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Technical analysis of the second biennial update report of the Republic of Korea submitted on 16 November 2017

Summary report by the team of technical experts


Summary

According to decision 2/CP.17, paragraph 41(a), Parties not included in Annex I to the Convention (non-Annex I Parties), consistently with their capabilities and the level of support provided for reporting, were to submit their first biennial update report (BUR) by December 2014. Further, paragraph 41(f) of that decision states that non-Annex I Parties shall submit a BUR every two years, either as a summary of parts of their national communication in the year in which the national communication is submitted or as a stand-alone update report. As mandated, the least developed country Parties and small island developing States may submit BURs at their discretion. This summary report presents the results of the technical analysis of the second BUR of the Republic of Korea conducted by a team of technical experts in accordance with the modalities and procedures contained in the annex to decision 20/CP.19.

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Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AD	activity data
BUR	biennial update report
CDM	clean development mechanism
CGE	Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention
CH ₄	methane
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
COP	Conference of the Parties
EF	emission factor
EU	European Union
GDP	gross domestic product
GHG	greenhouse gas
GIR	Greenhouse Gas Inventory & Research Center
GWP	global warming potential
HFC	hydrofluorocarbon
ICA	international consultation and analysis
IPCC	Intergovernmental Panel on Climate Change
IPCC good practice guidance	<i>Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories</i>
IPCC good practice guidance for LULUCF	<i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>
K-ETS	Korea Emissions Trading System
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
MRV	measurement, reporting and verification
N ₂ O	nitrous oxide
NA	not applicable
NC	national communication
NIR	national inventory report
NM VOC	non-methane volatile organic compound
NO _x	nitrogen oxides
non-Annex I Parties	Parties not included in Annex I to the Convention
OPC	Prime Minister's Office for Government Policy Coordination
PFC	perfluorocarbon
Revised 1996 IPCC Guidelines	<i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>
SF ₆	sulfur hexafluoride
SO _x	sulfur oxides
UNFCCC reporting guidelines on BURs	“UNFCCC biennial update reporting guidelines for Parties not included in Annex I to the Convention”
TMS	GHG and energy target management system
TTE	team of technical experts

I. Introduction and process overview

A. Introduction

1. The process of ICA consists of two steps: a technical analysis of the submitted BUR and a facilitative sharing of views under the Subsidiary Body for Implementation, resulting in a summary report and record, respectively.
2. According to decision 2/CP.17, paragraph 41(a), non-Annex I Parties, consistently with their capabilities and the level of support provided for reporting, were to submit their first BUR by December 2014. In addition, paragraph 41(f) of that decision states that non-Annex I Parties shall submit a BUR every two years, either as a summary of parts of their NC in the year in which the NC is submitted or as a stand-alone update report.
3. Further, according to paragraph 58(a) of the same decision, the first round of ICA is to commence for non-Annex I Parties within six months of the submission of the Parties' first BURs. The frequency of developing country Parties' participation in subsequent rounds of ICA, depending on their respective capabilities and national circumstances, and the special flexibility for small island developing States and the least developed country Parties, will be determined by the frequency of the submission of BURs.
4. The Republic of Korea submitted its first BUR on 29 December 2014, which was analysed by a TTE in the first round of technical analysis of BURs from non-Annex I Parties, conducted from 18 to 22 May 2015. After the publication of its summary report, the Republic of Korea participated in the first workshop for the facilitative sharing of views, convened in Bonn, Germany, on 20 May 2016.
5. This summary report presents the results of the technical analysis of the second BUR of the Republic of Korea undertaken by a TTE in accordance with the provisions on the composition, modalities and procedures of the TTE under ICA contained in the annex to decision 20/CP.19.

B. Process overview

6. The Republic of Korea submitted its second BUR on 16 November 2017, which is more than two years since the submission of the first BUR. An explanation was not provided in the second BUR, but the Republic of Korea explained during the technical analysis that in January 2016 there was a change in the national-level institutional arrangement to better respond to climate change, resulting in the delay.
7. The technical analysis of the BUR took place from 3 to 9 March 2018 in Bonn, Germany, and was undertaken by the following TTE, drawn from the UNFCCC roster of experts on the basis of the criteria defined in decision 20/CP.19, annex, paragraphs 2–6: Ms. Selam Abebe (Ethiopia, former CGE member), Mr. Oluseyi Adefisan (Nigeria, CGE member), Mr. Takeshi Enoki (Japan, former CGE member), Ms. Olga Gavrilova (Estonia), Ms. Valentina Idrissova (Kazakhstan), Ms. Neranda Maurice-George (Saint Lucia), Mr. John Steller (United States of America) and Mr. Daniel Tutu Benefoh (Ghana). Ms. Abebe and Mr. Enoki were the co-leads. The technical analysis was coordinated by Ms. Marion Vieweg-Mersmann and Ms. Karen Ortega (secretariat).
8. During the technical analysis, in addition to the written exchange, through the secretariat, to provide technical clarifications on the information reported in the BUR, the TTE and the Republic of Korea engaged in consultation¹ on the identification of capacity-building needs for the preparation of BURs and participation in the ICA process. Following the technical analysis of the Republic of Korea's second BUR, the TTE prepared and shared a draft summary report with the Republic of Korea on 30 May 2018 for its review and comment. The Republic of Korea, in turn, provided its feedback on the draft summary report on 29 September 2018.

¹ The consultation was conducted via teleconferencing.

9. The TTE responded to and incorporated the Party's comments referred to in paragraph 8 above and finalized the summary report in consultation with the Republic of Korea on 31 October 2018.

