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## **Technical analysis of the fourth biennial update report of Brazil submitted on 31 December 2020**

### **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, consistently with their capabilities and the level of support provided for reporting, were to submit their first biennial update report by December 2014. Further, paragraph 41(f) of that decision states that Parties not included in Annex I to the Convention shall submit a biennial update report 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 biennial update reports at their discretion. This summary report presents the results of the technical analysis of the fourth biennial update report of Brazil, conducted by a team of technical experts in accordance with the modalities and procedures contained in the annex to decision 20/CP.19.



## Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AD	activity data
AR	Assessment Report of the Intergovernmental Panel on Climate Change
BUR	biennial update report
CDM	clean development mechanism
CH <sub>4</sub>	methane
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
EF	emission factor
ETF	enhanced transparency framework under the Paris Agreement
GEF	Global Environment Facility
GHG	greenhouse gas
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>
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
MRV	measurement, reporting and verification
N <sub>2</sub> O	nitrous oxide
NA	not applicable
NC	national communication
NMVOG	non-methane volatile organic compound
non-Annex I Party	Party not included in Annex I to the Convention
NO <sub>x</sub>	nitrogen oxides
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
REDD+	reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks (decision 1/CP.16, para. 70)
Revised 1996 IPCC Guidelines	<i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>
SF <sub>6</sub>	sulfur hexafluoride
SO <sub>x</sub>	sulfur oxides
TTE	team of technical experts
UNFCCC guidelines for the preparation of NCs from non-Annex I Parties	“Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention”
UNFCCC reporting guidelines on BURs	“UNFCCC biennial update reporting guidelines for Parties not included in Annex I to the Convention”

## 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 a 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 BUR. 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. Decision 14/CP.19, paragraph 7, outlines that developing country Parties seeking to obtain and receive payments for results-based actions can submit relevant information and data through the BUR in the form of a technical annex as per decision 2/CP.17, annex III, paragraph 19.<sup>1</sup> Decision 14/CP.19, paragraph 8, outlines that the submission of the technical annex is voluntary and in the context of results-based payments. Brazil submitted two separate technical annexes providing data and information on REDD+ activities, one for the Amazon biome and one for the Cerrado biome. As mandated by decision 14/CP.19, paragraphs 10–14, each of the two technical annexes has been subject to technical analysis by two LULUCF experts who are included as members of a TTE. The results of the technical analyses are captured in separate technical reports.<sup>2</sup>
5. Brazil submitted its third BUR on 2 March 2019, which was analysed by a TTE in the fourteenth round of technical analysis of BURs from non-Annex I Parties, conducted from 2 to 6 September 2019. After the publication of its summary report, Brazil participated in the ninth workshop for the facilitative sharing of views, convened virtually from 24 to 27 November 2020.
6. This summary report presents the results of the technical analysis of the fourth BUR of Brazil, 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

7. In accordance with the mandate referred to in paragraph 2 above, Brazil submitted its fourth BUR on 31 December 2020 as a stand-alone update report. The submission was made within two years from the submission of the third BUR.
8. A desk analysis of Brazil's BUR was conducted remotely from 28 June to 2 July 2021 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: Charles Asumana Sr. (Liberia), Irina Atamuradova (former member of the Consultative Group of Experts from Turkmenistan), Diana Barba (Colombia), Joseph Benise Nissa (Saint Lucia), Pierre Brender (United Kingdom of Great Britain and Northern Ireland), Paulo Cornejo (Chile), Patience Thelma Melfah Dampney (former member of the Consultative Group of Experts from Ghana), Elsa Hatanaka (Japan), Brittany Meighan (Belize), Walter Oyhantcabal (Uruguay), Marieke Sandker (Netherlands), John Steller (United States of America), Hartley Walimwipi

<sup>1</sup> The technical annex on the results of the implementation of REDD+ activities.

<sup>2</sup> FCCC/SBI/ICA/2021/TATR.5/BRA and FCCC/SBI/ICA/2021/TATR.6/BRA.

