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Report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Kazakhstan

Note by the expert review team

Summary

According to decision 2/CMP.8, each Party with a quantified emission limitation and reduction commitment inscribed in the third column of Annex B to the Kyoto Protocol, as contained in annex I to decision 1/CMP.8, shall submit to the secretariat a report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol. In accordance with decision 22/CMP.1, annex, paragraph 11, in conjunction with decision 4/CMP.11, the report to facilitate the calculation of the assigned amount is subject to a review. This report presents the results of the technical review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol, conducted by an expert review team in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol". The review took place from 18 to 23 September 2017 in Astana, Kazakhstan.

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I. Introduction[1]

1. The review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol (hereinafter referred to as the report to facilitate the calculation of the assigned amount) of Kazakhstan was organized by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol".[2] The review took place from 18 to 23 September 2017 in Astana, Kazakhstan, and was coordinated by Mr. Javier Hanna Figueroa (UNFCCC secretariat). Table 1 provides information on the composition of the ERT that conducted the review of Kazakhstan.

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

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

Area of expertise	*Name*	*Party*
Generalist	Ms. Olia Glade	New Zealand
Energy	Ms. Rana Humbatova	Azerbaijan
IPPU	Mr. Roman Kazakov	Russian Federation
Agriculture	Ms. Anna Romanovskaya	Russian Federation
LULUCF	Ms. Oksana Butrym	Ukraine
Waste	Ms. Tatiana Tugui	Republic of Moldova
Lead reviewers	Ms. Glade	
	Ms. Tugui	

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

II. Summary of the reporting on mandatory elements in the report to facilitate the calculation of the assigned amount

3. Table 2 provides a summary of the ERT's assessment of the reporting of mandatory elements by Kazakhstan in its report to facilitate the calculation of the assigned amount. Key data and elections by the Party are included in table 5.

Table 2
Expert review team's assessment of the reporting of mandatory elements by Kazakhstan in its report to facilitate the calculation of the assigned amount

Item	*Comment*
General Party information	
Dates of submission	Original submission: 4 July 2017 and 21 September 2017 (addendum)

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

[2] Decision 22/CMP.1 and its annex and any revisions contained in decision 4/CMP.11 and its annex I.

Item		*Comment*
Are there any missing categories or issues related to completeness[a] in the reporting of GHG emissions by sources and removals by sinks for the base year or period?	Yes	For further information, see FCCC/ARR/2017/KAZ (table 2 and annex III)
Was the GHG inventory recalculated in accordance with decision 4/CMP.7 for all years from 1990 to the most recent year available?	Yes	
Did the Party report the base year for HFCs, PFCs and SF_6?	Yes	See annex I, table 5
Did the Party report the base year for NF_3?	Yes	See annex I, table 5
Information related to the assigned amount and the commitment period reserve		
Was the assigned amount in the original submission calculated in accordance with Article 3, paragraph 8, of the Kyoto Protocol, Article 3, paragraphs 7 bis and 8 bis, as contained in the Doha Amendment, and decision 13/CMP.1 in conjunction with decision 3/CMP.11?	No	See annex I, table 5. For further information, see ID# 1 in table 3
Has the Party reported in the original submission the difference between the assigned amount for the second commitment period and average annual emissions for the first three years of the first commitment period, multiplied by 8?	No	See annex I, table 5. For further information, see ID# 19 in table 3
Has the Party indicated in the original submission the approach[b] used to calculate average annual emissions for the first three years of the first commitment period?	No	See annex I, table 5. For further information, see ID# 19 in table 3
Did land-use change and forestry constitute a net source of GHG emissions in the base year and therefore did the Party include emissions from deforestation in the calculation of the assigned amount?	No	See annex I, table 6
Was the commitment period reserve in the original submission calculated in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1, the annex to decision 13/CMP.1, paragraph 8 quinquies, and decision 1/CMP.8, paragraph 18?	Yes	See annex I, table 5. For further information, see ID# 3 in table 3
Information related to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol		
Has the Party reported a definition of forest in accordance with decision 2/CMP.8, annex I, paragraph 1(f)?	Yes	See annex I, table 5
Has the Party reported a comparison between the values used in the forest definition and values that have been historically reported to FAO or other international bodies?	No	For further information, see ID# 9 in table 3

Item		*Comment*
If the Party identified activities elected under Article 3, paragraph 4, of the Kyoto Protocol, are these elections in accordance with decision 2/CMP.7, annex, paragraphs 6–8?	Yes	See annex I, table 5
Do the activities elected under Article 3, paragraph 4, of the Kyoto Protocol for the second commitment period include at least those activities elected for the first commitment period?	NA	Kazakhstan did not have a QELRC in the first commitment period
Is information reported on how the national system under Article 5, paragraph 1, of the Kyoto Protocol will identify land areas associated with all additional elected activities and how the Party ensures that land that was accounted for in the first commitment period continues to be accounted for in the second commitment period?	No	For further information, see ID# 10 in table 3. Kazakhstan did not have a QELRC in the first commitment period
Has the Party identified for each activity under Article 3, paragraphs 3 and 4, of the Kyoto Protocol whether it intends to account annually or for the entire commitment period?	Yes	See annex I, table 5
Did the Party provide information on the forest management reference level, including, if appropriate, information on technical corrections and information on how emissions from harvested wood products originating from forests prior to the start of the second commitment period have been calculated in the reference level?	No	See annex I, table 5. For further information, see ID# 12 in table 3
Has the Party reported the quantity amounting to 3.5% of the base-year GHG emissions, excluding LULUCF, in the original submission?	No	See annex I, table 5
Did the Party indicate whether it intends to apply the provisions to exclude emissions from natural disturbances for the accounting for afforestation and reforestation and/or forest management and provide the relevant information in accordance with decision 2/CMP.7, annex, paragraph 33?	Yes	See annex I, table 5. For further information, see ID# 14 in table 3
Information related to the national system and national registry		
Was a description of the national system provided, in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol?	No	For further information, see ID# 15 in table 3
Was a description of the national registry provided, in accordance with the requirements contained in the annex to decision 13/CMP.1, the annex to decision 5/CMP.1 and the technical standards for	No	For further information, see ID# 18 in table 3

Item	*Comment*
data exchange between registry systems adopted by the CMP?	

Abbreviations: CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, ERT = expert review team, FAO = Food and Agriculture Organization of the United Nations, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable, QELRC = quantified emission limitation and reduction commitment.

[a] Issues related to missing categories and completeness are only for those categories for which methods are available in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

[b] Parties may elect to calculate average annual emissions for the first three years of the first commitment period by including either the gases and sources listed in Annex A to the Kyoto Protocol, or the GHGs, sectors and source categories used to calculate the assigned amount for the second commitment period.

III. Technical assessment of the elements reviewed

4. In accordance with decision 22/CMP.1 in conjunction with decision 4/CMP.11, the review of the report to facilitate the calculation of the assigned amount of Kazakhstan has been undertaken together with the review of the 2017 annual submission.[3] Table 3 contains additional information, if any, to support the ERT's assessment included in table 2 above of the Party's capacity to account for its emissions and the assigned amount, specifically related to: the calculation of the assigned amount for the second commitment period and any adjustments applied; information related to Article 3, paragraph 7 ter, as contained in the Doha Amendment; information related to reporting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol; calculation of the commitment period reserve; and the national system and national registry.

Table 3
Additional findings of the expert review team, if any, related to Kazakhstan's reporting of mandatory elements in its report to facilitate the calculation of the assigned amount

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
1.	Calculation of the assigned amount	The assigned amount submitted by Kazakhstan in its report to facilitate the calculation of the assigned amount was calculated in accordance with Article 3, paragraphs 7 bis, 8 and 8 bis, of the Kyoto Protocol, the annex to decision 13/CMP.1 and annex I to decision 3/CMP.11. In its original submission, Kazakhstan reported its assigned amount as 2 957 193 956.82 t CO_2 eq (based on base-year estimates of 389 104 468.004 t CO_2 eq) The ERT, in the list of potential problems and further questions raised by the ERT, identified overestimations of emissions in 1990 for the following categories and subcategories: 1.A.3.d domestic navigation, 2.B.5 carbide production, 2.C.1.a steel, 2.C.1.d sinter, 2.C.1.e pellet, 2.C.1.f other, 2.C.2 ferroalloys production, 3.B.3 swine and 5.A solid waste disposal (waste generation and degradable organic carbon). In response to this list, Kazakhstan revised its emission estimates from the above categories and subcategories and submitted revised estimates on 17 November 2017 with subsequent resubmission on 26 January 2018 (see ID#s 4, 5, 6, 7, 8, 20, 21, 22, 23 and 24 below, and ID#s E.53, I.39, I.40, I.45, I.46, I.47, I.48, A.14, W.17 and W.18 in FCCC/ARR/2017/KAZ, table 5) In response to the list of potential problems and further questions raised by the ERT, Kazakhstan reported a revised assigned amount for the second commitment period as 2 855 504.699 t CO_2 eq. However, the ERT identified that there was a calculation error that led to the incorrect calculation of the assigned amount. To calculate its assigned amount, Kazakhstan used in the calculation formula an incorrect coefficient of 0.05	Not a problem

[3] The annual review report on the 2017 inventory submission of Kazakhstan is available at http://unfccc.int/resource/docs/2017/arr/kaz.pdf.

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		instead of 0.95, which corresponds to Kazakhstan's commitment for the second commitment period of the Kyoto Protocol to reduce emissions to 95 per cent of the base-year level In addition, the ERT disagreed with Kazakhstan's revised estimates for the categories and subcategories 1.A.3.d domestic navigation, 2.C.1.d sinter, 2.C.1.e pellet and 5.A solid waste disposal (waste generation and degradable organic carbon) and, therefore, the ERT concluded that the emission estimates for these categories remained overestimated for 1990 (see ID#s 20, 21, 22, 23 and 24 below). The ERT proceeded with the calculation of adjustments for the categories and subcategories 1.A.3.d domestic navigation, 2.C.1.d sinter, 2.C.1.e pellet and 5.A solid waste disposal (waste generation and degradable organic carbon) (for further information, see ID# 20 below for 1.A.3.d domestic navigation, and annex II for 2.C.1.d sinter, 2.C.1.e pellet and 5.A solid waste disposal). As a result of the adjustment procedures and taking into account the adjusted base-year estimates of 371 295 113 t CO_2 eq, the ERT recalculated the assigned amount and determined it to be 2 821 842 860 t CO_2 eq (for further information, see annex I, table 5, and annex II, table 2)	
2.	Calculation of the assigned amount	The ERT noted that Kazakhstan, in its report to facilitate the calculation of the assigned amount (NIR, chapter 8, point (b)), indicated that it did not selected a base year for nitrogen trifluoride (NF_3) because in Kazakhstan there is no production or consumption of NF_3. The ERT also noted that Kazakhstan submitted an addendum to its report to facilitate the calculation of the assigned amount that confirmed its intention to select 2000 as the base year for NF_3 in accordance with Article 3, paragraph 8 bis, of the Kyoto Protocol. This selection did not have any impact in the calculation of the assigned amount, as emissions of NF_3 are reported as "NO, NA" in 2000	Not a problem
3.	Calculation of the commitment period reserve	The commitment period reserve was calculated in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18 In its original submission, Kazakhstan reported its commitment period reserve as 2 407 364 007.36 t CO_2 eq. The ERT noted that in response to the list of potential problems and further questions raised by the ERT, Kazakhstan did not provide a revised value for the commitment period reserve The ERT, in the list of potential problems and further questions raised by the ERT, identified overestimations of emission estimates in 1990 for the following categories and subcategories: 1.A.3.d domestic navigation, 2.B.5 carbide production, 2.C.1.a steel, 2.C.1.d sinter, 2.C.1.e pellet, 2.C.1.f other, 2.C.2 ferroalloys production, 3.B.3 swine and 5.A solid waste disposal (waste generation and degradable organic carbon) (see ID#s 4, 5, 6, 7, 8, 20, 21, 22, 23 and 24 below) Also, the ERT identified underestimations of emission estimates in 2013–2015 for the following categories and subcategories: 1.A fuel combustion (coking coal), 1.B.1.a.i underground mines – post-mining activities, 1.B.1.a.ii surface mines – post-mining activities, 1.B.2.a.1 oil – exploration, 1.B.2.a.2 oil – production, 1.B.2.a.3 oil – transport, 1.B.2.b.2 natural gas – production, 1.B.2.b.3 natural gas – processing, 1.B.2.b.4 natural gas – transmission and storage, 1.B.2.b.5 natural gas – distribution, 1.B.2.c flaring, 2.A.1 cement production, 2.A.2 lime production, 2.A.3 glass production, 2.A.4.a ceramics, 2.A.4.d other, 2.B.1 ammonia production, 2.B.2 nitic acid production, 2.C.1.a steel, 2.C.1.b pig iron, 2.F.1 refrigeration and air conditioning , 2.G.1 electrical equipment, 3 agriculture (other livestock in 3.A, 3.B, 3.D.a and 3.D.b), 3.B.1 cattle – non-dairy cattle, 3.B.4 other livestock – buffalo, 3.C rice cultivation, 3.D	Not a problem