II. Technical analysis of the biennial update report

A. Scope of the technical analysis

10. The scope of the technical analysis is outlined in decision 20/CP.19, annex, paragraph 15, according to which the technical analysis aims to, without engaging in a discussion on the appropriateness of the actions, increase the transparency of mitigation actions and their effects and shall entail the following:

(a) The identification of the extent to which the elements of information listed in paragraph 3(a) of the ICA modalities and guidelines (decision 2/CP.17, annex IV) have been included in the BUR of the Party concerned (see chapter II.B below);

(b) A technical analysis of the information reported in the BUR, specified in the UNFCCC reporting guidelines on BURs (decision 2/CP.17, annex III), and any additional technical information provided by the Party concerned (see chapter II.C below);

(c) The identification, in consultation with the Party concerned, of capacity-building needs related to the facilitation of reporting in accordance with the UNFCCC reporting guidelines on BURs and to participation in ICA in accordance with the ICA modalities and guidelines, taking into account Article 4, paragraph 3, of the Convention (see chapter II.D below).

11. The remainder of this chapter presents the results of each of the three parts of the technical analysis of the Republic of Korea's BUR outlined in paragraph 10 above.

B. Extent of information reported

12. The elements of information referred to in paragraph 10(a) above include the national GHG inventory report; information on mitigation actions, including a description of such actions, an analysis of their impacts and the associated methodologies and assumptions, and the progress made in their implementation; information on domestic MRV; and information on support needed and received.

13. According to decision 20/CP.19, annex, paragraph 15(a), in undertaking the technical analysis of the submitted BUR, the TTE is to identify the extent to which the elements of information listed in paragraph 12 above have been included in the BUR of the Party concerned. The TTE considers that the reported information is mostly consistent with the UNFCCC reporting guidelines on BURs. Specific details on the extent of the information reported for each of the required elements are provided in annex I.

14. The TTE notes improvements in the reporting in the second BUR compared with the first BUR. Information on national circumstances, GHG inventories, mitigation actions and their effects reported in the second BUR demonstrates that the Party has taken into consideration the areas for enhanced transparency noted by the TTE in the summary report on the technical analysis of its first BUR. These include: information on institutional arrangements relevant to the preparation of NCs and BURs on a continuous basis; information on which IPCC guidelines were used in the estimation of emissions and removals; and information on mitigation actions, namely, the progress of implementation, quantitative results and goals, progress indicators, steps taken and envisaged, and timeline of implementation.

C. Technical analysis of the information reported

15. The technical analysis referred to in paragraph 10(b) above aims to increase the transparency of mitigation actions and their effects, without engaging in a discussion on the appropriateness of those actions. Accordingly, the technical analysis focused on the transparency of the information reported in the BUR.

16. For information reported on national GHG inventories, the technical analysis also focused on the consistency of the methods used for preparing those inventories with the appropriate methods developed by the IPCC and referred to in the UNFCCC reporting guidelines on BURs.

17. The results of the technical analysis are presented in the remainder of this chapter.

1. Information on national circumstances and institutional arrangements relevant to the preparation of national communications on a continuous basis

18. As per the scope defined in paragraph 2 of the UNFCCC reporting guidelines on BURs, the BUR should provide an update to the information contained in the most recently submitted NC, including information on national circumstances and institutional arrangements relevant to the preparation of NCs on a continuous basis. In their NCs, non-Annex I Parties report on their national circumstances following the reporting guidance contained in decision 17/CP.8, annex, paragraphs 3–5.

19. In accordance with decision 17/CP.8, annex, paragraph 3, in the second BUR, the Party reported the following information on its national circumstances and provided an update since its first BUR:

(a) Climate: in the Republic of Korea in 2016, the mean temperature was the highest since 1990 owing to climate variabilities and changes. In particular, between late July and August 2016, there were frequent prolonged heatwaves (22 days) and tropical nights (10.8 days) mainly caused by the North Pacific anticyclone and the anticyclones that had formed in mainland China;

(b) Population and economy: the Republic of Korea reported that its population remains largely the same but the observed structural changes reported in the first BUR have continued, with the share and absolute number of the population in the age range 15–64 set to decrease as the population gets older. The Republic of Korea reported that the economy has grown eightfold from 1990 to 2016 in terms of the nominal GDP. The Republic of Korea reported in its second BUR that the economy is transitioning into a mature phase and the economic base is moving gradually away from secondary activities. Also, the rate of economy growth, which peaked at 9 per cent in 1990, has now stabilized, to a lower annual growth rate of 3 per cent on average since 2011;

(c) Institutions and legal framework: in 2015, the Republic of Korea set a new GHG emission reduction target of 37 per cent below ‘business as usual’ by 2030. To achieve this and ongoing commitments from its reduction target of 30 per cent below ‘business as usual’ by 2020, the Republic of Korea prepared the Roadmap to Achieve the National GHG Reduction Target for 2030 and introduced a market mechanism, the K-ETS. It also introduced the GHG and Energy Target Management System and began implementation of the Act on the Management and Improvement of Carbon Sinks from 2013 to maintain and increase the capacity of forests to absorb carbon. The Party continues to render significant technical, financial and capacity-building support to a large number of developing country Parties.

20. In addition, in accordance with decision 17/CP.8, annex, paragraph 4, the Republic of Korea provided a summary of relevant information regarding its national circumstances, in tabular format, on temperature, precipitation and economic structure.

21. The Republic of Korea transparently described in its BUR the existing and planned institutional arrangements relevant to the preparation and submissions of its NCs and BURs on a continuous basis. The BUR also provided information on the coordinating institution and the other agencies involved in the process. During the technical analysis week, the Party

clarified that since 2016, OPC has been responsible for the overall coordination; however, this responsibility will be taken over by the Ministry of Environment for the next BUR submission as part of the amended Framework on Low Carbon Green Growth and its decree to strengthen the effectiveness and consistency of the GHG emission reduction policy and UNFCCC reporting. For continuity and in order to enhance the process, as of December 2017, the Framework on Low Carbon Green Growth and its decree were amended to strengthen the effectiveness and consistency of the GHG emission reduction policy. The subsequent coordination by the Ministry of Environment, collaborating with the various responsible ministries, will ensure reporting on a continuous basis and enhance the quality of the process in the future.