(Zambia), Jongikhaya Witi (South Africa) and Brian Zutta (Peru). Mr. Steller and Mr. Witi were the co-leads. The technical analysis was coordinated by Jeonghyun Emily Park, Sohel Pasha and Hiroaki Odawara (secretariat).

9. During the technical analysis, in addition to the written exchange, in the virtual team room, to provide technical clarifications on the information reported in the BUR, the TTE and Brazil engaged in consultation<sup>3</sup> on the identification of capacity-building needs for the preparation of BURs and participation in the ICA process. Following the technical analysis of Brazil's fourth BUR, the TTE prepared and shared a draft summary report with Brazil on 28 September 2021 for its review and comment. Brazil, in turn, provided its feedback on the draft summary report on 28 December 2021.

10. The TTE responded to and incorporated Brazil's comments referred to in paragraph 9 above and finalized the summary report in consultation with the Party on 10 May 2022.

## **II. Technical analysis of the biennial update report**

### **A. Scope of the technical analysis**

11. 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 chap. 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 chap. 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 chap. II.D below).

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

### **B. Extent of the information reported**

13. The elements of information referred to in paragraph 11(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 information on progress in their implementation; information on domestic MRV; and information on support needed and received.

14. 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 13 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 the tables included in annex I.

15. The current TTE noted improvements in the reporting in Brazil's fourth BUR compared with that in its third BUR. Information on the GHG inventory and institutional arrangements reported in the Party's fourth BUR demonstrates that it has taken into

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<sup>3</sup> The consultation was conducted via videoconferencing.

consideration the areas for enhancing the transparency of the extent of information reported noted by the previous TTE in the summary report on the technical analysis of the Party's third BUR.

### **C. Technical analysis of the information reported**

16. The technical analysis referred to in paragraph 11(b) above aims to increase the transparency of information reported by the Parties on mitigation actions and their effects, without engaging in a discussion on the appropriateness of those actions. Accordingly, the focus of the technical analysis was on the transparency of the information reported in the BUR.

17. 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.

18. 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**

19. 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, and they could report similar information in their BUR, which is an update of their most recently submitted NC.

20. In its fourth BUR, Brazil provided an update on its national circumstances, including a description of national development priorities; the legal framework for action on climate change; and features of climate, biodiversity, geography, the energy mix and the economy that might affect the Party's ability to deal with mitigating and adapting to climate change. The Party reported that balancing economic development, environmental conservation and social inclusion is challenging owing to its large population and urban growth, but it is continuing its efforts to pursue sustainable development through investment in research and innovation.

21. In addition, Brazil provided a summary of relevant information regarding its national circumstances, including socioeconomic indicators and the main elements of its national climate change policy, in tabular format.

22. Brazil reported in its fourth BUR an update on its existing institutional arrangements relevant to the preparation of its NCs and BURs on a continuous basis. The description covers key aspects of the institutional arrangements, including the legal status and roles of the overall coordinating entity, the involvement and roles of other institutions, and QA/QC procedures for the GHG inventory. Brazil reported that its Inter-ministerial Committee on Climate Change and Commission for the Coordination of Meteorology, Climatology and Hydrology Activities are the key institutions involved in coordinating its national policy on climate change. In accordance with decree 10.145 of 28 November 2019, the Inter-ministerial Committee on Climate Change comprises representatives of nine ministries responsible for dealing with climate change related issues and serves to establish guidelines, design policies and coordinate public action on climate change.

23. In its BUR, Brazil reported that two ministries are responsible for coordinating the preparation of its NCs and BURs. The Ministry of Science, Technology and Innovation coordinates projects related to NCs, with inputs from various public and private institutions. The Ministry of Foreign Affairs coordinates work on BURs, with the support of a task force involving five ministries (Ministry of Agriculture, Livestock and Food Supply, Ministry of the Economy, Ministry of Environment, Ministry of Mines and Energy, and Ministry of Science, Technology and Innovation), the Brazilian Agricultural Research Corporation and

the Brazilian Cooperation Agency. The TTE noted improvements to the information reported in the BUR, including on the roles and responsibilities of the institutions involved in preparing NCs and BURs.