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		agricultural soils (animal manure applied to soils), 3.D agricultural soils (mineralization/immobilization associated with loss/gain of soil organic matter), 3.D.b.2 nitrogen leaching and run-off, 3.H urea application, 5.A solid waste disposal (industrial waste) and 5.C.2 open burning of waste. In response to this list, Kazakhstan revised its emission estimates from all the above categories and subcategories and submitted revised estimates on 17 November 2017 with a subsequent resubmission on 26 January 2018 (see ID#s E.29, E.32, E.34, E.35, E.39–E.43, I.24, A.10 and W.12 in FCCC/ARR/2017/KAZ, table 3, and ID#s E.48, E.53, I.28, I.32, I.34–I.42, I.45–I.48, I.51, A.11, A.12, A.14–A.18, A.20 and W.17–W.19 in FCCC/ARR/2017/KAZ, table 5) The ERT disagreed with Kazakhstan's revised estimates for 1990 for the categories and subcategories 1.A.3.d domestic navigation, 2.C.1.d sinter, 2.C.1.e pellet and 5.A solid waste disposal (waste generation and degradable organic carbon) and, therefore, the ERT concluded that the emission estimates for these categories remained overestimated for 1990 (see ID#s 20, 21, 22, 23 and 24 below). The ERT also disagreed with Kazakhstan's revised estimates for 2013–2015 for the categories and subcategories 1.A fuel combustion (coking coal), 1.B.1.a.i underground mines – post-mining activities, 1.B.1.a.ii surface mines – post-mining activities, 1.B.2.a.1 oil – exploration, 1.B.2.a.2 oil – production, 1.B.2.a.3 oil – transport, 1.B.2.b.2 natural gas – production, 1.B.2.b.3 natural gas – processing, 1.B.2.b.4 natural gas – transmission and storage, 1.B.2.b.5 natural gas – distribution, 1.B.2.c flaring, 2.A.4.a ceramics, 2.F.1 refrigeration and air conditioning, 2.G.1 electrical equipment, 3.D agricultural soils (mineralization/ immobilization associated with loss/gain of soil organic matter), 5.A solid waste disposal (industrial waste) and 5.C.2 open burning of waste, and, therefore, the ERT concluded that the emission estimates for these categories remained underestimated for 2013–2015 (see ID#s E.29, E.32, E.34, E.35, E.39–E.43, I.24 and W.12 in FCCC/ARR/2017/KAZ, table 3, and ID#s E.48, I.35, I.51, A.18 and W.19 in FCCC/ARR/2017/KAZ, table 5) The ERT proceeded with the process of calculation of adjustments for the above-indicated categories and subcategories, and as a result applied adjustments for: 1.A fuel combustion (coking coal), 1.B.1.a.i underground mines – post-mining activities, 1.B.1.a.ii surface mines – post-mining activities, 1.B.2.a.1 oil – exploration, 1.B.2.a.2 oil – production, 1.B.2.b.2 natural gas – production, 1.B.2.b.3 natural gas – processing, 1.B.2.b.4 natural gas – transmission and storage, 1.B.2.b.5 natural gas – distribution, 1.B.2.c flaring, 2.C.1.d sinter, 2.C.1.e pellet, 2.F.1 refrigeration and air conditioning, 3.D agricultural soils (mineralization/immobilization associated with loss/gain of soil organic matter), 5.A solid waste disposal (waste generation and degradable organic carbon), 5.A solid waste disposal (industrial waste) and 5.C.2 open burning of waste (see ID# 20 below and annex II, ID#s E.35 and I.24 in FCCC/ARR/2017/KAZ, table 3, ID# I.35 in FCCC/ARR/2017/KAZ, table 5 and FCCC/ARR/2017/KAZ, section VI and annex IV for further information) As a result of the adjustment procedures and taking into account the adjusted base-year estimates of 371 295 113 t CO_2 eq and the adjusted 2015 estimates of 394 257 088 t CO_2 eq, the ERT recalculated the commitment period reserve and determined it to be 2 539 658 574 t CO_2 eq	
4.	Calculation of the assigned amount	The ERT noted that, according to section 4.3.2.2 of the NIR, the Party used the default CO_2 EF from the 2006 IPCC Guidelines for estimating emissions from carbide production taken. However, the reported CO_2 IEF (2.95 t CO_2/t CaC_2) is significantly higher than the default EF value (1.090 t CO_2/t CaC_2 production) from the 2006 IPCC Guidelines. The ERT also	Not a problem

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		noted that, according to section 4.3.2.1 of the NIR, plant-specific AD on coke and limestone consumption used for carbide production are available. However, these data were not taken into account for the estimates. Kazakhstan clarified during the review that the value of the IEF (2.95 t CO_2/t CaC_2) was chosen incorrectly and that acetylene is not produced on-site from carbide. The ERT noted that the use of the incorrect EF led to an overestimation of CO_2 emissions from carbide production in 1990 and the other years of the time series. Therefore, the ERT included this issue in the list of potential problems and further questions raised by the ERT and recommended that Kazakhstan revise its estimates of CO_2 emissions from category 2.B.5 carbide production using the actual data on coke consumption for carbide production available from the production plant and the corresponding EF from the 2006 IPCC Guidelines (vol. 3, table 3.8) In response to the list of potential problems and further questions raised by the ERT, Kazakhstan resubmitted a complete set of CRF tables for 1990–2015 and revised its CO_2 emission estimates for category 2.B.5 carbide production for 1990 and also for all other years of the inventory time series. Kazakhstan used for its estimates AD on coke consumption for calcium carbide production from JSC "Temirtau Electrometallurgical Plant" and the default EF from 2006 IPCC Guidelines. The ERT agreed with the Party's revised estimates. As a result of the revision, the estimated emissions from category 2.B.5 carbide production decreased in 1990 by 629.86 kt CO_2 (0.17 per cent of the national total and 2.64 per cent of the IPPU sector) (see ID# I.39 in FCCC/ARR/2017/KAZ, table 5)	
5.	Calculation of the assigned amount	The ERT noted that, according to section 4.4.1.2.3. of the NIR, the tier 2 method was used for the estimation of CO_2 emissions from 2.C.1.a steel. However, the ERT noted that the same section of the NIR stated that the default EF for the tier 1 method from the 2006 IPCC Guidelines was applied. The ERT also noted that the IEF for the subcategory 2.C.1.a (0.14 t CO_2/t steel) had been kept constant for the entire time series, even though actual data on the carbon balance were used in the estimations. Kazakhstan clarified during the review that CO_2 emissions from steel production were estimated based on the carbon balance of steel production, that carbon emissions were recalculated to CO_2 emissions using the conversion factor of 44/12 and finally the CO_2 amount was multiplied by the default EF (1.06 t CO_2/t steel) from the 2006 IPCC Guidelines. The ERT concluded that the applied methodology is not in accordance with the tier 2 method of the 2006 IPCC Guidelines and the resulting CO_2 emissions were overestimated in 1990 and the other years of the time series. Therefore, the ERT included this issue in the list of potential problems and further questions raised by the ERT, and recommended that Kazakhstan revise its CO_2 emission estimates from subcategory 2.C.1.a steel for 1990 using the tier 2 method provided in the 2006 IPCC Guidelines, without application of the default EF for tier 1 In response to the list of potential problems and further questions raised by the ERT, Kazakhstan resubmitted a complete set of CRF tables for 1990–2015 and revised its CO_2 emission estimates for this subcategory by excluding the default EF (1.06 t CO_2/t steel) from the formula used for the estimation for 1990 and also for all other years of the inventory time series. The ERT noted that the applied method corresponds to the tier 2 method of the 2006 IPCC Guidelines and the estimation was undertaken correctly. The ERT agreed with the Party's revised estimates. The ERT also noted that Kazakhstan revised its CO_2 emission estimates from this category by including the total steel production in the country. This revision was undertaken in response to the potential problem raised in ID# I.41 of FCCC/ARR/2017/KAZ	Not a problem

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		As a result of the revision of the method applied and AD used, the estimated CO_2 emissions from subcategory 2.C.1.a steel decreased in 1990 by 14.31 kt (0.004 per cent of the national total and 0.07 per cent of the IPPU sector); decreased in 2013 by 55.30 kt (0.02 per cent of the national total and 0.3 per cent of the IPPU sector); increased in 2014 by 3.35 kt (0.001 per cent of the national total and 0.02 per cent of the IPPU sector), and decreased in 2015 by 5.45 kt (0.002 per cent of the national total and 0.03 per cent of the IPPU sector) (see ID# I.40 in FCCC/ARR/2017/KAZ, table 5)	
6.	Calculation of the assigned amount	The ERT noted that Kazakhstan reported CO_2 and CH_4 emissions from coke production under 2.C.1.f other (under 2.C.1 iron and steel production) instead of allocating these emissions to the energy sector as recommended by the 2006 IPCC Guidelines. Kazakhstan used the tier 1 approach and default EFs for estimating emissions from coke production (section 4.4.1.2.3 of the NIR). The ERT also noted that the Party estimated and reported emissions from solid fuels combustion including coking coal used for coke production in the iron and steel industry under subcategory 1.A.2.a iron and steel. CO_2 emissions from solid fuels manufacturing are also reported under subcategory 1.A.1.c manufacture of solid fuels and other energy industries. Kazakhstan was not able to clarify during the review how coking coal is used or justify that CO_2 emissions from coke production were not double counted. The ERT concluded that CO_2 emissions from coke production could be overestimated in 1990 and included this issue in the list of potential problems and further questions raised by the ERT. The ERT recommended that Kazakhstan revise its estimates of CO_2 and CH_4 emissions from coke production in 1990 from subcategory 2.C.1.f other and allocate the revised estimates in the energy sector under 1.A.1.c. manufacture of solid fuels and other energy industries, as well as justify that emissions from coke production are not double counted under 2.C.1 iron and steel production, 1.A.1.b pig iron and 1.A.2.a iron and steel In response to the list of potential problems and further questions raised by the ERT, Kazakhstan excluded CO_2 and CH_4 emissions from coke production from subcategory 2.C.1.f other for 1990 and all other years of the inventory and reported these emissions as “IE”. The ERT agreed with the Party’s revisions As a result of the revision, the estimated emissions from 2.C.1.f other decreased in 1990 by 1 559.44 kt CO_2 eq (0.4 per cent of the national total and 7.3 per cent of the IPPU sector); decreased in 2013 by 1 009.08 kt CO_2 eq (0.3 per cent of the national total and 5.6 per cent of the IPPU sector); decreased in 2014 by 1 060.73 kt CO_2 eq (0.3 per cent of the national total and 5.7 per cent of the IPPU sector); decreased in 2015 by 1 065.46 kt CO_2 eq (0.4 per cent of the national total and 5.6 per cent of the IPPU sector) (see ID# I.47 in FCCC/ARR/2017/KAZ, table 5)	Not a problem
7.	Calculation of the assigned amount	The ERT noted that, according to section 4.4.2.2 of the NIR, Kazakhstan used the tier 1 method and default EFs to estimate CO_2 emissions from 2.C.2 ferroalloys production. The ERT also noted, however, that 2.C.2 ferroalloys production is a key category in accordance with the information in CRF table 7. The NIR does not provide an explanation of why the recommended tier 2 or 3 methods were not applied for the calculations. The Party confirmed during the review that the tier 1 method and default EFs for each type of ferroalloys were used for the emission estimates. The ERT further noted that data on reducing agents used in ferroalloys production are provided by the production plants and are available for estimation. The ERT concluded that CO_2 emissions were not estimated in accordance with the 2006 IPCC Guidelines and that they could be overestimated for 1990 on a basis of preliminary emission	Not a problem