22. In paragraph 24 of the summary report on the technical analysis of the first BUR of the Republic of Korea, the TTE had noted areas where the transparency of the reporting on institutional arrangements could be further enhanced. The TTE noted that this information is provided in the second BUR, and the TTE commends the Party for enhancing the transparency of its reporting.

2. National greenhouse gas emissions by sources and removals by sinks

23. As indicated in table 1 in annex I, the Republic of Korea reported information on its GHG inventory in its BUR mostly in accordance with paragraphs 3–10 of the UNFCCC reporting guidelines on BURs and paragraphs 8–24 of the “Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention”, contained in the annex to decision 17/CP.8.

24. The Republic of Korea submitted its second BUR in 2017 and the GHG inventory reported is for the years 1990–2014, which is consistent with the requirements for the reporting time frame. The second BUR explains that improvements or refinements were made in the energy and agriculture sectors, and the Republic of Korea has recalculated the entire time series as a result of these improvements.

25. GHG emissions and removals covering the 1990–2014 period were estimated mainly using a tier 1 methodology from the Revised 1996 IPCC Guidelines. The IPCC good practice guidance was used to estimate emissions from civil aviation, landfills, wastewater treatment and waste incineration. The IPCC good practice guidance for LULUCF was used to estimate emissions and removals in the LULUCF sector, and the 2006 IPCC Guidelines were used for fuel combustion emissions of refinery gas and LPG, fugitive emissions from oil and natural gas, semiconductor manufacture and electrical equipment, rice cultivation, agricultural soil management, field burning of agricultural residues, wastewater treatment and biological treatment of solid waste, and other waste.

26. With regard to the methodologies used, information is reported on which IPCC guidance had been used and which categories use country-specific EFs, but no information is provided on the tiers used. During the technical analysis week, the Republic of Korea informed the TTE that most categories were estimated using a tier 1 methodology and a tier 2 method was used for the following categories: CH₄ and N₂O for 1.A.1 energy industries, and electricity and heat production; CO₂, CH₄ and N₂O for 1.A.3 transport and civil aviation; 2.F.6 consumption of halocarbons and SF₆ consumption, semiconductor manufacturing and liquid crystal display manufacturing; CH₄ for 4.C rice cultivation; N₂O for 4.D agricultural soils; and CO₂ for 5.A changes in forest and other woody biomass stocks.

27. Regarding AD, the BUR provides footnotes for the main sources of AD used in the GHG inventory. During the technical analysis, the Party provided a more comprehensive list of the type of data used in the GHG inventory, the source and the data provider. The TTE notes that reporting updated data on activity levels based on the IPCC guidelines used would also facilitate a better understanding of the information reported.

28. Regarding EFs, the BUR provides (in tables 6.1 to 6.3 of appendix 2) a list of the country-specific EFs used in the GHG inventory. However, the TTE noted that the sources of the country-specific EFs were not included. During the technical analysis week, the Party provided the sources of all country-specific EFs.

29. For categories that do not use country-specific EFs, the Party mostly used the default EFs in the Revised 1996 IPCC Guidelines, with the exception of the following categories, which use the 2006 IPCC Guidelines: fuel combustion of refinery gas and LPG; fugitive emissions from oil and natural gas; semiconductor manufacture and electrical equipment; agricultural soil management and field burning of agricultural residues; and wastewater treatment and biological treatment of solid waste. The TTE notes that this information could be organized in a tabular format, which would enhance the transparency of reporting.
30. The total GHG emissions for 2014 reported in the BUR, including and excluding LULUCF, amounted to 648.1 Mt CO₂ eq and 690.6 Mt CO₂ eq, respectively, which is an increase of 150.2 and 135.6 per cent, respectively, since 1990 (259.0 Mt CO₂ eq and 293.1 Mt CO₂ eq, respectively). The CO₂ emissions excluding LULUCF reported for 2014 comprised 628.8 Mt CO₂, followed by CH₄ (26.6 Mt CO₂ eq) and N₂O (14.9 Mt CO₂ eq), emissions of fluorinated gases comprising HFCs (8.5 Mt CO₂ eq), PFCs (2.4 Mt CO₂ eq) and SF₆ (9.4 Mt CO₂ eq).
31. Emissions from CO, NO_x, NMVOCs and SO_x were not reported. During the technical analysis week, the Party informed the TTE that it plans to calculate emissions using the national statistics on air pollutants in future. The TTE welcomes the planned improvement by the Republic of Korea as including this information in future BURs will enhance the transparency of reporting.
32. The Republic of Korea reported comparable information to tables 1 and 2 for the entire time series in the BUR (tables 5.2–5.5 in annex 1). The Party applied notation keys in these tables where numerical data were not provided. In addition, the notation key “NE” was reported for some categories without providing explanations.
33. The Republic of Korea did not report comparable information addressing the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF and the sectoral reporting tables annexed to the Revised 1996 IPCC Guidelines. The Party informed the TTE that collecting AD and other parameters from the responsible ministries is not a challenge; the challenge is in understanding the extent to which data should be reported, which is not clear in the UNFCCC reporting guidelines on BURs.
34. The shares of emissions that different sectors contributed to the total GHG emissions excluding LULUCF as reported by the Party in 2014 are: energy, 87 per cent; industrial processes, 7.9 per cent; agriculture, 3.1 per cent; and waste, remaining emissions. LULUCF was responsible for removals of 42.5 Mt CO₂ eq in 2014.
35. GHG emissions in 2014 from the energy sector amounted to 599.3 Mt CO₂ eq. However, the information is not clearly reported at the category level but rather is reported in subsector totals (energy industries, manufacturing industries and construction, transport, other sectors, fugitive emissions from solid fuels, and fugitive emissions from oil and natural gas) by gas.
36. Emissions from industrial processes amounted to 54.6 Mt CO₂ eq. The majority of these emissions were attributed to the subsectors mineral products and consumption of halocarbons and SF₆, which accounted for 33.2 Mt CO₂ eq and 20.1 Mt CO₂ eq, respectively.
37. For the agriculture sector, the Republic of Korea reported GHG emissions of 21.3 Mt CO₂ eq.
38. For the LULUCF sector, the Republic of Korea reported GHG emissions and removals for the time series, as for all other sectors. Overall, the net removals from the LULUCF sector fluctuated between a minimum of 59.2 Mt CO₂ eq in 1999 and a maximum of 31.5 Mt CO₂ eq in 1992.
39. For the waste sector, the Republic of Korea reported emissions of 15.4 Mt CO₂ eq.
40. The Republic of Korea included in its BUR an NIR containing information on an update of its first BUR, which addressed anthropogenic emissions and removals for 1990–2012. The update was carried out for all years in the period 1990–2012 using the methodologies contained in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance, the IPCC good practice guidance for LULUCF and the 2006 IPCC Guidelines, thus generating a consistent 25-year time series.

