the accuracy of the estimates given that usually methane generation is higher in anaerobic conditions. During the review, Kazakhstan responded that this question should be further investigated The ERT recommends that Kazakhstan provide an explanation for the unusual ratio between the IEFs for the managed anaerobic and uncategorized disposal sites, and/or recalculate the time series, if necessary	Yes. Accuracy
W.9	5.A Solid waste disposal on land – CH ₄	The ERT noted that more than two-thirds of all MSW is reported as disposed in uncategorized SWDS. Only SWDS of Almaty and Astana are reported as managed. However, there are many big cities in Kazakhstan with populations of more than 100 000 (even up to 400 000), and their SWDS are considering as uncategorized. During the review, the Party explained that data collection is difficult and the NIR explains that further analysis of urban population data is planned The ERT recommends that Kazakhstan further study available AD and clarify the categorization of landfills beginning with the biggest cities in order to make the necessary	Yes. Accuracy

		corrections to the estimates for the category	
W.10	5.A Solid waste disposal on land – CH ₄	Kazakhstan reported values of 8.07% (for anaerobic/managed SWDS) and 8.56% (for uncategorized SWDS) for the fraction of degradable organic carbon that decomposes (DOCf) in CRF table 5.A, while in the NIR, a value of 0.5 (or 50%) is reported for the DOCf (p. 267). During the review, the Party confirmed that 0.5 is the value used in the inventory and the values of 8.07 and 8.56% are the values for degradable organic carbon (DOC) The ERT recommends that, in its next submission, the Party correct the value of DOCf reported in CRF table 5.A	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
W.11	5.A Solid waste disposal on land – CH ₄	The ERT noted that there is no clear description of the methodology used for the calculation of the waste generation in the NIR. It is not clear if the calculation is based on per capita waste generation and urban population or on collected waste volume and waste density. There is no detailed numerical information in the NIR on the AD for the time series used for the estimates in the category. During the review, Kazakhstan explained that generated wastes were calculated on a per capita basis and the Party provided AD and the calculation sheet used for the calculation of the waste generation in Almaty The ERT recommends that Kazakhstan provide detailed information on the methodology used for the calculation of waste generation and the parameters used, including data for per capita waste generation and urban population, ensuring transparency of reporting, as well as completeness of the estimates	Yes. Transparency
W.12	5.C.Incineration and open burning of waste – CO ₂ , CH ₄ and N ₂ O	In the NIR (table 7.1), emissions from the incineration of clinical waste were reported. Those emissions are reported under the category other (waste) (5.E) in CRF table 5. At the same time, in several parts of the NIR and in the appropriate CRF tables, it is mentioned that waste incineration does not occur in the country The ERT recommends that Kazakhstan include CO₂, CH₄ and N₂O emissions from the incineration of clinical waste under waste incineration in CRF table 5.C	Yes. Comparability
W.13	5.C.2 Open burning of waste – CO ₂ , CH ₄ and N ₂ O	The ERT noted that most of the SWDS in Kazakhstan are not authorized (only 307 of 4 530 sites are authorized). According to the experience of similar countries, the ERT considers that open burning is often practised in landfills. However, according to CRF table 5.C (where “NO” is reported) and the responses of the Party during the review, open burning is not occurring in the country The ERT recommends that Kazakhstan further investigate the potential CO₂, CH₄ and N₂O emissions from open burning in unauthorized SWDS and include the estimates of emissions from open burning, as needed	Yes. Completeness
W.14	5.C.1 Waste incineration –	The ERT noted that Kazakhstan reports “NA” for CO₂, CH₄ and N₂O emissions from waste incineration for 1990–2013 and blank cells for 2014 in CRF table 5.C. According to decision 24/CP.19, “NA” is only appropriate where the activity occurs in the country but the activity	Yes. Transparency

	CO ₂ , CH ₄ and N ₂ O	does not result in emissions. The ERT believes that it is more likely that these emissions should be reported as “NO” because the activity does not occur, or ‘IE” because emissions occur but are included elsewhere	
		The ERT recommends that the Party use the appropriate notation key for waste incineration consistent with decision 24/CP.19, annex I, paragraph 37	
W.15	5.D.2 Industrial wastewater – CH ₄	Kazakhstan reports CH ₄ emissions from industrial wastewater as “NA”. During the review, the Party explained that there is no separate treatment of domestic and industrial wastewater	Yes. Comparability
		The ERT recommends that the Party try to report domestic and industrial wastewater separately and if this is not implemented use the correct notation key in reporting (e.g. “IE”)	
		consistent with decision 24/CP.19, annex I, paragraph 37	