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		estimates for this category using the tier 2 methodology and AD provided by Kazakhstan during the review. Therefore, the ERT included this issue in the list of potential problems and further questions raised by the ERT and recommended that Kazakhstan revise its CO_2 emission estimates for 2.C.2 ferroalloys production in 1990 by applying tier 2 or 3 methods from the 2006 IPCC Guidelines and using the coke consumption data for ferroalloys production available from the plants In response to the list of potential problems and further questions raised by the ERT, Kazakhstan resubmitted a complete set of CRF tables for 1990–2015 and revised its CO_2 emission estimates for 2.C.2 ferroalloys production in 1990 and also for all other years of the time series, using AD on reducing agent consumption for each type of ferroalloys produced in Kazakhstan and the EF (3.3 t CO_2/t coke) from the 2006 IPCC Guidelines. The amount of ferroalloys that was not identified by type was taken into account by the application of the default EF (1.6 t CO_2/t ferroalloys). The ERT concluded that the AD and revised emissions reported in the resubmitted CRF tables are complete and cover all ferroalloys produced in Kazakhstan and agreed with the Party's revised estimates As a result of the revision, the estimated emissions from 2.C.2 ferroalloys production decreased in 1990 by 391.21 kt CO_2 eq (0.1 per cent of the national total and 1.8 per cent of the IPPU sector), increased in 2013 by 794.79 kt CO_2 eq (0.3 per cent of the national total and 4.4 per cent of the IPPU sector), increased in 2014 by 719.81 kt CO_2 eq (0.2 per cent of the national total and 3.9 per cent of the IPPU sector), increased in 2015 by 826.47 kt CO_2 eq (0.2 per cent of the national total and 3.8 per cent of the IPPU sector) (see ID# I.48 in FCCC/ARR/2017/KAZ, table 5)	
8.	Calculation of the assigned amount	The ERT noted that Kazakhstan applied a default EF of 0.005 kg N_2O-N/kg N for liquid manure management systems with natural crust cover. The ERT also noted that the IPCC default EF for liquid systems without natural crust cover is 0 kg N_2O-N/kg N. The NIR does not contain any documentation supporting the existence of liquid systems with natural crust cover in the country and the related methodological choice of the EF value made by Kazakhstan. During the review, Kazakhstan explained that there are no relevant standards for liquid manure treatment systems in Kazakhstan. Therefore, the ERT concluded that liquid systems without natural crust cover might exist in the country, which leads to a potential overestimation of N_2O emissions in the manure management systems for the subcategory 3.B.3 swine for 1990, and included this issue in the list of potential problems and further questions raised by the ERT. The ERT recommended that Kazakhstan investigate further the existence of liquid manure management systems in the country and their types and revise its N_2O emission calculations for 1990 accordingly or apply the default EF for liquid manure management systems without natural crust cover (0 kg N_2O-N/kg N from table 10.21 of volume 4 of the 2006 IPCC Guidelines) in order to increase the accuracy of the estimates In response to the list of potential problems and further questions raised by the ERT, Kazakhstan submitted a complete set of CRF tables for the period 1990–2015 with revised N_2O emission estimates for manure management systems for subcategory 3.B.3 swine for all years of the time series. The revised estimates were calculated using a default EF for liquid manure management systems without natural crust cover in accordance with the 2006 IPCC Guidelines. The ERT agreed with the Party's revised estimates As a result of the revision, the estimated N_2O emissions for 1990 decreased by 74.50 kt CO_2 eq (0.02 per cent of the national total and 0.2 per cent of the agriculture sector). For 2013, 2014 and 2015, N_2O	Not a problem

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		emissions decreased by 21.00, 20.14 and 20.21 kt CO_2 eq, respectively (0.007, 0.006 and 0.007 per cent of the national total without LULUCF in 2013, 2014 and 2015, respectively) (see ID# A.14 in FCCC/ARR/2017/KAZ, table 5)	
9.	Accounting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	The report to facilitate the calculation of the assigned amount of Kazakhstan (NIR, chapter 8, point (f)) included values for the forest definition for use by Kazakhstan in accounting for its activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol; however, the Party did not include a justification of the consistency of the values used in its forest definition with the information that has been historically reported to FAO or other international bodies, or a statement that the definitions were identical, or, in the case of difference, an explanation of why and how such values were chosen, in accordance with decisions 16/CMP.1 and 2/CMP.7. During the review, Kazakhstan, in response to a question raised by the ERT, indicated that the Party did not report to FAO the parameters of its forest definition. However, the ERT found that the national definition and numerical values of forest area for some years of the time series have been reported to FAO and that these are not consistent with the definition and forest area used by Kazakhstan. At the same time, the ERT noted that Kazakhstan reported to FAO the forest area for a number of years of the time series using the definitions of the Global Forest Resources Assessment of the FAO (http://www.fao.org/3/a-az250e.pdf). Taking into account the above, the ERT considers that Kazakhstan may provide in its next annual submission a justification of the consistency of the values used in its forest definition with the information that has been historically reported to FAO or, in the case of difference, an explanation of why and how such values were chosen	Completeness
10.	Accounting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	The ERT noted that Kazakhstan, in its report to facilitate the calculation of the assigned amount (NIR, chapter 8, point (g)), indicated that it has elected revegetation as an activity to be accounted under Article 3, paragraph 4, of the Kyoto Protocol for the second commitment period, but provided very limited information in this report on how its national system under Article 5, paragraph 1, of the Kyoto Protocol will identify land areas associated with all elected activities (see FCCC/ARR/2017/KAZ, ID# G.20 in table 5). On 21 September 2017, Kazakhstan submitted an addendum to its report to facilitate the calculation of the assigned amount that confirmed its intention to change its election to grazing land management only, as the activity under Article 3, paragraph 4, of the Kyoto Protocol for inclusion in its accounting for the second commitment period, but did not provide information on how its national system under Article 5, paragraph 1, of the Kyoto Protocol will identify land areas associated with all elected activities	Not a problem
11.	Accounting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	The ERT noted that Kazakhstan, in its report to facilitate the calculation of the assigned amount (NIR, chapter 8, point (h)), indicated that it elected annual accounting for each activity under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. On 21 September 2017, Kazakhstan submitted an addendum to its report to facilitate the calculation of the assigned amount that confirmed its intention to elect entire commitment period accounting for each activity under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	Not a problem
12.	Accounting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	The ERT noted that Kazakhstan, in its report to facilitate the calculation of the assigned amount (NIR, chapter 8, point (i)) regarding the provision of information, referred to the FMRL and any technical corrections as contained in the inventory report for the first year of the second commitment period, indicated that "the reference level for all selected activities is 1990". The ERT noted that this information is not related to the FMRL as inscribed in the appendix to the annex to decision 2/CMP.7,	Completeness

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		and as required to be reported in accordance with paragraph 1(i) of annex I to decision 2/CMP.8, because in that appendix there is no such information for Kazakhstan. The reason for this is that Kazakhstan did not submit to the secretariat information on the FMRL in accordance with decision 2/CMP.6, paragraph 4, and therefore no submission on the FMRL from Kazakhstan was subject to a technical assessment by a review team in accordance with paragraph 5 of decision 2/CMP.6. Consequently, the CMP did not consider the outcomes of a technical assessment of a submission on the FMRL from Kazakhstan In response to the list of potential problems and further questions raised by the ERT, Kazakhstan indicated that in 2010–2011 it did not need to define an FMRL, because decisions about it were made before Kazakhstan's commitment was inscribed in Annex B to the Kyoto Protocol for its second commitment period. Nevertheless, the ERT considers that Kazakhstan, as an Annex I Party with commitments for the second commitment period of the Kyoto Protocol, is subject to compliance with all CMP decisions related to this commitment period, and in this particular case, to those of submission, technical assessment and consideration by the CMP of the information on the FMRL of the Party. Taking into account the above, the ERT considers that Kazakhstan may consider to submit to the secretariat information on its FMRL and to start the process for its technical assessment with the aim to provide in its next annual submission the required information to be reported in accordance with paragraph 1(i) of annex I to decision 2/CMP.8 and with other relevant requirements in annex II to decision 2/CMP.8 (see ID# KL.1 in table 5 in FCCC/ARR/2017/KAZ)	
13.	Accounting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	The ERT noted that, in the report to facilitate the calculation of the assigned amount (NIR, chapter 8, point (j)) regarding the information on how emissions from harvested wood products originating from forest prior to the start of the second commitment period have been calculated in the FMRL in accordance with decision 2/CMP.7, annex, paragraph 16, Kazakhstan indicated that "emissions from harvested wood products, taken from forests prior to the start of the second commitment period, were not reported officially". The ERT also noted that the information related to the FMRL (as inscribed in the appendix to the annex to decision 2/CMP.7) has not been reported in the report to facilitate the calculation of the assigned amount, because in that appendix there is no such information for Kazakhstan. The reason for this is that the Party did not submit to the secretariat information on the FMRL in accordance with decision 2/CMP.6, paragraph 4 (see ID# 12 above)	Completeness
14.	Accounting of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	The ERT noted that Kazakhstan, in its report to facilitate the calculation of the assigned amount (NIR, chapter 8, point (k) (i) and (ii)) regarding the indication of whether it intends to apply the provisions to exclude emissions from natural disturbances for the accounting for afforestation and reforestation under Article 3, paragraph 3, and/or forest management under Article 3, paragraph 4, of the Kyoto Protocol during the second commitment period, indicated that "only forest fires were included in the reference levels due to the lack of regular data on pests and diseases" and "background levels were calculated on the basis of regular data records (forest inventory), which are conducted in Kazakhstan every five years, starting in 1988". The ERT considered that this information is not relevant for the required purpose and that the related mandatory information in accordance with decision 2/CMP.8, annex I, paragraph 1(k) (i) and (ii) has not been reported in the Party's report to facilitate the calculation of the assigned amount. The ERT also noted that Kazakhstan submitted an addendum to its report to facilitate the calculation of the assigned amount that confirmed its intention to exclude emissions from natural disturbances	Not a problem

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		for the accounting for afforestation and reforestation under Article 3, paragraph 3, of the Kyoto Protocol and/or forest management under Article 3, paragraph 4, of the Kyoto Protocol during the second commitment period However, later in the review process, on 5 December 2017, Kazakhstan formally notified the ERT by email about its intention to correct this statement in the addendum to its report to facilitate the calculation of the assigned amount and stated that Kazakhstan does not intend to apply the provisions to exclude emissions from natural disturbances for the accounting for afforestation and reforestation, and forest management during the second commitment period of the Kyoto Protocol. The ERT also noted that Kazakhstan intends to notify the UNFCCC secretariat that it will not apply the provisions to exclude emissions from natural disturbances in accordance with decision 2/CMP.7, annex, paragraph 33, for the accounting for afforestation and reforestation under Article 3, paragraph 3, and for the accounting for forest management under Article 3, paragraph 4, of the Kyoto Protocol, during the second commitment period. Furthermore, Kazakhstan will not provide information on natural disturbances owing to the lack of regular statistical information about natural disturbances in the country	
15.	National system	During the review, Kazakhstan explained the institutional arrangements, as part of the national system, for preparation of the inventory. The JSC Zhasyl Damu, institution dependent of the Ministry of Energy, is the designated single national entity with overall responsibility for the national inventory. Other organizations are also involved in the preparation of the inventory; however, the NIR of the 2017 annual submission does not clearly identify their specific roles and responsibilities in relation to the inventory preparation, or their specific responsibilities for the inventory development process The ERT noted that the NIR of the 2017 annual submission was submitted on 4 July 2017, which was beyond six weeks after the submission due date of 15 April 2017, although the CRF tables were submitted on time. A similar situation occurred in 2016, when the NIR submission happened in October 2016, several months after the submission of the CRF tables During the review, Kazakhstan explained that the delay with the NIR submission in 2017 was due to problems experienced by the designated inventory agency with obtaining inventory data and information from other organizations across multiple inventory sectors and provided to the ERT Order #214 of the Ministry of Energy, which is used as a legal basis for establishing the national system governing inventory data collection. The ERT noted that Order #214 did not provide sufficient detail on the roles of stakeholders involved in the inventory preparation and did not identify the particular responsibilities of different inventory data providers. Also, it did not include procedural guidance regarding inventory data sharing, data communication and data QC. The ERT also noted that the lack of clearly defined institutional arrangements and mechanisms to ensure compliance with the allocated responsibilities to the inventory in Kazakhstan may be the main reason for late NIR submissions in 2016 and 2017, and that the general functions for the national system, in accordance with decision 19/CMP.1 in conjunction with decisions 3/CMP.11 and 4/CMP.11, annex, section VI, paragraph 10(a) and (d), are not fully implemented by Kazakhstan The ERT further noted that Kazakhstan's national system was not implementing sufficiently the requirements in decision 19/CMP.1 in conjunction with decisions 3/CMP.11 and 4/CMP.11, annex, section VI, paragraph 12(c–e), that describe mandatory requirements for national	Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		systems regarding inventory planning functions. The ERT noted that the indicated specific inventory planning functions need to be improved to allow Kazakhstan to ensure the quality of its national GHG inventory in accordance with relevant COP and CMP decisions Therefore, the ERT concluded that the general functions and inventory planning functions of the national system described above were not fully implemented in accordance with decision 19/CMP.1 in conjunction with decisions 3/CMP.11 and 4/CMP.11, annex, sections V and VI, paragraphs 10(a) and (d) and 12(c–e) The ERT included this issue in the list of potential problems and further questions raised by the ERT and recommended that Kazakhstan provide an action plan detailing the steps and time frames for: (1) putting in place additional agreements and mechanisms to improve inter-agency cooperation and support that clearly define mandates for each inventory contributor and participant, regarding inventory roles and responsibilities, inventory funding and inventory resourcing; (2) identifying roles and responsibilities for QA/QC and data verification for each inventory sector to ensure data quality and reliability; and (3) implementing arrangements for review, approval and sign-off processes to ensure timely annual submission of the NIR by the agreed submission due date In response to the list of potential problems and further questions raised by the ERT, Kazakhstan clarified that the delays in the 2016 and 2017 annual submissions were associated with the late announcement of the tender and signing of a contract for the GHG inventory preparation, and indicated that it has started to implement the following activities: (1) the Ministry of Energy is making every effort to hold a tender for the GHG inventory preparation and to conclude a contract with the implementing organization earlier, but not later than the first quarter of 2018 to ensure that the reporting is provided in a timely manner in 2018; (2) inventory planning is indicated in the contract for the performance of work and is strictly maintained; and (3) the QA/QC plan will be described in more detail in the next annual submission. Kazakhstan also indicated that the terms of the procedures for official review and approval of the inventory, including recalculations, will be established more rigorously. Kazakhstan considered that if these requirements are met, then the procedures for the formal approval and submission of the inventory will be carried out on time. Kazakhstan further indicated that the general planning functions of the national system will also be brought in line with the requirements of decision 19/CMP.1, annex, paragraphs 10(a) and (d) and 12(c–e), in conjunction with decisions 3/CMP.11 and 4/CMP.11 Kazakhstan indicated that an action plan detailing the steps and the time frame for creating additional agreements to improve inter-agency cooperation and support will be presented in the next annual submission. Kazakhstan further indicated, after the completion of the review week in 2017, that the Ministry of Energy has already started setting up an interdepartmental working group to support the preparation of national inventories and improve QA/QC procedures. In addition, the mechanisms for data collection with other organizations will be strengthened The ERT considered Kazakhstan's response and found that it did not satisfactorily resolve the problem. The ERT noted that there was some positive shift towards resolution of the issues related to formal and administrative procedures and coordination among agencies to support the preparation of national inventories. However, the response on most of the points, including the most important elements, lacked substantive information and detailed steps with clearly identified roles and responsibilities and relevant time frames to monitor the progress of implementation of the described activities and the action plan. The ERT	