41. The Republic of Korea described in its BUR the institutional framework for the preparation of its GHG inventory. OPC is the government body responsible for climate change policies and GIR (managed by OPC) is responsible for the Republic of Korea's GHG inventory. Different ministries are responsible for estimating GHG emissions and removals, and the sectoral inventories are compiled by the responsible agencies and submitted to GIR. A management committee, which is chaired by the Second Vice Minister of OPC and composed of director general level officials from the responsible ministries and Statistics Korea, and other experts from academia and the public sector, approves the final draft of the national GHG inventory.
42. The Republic of Korea did not report a key category analysis in its second BUR. During the technical analysis, the Republic of Korea informed the TTE that it has carried out a key category analysis and will include the results in the next BUR.
43. The Party reported information on CO₂ fuel combustion using only the sectoral approach. During the technical analysis week, the Party clarified that it has estimated the reference approach and that the difference was that the sectoral approach was about 2 per cent higher than the reference approach.
44. Information was reported on international aviation and marine bunker fuels. During the technical analysis week, the Party confirmed that emissions from bunker fuels are not included in the national totals.
45. The Republic of Korea reported information on its use of GWP values consistent with those provided by the IPCC in its Second Assessment Report based on the effects of GHGs.
46. The Republic of Korea did not report information on the uncertainty assessment of its national GHG inventory. During the technical analysis, the Party informed the TTE that the uncertainty analysis has been conducted for the energy sector.
47. The TTE noted that the transparency of the information reported could be enhanced by addressing the areas noted by the TTE in paragraphs 27, 28, 29, 31, 32, 43 and 46 above, which could enable the TTE to better understand the information reported.
48. In paragraph 25 of the summary report on the technical analysis of the first BUR of the Republic of Korea, the TTE noted where the transparency of reporting on methodologies could be enhanced. The TTE noted that the Republic of Korea had taken into consideration this area of improvement in its second BUR and commends the Party for enhancing the transparency of the information reported.

3. Mitigation actions and their effects, including associated methodologies and assumptions

49. As indicated in table 2 in annex I, the Republic of Korea reported in its BUR, mostly in accordance with paragraphs 11–13 of the UNFCCC reporting guidelines on BURs, information on mitigation actions and their effects, to the extent possible.
50. The information reported partly provides a clear and comprehensive overview of the Party's mitigation actions and their effects, including the national context. In its BUR, the Republic of Korea frames its national mitigation planning and actions in the context of the national emission reduction targets by 2020 and 2030.
51. In its BUR, the Republic of Korea reported its road map to enable the country to archive its national GHG emission reduction targets to 2020 and 2030, the achievement of which is supported by relevant ministries and agencies, and by GIR. The Republic of Korea reported that the national targets are to reduce GHG emissions by 30 per cent and 37 per cent below a 'business as usual' level by 2020 and 2030, respectively.
52. There are two major mitigation policies identified to support the achievement of the reduction targets: the K-ETS; and the TMS. The K-ETS was launched in 2015. It covers 69 per cent of the national GHG emissions and is designed to operate under three phases: phase 1 (2015–2017), phase 2 (2018–2020) and phase 3 (2021–2025). In total, 602 companies were designated for the allocation of emission allowances under phase 1. As at December 2016, 75 offset projects had been carried out, resulting in units equivalent to 15.6 Mt CO₂ eq being supplied to the market. The TMS, established in 2011, is designed for the systematic

management of GHG emissions. It is designated for business entities that emit more than 50 kt CO₂ eq and consume over 200 TJ of energy annually, and for facilities that emit more than 15 kt CO₂ eq and consume over 80 TJ of energy annually. The operation of the TMS resulted in a reduction of 740 kt CO₂ eq in 2015.

53. The TTE noted that the Republic of Korea included in its first BUR information regarding the national and sectoral reduction targets and a future emission pathway for a ‘business as usual’ scenario and a GHG emission road map, expressed in t CO₂ eq, which includes the effect of the mitigation actions to 2020. However, the TTE noted that the Republic of Korea has not presented in its second BUR information on projected emission trends for a ‘business as usual’ scenario and GHG emission reduction scenario to 2030. During the technical analysis, the Republic of Korea clarified that emissions related to the ‘business as usual’ scenario and the emission reduction trends to 2030 have been developed as part of the revised 2030 road map, which was finalized during 2018 (the initial 2030 road map was published in 2016) and detailed information will be presented in the next BUR. The TTE welcomes the efforts of the Republic of Korea in evaluating annual GHG emission reductions until 2030.

54. The Party reported a summary of its mitigation actions in tabular format. Consistent with decision 2/CP.17, annex III, paragraph 12(a), the Republic of Korea reported the names of mitigation actions or groups of actions, coverage (by sector and gas) and progress indicators in table 3.9 of the BUR. A description of mitigation actions as well as information on quantitative goals and performance indicators were clearly reported in the BUR. However, the TTE noted that table 3.9 contains only actions that have already been implemented. Information on actions planned or under development is provided only at the national level. During the technical analysis, the Republic of Korea provided the TTE with a list of planned mitigation actions, including information on the sector, a description of the mitigation action and the agency responsible for implementation. The TTE noted that the transparency would be further improved if the Republic of Korea included detailed information on planned mitigation actions in its next BUR.