24. Information on the roles and responsibilities of the Commission for the Coordination of Meteorology, Climatology and Hydrology Activities, as well as on its relationship with the Inter-ministerial Committee on Climate Change, was not clearly reported in Brazil's BUR. During the technical analysis, the Party clarified that the Commission is responsible for coordinating, monitoring and assessing the implementation of meteorological, climatological and hydrological activities in the country, and that it contributes to the formulation of relevant national policies. The Commission is composed of representatives of 22 public institutions and civil society organizations, and the Ministry of Science, Technology and Innovation serves as its executive secretariat. During the technical analysis, the Party informed the TTE that the Commission's scope of action is currently being redefined and noted that, regarding its relationship with the Inter-ministerial Committee on Climate Change, the two institutions have different but complementary roles in implementing the Party's national policies on climate change.

25. It was not clear to the TTE from the information included in the BUR whether specific institutional arrangements are in place for avoiding potential discrepancies between NCs and BURs, given that different entities coordinate their preparation. During the technical analysis, the Party clarified that, although the Ministry of Foreign Affairs and the Ministry of Science, Technology and Innovation are responsible for BURs and NCs, respectively, they cooperate closely on these reports; therefore, while textual descriptions may vary occasionally between NCs and BURs, more broadly their consistency is ensured.

26. The TTE noted that the transparency of the information reported on institutional arrangements could be further enhanced by addressing the areas noted in paragraphs 24–25 above, which could facilitate a better understanding of the information reported on institutional arrangements.

27. In paragraph 22 of the summary report on the technical analysis of Brazil's third BUR, the previous TTE noted that the transparency of the reporting on institutional arrangements could be further enhanced by clearly reporting on the roles and responsibilities of the agencies involved in the preparation of the Party's NCs and BURs on a continuous basis, particularly in relation to QA/QC procedures and coordination arrangements. The current TTE noted the improvements referred to in paragraph 23 above and commends the Party for enhancing the transparency of its reporting.

28. Brazil reported in its fourth BUR an update on its domestic MRV arrangements, which are designed at the national level and cover two main areas: the GHG inventory system and MRV of mitigation actions and their effects. The Party reported that, in accordance with decree 10.145, the Inter-ministerial Committee on Climate Change is responsible for developing strategies for monitoring and evaluating climate change policies and for ensuring Brazil's compliance with reporting under the Convention.

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

29. As indicated in table I.1, Brazil 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 UNFCCC guidelines for the preparation of NCs from non-Annex I Parties, contained in the annex to decision 17/CP.8.

30. Brazil submitted its fourth BUR in 2020 and the GHG inventory reported is for 1990–2016. The GHG inventory is consistent with the requirements for the reporting time frame.

31. GHG emissions and removals for the BUR covering the 1990–2016 inventories were estimated using tier 1, 2 and 3 methodologies from the Revised 1996 IPCC Guidelines, the IPCC good practice guidance, the IPCC good practice guidance for LULUCF and, for some individual categories, the 2006 IPCC Guidelines. Brazil used the 2006 IPCC Guidelines for the following categories: fuel combustion (stationary and mobile combustion), cement production, other uses of limestone and dolomite, steel production, aluminium production, chemical industry, HFC production and consumption, SF<sub>6</sub> consumption, and CO<sub>2</sub> emissions

and removals from land-use change. Brazil also used parameters from the 2006 IPCC Guidelines for all categories in the waste sector. The TTE commends the Party for using the most recent IPCC guidelines for these categories.