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		noted that the plan and these elements were required to be provided in the response from Kazakhstan by 6 November 2017, in accordance with the Article 8 review guidelines, and not in the next annual submission, with the objective of ensuring, among other things, that the next annual submission will be timely submitted by 15 April 2018 and with the required level of quality. In addition, the ERT noted that the response by Kazakhstan to the list of potential problems and further questions raised by the ERT was submitted, with a delay, on 17 November 2017 and did not include supporting documentation and/or worksheets of revised calculations for the energy and waste sectors, which were submitted later on 21 November 2017 Therefore, the ERT identified this problem, which pertains to language of a mandatory nature and influences the fulfilment of commitments, as a question of implementation in accordance with decision 22/CMP.1 in conjunction with decision 4/CMP.11 (see chapter IV below)	
16.	National system	The ERT noted that robust arrangements for technical competence of the staff involved in the inventory development process were not fully in place under Kazakhstan's national system and that building inventory capacity and its enhancement, and maintaining business continuity of the GHG inventory preparation and management were not included in the inventory planned improvements. The ERT also noted that the issues indicated above were preventing the national system from fully ensuring sufficient capacity for timely performance of its functions. During the review, Kazakhstan expressed interest in undertaking UNFCCC training on review of GHG inventories for its leading inventory experts and participating in bilateral collaboration with other Annex I Parties as a way to enhance the technical capacity of the staff involved in the inventory development process During the review, Kazakhstan explained that the delay with the NIR submission in 2017 was related to problems experienced by the designated inventory agency with obtaining inventory data and information from other organizations across multiple inventory sectors, which indicated difficulties for the national system in ensuring timely data collection for estimating GHG emissions and removals. Therefore, the ERT concluded that Kazakhstan was not sufficiently implementing the general functions of the national system required in decision 19/CMP.1 in conjunction with decisions 3/CMP.11 and 4/CMP.11, annex, section V, paragraph 10(b) The ERT included this issue in the list of potential problems and further questions raised by the ERT and recommended that Kazakhstan undertake further steps in building inventory capacity within the national system and provide information on planned capacity-building steps. In addition, the ERT recommended that Kazakhstan report on progress in the capacity-building activities in the action plan for inventory improvement. Specifically, it should include the planned actions, roles and responsibilities for those actions and the time frame for implementation of each action regarding: (1) building technical capacity of the personnel participating in the inventory preparation and management; and (2) making specific arrangements for data sharing and data communication to ensure uninterrupted and timely access to AD from other organizations by the designated inventory agency In response to the list of potential problems and further questions raised by the ERT, Kazakhstan indicated that an action plan detailing the steps and the time frame for creating additional agreements to improve inter-agency cooperation and support will be presented in the next annual submission. In addition, Kazakhstan indicated that, with the intention of building the capacity of the experts, the appropriate conditions will be created for the	Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		development of skills and training of sector specialists and the mechanisms for data collection with other organizations will be strengthened The ERT considered Kazakhstan's response and found that it did not satisfactorily resolve the problem. The ERT noted that there was some positive shift towards resolution of the issues related to inventory capacity-building and data collection to support the preparation of national inventories. However, the short response lacked substantive information on planned capacity-building actions and a description of planned actions, roles and responsibilities for those actions and the time frame for implementation of each action and, importantly, the action plan for inventory improvement was not provided in the response from Kazakhstan Therefore, the ERT identified this problem, which pertains to language of a mandatory nature and influences the fulfilment of commitments, as a question of implementation in accordance with decision 22/CMP.1 in conjunction with decision 4/CMP.11 (see chapter IV below)	
17.	National system	The ERT noted that Kazakhstan's inventory archiving system is developed, but it does not function adequately as defined in decision 19/CMP.1 in conjunction with decisions 3/CMP.11 and 4/CMP.11, annex, section VI, paragraph 16, regarding some of the functions of inventory management. Specifically, the organization of the current inventory archiving system did not always allow the Party to respond in a timely manner to the requests from the ERT for clarifying the most recent inventory information resulting from the different stages of the review process because, according to the Party, the inventory archives were located in Almaty, while the review week took place in Astana. The ERT noted that it was problematic for Kazakhstan to make some data and information stored in the archives available to the ERT during the review week in Astana	Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
18.	National registry	The ERT noted that the report to facilitate the calculation of the assigned amount of Kazakhstan indicated that "the national registry is currently being developed" (NIR, chapter 8, point (m), p.341). The ERT noted that a description of the national registry shall be included in the report to facilitate the calculation of the assigned amount as specified in decision 2/CMP.8, annex I, paragraph 1(m), and that under Article 7, paragraphs 1 and 4, of the Kyoto Protocol, and according to decision 13/CMP.1 in conjunction with decision 3/CMP.11, annex, part II.A, each Party included in Annex I is required to establish and maintain a national registry that must be in place prior to the submission of the Party's report to facilitate the calculation of the assigned amount under the Kyoto Protocol During the review, the ERT was not able to perform the review of the national registry of Kazakhstan in accordance with the Article 8 review guidelines because a national registry and related information were not available. From this and responses provided by the Party to the questions of the ERT, the ERT concluded that the process of building Kazakhstan's national registry is not complete and, therefore, that Kazakhstan did not establish and maintain a national registry in the form of a standardized electronic database, to ensure the accurate accounting of its holdings of and transactions of Kyoto Protocol units, to track its holdings of and transactions of Kyoto Protocol units, and that the national registry is not operating and performing the mandatory requirements for the registry's functionality for the second commitment period of the Kyoto Protocol, in accordance with requirements set out in section II of the annex to decision 13/CMP.1 in conjunction with decision 3/CMP.11, in particular paragraphs 17–25, 28 and 44–48. The ERT also noted that a thorough review of the national registry would be undertaken in the context of a future initialization of the national registry of Kazakhstan	Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		The ERT included this issue in the list of potential problems and further questions raised by the ERT and recommended that Kazakhstan prioritize the establishment of the national registry as early as possible in accordance with the requirements set out in section II of the annex to decision 13/CMP.1 in conjunction with decision 3/CMP.11 and relevant CMP decisions and provide: (1) a detailed plan for the registry design and implementation; (2) information on progress to date in national registry development; (3) information on specific steps taken to ensure that the registry adheres to the relevant provisions, including the data exchange standards and defined timelines for their implementation under the plan; (4) information on how Kazakhstan is planning to meet reporting requirements as per decision 15/CMP.1 in conjunction with decision 3/CMP.11; (5) a clear statement on how Kazakhstan ensures the submission of annual information on Kyoto Protocol units using SEF tables in accordance with decision 15/CMP.1 in conjunction with decision 3/CMP.11 and relevant CMP decisions; and (6) clear defined deadlines for the fulfilment of the plan In response to the list of potential problems and further questions raised by the ERT, Kazakhstan indicated that it will: (1) identify sources of financing for the development of the national registry, purchase of equipment and software; (2) prepare a detailed workplan for determining the configuration of the national registry, describing and analysing the technologies that will be used to build it, with specific steps and timetables for their implementation; (3) identify specific steps taken and deadlines for their implementation, in accordance with this plan, to ensure that the registry complies with the relevant provisions; and (4) ensure that the submission of annual information on the Kyoto Protocol units uses the SEF tables in accordance with decisions 15/CMP.1 and 3/CMP.11 and relevant decisions of the CMP The ERT considered that Kazakhstan's response did not adequately resolve the potential problem. The ERT noted that, although Kazakhstan provided an initial description of the steps it intends to undertake to develop the national registry, the response did not cover all of the important elements included in the ERT's recommendation. Specifically, no details were provided on progress to date with the national registry development, registry conceptual design and/or implementation, and clearly defined timelines for the proposed actions. Therefore, progress in the resolution of the problem cannot be monitored and assessed. Also, the steps described in Kazakhstan's response were far too general, and specific roles and responsibilities in relation to the project for the development of the national registry were not included. Therefore, the ERT considered that the description of the steps in Kazakhstan's response cannot be considered a plan. In addition, the statement by Kazakhstan on its intention to ensure that the submission of annual information on Kyoto Protocol units uses the SEF tables did not replace a clear statement on how Kazakhstan will ensure that the submission of annual information on Kyoto Protocol units is made using SEF tables in accordance with decision 15/CMP.1 in conjunction with decision 3/CMP.11 and relevant CMP decisions, as it was recommended by the ERT Therefore, the ERT has identified this problem, which pertains to language of a mandatory nature and influences the fulfilment of commitments, as a question of implementation in accordance with decision 22/CMP.1 in conjunction with decision 4/CMP.11 (see chapter IV below)	
19.	Reporting pursuant to Article 3.7 ter of	The ERT noted that Kazakhstan did not provide information in accordance with Article 3, paragraph 7 ter, of the Doha Amendment, specifically, Kazakhstan did not report the difference between the assigned amount for the second commitment period and the average annual emissions for the	Not a problem

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
	the Doha Amendment	first three years of the preceding commitment period (2008–2010), multiplied by 8 During the review, Kazakhstan did not provide the required value in response to a question by the ERT and in its response to the list of potential problems and further questions raised by the ERT The ERT calculated the difference between the assigned amount for the second commitment period (see ID# 1 above) and the average annual emissions for the first three years of the first commitment period, multiplied by 8, to be 548 265 662 t CO_2 eq	
20.	Adjustments	The ERT noted that Kazakhstan did not provide a separate set of data on fuel consumption for marine bunkers and domestic navigation and reported all emissions from navigation in the country under category 1.A.3.d domestic navigation. This reporting is not in line with the 2006 IPCC Guidelines and the UNFCCC Annex I inventory reporting guidelines The ERT concluded that the approach used by Kazakhstan in reporting emissions from navigation may result in an overestimation of CO_2, CH_4 and N_2O emissions from category 1.A.3.d domestic navigation for 1990. The ERT included this issue in the list of potential problems and further questions raised by the ERT and recommended that Kazakhstan: (1) collect relevant data on fuel consumption by type of fuel, separately for domestic and international navigation, or use appropriate interpolation/extrapolation techniques based on existing indicators or expert judgment to allow this disaggregation; (2) use appropriate EFs for CO_2, CH_4 and N_2O (e.g. default EFs from the 2006 IPCC Guidelines) to calculate emissions of fuels used for domestic navigation for 1990; and (3) following the principle of consistency, provide revised estimates for the entire time series In response to the list of potential problems and further questions raised by the ERT, Kazakhstan resubmitted a complete set of CRF tables for 1990–2015 with revised CO_2, CH_4 and N_2O emission estimates for this category. In its response, Kazakhstan indicated that data on water transport statistics does not contain a division between domestic and international activities and are limited to general data on fuel consumption for a particular year. Kazakhstan requested this information from the national company that carries out operator activities in the Caspian Sea, being the only company in Kazakhstan that works with international seaports. However, no data on fuel consumption by navigation type have been obtained from this company. Therefore, the division of fuel consumption into marine bunker and domestic navigation was carried out on the basis of the ratio between the volumes of goods transported for domestic consumption and the volumes of goods transported for international activities. Kazakhstan also indicated that volumes of goods transported based on data on “Main indicators of external water transport” (marine bunkers) and “Main indicators of inland water transport” (domestic navigation) were taken from the compilation of the Agency of Statistics of the Republic of Kazakhstan on the activities of the water transport in Kazakhstan The Party further explained that, according to expert judgment, fuel oil and diesel oil engines are installed on ships with a large cargo weight and such vessels cannot be used for servicing in internal waters of Kazakhstan because of their size. At the same time, light boats with gasoline and diesel oil engines are used on rivers and in the coastal zone. For this reason, it was assumed that marine bunkers use fuel oil and diesel oil, and inland water transport uses gasoline and diesel oil. Accordingly, the obtained ratio indicated above between the respective volumes of goods was used to	Accuracy