Abbreviations: AD = activity data, ARR = annual review report, CLRTAP = Convention on Long-range Transboundary Air Pollution, CRF = common reporting format, DOCf = fraction of degradable organic carbon, EF = emission factor, ERT = expert review team, F-gases = fluorinated gases, FOD = first-order decay, GHG = greenhouse gas, IE = included elsewhere, IEA = International Energy Agency, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPPU = industrial processes and product use, KazNIEK = Kazakh Scientific Research Institute of Ecology and Climate, LULUCF = land use, land-use change and forestry, MMS = manure management system, MSW = municipal solid waste, NA = not applicable, NE = not estimated, Nex = nitrogen excretion rate, NIR = national inventory report, NO = not occurring, QA/QA = quality assurance/quality control, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, SOC = soil organic carbon, SWDS = solid waste disposal sites, 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”, VS = volatile solids, 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 issues.

^b See <<http://www.kazzinc.com/en/Production>>.

Annex I

Overview of greenhouse gas emissions and removals for Kazakhstan 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 (CO₂) emissions, with and without indirect CO₂. Tables 7 and 8 show GHG emissions reported under the Convention by Kazakhstan by gas and by sector, respectively.

Table 6

Total greenhouse gas emissions for Kazakhstan, 1990–2014^a

(kt CO₂ 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	373 310.42	389 575.27	373 310.42	389 575.27
1995	234 936.84	233 777.88	234 936.84	233 777.88
2000	204 972.58	191 788.20	204 972.58	191 788.20
2010	307 057.91	305 343.85	307 057.91	305 343.85
2011	305 394.38	297 954.94	305 394.38	297 954.94
2012	317 718.38	303 665.24	317 718.38	303 665.24
2013	330 727.22	312 237.88	330 727.22	312 237.88
2014	338 451.46	313 755.41	338 451.46	313 755.41

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 greenhouse gas emissions.

^b The Party has not reported indirect CO₂ emissions in common reporting format table 6.

Table 7
Greenhouse gas emissions by gas for Kazakhstan, excluding land use, land-use change and forestry 1990–2014^a
 (kt CO₂ eq)

	CO ₂ ^b	CH ₄	N ₂ O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF ₆	NF ₃
1990	274 697.24	96 766.89	18 111.13	NO, NA	NO, NA	NO, NA	NA, NO	NO, NA
1995	167 536.46	52 961.92	13 279.50	NO, NA	NO, NA	NO, NA	NA, NO	NO, NA
2000	138 207.82	40 172.04	13 241.99	166.35	NO, NA	NO, NA	NA, NO	NO, NA
2010	232 707.02	57 815.78	12 443.76	957.71	1 419.58	NO, NA	NA, NO	NO, NA
2011	223 764.50	58 282.83	13 387.70	966.32	1 553.59	NO, NA	NA, NO	NO, NA
2012	226 759.93	60 122.41	14 240.79	987.38	1 554.73	NO, NA	NA, NO	NO, NA
2013	234 031.46	60 354.11	15 288.19	998.63	1 565.49	NO, NA	NA, NO	NO, NA
2014	243 844.47	50 670.25	17 002.58	929.62	1 308.49	NA, NO	NA, NO	NA, NO
Per cent change								
1990–2014	–11.2	–47.6	–6.1	NA	NA	NA	NA	NA

Abbreviations: 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 Kazakhstan did not report indirect CO₂ emissions in common reporting format table 6.

Table 8

Greenhouse gas emissions by sector for Kazakhstan, 1990–2014^{a, b}
(kt CO₂ eq)

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other^a</i>
1990	319 517.40	21 977.99	44 253.06	–16 264.84	3 826.81	
1995	190 711.71	9 216.46	29 549.71	1 158.96	4 300.00	
2000	152 179.23	11 649.62	23 575.62	13 184.38	4 383.73	
2010	255 950.09	16 152.48	27 950.87	1 714.06	5 290.42	
2011	246 002.75	18 567.50	27 987.50	7 439.44	5 397.20	
2012	251 697.47	17 531.55	28 936.66	14 053.14	5 499.56	
2013	258 934.96	17 236.85	30 461.97	18 489.34	5 604.10	
2014	257 759.01	17 542.11	32 738.60	24 696.05	5 715.69	
Per cent change						
1990–2014	–19.3	–20.2	–26.0	–251.8	49.4	

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

^a Kazakhstan did not report emissions or notation keys for the sector other (sector 6).