32. Information on the sources of AD and EFs and on the EFs used was clearly reported in the BUR, including a summary, in tabular format, of sources of AD and EFs for each sector (in appendix II). Brazil reported that it used the same methodologies as those used in preparing the NC3 to obtain a data set of AD and EFs for the BUR. When updated assumptions or parameters were used for the BUR, the Party provided clear information on these for each category (in appendix II). During the technical analysis, Brazil noted that it referenced methodologies, assumptions and parameters from the NC3 rather than the more recent NC4 because the validation process for the NC4 was still under way when the fourth BUR was being prepared. The Party also clarified that, for the NC4, methodologies from the 2006 IPCC Guidelines were used for all categories.

33. Updated data on activity levels were not reported in Brazil's BUR. During the technical analysis, the Party clarified that reporting this information is not mandatory for non-Annex I Parties and was therefore not prioritized in preparing the BUR. In the light of its capacity and national circumstances, Brazil decided to focus its reporting on mandatory requirements.

34. Information on the Party's total GHG emissions by gas for 2016 is outlined in table 1 in Gg CO<sub>2</sub> eq, as calculated by the TTE using information from the BUR and the GWP values from the AR2. It shows a decrease in emissions of 3.1 per cent with LULUCF, and an increase of 83.6 per cent without LULUCF, since 1990.

Table 1

**Greenhouse gas emissions by gas of Brazil for 2016**

<i>Gas</i>	<i>GHG emissions (Gg CO<sub>2</sub> eq) including LULUCF</i>	<i>% change 1990–2016</i>	<i>GHG emissions (Gg CO<sub>2</sub> eq) excluding LULUCF</i>	<i>% change 1990–2016</i>
CO <sub>2</sub>	747 085.00	–23.2	478 123.00	123.9
CH <sub>4</sub>	362 646.90	42.9	348 534.90	50.4
N <sub>2</sub> O	185 119.60	58.4	177 326.20	71.2
HFCs	10 232.01	627.3	10 232.01	627.3
PFCs	259.22	–88.3	259.22	–88.3
SF <sub>6</sub>	227.05	–5.0	227.05	–5.0
Other	–	NA	–	NA
<b>Total</b>	<b>1 305 569.78</b>	<b>–3.1</b>	<b>1 014 702.38</b>	<b>83.6</b>

35. Information on other emissions was clearly reported, including, for 2016, 2,860.4 Gg NO<sub>x</sub>, 24,442.7 Gg CO and 106,506.1 Gg NMVOCs.

36. Information on other gases not controlled by the Montreal Protocol, such as SO<sub>x</sub>, and included in the Revised 1996 IPCC Guidelines was not reported in Brazil's BUR. However, the Party provided relevant clarification in its BUR, stating that it decided not to estimate sulfur dioxide emissions as they are not considered relevant for the country.

37. Brazil applied notation keys in tables where numerical data were not provided, which is an improvement compared with the previous BUR. The use of notation keys was mostly consistent with the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties.

38. Notation keys were not clearly reported in some of the summary tables of the BUR, including for CH<sub>4</sub> emissions from fuel combustion in civil aviation and in the public subsector (table IX, p.23), CO and NO<sub>x</sub> emissions from the burning of cotton residue (appendix I, pp.96–97) and fluorinated gases across the time series (appendix I, p.99). During the technical analysis, the Party clarified that, owing to formatting issues, in the BUR tables “not occurring” was denoted by “-” and values smaller than two decimal places were denoted by “0.0”.

39. Brazil reported comparable information addressing the sectoral reporting tables annexed to the Revised 1996 IPCC Guidelines in the BUR (tables VIII–XIII).

40. Comparable information addressing the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF was not reported in Brazil's BUR. During the technical analysis, the Party clarified that provision of this information was not prioritized in preparing the BUR: reporting on GHG emissions and removals from the LULUCF sector would require a large investment in resources to compare satellite data over the time series and identify variations in carbon stock for each mapping unit.

41. The shares of emissions that different sectors contributed to the Party's total GHG emissions excluding LULUCF, as calculated by the TTE using information from the BUR and the GWP values from the AR2, in 2016 are reflected in table 2.