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		separate only diesel oil used in water transport for marine bunkers and domestic navigation The ERT considered Kazakhstan's response and found that the Party has not satisfactorily resolved the problem. The ERT noted that total emissions (expressed in CO_2 eq) reported from domestic navigation in the revised CRF table 1.A(a) (125.22 kt CO_2 eq) are significantly higher than those provided in Kazakhstan's response (44.74 kt CO_2 eq) for 1990, while no additional documentation or explanations were provided to support the revised data in CRF table 1.A(a) or the calculations and the AD that actually were used in the calculations, in particular for diesel oil The ERT also noted that the revised overall fuel consumption of liquid fuels for navigation (domestic navigation and marine bunkers) for all years of the time series differ significantly from the original 2017 annual submission. For example, in the original 2017 submission, "NO" was used for residual fuel oil used in domestic navigation for the entire time series (and "NA" for marine bunkers), while in the revised CRF tables "NA" is reported. On the other hand, in the resubmitted CRF tables a significant amount of residual fuel oil consumption appears, which was not reported as used under navigation activities, and is reported under marine bunkers for the entire time series (5,509.53 TJ in 1990). No documentation was provided on the source of these new AD for residual fuel oil and it is unclear how the balance of liquid fuels used for navigation (domestic navigation and marine bunkers) has been maintained The ERT further noted that the EFs for CH_4 and N_2O emissions used for the calculation of emissions from domestic navigation differ from the IPCC default values. Kazakhstan used an EF of 3.90 kg/TJ for gas/diesel oil for both CH_4 and N_2O, for the entire time series, while the default values in the 2006 IPCC Guidelines are 7 and 2 kg/TJ, respectively. A similar situation occurs with the CH_4 and N_2O EFs for gasoline, which differ slightly from the default values in the 2006 IPCC Guidelines (uncontrolled motor gasoline) of 33.0 and 3.2 kg/TJ, respectively. No explanations or documentation on the choice of the EFs was provided The ERT concluded that, owing to the lack of reliable and verifiable information on fuel consumption for 1990 (and other years of the time series) as well as the use of a high EF value for N_2O emissions, the CO_2, CH_4 and N_2O emissions from domestic navigation for 1990 are overestimated. Therefore, the ERT disagreed with the Party's response and considers that Kazakhstan has not satisfactorily resolved the potential problem Therefore, in accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1, in conjunction with decision 4/CMP.11), the ERT carried out the procedure for the calculation of adjustments for this category. As a result of the adjustment calculation, the ERT identified that the change resulting from the adjustment between the original estimates and the submitted revised estimates for category 1.A.3.d domestic navigation in 1990 (0.02 per cent of the national total or 62.32 kt CO_2 eq) is below the threshold given in decision 24/CP.19, annex, paragraph 37, and therefore the calculated adjustment should not be applied (for further information, see ID# E.9 in table 3 and ID# E.53 in table 5 in FCCC/ARR/2017/KAZ)	
21.	Adjustments	According to the NIR and the CRF tables, the Party used the tier 1 method and a default EF (0.2 t CO_2/t sinter) to estimate CO_2 emissions from sinter production under 2.C.1 iron and steel production for the complete time series. However, the ERT noted that category 2.C.1 iron and steel production is a key category. Kazakhstan confirmed during the review that the tier 1 method was used for the estimation of CO_2 emissions from	Accuracy

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		subcategory 2.C.1.d sinter and a default EF was applied. The Party also confirmed that the fuels used for sinter production were estimated and reported under subcategory 1.A.2.a iron and steel in the energy sector. The ERT concluded that CO_2 emissions from subcategory 2.C.1.d sinter were potentially double counted in 1990 under the IPPU and energy sectors, and included this issue in the list of potential problems and further questions raised by the ERT. The ERT recommended that Kazakhstan collect AD of fuels, reducing agents (coke breeze) and limestone used for emission estimates from subcategory 2.C.1.d sinter, revise the CO_2 emission estimates for 1990 using tier 2 or 3 methods from the 2006 IPCC Guidelines and demonstrate that emissions from fuels used for sinter production are excluded from the energy sector In response to the list of potential problems and further questions raised by the ERT, Kazakhstan resubmitted a complete set of CRF tables for 1990–2015 and revised its CO_2 emission estimates from this subcategory by using the tier 2 method with plant-specific data from the company ArcelorMittal Temirtau on coke, coke oven gas and blast furnace gas consumption. However, the ERT noted that Kazakhstan did not demonstrate that CO_2 emissions from these fuels were not estimated and reported also under the subcategories 1.A.2.a iron and steel and 1.A.1.c. manufacture of solid fuels and other energy industries in the energy sector, and 2.C.1.b pig iron in the IPPU sector. The ERT concluded that CO_2 emissions from subcategory 2.C.1.d sinter continued to be overestimated in 1990 because of double counting of these emissions under the IPPU and energy sectors. Therefore, the ERT disagreed with the Party's response and considered that Kazakhstan has not satisfactorily resolved the potential problem Therefore, in accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1, in conjunction with decision 4/CMP.11), the ERT carried out the procedure for the calculation of adjustments for this subcategory (see annex II below) (for further information, see ID# I.45 in table 5 in FCCC/ARR/2017/KAZ)	
22.	Adjustments	The ERT noted that, according to the NIR and the CRF tables, the Party used the tier 1 method and a default EF (0.03 t CO_2/t pellets) to estimate CO_2 emissions from pellet production under 2.C.1 iron and steel production for the complete time series. However, the ERT noted that category 2.C.1 iron and steel production is a key category. Kazakhstan confirmed during the review that the tier 1 method was used for the estimation of CO_2 emissions from pellet production and a default EF was applied. The Party also confirmed that the fuels used for pellet production were estimated and reported under subcategory 1.A.2.a iron and steel in the energy sector. The ERT concluded that CO_2 emissions from subcategory 2.C.1.e pellet were potentially double counted in 1990 under the IPPU and energy sectors, and included this issue in the list of potential problems and further questions raised by the ERT. The ERT recommended that Kazakhstan collect AD of fuels, reducing agents and limestone used for emission estimates from subcategory 2.C.1.e pellet, revise its CO_2 emission estimates for 1990 using tier 2 or 3 methods from the 2006 IPCC Guidelines and demonstrate that emissions from fuels used for pellet production are excluded from the energy sector In response to the list of potential problems and further questions raised by the ERT, Kazakhstan indicated that it was not possible to obtain data for a tier 2 calculation and that revised estimates will be included in the inventory of its next annual submission. Nevertheless, the ERT noted that Kazakhstan revised its estimates from 2.C.1.e pellet using AD on natural gas for pellet production, although it was indicated that no revisions were made to its CO_2 emission estimates for this subcategory. In addition,	Accuracy

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		Kazakhstan did not demonstrate that CO_2 emissions from natural gas for pellet production were not estimated and reported under the subcategory 1.A.2.a iron and steel in the energy sector. The ERT concluded that CO_2 emissions from subcategory 2.C.1.e pellet continued to be overestimated in 1990 because of double counting of these emissions under the IPPU and energy sectors. Therefore, the ERT disagreed with the Party's response and considers that Kazakhstan has not satisfactorily resolved the potential problem Therefore, in accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1, in conjunction with decision 4/CMP.11), the ERT carried out the procedure for the calculation of adjustments for this subcategory (see annex II below) (for further information, see ID# I.46 in table 5 in FCCC/ARR/2017/KAZ)	
23.	Adjustments	The ERT noted that the NIR did not contain a clear description of the AD used for the calculation of annual waste generation for CH_4 emission estimates from category 5.A solid waste disposal. In addition, there was no detailed numerical information for the complete time series on the AD used for the emission estimates in this category. Also, it was not clear in the NIR whether the calculation was based on per capita waste generation and urban population or on collected waste volume and waste density During the review, Kazakhstan confirmed that the calculation was based on per capita waste generation and urban population, and provided a worksheet with calculations data only for Astana and Almaty. The ERT noted that historical data on waste generation in this worksheet for 1950–1990 seem to be overestimated because the per capita generation rate used in the calculations was 226–332 kg/year, which is higher than other Annex I Parties with similar economic and geographical conditions (e.g. the Russian Federation and Ukraine). In addition, Kazakhstan explained that AD on SWDS are available from the Agency of Statistics of the Republic of Kazakhstan, having been collected directly from the SWDS operators since 2008. The ERT noted that this information is available from 2005 onwards (available at: http://www.stat.gov.kz/faces/wcnav_externalId/ecolog-I-33) Therefore, the ERT noted that likely overestimated historical data on waste generation in the years before 1990 and the early 1990s may lead to a potential overestimation of emissions in 1990 for category 5.A solid waste disposal, and included this issue in the list of potential problems and further questions raised by the ERT. The ERT recommended that Kazakhstan revise its CH_4 emissions from category 5.A solid waste disposal using revised historical data for 1950–1990 based on available statistical data on waste disposal for the period 2005–2015 and relevant economic indicators (e.g. population and gross domestic product) In response to the list of potential problems and further questions raised by the ERT, Kazakhstan indicated that a detailed description of the AD used will be included in the NIR of its next annual submission. Kazakhstan also indicated that these AD were based on per capita waste generation and interpolations when data were lacking, and that statistical data should be approached critically sometimes owing to unclear definitions. The ERT noted in Kazakhstan's response that the AD provided in the calculation worksheets for Astana, Almaty and other towns of Kazakhstan were the same AD as those used in the estimates of the original 2017 annual submission for waste generation based on per capita waste generation rate (in the range of 226–332 kg/year) for the period 1950–1990, which seem too high for the conditions of the country in those years. The ERT also noted that no differences were reported between the CRF tables of the original 2017 annual submission and submitted revised CRF tables for 5.A	Accuracy

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		solid waste disposal. Thus, the ERT concluded that historical data on waste generation in the early 1990s and the years before were overestimated, and therefore CH_4 emissions from category 5.A solid waste disposal in 1990 continue to be overestimated. Therefore, the ERT disagreed with the Party's response and considered that Kazakhstan has not satisfactorily resolved the potential problem Therefore, in accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1, in conjunction with decision 4/CMP.11), the ERT carried out the procedure for the calculation of adjustments for this category (see annex II below) (for further information, see ID# W.17 in table 5 in FCCC/ARR/2017/KAZ)	
24.	Adjustments	The ERT noted that the average morphological waste composition used in the CH_4 emission calculations for category 5.A solid waste disposal was reported in the NIR, but it was not clear for which period it was calculated. During the review, Kazakhstan explained that the average morphological waste composition was estimated for 2010. The ERT also noted that in the NIR the reported 40 per cent share for waste paper and carton, including packaging in the waste composition, is too high, whereas the share for food (15 per cent) is too low in comparison with the IPCC default values for South-Central Asia. Referenced materials presented during the review on this matter did not allow the ERT to conclude whether the used data on waste composition for the DOC estimation were correct. During the review, Kazakhstan also explained that data collection is challenging in the country and it is planning to update information on municipal solid waste composition in order to calculate DOC values for 1990–2015. The ERT concluded that using a constant value of 0.21 for DOC (for bulk waste data) for 1950–2015 did not reflect changes in the waste management practices in the country over time and could lead to a potential overestimation of emissions in category 5.A solid waste disposal for 1990, and included this issue in the list of potential problems and further questions raised by the ERT. The ERT recommended that Kazakhstan update the DOC values for 1950–2015 based on representative values of waste composition in the country or, if not possible, use DOC values from a country with similar economic and geographical conditions, and revise the CH_4 emissions from 5.A solid waste disposal in accordance with the 2006 IPCC Guidelines In response to the list of potential problems and further questions raised by the ERT, Kazakhstan indicated that it used the IPCC model to calculate CH_4 emissions from this category with a DOC value changing in the model depending on waste composition, and that it would be corrected in its next annual submission. The ERT noted that in the calculation worksheets provided in Kazakhstan's response, the data used were the same as in the original 2017 annual submission and that no differences between the CRF tables of the original 2017 annual submission and submitted revised CRF tables for 5.A solid waste disposal were reported. Therefore, the ERT concluded that Kazakhstan had not updated the DOC values and continued to use high values. For example, the 32.4 per cent share in 1990 for waste paper and carton, including packaging, in municipal solid waste composition that Kazakhstan used for calculations for the rest of the country (excluding Almaty and Astana) is too high in comparison with the IPCC default value for paper/cardboard of 11.3 per cent for South-Central Asia (2006 IPCC Guidelines, vol. 5, table 2.3), thus CH_4 emissions from category 5.A solid waste disposal in 1990 continued to be overestimated. Therefore, the ERT disagreed with the Party's response and considers that Kazakhstan has not satisfactorily resolved the potential problem	Accuracy

ID#	*Finding classification*	*Description of the finding*	*Classification of problem*
		Therefore, in accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1, in conjunction with decision 4/CMP.11), the ERT carried out the procedure for the calculation of adjustments for this category (see annex II below) (for further information, see ID# W.18 in table 5 in FCCC/ARR/2017/KAZ)	
25.	Adjustments	The ERT identified overestimations in emission estimates for Annex A sources for the base year and recommended four adjustments in the IPPU and waste sectors In accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (annex to decision 20/CMP.1 in conjunction with decision 4/CMP.11), the adjustments to the IPPU and waste sectors were prepared by the ERT in consultation with Kazakhstan. In addition, in accordance with the Article 8 review guidelines, the ERT officially notified Kazakhstan of the calculated adjustments For full details on each adjustment applied, refer to annex II	Accuracy
26.	Adjustments	Kazakhstan did not notify the secretariat of its intention to accept or reject the adjustments, therefore, in accordance with paragraph 80(e) of the Article 8 review guidelines, it is considered that the Party accepts the adjustments, as contained in this report	

Abbreviations: 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, AD = activity data, Annex A sources = source categories included in Annex A to the Kyoto Protocol, Article 8 review guidelines = "Guidelines for review under Article 8 of the Kyoto Protocol", CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, COP = Conference of the Parties, CRF = common reporting format, DOC = degradable organic carbon, EF = emission factor, ERT = expert review team, FAO = Food and Agriculture Organization of the United Nations, FMRL = forest management reference level, GHG = greenhouse gas, IEF = implied emission factor, LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring, SEF = standard electronic format, SWDS = solid waste disposal sites, QA/QC = quality assurance/quality control.