^b Kazakhstan did not report indirect CO₂ emissions in common reporting format table 6.

Annex II

Additional information to support findings in table 2

A. Missing categories that may affect completeness

1. The categories for which methods are included in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories were reported as “NE” (not estimated) or for which the expert review team (ERT) otherwise determined that there may be an issue with the completeness of reporting in the Party’s inventory are the following:

- (a) 1.A.2.c CH₄ and N₂O emissions from chemicals (manufacturing industries and construction) (1999, 2004, 2005 and 2006) (see G.16);
- (b) 1.A.2.d CH₄ and N₂O emissions from pulp, paper and print (manufacturing industries and construction) (1990–1991, 1993–2014) (see E.32);
- (c) 1.B.2.a CO₂ and CH₄ emissions from oil exploration (see E.45);
- (d) 1.B.2.a CO₂ emissions from oil production and oil transport (1990–2013) (see E.46);
- (e) 1.B.2.b CO₂ emissions from natural gas processing (1990–2013) (see E.53);
- (f) 1. B.2.c CO₂ and CH₄ emissions from venting and flaring – oil, gas, combined (2014) (see E. 56);
- (g) 1.C CO₂ emissions from carbon dioxide transport and storage (see E.57);
- (h) 2.A.4 CO₂ emissions from other process uses of carbonates (limestone and dolomite use reallocation) (see I.15);
- (i) 2.C.2 CH₄ emissions from ferroalloys production (see I.20);
- (j) 2.C.6 CO₂ emissions from zinc production (see I.22);
- (k) 2.D.1 CO₂ emissions from lubricant use (see I.24);
- (l) 2.G.1 SF₆ emissions from electrical equipment (see I.9 and I.26);
- (m) 3.H CO₂ from urea application (see A.22);
- (n) 4.A.1. Net carbon stock change in litter and mineral soils from forest land remaining forest land (see L.15);
- (o) 4.B.1 Net carbon stock change in dead organic matter and carbon stock losses from living biomass from cropland remaining cropland (see L.15);
- (p) 4. Land conversions in all categories (except other land converted to settlements) (see L.15);
- (q) 4.C.2 Net carbon stock change for land converted to grassland (L.12 and L.23);
- (r) 5.A.1 CH₄ emissions from industrial waste (see W.1);
- (s) 5.B.1 CH₄ and N₂O emissions from composting (see W.5);
- (t) 5.C.1 CO₂, CH₄ and N₂O emissions from biogenic and non-biogenic (waste incineration) (see W.5);

- (u) 5.C.2 CO₂, CH₄ and N₂O emissions from biogenic (open burning of waste) (see W.13).

B. Recommendation for an in-country review: list of issues

2. The ERT has recommended that the next review for Kazakhstan be conducted as an in-country review. In accordance with decision 13/CP.20, annex, paragraph 64, the ERT has provided a list of questions and issues to be addressed during this in-country review, as set out below, in addition to the list of issues identified in tables 3 and 5 above.

Cross-cutting issues:

- (a) Assess the institutional arrangements for inventory preparation, planning and management, including data archiving and management (timely submissions and responses);
- (b) Assess the quality assurance/quality control (QA/QC) plan as well as legal and procedural arrangements and the institutions involved;
- (c) Assess the reasons behind the lack of completeness in the reporting of the mandatory categories;
- (d) Assess the transparency of the reporting, including adherence to the UNFCCC Annex I inventory reporting guidelines and structure of national inventory report (NIR) and documentation of activity data, emission factors and other parameters used in the inventory compilation;
- (e) Assess the application and justification of the use of all notation keys, particularly the notation keys “NE” (not estimated), “IE” (included elsewhere) and “NA” (not applicable);
- (f) Understand how the Party is using the key category analyses to upgrade the methods applied in the inventory;
- (g) Assess the status of implementation of the recommendations from the previous review reports and their tracking.