55. Mitigation actions were described and reported for the following economic sectors in tabular format (BUR table 3.9): energy transformation (three mitigation actions, e.g. establishment of low-carbon facilities in the power generation sector, enhancement of the share of renewable energy in total power generation); industry (seven mitigation actions, e.g. promotion of energy-efficient use of energy and energy-saving facilities supply); transport (six mitigation actions, e.g. strengthening of vehicle average fuel standards, distribution of electric buses, promotion of voluntary GHG emissions trading system for domestic airlines); buildings (four mitigation actions, e.g. strengthening of standards on energy-saving design for buildings); agriculture and fisheries (seven mitigation actions, e.g. improvement of water supply management in rice cropland, reduction in use of chemical fertilizers, expansion of facilities that convert manure into energy); forestry (six mitigation actions, e.g. planting of urban forest, afforestation and reforestation of unused lands); and waste (three mitigation actions, e.g. increasing the recycling rate of municipal waste and reduction of the disposal rate of municipal waste).

56. In addition, the Republic of Korea explained in the BUR text the following mitigation actions: the Renewable Portfolio Standard, the Energy Use Rationalization Act, the 2030 New Energy Industry Promotion Strategy, GHG emissions and fuel efficiency standards for cars, and the First Masterplan on Green Buildings. The objectives of the mitigation actions were reported along with information on the steps taken to implement them. The greatest emission reductions expected are from improvements in energy transformation. Emission reductions related to the LULUCF sector are not included in the current national reduction target plan, but the Republic of Korea reported that it would consider incorporating these into its nationally determined contribution in the future. The objectives of the mitigation actions implemented were reported along with information on the steps taken to implement them.

57. In its BUR, the Republic of Korea defined and described trends in performance indicators for most mitigation actions (e.g. presented in tables 3.2–3.6 and figure 3.6). However, the TTE noted that the Republic of Korea has not presented information on the methodologies and underlying assumptions for defining the ‘business as usual’ emissions and emission mitigation scenario. In response to a question raised during the technical

analysis, the Republic of Korea provided the TTE with supplemental information related to mitigation actions implemented, namely: the sector in which each mitigation action is implemented; a description of the mitigation action; the performance indicator; and some measured values for the performance indicator. The TTE noted that transparency would be further improved if the Party included this information in its next BUR, along with further detailed descriptions of methodologies and assumptions applied to estimate GHG emissions projected under the ‘business as usual’ scenario and GHG emission reductions.

58. The Republic of Korea provided information on its involvement in international market mechanisms as a Party to the Kyoto Protocol. The Republic of Korea has documented 74 CDM projects as part of its offset activities within the K-ETS. The TTE noted that transparency would be further improved if the Party reported further information, such as the sectors covered by the projects and the quantity of certified emission reductions issued for the Republic of Korea.

59. The Republic of Korea has reported information on its domestic MRV arrangements consistent with decision 2/CP.17, annex III, paragraph 13. The information reported indicates that the Republic of Korea has in place domestic MRV systems for mitigation actions. The Party’s road map to 2030 introduces evaluation methods to implement reduction plans by sector, which will be piloted from 2017 to 2019 for the purpose of improving and supplementing the evaluation system. Another example of an MRV system is a verification framework which was established under the TMS for energy consumers that are not covered by the K-ETS. The Ministry of Environment is the lead agency providing overall guidelines and standards for verification procedures, designating and managing verification agencies. In total, 19 agencies were designated as verification agencies to ensure third-party verification of the GHG emission and energy consumption reports submitted by the controlled entities. In addition, to facilitate the reduction of emissions and to support verification, the Republic of Korea implemented two initiatives in the agriculture sector: the farm–business mutual cooperation for GHG mitigation and the low-carbon agricultural and livestock product certification systems.

60. In paragraph 53(e) of the summary report on the technical analysis of the first BUR of the Republic of Korea, the TTE noted that the transparency of reporting could be enhanced by defining the progress of implementation of mitigation actions and reporting on underlying steps taken or envisaged to achieve the actions. The TTE noted that the Republic of Korea partly took into consideration this area of improvement in its second BUR and commends the Party for enhancing the transparency of the information reported.

4. Constraints and gaps, and related technology, financial, technical and capacity-building needs, including a description of support needed and received

61. The Republic of Korea, in its BUR, has reported extensively on the financial support provided to other developing countries. As indicated in table 3 in annex I, the Republic of Korea clarified during the technical analysis that information on finance, technology and capacity-building needs and support received was not provided because the Party did not identify such needs. The Republic of Korea receives ongoing support in the form of learning from the experience of the EU for the continued enhancement of its climate change mitigation capacity via the EU–Korea Emissions Trading Scheme Project (2016–2018).

62. The Party reported on the wide range of support it provides to other developing countries, as explained in paragraph 63 below. The TTE commends the Republic of Korea for reporting on these activities.

5. Any other information

63. The Republic of Korea reported comprehensive information on support provided to developing country Parties, such as finance, technology development and transfer and capacity-building, in addition to providing information on concessional loans and grant aid to developing country Parties. The Party provided in tables 4.1 and 4.2 of the BUR information on the monetary amounts, status, funding sources, financial instruments, support type and the sectors identified for its support to multilateral institutions and at the bilateral and regional level as well as information on support provided through other channels. It also

provided information in table 4.3 of the BUR on the technology development and transfer support provided, and on capacity-building support in table 4.4.

D. Identification of capacity-building needs

64. In consultation with the Republic of Korea, the TTE identified one capacity-building need related to the facilitation of the preparation of subsequent BURs and participation in ICA: improve the uncertainty assessment for sectors other than the energy sector.

65. The TTE noted that the Republic of Korea did not report any capacity-building needs in its BUR.

66. In paragraph 53 of the summary report on the technical analysis of the first BUR of the Republic of Korea, the TTE, in consultation with the Republic of Korea, identified six capacity-building needs. The Republic of Korea informed the TTE that it has addressed or is addressing all these needs.