[a] At the time of publication of this report, Kazakhstan had not yet submitted its instrument of ratification of the Doha Amendment.

[b] Pursuant to decision 16/CP.10, the administrator of the international transaction log, once registry systems become operational, is requested to facilitate an interactive exercise, including with experts from Parties to the Kyoto Protocol not included in Annex I to the Convention, demonstrating the functioning of the international transaction log with other registry systems. Information on this exercise will be included in the annual report of the administrator of the international transaction log to the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol.

IV. Questions of implementation

5. The ERT considers that Kazakhstan has not satisfactorily resolved, during the review, the potential problems included in table 4 below, which pertain to language of a mandatory nature and influence the fulfilment of commitments. Therefore, the ERT has identified these problems as questions of implementation in accordance with decision 22/CMP.1, in conjunction with decision 4/CMP.11.

Table 4
Questions of implementation for Kazakhstan

Unresolved problem of a mandatory nature	*Reference to relevant decision*	*Description of the problem*
National system	Decision 19/CMP.1 in conjunction with decisions 3/CMP.11 and 4/CMP.11, annex, section V, paragraph 10(a) and (d) and section VI, paragraph 12(c–e)	For the full description of the problem, see ID# 15 in table 3
National system	Decision 19/CMP.1 in conjunction with decisions 3/CMP.11 and 4/CMP.11, annex, section V, paragraph 10(b)	For the full description of the problem, see ID# 16 in table 3
National registry	Decision 13/CMP.1 in conjunction with decision 3/CMP.11, annex, part II.A, in particular paragraphs 17–25, 28 and 44–48	For the full description of the problem, see ID# 18 in table 3

Annex I

Key relevant data for Kazakhstan

1. Table 5 provides key data and parameters for, and elections by, Kazakhstan relevant for the implementation of the second commitment period of the Kyoto Protocol. The information included in table 5 is as given by the Party in its report to facilitate the calculation of the assigned amount, unless otherwise specified.

Table 5
Key relevant data for Kazakhstan[a]

Key information or parameter provided	*Comment*
General Party information	
Did the Party have a QELRC in the first commitment period?	No
Kazakhstan's QELRC in the second commitment period	95% of the base year
Has the Party reached an agreement under Article 4 of the Kyoto Protocol to fulfil its commitments jointly with other Parties?	NA
Base year	1990
Base year for HFCs, PFCs and SF_6	1995
Base year for NF_3	2000
Base-year emissions, as reported by the Party	389 104 468.004 t CO_2 eq (original submission) 375 565 077 t CO_2 eq (revised value)
Base-year emissions, final, as calculated by the ERT and agreed by the Party	371 295 113 t CO_2 eq (see ID# 1 in table 3)
Information related to the calculation of the assigned amount and the commitment period reserve	
Assigned amount, as reported by the Party	2 957 193 956.82 t CO_2 eq (original submission) 2 855 504.699 t CO_2 eq (revised value)
Assigned amount, final, as calculated by the ERT	2 821 842 860 t CO_2 eq (see ID# 1 in table 3)
Approach used to calculate the average annual emissions for the first three years of the first commitment period	Not reported
Difference between the assigned amount for the second commitment period and average annual emissions for the first three years of the first commitment period, multiplied by 8, as reported by the Party	Not reported
Difference between the assigned amount for the second commitment period and average annual emissions for the first three years of the first commitment period, multiplied by 8, final value, as calculated by the ERT	548 265 662 t CO_2 eq (see ID# 19 in table 3)

Key information or parameter provided	*Comment*
Commitment period reserve, as reported by the Party	2 407 364 007.36 t CO_2 eq
Commitment period reserve, final value, as calculated by the ERT	2 539 658 574 t CO_2 eq (see ID# 3 in table 3)
Information related to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol	
LULUCF parameters	Minimum tree crown cover: 10% Minimum land area: 0.05 ha Minimum tree height: 2 m
Elections under Article 3, paragraphs 3 and 4, of the Kyoto Protocol:	
(a) Afforestation/reforestation	Commitment period accounting (see ID# 11 in table 3)
(b) Deforestation	Commitment period accounting (see ID# 11 in table 3)
(c) Forest management	Commitment period accounting (see ID# 11 in table 3)
(d) Cropland management	Not elected
(e) Grazing land management	Commitment period accounting (see ID#s 10 and 11 in table 3)
(f) Revegetation	Not elected
(g) Wetland drainage and rewetting	Not elected
FMRL	The appendix to decision 2/CMP.7 does not contain an FMRL for Kazakhstan (see ID#s 12 and 13 in table 3)
Technical corrections to the FMRL as reported in the original submission	NA
Technical corrections to the FMRL, final value	NA
3.5% of total base-year GHG emissions, excluding LULUCF, as reported by the Party	Not reported in the original submission 13 150.35 kt CO_2 eq (reported in the response to the list of potential problems and further questions raised by the ERT)
3.5% of total base-year GHG emissions, excluding LULUCF, final value, as calculated by the ERT	12 995.329 kt CO_2 eq
3.5% of total base-year GHG emissions, excluding LULUCF, multiplied by 8, as reported by the Party in the original submission	108 949.250 kt CO_2 eq
3.5% of total base-year GHG emissions, excluding LULUCF and including indirect CO_2 emissions, multiplied by 8, final value as calculated by the ERT	103 962.632 kt CO_2 eq
Will the Party exclude emissions from natural disturbances in accounting for:	
(a) Afforestation and reforestation	No (see ID# 14 in table 3)

Key information or parameter provided	*Comment*
(b) Forest management	No (see ID# 14 in table 3)

Abbreviations: ERT = expert review team, FMRL = forest management reference level, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable, QELRC = quantified emission limitation and reduction commitment.

2. Tables 6–8 provide an overview of total greenhouse gas emissions and removals, as submitted by Kazakhstan. Where a Party has decided to voluntarily report indirect carbon dioxide emissions, this is noted in the relevant table.

Table 6
Total greenhouse gas emissions for Kazakhstan, base year[a]–2015[b]
(kt CO_2 eq)

Year	*Total GHG emissions excluding indirect CO_2 emissions*		*Total GHG emissions including indirect CO_2 emissions[c]*		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)[d]*
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*	
Base year	358 291.86	375 565.08	NA	NA	NA
1990	358 291.86	375 565.08	NA	NA	
1995	230 867.78	228 293.48	NA	NA	
2000	207 050.47	189 956.32	NA	NA	
2010	306 232.95	303 633.03	NA	NA	
2011	297 777.82	293 656.71	NA	NA	
2012	308 221.68	302 304.87	NA	NA	
2013	316 447.49	309 096.38	NA	NA	
2014	325 403.94	314 754.89	NA	NA	
2015	312 063.57	298 069.64	NA	NA	

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] Base year refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, 1995 for HFCs, PFCs and SF_6 and 2000 for NF_3.

[b] Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions. Values in this table do not reflect the adjustments calculated by the expert review team for CO_2, CH_4 and N_2O. For further information, please refer to annex II below.

[c] Kazakhstan has not reported indirect CO_2 emissions in common reporting format table 6.

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

Table 7
Greenhouse gas emissions by gas for Kazakhstan, excluding land use, land-use change and forestry, 1990–2015[a]
(kt CO_2 eq)

Year	*CO_2[b]*	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	272 490.03	85 958.41	17 116.64	NO, NA	NA, NO	NO, NA	NA, NO	NO, NA
1995	167 752.29	48 169.69	12 371.50	NO, NA	NA, NO	NO, NA	NA, NO	NO, NA
2000	138 976.97	37 783.20	13 029.80	166.35	NA, NO	NO, NA	NA, NO	NO, NA
2010	236 431.67	52 983.92	11 840.13	957.71	1 419.58	NO, NA	0.01	NO, NA
2011	226 029.33	52 897.87	12 209.58	966.32	1 553.59	NO, NA	0.02	NO, NA
2012	232 875.68	54 777.40	12 109.65	987.38	1 554.73	NO, NA	0.03	NO, NA
2013	237 022.42	57 233.04	12 276.79	998.63	1 565.49	NO, NA	0.02	NO, NA
2014	244 748.79	55 106.95	12 661.03	929.62	1 308.49	NA, NO	0.02	NA, NO
2015	230 078.80	52 622.59	13 046.05	938.27	1 383.89	NO, NA	0.03	NO, NA

Year	*CO_2*[b]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
Per cent change 1990–2015	**–15.6**	**–38.8**	**–23.8**	**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. Values in this table also do not reflect the adjustments calculated by the expert review team for CO_2, CH_4 and N_2O. For further information, please refer to annex II below.

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

Table 8
Greenhouse gas emissions by sector for Kazakhstan, 1990–2015[a, b]
(kt CO_2 eq)

Year	*Energy*	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	305 601.91	21 404.84	43 783.04	–17 273.21	4 775.28	NO
1995	184 823.49	9 740.29	29 238.93	2 574.30	4 490.76	NO
2000	149 311.79	12 326.66	23 723.94	17 094.15	4 593.92	NO
2010	251 857.83	18 558.63	27 761.09	2 599.92	5 455.48	NO
2011	241 743.25	19 147.77	27 155.88	4 121.11	5 609.81	NO
2012	250 914.86	18 575.01	27 115.70	5 916.81	5 699.29	NO
2013	257 283.88	18 187.84	27 809.91	7 351.11	5 814.76	NO
2014	261 270.42	18 613.13	28 888.34	10 649.05	5 983.01	NO
2015	243 057.62	19 006.25	29 890.63	13 993.93	6 115.15	NO
Per cent change 1990–2015	**–20.5**	**–11.2**	**–31.7**	**–181.0**	**28.1**	**NA**

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

[a] Emissions/removals reported in the sector other (sector 6) are not included in total greenhouse gas emissions. Values in this table do not reflect the adjustments calculated by the expert review team for CO_2, CH_4 and N_2O. For further information, please refer to annex II below.

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

Annex II

Additional information on adjustments

As required by decision 22/CMP.1, annex, paragraph 83(b), this annex provides the relevant information on the adjustments applied to the base-year inventory of Kazakhstan, as contained in the most recent (2017) annual submission of Kazakhstan. Quantitative information used in the calculation of each adjustment is presented in tables 9–17 below.

Table 9
Summary information on adjustments for Kazakhstan

	1990		*Reference*
	As reported (kt CO_2 eq)	*Calculated by the ERT (kt CO_2 eq)*	
Annex A sources			
2.C.1.d sinter – CO_2 and CH_4	2 264.396	0.000	ID# 21 in table 3
2.C.1.e pellet – CO_2	231.702	0.000	ID# 22 in table 3
5.A solid waste disposal (waste generation and degradable organic carbon) – CH_4	2 265.202	491.337	ID# 23 and ID# 24 in table 3
Total emissions from Annex A sources	**4 761.300**	**491.337**	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, ERT = expert review team.