Table 2

**Shares of greenhouse gas emissions by sector of Brazil for 2016**

<i>Sector</i>	<i>GHG emissions (Gg CO<sub>2</sub> eq)</i>	<i>% share<sup>a</sup></i>	<i>% change 1990–2016</i>
Energy	422 498.40	41.6	127.3
IPPU	90 106.78	8.9	73.1
Agriculture	439 212.80	43.3	53.0
LULUCF	290 867.40	NA	–63.4
Waste	62 884.40	6.2	127.9

<sup>a</sup> Share of total emissions without LULUCF.

42. Brazil reported information on its use of GWP values consistent with those provided by the IPCC in its AR2 based on the effects over a 100-year time-horizon of GHGs. In addition, the Party presented inventory data using GWP values and global temperature change potential values consistent with those provided in the AR5 based on the effects over a 100-year time-horizon of GHGs.

43. For the energy sector, information was clearly reported on fuel combustion for the energy and manufacturing industries, transport, residential, agriculture and other subsectors; fugitive emissions from coal mining; and oil and natural gas operations. Road transport and electricity production were the two largest contributors to CO<sub>2</sub> emissions in the energy sector, responsible for 45.8 and 20.4 per cent, respectively, of the sectoral total for 2016. To estimate CO<sub>2</sub> emissions for this sector, Brazil used mostly default EFs from the 2006 IPCC Guidelines, although it used country-specific EFs for a few categories (e.g. road transport and pipeline transport) and fuels (e.g. firewood and charcoal). For non-CO<sub>2</sub> gases, default EFs were used with methodologies from the Revised 1996 IPCC Guidelines and the 2006 IPCC Guidelines.

44. For the industrial processes and other product use sector, information was clearly reported on mineral industry, chemical industry and metal industry; use of HFCs, PFCs and SF<sub>6</sub>; and other manufacturing industries. Iron and steel production was the largest source of CO<sub>2</sub> emissions for 2016 in this sector, followed by cement production (47.5 and 28.7 per cent of total sectoral CO<sub>2</sub> emissions, respectively). The 2006 IPCC Guidelines were used for estimating emissions from cement production (tier 3 methodology); steel production and other uses of limestone and dolomite (tier 1 for both); and aluminium production, chemical industry, HFC production and consumption, and SF<sub>6</sub> consumption (a combination of tiers 1, 2 and 3). The Revised 1996 Guidelines were used for estimating emissions from lime production (tier 2) and other uses of soda ash (tier 1).

45. For the agriculture sector, information was reported on enteric fermentation, manure management, agricultural soils, rice cultivation and burning of crop residues. CH<sub>4</sub> emissions from enteric fermentation of beef cattle and direct N<sub>2</sub>O emissions from agricultural soils were the principal sources of emissions in this sector (77.6 and 59.2 per cent of the sectoral total, respectively). The Party applied a combination of tier 1 and 2 methodologies from the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the 2006 IPCC Guidelines. Country-specific parameters were used for CH<sub>4</sub> emissions from enteric fermentation of cattle, CH<sub>4</sub> and N<sub>2</sub>O emissions from manure management of cattle and of swine, CH<sub>4</sub> emissions from rice cultivation and N<sub>2</sub>O emissions from agriculture.

46. The approach used to disaggregate data by livestock type for enteric fermentation and manure management was not clearly reported in Brazil's BUR. In particular, it was not clear



to the TTE why disaggregated data on CH<sub>4</sub> emissions from enteric fermentation of swine were not reported given that CH<sub>4</sub> emissions from manure management of swine was reported as a separate category. During the technical analysis, the Party clarified that CH<sub>4</sub> emissions from the enteric fermentation of swine were included under the category other animals.

47. For the LULUCF sector, Brazil reported annual GHG emissions and removals for 1990–2016. Overall, the net emissions from the LULUCF sector fluctuated between a minimum of 62,020.60 Gg CO<sub>2</sub> eq in 2012 and a maximum of 2,508,963.40 Gg CO<sub>2</sub> eq in 2004. The Party used a combination of tier 1, 2 and 3 methodologies and approach 3 (spatially explicit land-use conversion data) from the 2006 IPCC Guidelines to estimate CO<sub>2</sub> emissions and removals from land-use change. Non-CO<sub>2</sub> emissions from land-use change and CO<sub>2</sub> emissions from liming were estimated using a combination of tier 1 and 2 methodologies from the IPCC good practice guidance for LULUCF.