III. Conclusions

67. The TTE conducted a technical analysis of the information reported in the second BUR of the Republic of Korea in accordance with the UNFCCC reporting guidelines on BURs. The TTE concludes that the reported information is mostly consistent with the UNFCCC reporting guidelines on BURs and provides an overview of: national circumstances and institutional arrangements relevant to the preparation of NCs on a continuous basis; the national inventory of anthropogenic emissions by sources and removal by sinks of all GHGs not controlled by the Montreal Protocol, including an NIR; mitigation actions and their effects, including associated methodologies and assumptions; domestic MRV; capacity-building received; and any other information relevant to the achievement of the objective of the Convention. During the technical analysis, additional information was provided by the Republic of Korea on sources of AD for the GHG inventory, categories that use tier 2 methods in the GHG inventory, and a list of planned mitigation actions, including information on the sector where a mitigation action is planned to be implemented, a description of the mitigation action and the agency responsible for implementation. The TTE concluded that the information analysed is mostly transparent.

68. The Republic of Korea reported information on the institutional arrangements relevant to the preparation of BURs. The preparation of the second BUR of the Republic of Korea was led by the Prime Minister's Office and the draft was prepared in collaboration with sectoral responsible ministries. As of December 2017, the Framework on Low Carbon Green Growth and its decree were amended to strengthen the effectiveness and consistency of the GHG emission reduction policy. The subsequent coordination by the Ministry of Environment, collaborating with the various responsible ministries, will ensure reporting on a continuous basis and enhance the quality of the process in the future.

69. In its second BUR, submitted in 2017, the Republic of Korea reported information on its national GHG inventory for the years 1990–2014. This included GHG emissions and removals of CO₂, CH₄, N₂O, HFCs, PFCs and SF₆ for all relevant sources and sinks. The inventory was developed on the basis of the Revised 1996 IPCC Guidelines, the IPCC good practice guidance, the IPCC good practice guidance for LULUCF and the 2006 IPCC Guidelines. The total GHG emissions for 1990–2014 were reported and, in 2014, the total emissions were 690.6 Mt CO₂ eq (excluding LULUCF) and 648.1 Mt CO₂ eq (including LULUCF).

70. The Republic of Korea reported that the national targets to reduce GHG emissions are 30 per cent and 37 per cent below the 'business as usual' level by 2020 and 2030, respectively. The mitigation actions and performance indicators related to each mitigation action were categorized in the context of the following economic sectors: energy transformation, industry, transport, buildings, agriculture and fisheries, forestry and waste. The Republic of Korea reported steps taken to achieve the mitigation targets related to each mitigation action, results achieved, which are measured in metrics depending on the type of action (e.g. the percentage

of renewables in the energy portfolio, average value of fuel efficiency standards in litres per kilometre, a rate of municipal and industrial waste recycled), but did not report estimated GHG emission reductions for individual mitigation actions.

71. In its BUR the Republic of Korea did not report any information on key constraints, gaps and related needs. During the technical analysis week, the Republic of Korea clarified that it does not require nor did it receive financial, technical or capacity-building support from developed countries, except for the support on capacity-building for the K-ETS market mechanism it received from the EU. On the other hand, the Republic of Korea reported on the wide-ranging financial, technical and capacity-building support it has provided and funded for many developing country Parties. The Party reports on its international cooperation and the support it provided to several countries at the bilateral and multilateral level.

72. The TTE, in consultation with the Republic of Korea, identified one capacity-building need listed in chapter II.D above that aims to facilitate reporting in accordance with the UNFCCC reporting guidelines on BURs and participation in ICA, in accordance with the ICA modalities and guidelines, taking into account Article 4, paragraph 3, of the Convention.

Annex I

Extent of the information reported by the Republic of Korea in its second biennial update report

Table 1

Identification of the extent to which the elements of information on greenhouse gases are included in the second biennial update report of the Republic of Korea

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/partly/ no/NA</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, paragraph 41(g)	The first BUR shall cover, at a minimum, the inventory for the calendar year no more than four years prior to the date of the submission, or more recent years if information is available, and subsequent BURs shall cover a calendar year that does not precede the submission date by more than four years.	Yes	The Republic of Korea submitted its second BUR in November 2017; the GHG inventories reported are for 1990–2014.
Decision 2/CP.17, annex III, paragraph 4	Non-Annex I Parties should use the methodologies established by the latest UNFCCC guidelines for the preparation of NCs from non-Annex I Parties approved by the COP or those determined by any future decision of the COP on this matter.	Yes	The Republic of Korea used a combination of the Revised 1996 IPCC Guidelines, the IPCC good practice guidance, the IPCC good practice guidance for LULUCF and the 2006 IPCC Guidelines.
Decision 2/CP.17, annex III, paragraph 5	The updates of the sections on the national inventories of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol should contain updated data on activity levels based on the best information available using the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF; any change to the EF may be made in the subsequent full NC.	No	
Decision 2/CP.17, annex III, paragraph 6	Non-Annex I Parties are encouraged to include, as appropriate and to the extent that capacities permit, in the inventory section of the BUR:	No	
	(a) Tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF;	Partly	The Republic of Korea reported emissions and removal data by subsector and EF data in the annex. However, the background AD were not reported.
	(b) The sectoral report tables annexed to the Revised 1996 IPCC Guidelines.	Partly	The Republic of Korea reported emissions data by subsector and EF data in the annex. However, the background AD were not reported.
Decision 2/CP.17, annex III, paragraph 7	Each non-Annex I Party is encouraged to provide a consistent time series back to the years reported in the previous NCs.	Yes	
Decision 2/CP.17, annex III, paragraph 8	Non-Annex I Parties that have previously reported on their national GHG inventories contained in their national communications are encouraged to submit summary information tables of inventories for previous submission years (e.g. for 1994 and 2000).	Yes	This information was reported for the years 1990–2014.
	The inventory section of the BUR should consist of an NIR as a summary or as an update of the information contained in decision 17/CP.8, annex,		