Table 10
Background information to support adjustments for 2.C.1.d sinter – CO_2 and CH_4 for Kazakhstan

Element	*Description*
Underlying problem and rationale for adjustment	According to the NIR and the CRF tables, Kazakhstan used the tier 1 method and a default EF (0.2 t CO_2/t sinter) to estimate CO_2 emissions from sinter production under 2.C.1 iron and steel production for the complete time series. However, category 2.C.1 is a key category. During the review, Kazakhstan confirmed that the fuels used for sinter production were also estimated and reported under the energy sector (category 1.A.2.a iron and steel). The ERT concluded that CO_2 emissions from subcategory 2.C.1.d sinter were potentially double counted in 1990 because of reporting of these emissions under both the IPPU and energy sectors In response to the list of potential problems and further questions raised by the ERT, Kazakhstan revised its estimation for 2.C.1.d sinter using tier 2 and plant-specific AD on coke, coke oven gas and blast furnace gas consumption. However, Kazakhstan did not demonstrate that CO_2 emissions from these fuels used for sinter production were not estimated and reported also under the subcategories 1.A.2.a iron and steel and 1.A.1.c manufacture of solid fuels and other energy industries in the energy sector, and 2.C.1.b pig iron in the IPPU sector. The ERT concluded that CO_2 emissions (and CH_4 emissions) from subcategory 2.C.1.d sinter were overestimated in 1990, because of double counting of these emissions under the IPPU and energy sectors
Recommendation to Kazakhstan to address the underlying problem, as	Collect the AD of fuels, reducing agents (coke breeze) and limestone used for sinter production, revise the CO_2 emission

contained in the list of potential problems and further questions raised by the ERT	estimates from subcategory 2.C.1.d sinter for 1990 using tier 2 or 3 methods from the 2006 IPCC Guidelines and demonstrate that emissions from fuels used for sinter production are excluded from the energy sector
Assumptions, data and methodology used to calculate the adjustment	The emission estimations under 2.C.1.d sinter were adjusted by excluding the estimated values of emissions for this subcategory from the IPPU sector (i.e. emissions from 2.C.1.d sinter were assumed to be 0 kt CO_2 eq). That prevents the double counting of emissions in 1990 under subcategory 2.C.1.d sinter and the relevant categories 1.A.2.a iron and steel (emissions from coke use) and 1.A.1.c. manufacture of solid fuels and other energy industries (emissions from coke oven gas use) in the energy sector, and 2.C.1.b pig iron (emissions from blast furnace gas use) in the IPPU sector
Description of how the adjustment is conservative	The adjusted value of CO_2 emissions from 2.C.1.d sinter in 1990 (0.00 kt CO_2 eq) is lower than the Party's estimation (2 264.40 kt CO_2 eq). The ERT therefore considers that the resulting adjusted value is conservative

[a] *Abbreviations*: 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, AD = activity data, CRF = common reporting format, EF = emission factor, ERT = expert review team, IPPU = industrial processes and product use, NIR = national inventory report.

Table 11
Description of the calculation of adjustments for 2.C.1.d sinter – CO_2 and CH_4 included in Annex A to the Kyoto Protocol for Kazakhstan

Parameter/estimate	*Value or assessment*	*Unit*	*Reference*
Category: 2.C.1.d sinter – CO_2 and CH_4			
Party's estimate of: CO_2 and CH_4 emissions from sinter production	2 264.396	kt CO_2 eq	CRF table 2(I).A-H
Party's emission estimate from 2.C.1.d sinter	2 264.396	kt CO_2 eq	CRF table 2(I).A-H
Input data/parameter for calculation of adjustment			
Calculated estimate for CO_2 and CH_4 emissions from sinter production	0.000	kt CO_2 eq	ERT assumption
Conservativeness factor	0.94		Table 1 in appendix III to the annex to decision 20/CMP.1 in conjunction with decision 4/CMP.11
Adjusted conservative estimate for CO_2 and CH_4 emissions from sinter production	0.000	kt CO_2 eq	ERT calculation
Adjusted conservative estimate for 2.C.1.d sinter	0.000	kt CO_2 eq	ERT calculation
Total aggregated GHG emissions (excluding LULUCF and including indirect CO_2 emissions) as reported by Kazakhstan	375 565.077	kt CO_2 eq	CRF table Summary 2
Total aggregated GHG emissions (excluding LULUCF and including indirect CO_2 emissions) after application of adjustment	373 300.681	kt CO_2 eq	ERT calculation
Difference between original and adjusted total aggregated GHG emissions	2 264.396	kt CO_2 eq	ERT calculation
	0.603	%	ERT calculation
The ERT estimates that the change resulting from the adjustment is above	Yes	Adjusted value for the category is greater than 500 kt CO_2 eq and 0.05	ERT calculation

Parameter/estimate	*Value or assessment*	*Unit*	*Reference*
the threshold given in decision 24/CP.19, annex, paragraph 37(b)		per cent of national emissions	

[a] *Abbreviations*: CRF = common reporting format, ERT = expert review team, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

Table 12
Background information to support adjustments for 2.C.1.e pellet – CO_2 for Kazakhstan

Element	*Description*
Underlying problem and rationale for adjustment	According to the NIR and the CRF tables, Kazakhstan used a tier 1 method and a default EF (0.03 t CO_2/t pellets) to estimate CO_2 emissions from pellet production under 2.C.1 iron and steel production for the complete time series. However, the ERT noted that category 2.C.1 iron and steel production is a key category. During the review, Kazakhstan confirmed that the fuels used for pellet production were also estimated and reported under the energy sector (subcategory 1.A.2.a iron and steel). The ERT concluded that CO_2 emissions from subcategory 2.C.1.e pellet were potentially double counted in 1990 because of reporting of these emissions under both the IPPU and energy sectors In response to the list of potential problems and further questions raised by the ERT, Kazakhstan revised its estimates from 2.C.1.e pellet using AD on natural gas combustion for pellet production, although Kazakhstan indicated that no revisions were made to its CO_2 emission estimates for this subcategory because of lack of data and it did not demonstrate that natural gas consumed for pellet production was not estimated and reported under the energy sector (subcategory 1.A.2.a iron and steel). The ERT concluded that CO_2 emissions from pellet production were overestimated in 1990 because of double counting of emissions under the IPPU and energy sectors
Recommendation to Kazakhstan to address the underlying problem, as contained in the list of potential problems and further questions raised by the ERT	Collect the AD of fuels, reducing agents and limestone use for pellet production, revise the CO_2 emission estimates from subcategory 2.C.1.e pellet in 1990 using tier 2 or 3 methods from the 2006 IPCC Guidelines and demonstrate that emissions from fuels used for pellet production are excluded from the energy sector
Assumptions, data and methodology used to calculate the adjustment	The emission estimations under 2.C.1.e pellet were adjusted by excluding the estimated values of emissions for this subcategory from the IPPU sector (i.e. emissions from 2.C.1.e pellet assumed to be 0 kt CO_2 eq). That prevents the double counting of emissions in 1990 under subcategory 2.C.1.e pellet and the relevant category 1.A.2.a iron and steel in the energy sector
Description of how the adjustment is conservative	The adjusted value of CO_2 emissions from 2.C.1.e pellet in 1990 (0.00 kt CO_2 eq) is lower than the Party's estimation (231.70 kt CO_2 eq). The ERT therefore considers that the resulting adjusted value is conservative

Abbreviations: 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, AD = activity data, CRF = common reporting format, ERT = expert review team, IPPU = industrial processes and product use, NIR = national inventory report.

Table 13
Description of the calculation of adjustments for 2.C.1.e pellet – CO_2 included in Annex A to the Kyoto Protocol for Kazakhstan

Parameter/estimate	*Value or assessment*	*Unit*	*Reference*
Category: 2.C.1.e pellet – CO_2			
Party's estimate of: CO_2 emissions from pellet production	231.702	kt CO_2 eq	CRF table 2(I).A-H
Party's emission estimate from 2.C.1.e pellet	231.702	kt CO_2 eq	CRF table 2(I).A-H
Input data/parameter for calculation of adjustment			
Calculated estimate for CO_2 emissions from pellet production	0.000	kt CO_2 eq	ERT assumption
Conservativeness factor	0.94		Table 1 in appendix III to the annex to decision 20/CMP.1 in conjunction with decision 4/CMP.11
Adjusted conservative estimate for CO_2 emissions from pellet production	0.000	kt CO_2 eq	ERT calculation
Adjusted conservative estimate for 2.C.1.e pellet	0.000	kt CO_2 eq	ERT calculation
Total aggregated GHG emissions (excluding LULUCF and including indirect CO_2 emissions) as reported by Kazakhstan	375 565.077	kt CO_2 eq	CRF table Summary 2
Total aggregated GHG emissions (excluding LULUCF and including indirect CO_2 emissions) after application of adjustment	375 333.375	kt CO_2 eq	ERT calculation
Difference between original and adjusted total aggregated GHG emissions	231.702	kt CO_2 eq	ERT calculation
	0.062	%	ERT calculation
The ERT estimates that the change resulting from the adjustment is above the threshold given in decision 24/CP.19, annex, paragraph 37(b)	Yes	Adjusted value for the category is greater than 0.05 per cent of national emissions	ERT calculation

Abbreviations: CRF = common reporting format, ERT = expert review team, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

Table 14
Background information to support adjustments for 5.A solid waste disposal (degradable organic carbon) – CH_4 for Kazakhstan

Element	*Description*
Underlying problem and rationale for adjustment	In the NIR, it was not clear for which period the average morphological waste composition used in the CH_4 emission calculations for category 5.A solid waste disposal was calculated. Kazakhstan explained that the average morphological waste composition was estimated for 2010. The 40 per cent share for waste paper and carton, including packaging in the waste composition, reported in the NIR is too high, whereas the share for food (15 per cent) is too low in comparison with the IPCC default values for South-Central Asia. A constant value of 0.21 for DOC (for bulk waste data) was used for the 1950–2015 time series and this does not reflect changes in the waste management practices in the country over time and may lead to a potential overestimation of emissions from category 5.A solid waste disposal for 1990

Element	*Description*
	In response to the list of potential problems and further questions raised by the ERT, Kazakhstan indicated that it used the IPCC model to calculate CH_4 emissions from this category with a DOC value changing in the model depending on the waste composition. In the calculation worksheets provided by Kazakhstan, the data used were the same as in the original 2017 annual submission and no differences between the CRF tables of the original 2017 annual submission and the submitted revised CRF tables for 5.A solid waste disposal were reported. Kazakhstan did not update the DOC values and continued to use high values in comparison with the IPCC default values. The ERT concluded that CH_4 emissions from category 5.A solid waste disposal in 1990 were overestimated
Recommendation to Kazakhstan to address the underlying problem, as contained in the list of potential problems and further questions raised by the ERT	Update DOC values for 1950–2015 based on representative values of waste composition in the country or, if not possible, use DOC values from a country with similar economic and geographical conditions, and revise the CH_4 emissions from 5.A solid waste disposal in accordance with the 2006 IPCC Guidelines
Assumptions, data and methodology used to calculate the adjustment	CH_4 emissions from category 5.A solid waste disposal with adjusted DOC values were estimated using: (a) Tier 1 method using the IPCC FOD model for 1950–2015 and default parameters provided in the model for South-Central Asia and dry temperate climate (methane correction factor, fraction of DOC dissimilated, CH_4 generation rate constant, delay time, fraction of CH_4 in developed gas and oxidation factor) and country-specific distribution of SWDS provided by Kazakhstan in its calculation spreadsheets in its response to the list of potential problems and further questions from the ERT; (b) DOC default values from the 2006 IPCC Guidelines (vol. 5, table 2.4); (c) Total population covered by waste collection systems for 1950–2015, waste generation rate for 1950–2015 (for 2013–2015 weighted average value for Almaty, Astana and the rest of Kazakhstan) and fraction of generated municipal solid waste deposited in SWDS provided by Kazakhstan in its calculation spreadsheets in its response to the list of potential problems and further questions from the ERT; (d) Default values of municipal solid waste composition for South-Central Asia for 1950–1990 from the 2006 IPCC Guidelines (vol. 5, table 2.3) and values of municipal solid waste composition for 1991–2015 provided by Kazakhstan in its calculation spreadsheets in its response to the list of potential problems and further questions from the ERT
Description of how the adjustment is conservative	In line with paragraph 5 of decision 20/CMP.1 in conjunction with decision 4/CMP.1, conservativeness was ensured by applying to the DOC values the conservativeness factor of 0.89 for the CH_4 EF (5.A solid waste disposal) from table 1 of appendix III to the technical guidance on methodologies for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (annex to decision 20/CMP.1 in conjunction with decision 4/CMP.11). The ERT therefore considers that the resulting adjusted values are conservative

Abbreviations: 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, CRF = common reporting format, DOC = degradable organic carbon, EF = emission factor, ERT = expert review team, FOD = first-order decay, NIR = national inventory report, SWDS = solid waste disposal sites.