48. Disaggregated data by land-use category (i.e. forest land, cropland, grassland, wetlands, settlements and other land) were not reported in Brazil's BUR. During the technical analysis, the Party clarified that it nonetheless provided separate data for liming and for land-use change at an aggregated level and will consider reporting information by land-use category in its next BUR.

49. Information on gross and net CO<sub>2</sub> emissions from land-use change and liming for 1994 was not clearly reported in Brazil's BUR. In BUR table VIII, for 1994, the Party reported the same value of 1,176,700 Gg for gross CO<sub>2</sub> emissions from both land-use change and liming, and it reported CO<sub>2</sub> removals from land-use change as –362,411 Gg. These values are not compatible with the net CO<sub>2</sub> emissions of 823,280 Gg reported for the LULUCF sector for the same year. During the technical analysis, the Party clarified that the discrepancy arose from a data input error and that the correct value is 8,991 Gg for gross and net CO<sub>2</sub> emissions from liming for 1994.

50. For the waste sector, information was clearly reported on solid waste and on domestic and industrial wastewater. CH<sub>4</sub> emissions from solid waste disposal sites was the main source for the sector (52.1 per cent of the sectoral total). The Party used a combination of tier 1 and 2 methodologies from the Revised 1996 IPCC Guidelines and the 2006 IPCC Guidelines for estimating emissions for reported categories in the sector. Default EFs from the 2006 IPCC Guidelines were used for the following parameters: fraction of decomposing degradable organic carbon, CH<sub>4</sub> correction factor for waste disposal site management, fraction of CH<sub>4</sub> generated in landfill gas, protein nitrogen fraction, carbon content in waste, fraction of fossil carbon in waste incinerated, and burnout efficiency of combustion of waste incinerators.

51. The BUR provides an update to all GHG inventories reported in the Party's previous NCs and BURs. The information reported provides an update of Brazil's third BUR, which addressed anthropogenic emissions and removals for 1990–2015. The update was carried out for 1990–2015 using a combination of the methodologies contained in the Revised 1996 IPCC Guidelines, IPCC good practice guidance, IPCC good practice guidance for LULUCF and 2006 IPCC Guidelines, thus generating a consistent 27-year time series. During the technical analysis, the Party clarified that it performed recalculations for 2011–2015 owing to the availability of updated AD (the same EFs were used).

52. Brazil described in its BUR the institutional framework for the preparation of its 2016 GHG inventory. The Party reported that the Ministry of Science, Technology and Innovation is the government body responsible for its GHG inventory. The Ministry has established a technical team for this purpose, in partnership with relevant institutions, which is supported by sectoral working groups. The Brazilian Research Network on Global Climate Change, which was established by the Ministry in collaboration with academic and research institutions, supports the preparation of GHG inventories by updating AD, EFs and relevant parameters.

53. Brazil reported that its GHG inventories are archived (as a set of spreadsheets together with metadata used for inventory preparation) on the internal network of the Ministry of Science, Technology and Innovation. A national emission registry has been established as an official instrument to enhance the security of the archived data and facilitate public access to the GHG inventories. The Party noted that long-term improvements to the registry – to

expand the range of data it holds and to enable analysis of relevant indicators – are under way as part of a phased approach.

54. The results of a key category analysis were not reported in the BUR, although Brazil noted in the BUR (p.16) that the key categories were analysed to identify the subsectors that should be prioritized for methodological refinement. During the technical analysis, the Party provided the results of its key category analysis to the TTE to allow a better understanding of the information reported in the BUR, but noted that the results are confidential.