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/partly/ no/NA</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 9	chapter III (National greenhouse gas inventories), including:		
	(a) Table 1 (National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors);	Yes	Comparable information was reported in tables 5.2–5.5 of annex 1 to the BUR.
	(b) Table 2 (National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF ₆).	Yes	Comparable information was reported in tables 5.2–5.5 of annex 1 to the BUR.
Decision 2/CP.17, annex III, paragraph 10	Additional or supporting information, including sector-specific information, may be supplied in a technical annex.	Yes	
Decision 17/CP.8, annex, paragraph 13	Non-Annex I Parties are encouraged to describe procedures and arrangements undertaken to collect and archive data for the preparation of national GHG inventories, as well as efforts to make this a continuous process, including information on the role of the institutions involved.	Yes	A description of the institutional arrangements is presented in the GHG inventory chapter along with changes to the arrangements for the second BUR.
Decision 17/CP.8, annex, paragraph 14	Each non-Annex I Party shall, as appropriate and to the extent possible, provide in its national inventory, on a gas-by-gas basis and in units of mass, estimates of anthropogenic emissions of:		
	(a) CO ₂ ;	Yes	
	(b) CH ₄ ;	Yes	
	(c) N ₂ O.	Yes	
Decision 17/CP.8, annex, paragraph 15	Non-Annex I Parties are encouraged, as appropriate, to provide information on anthropogenic emissions by sources of:	Yes	
	(a) HFCs;	Yes	
	(b) PFCs;	Yes	
	(c) SF ₆ .	Yes	
Decision 17/CP.8, annex, paragraph 16	Non-Annex I Parties are encouraged, as appropriate, to report on anthropogenic emission by sources of other GHGs, such as:		
	(a) CO;	No	
	(b) NO _x ;	No	
	(c) NMVOCs.	No	
Decision 17/CP.8, annex, paragraph 17	Other gases not controlled by the Montreal Protocol, such as SO _x , included in the Revised 1996 IPCC Guidelines may be included at the discretion of the Parties.	No	
Decision 17/CP.8, annex, paragraph 18	Non-Annex I Parties are encouraged, to the extent possible and if disaggregated data are available, to estimate and report CO ₂ fuel combustion emissions using both the sectoral and the reference approach and to explain any large differences between the two approaches.	No	The information was reported only for the sectoral approach.
Decision 17/CP.8, annex, paragraph 19	Non-Annex I Parties should, to the extent possible and if disaggregated data are available, report emissions from international aviation and marine bunker fuels separately in their inventories:		
	(a) International aviation;	Yes	
	(b) Marine bunker fuels.	Yes	

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/partly/ no/NA</i>	<i>Comments on the extent of the information provided</i>
Decision 17/CP.8, annex, paragraph 20	Non-Annex I Parties wishing to report on aggregated GHG emissions and removals expressed in CO ₂ eq should use the GWP provided by the IPCC in its Second Assessment Report based on the effects of GHGs over a 100-year time-horizon.	Yes	
Decision 17/CP.8, annex, paragraph 21	Non-Annex I Parties are encouraged to provide information on methodologies used in the estimation of anthropogenic emissions by sources and removals by sinks of GHGs not controlled by the Montreal Protocol, including a brief explanation of the sources of EFs and AD. If non-Annex I Parties estimate anthropogenic emissions and removals from country-specific sources and/or sinks that are not part of the Revised 1996 IPCC Guidelines, they should explicitly describe the source and/or sink categories, methodologies, EFs and AD used in their estimation of emissions, as appropriate. Parties are encouraged to identify areas where data may be further improved in future communications through capacity-building:		
	(a) Information on methodologies used in the estimation of anthropogenic emissions by sources and removals by sinks of GHGs not controlled by the Montreal Protocol;	Yes	The Republic of Korea used a combination of the Revised 1996 IPCC Guidelines, the IPCC good practice guidance, the IPCC good practice guidance for LULUCF and the 2006 IPCC Guidelines.
	(b) Explanation of the sources of EFs;	Partly	The values of the country-specific EFs are provided in the annex to the BUR but the sources are not clear for some of the values.
	(c) Explanation of the sources of AD;	Partly	The sources of the major AD can be found in the footnotes of the BUR. During the technical analysis week, the Party provided an overview of the sources.
	(d) If non-Annex I Parties estimate anthropogenic emissions and removals from country-specific sources and/or sinks that are not part of the Revised 1996 IPCC Guidelines, they should explicitly describe:	NA	
	(i) Source and/or sink categories;		
	(ii) Methodologies;		
	(iii) EFs;		
	(iv) AD;		
	(e) Parties are encouraged to identify areas where data may be further improved in future communications through capacity-building.	No	
Decision 17/CP.8, annex, paragraph 22	Each non-Annex I Party is encouraged to use tables 1 and 2 of the guidelines annexed to decision 17/CP.8 in reporting its national GHG inventory, taking into account the provisions established in paragraphs 14–17. In preparing those tables, Parties should strive to present information that is as complete as possible. Where numerical data are not provided, Parties should use the notation keys as indicated.	Yes	

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/partly/ no/NA</i>	<i>Comments on the extent of the information provided</i>
Decision 17/CP.8, annex, paragraph 24	Non-Annex I Parties are encouraged to provide information on the level of uncertainty associated with inventory data and their underlying assumptions, and to describe the methodologies used, if any, for estimating these uncertainties:		
	(a) Level of uncertainty associated with inventory data;	No	
	(b) Underlying assumptions;	No	
	(c) Methodologies used, if any, for estimating these uncertainties.	No	

Note: The parts of the UNFCCC reporting guidelines on BURs on reporting information on GHG emissions by sources and removals by sinks in BURs are contained in decision 2/CP.17, paragraphs 3–10 and 41(g). Further, as per paragraph 3 of those guidelines, non-Annex I Parties are to submit updates of their national GHG inventories in accordance with paragraphs 8–24 of the “Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention”, contained in the annex to decision 17/CP.8. The scope of such updates should be consistent with the non-Annex I Party’s capacity and time constraints and the availability of its data, as well as the level of support provided by developed country Parties for biennial update reporting.