Table 15
Description of the calculation of adjustments for 5.A solid waste disposal (degradable organic carbon) included in Annex A to the Kyoto Protocol – CH_4 for Kazakhstan

Parameter/estimate	*Value or assessment*	*Unit*	*Reference*
Category: 5.A solid waste disposal – CH_4			
Party's estimate of: DOC value (1990)	0.210		Kazakhstan's response to the list of potential problems and further questions from the ERT
Party's emission estimate from 5.A solid waste disposal	2 265.202	kt CO_2 eq	CRF table Summary 2
Input data/parameter for calculation of adjustment			
Calculated estimate for DOC value (1990)	0.146		ERT calculation
Conservativeness factor	0.89		Table 1 in appendix III to the annex to decision 20/CMP.1 in conjunction with decision 4/CMP.11
Adjusted conservative estimate for DOC value (1990)	0.134		ERT calculation
Adjusted conservative estimate for CH_4 emissions from 5.A solid waste disposal	1 117.560	kt CO_2 eq	ERT calculation
Total aggregated GHG emissions (excluding LULUCF and including indirect CO_2 emissions) as reported by Kazakhstan	375 565.077	kt CO_2 eq	CRF table Summary 2
Total aggregated GHG emissions (excluding LULUCF and including indirect CO_2 emissions) after application of adjustment	374 417.434	kt CO_2 eq	ERT calculation
Difference between original and adjusted total aggregated GHG emissions	1 147.643	kt CO_2 eq	ERT calculation
	0.306	%	ERT calculation
The ERT estimates that the change resulting from the adjustment is above the threshold given in decision 24/CP.19, annex, paragraph 37(b)	Yes	Adjusted value for the category is greater than 500 kt CO_2 eq and 0.05 per cent of national emissions	ERT calculation

[a] *Abbreviations*: CRF = common reporting format, DOC = degradable organic carbon, ERT = expert review team, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

Table 16
Background information to support adjustments for 5.A solid waste disposal (waste generation) – CH_4 for Kazakhstan

Element	*Description*
Underlying problem and rationale for adjustment	The NIR did not contain a clear description of the AD used for the calculation of annual waste generation for CH_4 emission estimates from category 5.A solid waste disposal. In addition, there was no detailed numerical information for the complete time series on the AD used for the emission estimates and it was not clear in the NIR whether the

Element	*Description*
	calculation was based on per capita waste generation and urban population or on collected waste volume and waste density. Historical data on waste generation for 1950–1990 seem to be overestimated because the per capita generation rate used in the calculations was 226–332 kg/year, which is higher than other Annex I Parties with similar economic and geographical conditions (e.g. the Russian Federation and Ukraine). The ERT concluded that historical data on waste generation per capita could be overestimated in the years before 1990, which may lead to a potential overestimation of the emissions from 5.A solid waste disposal for 1990 In response to the list of potential problems and further questions raised by the ERT, Kazakhstan indicated that the AD used were based on per capita waste generation and interpolations when data were lacking, and that a detailed description of AD will be included in the NIR of its next annual submission. In Kazakhstan's response, the AD provided in the calculation worksheets for Astana, Almaty and other towns of Kazakhstan were the same AD as those used in the estimates of the original 2017 annual submission for waste generation based on per capita waste generation rate (in the range of 226–332 kg/year) for the period 1950–1990, which seem too high for the conditions of the country in those years. No differences were reported between the CRF tables of the original 2017 annual submission and the submitted revised CRF tables for 5.A solid waste disposal. Thus, the ERT concluded that historical data on waste generation in the early 1990s were overestimated, and therefore CH_4 emissions from category 5.A solid waste disposal in 1990 were overestimated
Recommendation to Kazakhstan to address the underlying problem, as contained in the list of potential problems and further questions raised by the ERT	Revise the CH_4 emissions from category 5.A solid waste disposal using revised historical data for 1950–1990 based on available statistical data on waste disposal for the period 2005–2015 and relevant economic indicators (e.g. population, gross domestic product)
Assumptions, data and methodology used to calculate the adjustment	CH_4 emissions from category 5.A solid waste disposal with adjusted waste generation were estimated using: (a) Tier 1 method using the IPCC FOD model for Astana, Almaty and other towns of Kazakhstan for 1950–2015, default parameters provided in the model for South-Central Asia and dry temperate climate (DOC values, methane correction factor, fraction of DOC dissimilated, CH_4 generation rate constant, delay time, fraction of CH_4 in developed gas and oxidation factor) and country-specific distribution of SWDS for Astana, Almaty and other towns of Kazakhstan, provided by Kazakhstan in its calculation spreadsheets in its response to the list of potential problems and further questions from the ERT; (b) Average waste generation per capita for 1950–2015 from a cluster of countries (the Russian Federation and Ukraine). Data on waste generation rate for the Russian Federation from the NIR of the 2016 and 2017 annual submissions (for 1960, 1990, 2000, 2013, 2014 and 2015), while data for 1950 obtained by exponential extrapolation of the trend for the available years. Data on waste generation rate for Ukraine from the NIR of the 2016 and 2017 annual submissions (for 1950, 1960, 1990, 2000, 2013, 2014 and 2015). Data on waste

Element	*Description*
	generation per capita for other years of the time series for both countries obtained by linear interpolation. Total annual waste generation for some years provided in the NIRs of both countries converted to per capita basis using urban population data from the World Bank (https://data.worldbank.org/indicator/SP.URB.TOTL?locations=UA&view=chart); (c) Population covered by waste collection systems for Astana, Almaty and other towns of Kazakhstan for 1950–2015 and fraction of generated municipal solid waste deposited in SWDS provided by Kazakhstan in its calculation spreadsheets in its response to the list of potential problems and further questions from the ERT; (d) Values of municipal solid waste composition for 1950–2015 provided by Kazakhstan in its calculation spreadsheets in its response to the list of potential problems and further questions from the ERT
Description of how the adjustment is conservative	In line with paragraph 5 of decision 20/CMP.1 in conjunction with decision 4/CMP.1, conservativeness was ensured by applying the conservativeness factor of 0.82 for AD (5.A solid waste disposal) from table 1 of appendix III to the technical guidance on methodologies for adjustments under Article 5, paragraph 2 ,of the Kyoto Protocol (annex to decision 20/CMP.1 in conjunction with decision 4/CMP.11). The ERT therefore considers that the resulting adjusted values are conservative

Abbreviations: AD = activity data, CRF = common reporting format, DOC = degradable organic carbon, ERT = expert review team, FOD = first-order decay, IPCC = Intergovernmental Panel on Climate Change, NIR = national inventory report, SWDS = solid waste disposal sites.

Table 17

Description of the calculation of adjustments for 5.A solid waste disposal (waste generation) – CH_4 included in Annex A to the Kyoto Protocol for Kazakhstan

Parameter/estimate	*Value or assessment*	*Unit*	*Reference*
Category: 5.A solid waste disposal – CH_4			
Party's estimate of: AD – municipal waste generation per capita (1990)	332.967	kg/cap/year	Kazakhstan's response to the list of potential problems and further questions from the ERT
Party's emission estimate from 5.A solid waste disposal	2 265.202	kt CO_2 eq	CRF table Summary 2
Input data/parameter for calculation of adjustment			
Calculated estimate for AD – municipal waste generation per capita (1990)	264.282	kg/cap/year	ERT calculation
Conservativeness factor	0.82		Table 1 in appendix III to the annex to decision 20/CMP.1 in conjunction with decision 4/CMP.11
Adjusted conservative estimate for AD – municipal waste generation per capita (1990)	216.711	kg/cap/year	ERT calculation
Adjusted conservative estimate for 5.A solid waste disposal	776 477	kt CO_2 eq	ERT calculation

Parameter/estimate	*Value or assessment*	*Unit*	*Reference*
Total aggregated GHG emissions (excluding LULUCF and including indirect CO_2 emissions) as reported by Kazakhstan	375 565.077	kt CO_2 eq	CRF table Summary 2
Total aggregated GHG emissions (excluding LULUCF and including indirect CO_2 emissions) after application of adjustment	374 076.351	kt CO_2 eq	ERT calculation
Difference between original and adjusted total aggregated GHG emissions	1 488.725	kt CO_2 eq	ERT calculation
	0.396	%	ERT calculation
The ERT estimates that the change resulting from the adjustment is above the threshold given in decision 24/CP.19, annex, paragraph 37(b)	Yes	Adjusted value for the category is greater than 500 kt CO_2 eq and 0.05 per cent of the national emissions	ERT calculation

[a] *Abbreviations*: CRF = common reporting format, ERT = expert review team, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

Annex III

Additional information on the review of the national system and the national registry

Review of national systems

1. Table 18 contains the ERT assessment of whether or not the Party has successfully implemented the mandatory elements for the national system, and included the relevant information in its report to facilitate the calculation of the assigned amount.

Table 18
Summary of reporting on mandatory elements of the national system of Kazakhstan

Reporting element	*Provided?*
Inventory planning	
Designated single national entity, including contact information	Yes
Defined/allocated specific responsibilities for inventory development process	No
Established process for approving the inventory	Yes
Elaborated quality assurance/quality control plan	Yes
Considered ways to improve inventory quality	No
Inventory preparation	
Identified key categories	Yes
Estimates prepared in line with the 2006 IPCC Guidelines	No
Sufficient activity data and emission factors collected to support methods selected	No
Conducted quantitative uncertainty analysis	Yes
Recalculations prepared in accordance with the 2006 IPCC Guidelines	Yes
Inventory compiled in accordance with Article 7, paragraph 1, of the Kyoto Protocol	No
General QC (approach 1) procedures implemented	No
Inventory management	
Archived inventory information, including emission factors, activity data, documentation, QA/QC procedures, external/internal reviews, key category documentation and planned inventory improvements	No
Provided the ERT with access to archived information	No
Responded to requests for clarifying inventory information during the review process	Yes

Abbreviations: 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, ERT = expert review team, QA/QC = quality assurance/quality control.

2. Table 19 contains the ERT assessment of whether or not the Party has successfully implemented the mandatory elements for national registries, and included the relevant information in the report to facilitate the calculation of the assigned amount.

Table 19

Summary of reporting on mandatory elements of the national registry of Kazakhstan

Reporting element	*Provided?*
Name and contact information of registry administrator	No
Names of other Parties with which the Party cooperates, if applicable	NA
Description of the database structure	No
Description of the capacity of the national registry	No
Description of how the national registry conforms to the technical DES between registry systems	No
Description of the procedures employed in the national registry to minimize discrepancies in the transactions of Kyoto Protocol units	No
Description of the steps taken to terminate transactions where a Party is notified of a discrepancy and to correct problems in the event of a failure to terminate the transaction	No
An overview of security measures employed in the national registry to prevent unauthorized manipulations and operator error, and an overview of how these measures are kept up to date	No
A list of the information publicly accessible by means of the user interface to the national registry	No
The Internet address of the interface to the Party's national registry	No
A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster	No
The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of decision 19/CP.7 relating to the DES between registry systems	No

Abbreviations: DES = data exchange standard, NA = not applicable.

Annex IV

Documents and information used during the review

A. Reference documents

"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol". Annex to decision 19/CMP.1. Available at http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf# page=14.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Annex to decision 15/CMP.1. Available at http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf.

"Guidelines for review under Article 8 of the Kyoto Protocol". Annex to decision 22/CMP.1. Available at http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51.

"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 I 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.

"Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, Part I: Implications related to accounting and reporting and other related issues". Decision 3/CMP.11. Available at http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf#page=5.

"Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, Part II: Implications related to review and adjustments and other related issues". Decision 4/CMP.11. Available at http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf#page=30.

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 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Available at http://www.ipcc-nggip.iges.or.jp/public/kpsg.

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 (JSC Zhasyl Damu), including additional material on the methodology and assumptions used. The following documents[1] were also provided by Kazakhstan:

Main Indices of Industrial Production in Kazakhstan in 2015. 4th Series of Statistics of Industrial Production. Committee of Statistics of Ministry of National Economy of the Republic of Kazakhstan.

Municipal Solid Waste Management in Kazakhstan: Astana and Almaty Case Studies, available at: http://www.aidic.it/cet/17/56/095.pdf.

Activity data on MSW collection and disposal, available on web page of the statistic authorities, since 2000 (http://www.stat.gov.kz/faces/wcnav_externalId/ecolog-I-33).

National energy balance of Kazakhstan for 2015.

[1] Reproduced as received from the Party.

Annex V

Acronyms and abbreviations

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AD	activity data
Annex A sources	source categories included in Annex A to the Kyoto Protocol
Annex I Parties	Parties included in Annex I to the Convention
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
CaC_2	calcium carbide
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
COP	Conference of the Parties
CRF	common reporting format
DES	data exchange standard
DOC	degradable organic carbon
EF	emission factor
ERT	expert review team
FAO	Food and Agriculture Organization of the United Nations
FMRL	forest management reference level
FOD	first-order decay
GHG	greenhouse gas
HFC	hydrofluorocarbon
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
JSC	joint stock company
LULUCF	land use, land-use change and forestry
N	nitrogen
NA	not applicable
NE	not estimated
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
N_2O	nitrous oxide
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
QELRC	quantified emission limitation and reduction commitment
SEF	standard electronic format
SWDS	solid waste disposal site
SF_6	sulfur hexafluoride
UNFCCC	United Nations Framework Convention on Climate Change
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"