55. The BUR provides information on QA/QC measures for all sectors. With regard to QC, the technical team (see para. 52 above) reviews the methodologies, AD, EFs, parameters and calculations used to estimate emissions. For QA, the inventory reports, sectoral reference documents and spreadsheets are shared with experts who are not directly involved in preparing the inventory; their comments and suggestions are incorporated into the inventory or responded to, as appropriate. The TTE commends Brazil for providing information in accordance with the IPCC good practice guidance.

56. Brazil clearly reported information on CO<sub>2</sub> fuel combustion using both the sectoral and the reference approach. For 2016, the information reported indicates that the combustion emissions estimated under the sectoral and reference approach are 382,504 and 382,166 Gg CO<sub>2</sub> eq, respectively. The difference between the estimates calculated using the two approaches was reported as 0.1 per cent. The Party reported in the BUR that the difference was more than 5 per cent for 1990–1999 owing to statistical adjustments made in the national energy balance and the values considered to account for variation in oil stocks for those years. The Party also reported that it is currently investigating the findings from using both the sectoral and the reference approach to further improve its estimates of combustion emissions in the future.

57. Information was clearly reported on international aviation and marine bunker fuels in the BUR (appendix I). For 2016, the Party reported that emissions from international aviation and marine bunkers were estimated as 17.13 Gg CO<sub>2</sub>, 0.10 Gg CH<sub>4</sub>, 0.28 Gg N<sub>2</sub>O, 3.40 Gg CO, 27.30 Gg NO<sub>x</sub> and 19.40 Gg NMVOCs.

58. Brazil reported information on the uncertainty assessment (level) of its national GHG inventory for 2016 (BUR tables IV–VII). The uncertainty analysis covers all source categories (including LULUCF) and the direct GHGs CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O. The results obtained were clearly reported by gas in the BUR and reveal that the level uncertainty was highest for N<sub>2</sub>O emissions (44 per cent), followed by CH<sub>4</sub> emissions (24 per cent) and CO<sub>2</sub> emissions (12 per cent). The combined total uncertainty for these gases was 11 per cent.

59. Information on the underlying assumptions and methodologies used to conduct the uncertainty analysis was not reported in Brazil's BUR; although the Party stated that it used the same criteria as for its third inventory to conduct the analysis, it was not clear to the TTE which document contains the third inventory. During the technical analysis, the Party clarified that it used approach 1 of the 2006 IPCC Guidelines for its uncertainty analysis and noted that reporting information on underlying assumptions and methodologies is not mandatory for non-Annex I Parties and was therefore not prioritized in preparing the BUR.

60. The TTE noted that the transparency of the information reported on GHG inventories could be enhanced by addressing the areas noted in paragraphs 33, 38, 40, 46, 48, 49, 54 and 59 above, which could facilitate a better understanding of the information reported on GHG inventories.

61. In paragraph 47 of the summary report on the technical analysis of Brazil's third BUR, the previous TTE noted areas where the transparency of the reporting on GHG inventories could be further enhanced. The current TTE noted that Brazil took into consideration these areas for improvement (methodologies used in preparing its GHG inventory, notation keys and CO<sub>2</sub> fuel combustion using both the sectoral and the reference approach), as referred to in paragraphs 32, 37 and 56 above, and commends the Party for enhancing the transparency of its reporting.

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

62. As indicated in table I.2, Brazil 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.

63. The information reported provides a clear overview of the Party's mitigation actions and their effects. In its BUR, Brazil reported information on its national context and framed its national mitigation planning and actions in the context of its national policy on climate change, which was instituted through law 12.187 of 29 December 2009. The objectives of the policy include promoting sustainable development while protecting the climate system, reducing GHG emissions from various sources and strengthening removals of GHGs by sinks. Key instruments under the policy include the National Fund on Climate Change, action plans for the prevention and control of deforestation, fiscal and tax measures, and research programmes. The law formalized Brazil's voluntary target to reduce its GHG emissions by 36.1–38.9 per cent below the 'business as usual' level in 2020. The Party also referred to its nationally determined contribution, the aim of which is to reduce GHG emissions by 37 per cent in 2025 and by 43 per cent in 2030 below the 2005 level. Most of the mitigation actions are in the energy sector. Further, the mitigation actions reported in the BUR contributed to an overall estimated reduction in emissions of 974–1,051 Mt CO<sub>2</sub> eq by 2020, with the LULUCF sector being the main source of emission reductions.