Energy sector:

- (a) Consider progress in harmonization between different official reporting organizations (energy statistics);
- (b) Ensure transparent and consistent reporting of the feedstocks and the non-energy use of fuels, in the framework of the categories within the energy sector and with regard to the correlation with the industrial processes and product use (IPPU) sector;
- (c) Check the implementation and appropriateness of the QA/QC procedures, particularly for fugitive emissions;
- (d) Verify the time-series consistency in the estimates in the sector;
- (e) Review the availability of documentation of methodologies for the estimation of the country-specific emission factors and comparison with the emission factor ranges provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the 2006 IPCC Guidelines) (especially with regard to the emissions from the transport sector and fugitive emissions).

IPPU:

- (a) Investigate the QA/QC process that is meant to ensure coherence between the NIR and the common reporting format (CRF) files and time-series consistency and to guarantee the avoidance of miscalculation of emissions;
- (b) Perform a thorough review of methodologies for the estimation of the emissions from cement, zinc, ammonia production and for the estimation of the emission of fluorinated gases;
- (c) Review the transition from the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the Revised 1996 IPCC Guidelines) to the 2006 IPCC Guidelines in terms of the implementation of new methodologies and the reallocation of emissions;
- (d) Discuss carbon excluded from the energy sector and its allocation to the IPPU sector.

Agriculture:

- (a) Investigate the nitrogen flow in the agricultural sector (mineral fertilizers, animal manure and crop residues), which is the major component used for estimating the carbon losses from agricultural soils (CRF table 4.B);¹ and review the description and documentation of the model, including the assumptions behind these estimates;
- (b) Review the efforts by the Party and available documentation to support the change in the use of default nitrogen excretion rates from the Revised 1996 IPCC Guidelines used in the 2016 inventory submission to the application of the 2006 IPCC Guidelines methodology.
- (c) Land use, land-use change and forestry (LULUCF):
- (d) Investigate the raw data used for land representation and options for enhance data representation;
- (e) Verify the methodology applied for land categorization and land-use change in the time series;
- (f) Discuss the transparent reporting of the estimation method used for the LULUCF categories and pools;
- (g) Discuss the possibility to improve the uncertainty analysis for the sector.

Waste:

- (a) Further investigate the methodology for calculating the waste generation and the applicability of used parameters;
- (b) Discuss the allocation of more than two-thirds of municipal solid waste to uncategorized solid waste disposal sites;
- (c) Discuss the validity of the exclusion of open burning in landfills.

¹ In 1990, CO₂ emissions from cropland were a small sink, while in 2014 this has turned into a major source accounting for 13 per cent of the total national emissions. The associated release of nitrogen in the soil and the related reported N₂O emission from this source in the agricultural sector in CRF table 3.D accounts for 19.0 per cent of the total emission from the agricultural sector.

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>>.

Annual status report for Kazakhstan for 2016. Available at <<http://unfccc.int/resource/docs/2016/asr/kaz.pdf>>.

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

FCCC/ARR/2012/KAZ. Report on the individual review of the inventory submission of Kazakhstan submitted in 2012. Available at <<http://unfccc.int/resource/docs/2013/arr/KAZ.pdf>>.

FCCC/ARR/2011/KAZ. Report of the individual review of the inventory submission of Kazakhstan submitted in 2011. Available at <<http://unfccc.int/resource/docs/2012/arr/KAZ.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. 1996. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html>>.

Intergovernmental Panel on Climate Change. 2006. *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. Irina Yesserkepova (Joint Stock Company “Jassyl Damu”), including additional material on the methodology and assumptions used.

Annex IV

Acronyms and abbreviations

AD	activity data
ARR	annual review report
AWMS	animal waste management system
CH ₄	methane
CLRTAP	Convention on Long-range Transboundary Air Pollution
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
COP	Conference of the Parties
CRF	common reporting format
CSF	fraction of carbon stored
DOC	degradable organic carbon
FOD	first-order decay
EF	emission factor
EMEP/EEA	European Monitoring and Evaluation Programme/European Environment Agency
ERT	expert review team
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
KazNIIK	Kazakh Scientific Research Institute of Ecology and Climate
kt	kilotonne (1 kt = 1 gigagram (Gg))
LULUCF	land use, land-use change and forestry
MMS	manure management system
MSW	municipal solid waste
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
SOC	soil organic carbon
SWDS	solid waste disposal sites
QA/QC	quality assurance/quality control
UNFCCC	United Nations Framework Convention on Climate Change