Table 2

Identification of the extent to which the elements of information on mitigation actions are included in the second biennial update report of the Republic of Korea

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/ partly/ no</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 11	Non-Annex I Parties should provide information, in a tabular format, on actions to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol.	Yes	
Decision 2/CP.17, annex III, paragraph 12	For each mitigation action or group of mitigation actions, including, as appropriate, those listed in document FCCC/AWGLCA/2011/INF.1, developing country Parties shall provide the following information, to the extent possible:		
	(a) Name and description of the mitigation action, including information on the nature of the action, coverage (i.e. sectors and gases), quantitative goals and progress indicators;	Yes	
	(b) Information on:		
	(i) Methodologies;	No	
	(ii) Assumptions;	No	
	(c) Information on:		
	(i) Objectives of the action;	Yes	
	(ii) Steps taken or envisaged to achieve that action;	Yes	
	(d) Information on:		
	(i) Progress of implementation of the mitigation actions;	Yes	
	(ii) Progress of implementation of the underlying steps taken or envisaged;	Partly	The Republic of Korea did not provide detailed information on progress of implementation for all of the mitigation actions that have been implemented at the national and sectoral level. The Party also reported information on actions

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/ partly/ no</i>	<i>Comments on the extent of the information provided</i>
			planned or under development at the national level.
	(iii) Results achieved, such as estimated outcomes (metrics depending on type of action) and estimated emission reductions, to the extent possible;	Partly	The Party reported progress on each mitigation action in a metric corresponding to each type of action. However, estimated emission reductions related to most of the mitigation actions are not reported.
	(e) Information on international market mechanisms.	Yes	The Party reported on the number of CDM projects (BUR, p.34) carried out as of December 2016.
Decision 2/CP.17, annex III, paragraph 13	Parties should provide information on the description of domestic MRV arrangements.	Yes	

Note: The parts of the UNFCCC reporting guidelines on BURs on the reporting of information on mitigation actions in BURs are contained in decision 2/CP.17, annex III, paragraphs 11–13.

Table 3

Identification of the extent to which the elements of information on finance, technology and capacity-building needs and support received are included in the second biennial update report of the Republic of Korea

<i>Decision</i>	<i>Provision of the reporting requirements</i>	<i>Yes/partly/ no</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 14	Non-Annex I Parties should provide updated information on: (a) Constraints and gaps; (b) Related financial, technical and capacity-building needs.	NA NA	Information on needs was not reported by the Republic of Korea. During the technical analysis, the Party clarified that this was not reported because the Republic of Korea does not identify any needs. The Party reported support provided to developing country Parties.
Decision 2/CP.17, annex III, paragraph 15	Non-Annex I Parties should provide: (a) Information on financial resources received, technology transfer and capacity-building received; (b) Information on technical support received from the Global Environment Facility, Parties included in Annex II to the Convention and other developed country Parties, the Green Climate Fund and multilateral institutions for activities relating to climate change, including for the preparation of the current BUR.	Yes NA	
Decision 2/CP.17, annex III, paragraph 16	With regard to the development and transfer of technology, non-Annex I Parties should provide information on: (a) Technology needs, which are nationally determined; (b) Technology support received.	NA NA	

Note: The parts of the UNFCCC reporting guidelines on BURs on the reporting of information on finance, technology and capacity-building needs and support received in BURs are contained in decision 2/CP.17, annex III, paragraphs 14–16.

Annex II

Documents and information used during the technical analysis

A. Reference documents

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

IPCC. 2000. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. J Penman, D Kruger, I Galbally, et al. (eds.). Hayama, Japan: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency/Institute for Global Environmental Strategies. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

IPCC. 2003. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. J Penman, M Gytarsky, T Hiraishi, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/lulucf/gp/lulucf.html>.

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

“Composition, modalities and procedures of the team of technical experts for undertaking the technical analysis of biennial update reports from Parties not included in Annex I to the Convention”. Annex to decision 20/CP.19. Available at <http://unfccc.int/resource/docs/2013/cop19/eng/10a02.pdf#page=12>.

“Modalities and guidelines for international consultation and analysis”. Annex IV to decision 2/CP.17. Available at <http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf>.

“UNFCCC biennial update reporting guidelines for Parties not included in Annex I to the Convention”. Annex III to decision 2/CP.17. Available at <http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf>.

“Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention”. Annex to decision 17/CP.8. Available at <http://unfccc.int/resource/docs/cop8/07a02.pdf#page=2>.

First biennial update report of the Republic of Korea. Available at <http://unfccc.int/8722.php>.

First, second and third national communication of the Republic of Korea. Available at <https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-update-reports-non-annex-i-parties/national-communication-submissions-from-non-annex-i-parties>.

Summary report on the technical analysis of the first biennial update report of the Republic of Korea. Available at http://unfccc.int/national_reports/non-annex_i_parties/ica/technical_analysis_of_burs/items/10054.php.

B. Additional information provided by the Party

The following documents¹ were provided by the Party in response to requests for technical clarification during the technical analysis:

Attachment 1. List of Activity Data for the National GHG Inventory of ROK: List of the type of data used, the source, and data provider in the GHG inventory;

Attachment 2. GHG Inventory, Tier2 Methodology 21(a): List of categories that use tier 2 methods in the GHG inventory; and

Attachment 3. Mitigation Actions and Effects 12(b): List of performance indicators for mitigation actions, including further explanations

Attachment 4. Mitigation Actions and Effects 12(c): List of planned mitigation actions including information on sector where a mitigation action is planned to be implemented, description of mitigation action, agency responsible to implement

¹ Reproduced as received from the Party.