64. The Party reported a summary of its mitigation actions in tabular format in accordance with decision 2/CP.17, annex III, paragraph 11. Eight mitigation actions covering the energy, agriculture and LULUCF sectors are summarized in the BUR (table XVI). The Party also reported information on its mitigation actions in narrative format.

65. Consistently with decision 2/CP.17, annex III, paragraph 12(a), Brazil clearly reported the names of mitigation actions, coverage (sector) and progress indicators for all mitigation actions in the BUR (table XVI). Information on the coverage of gases was provided for only one mitigation action (in the agriculture sector). A clear description of mitigation actions was provided for those in the agriculture and LULUCF sectors. Information on goals was provided for each mitigation action, but for some goals the description was only qualitative.

66. Information on the coverage of gases was not reported for mitigation actions in the energy and LULUCF sectors. During the technical analysis, the Party clarified that it decided not to report information on individual gases as it considers reporting information in CO<sub>2</sub> eq for all actions makes them more comparable than applying different metrics for different actions. The Party also clarified that policies and measures vary in nature and reducing GHG emissions is not the primary objective for some actions (rather, an emission reduction is considered to be an indirect effect).

67. In the BUR, Brazil provided a clear description of the mitigation actions in the industrial processes and other product use, agriculture and LULUCF sectors (table XVI). However, for the actions in the energy sector, descriptions were not provided. During the technical analysis, the Party provided information on each mitigation action in the energy sector.

68. Brazil clearly reported information on the objectives of the actions and steps taken to achieve those actions for all mitigation actions reported.

69. Brazil reported five mitigation actions in the energy sector, three of which are aimed at increasing the share of renewable energy in the national energy mix by increasing energy supply from (1) hydroelectric power plants, (2) alternative energy (solar, wind and biomass) or (3) biofuels. Of those three actions, increasing energy supply from hydroelectric power plants has the potential for achieving the most significant GHG emission reductions by 2020 (79–99 Mt CO<sub>2</sub> eq), followed by the actions on biofuels (48–60 Mt CO<sub>2</sub> eq) and solar, wind and biomass (26–33 Mt CO<sub>2</sub> eq). The Party reported that during 2018–2019 it installed additional capacity of 8,835 MW hydroelectric power, 3,346 MW solar photovoltaic power, 3,095 MW wind power and 302 MW power from biomass. Regarding biofuels, supply of 68.4 million m<sup>3</sup> ethanol and 11.3 million m<sup>3</sup> biodiesel was added to the fuel mix in 2018–2019.

70. The remaining two mitigation actions in the energy sector focus on (1) increasing energy efficiency and (2) promoting sustainable production in the steel industry, and the Party estimated GHG emission reductions by 2020 of 12–15 and 8–10 Mt CO<sub>2</sub> eq, respectively, for these two mitigation actions. In its BUR, Brazil reported that electricity consumption in the country was reduced by 44,590 GWh in 2018–2019, compared with the baseline scenario for that period. The action on steel also relates to the IPPU sector, as it promotes the sustainable production of charcoal used in the production of pig iron, steel and ferroalloys.

71. For the LULUCF sector, the Party reported two mitigation actions: the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon, and the Action Plan for the Prevention and Control of Deforestation and Forest Fires in the Cerrado. These action plans focus on the prevention and control of deforestation and the sustainable management of forests. Each action plan includes several specific measures, such as using economic incentives to control illegal deforestation, preventing and combating forest fires and strengthening the monitoring of vegetation cover. The Party reported that the deforested area in the Legal Amazon decreased by 63.5 per cent by 2019 compared with the 2004 area, while the deforested area in the Cerrado biome decreased by 53.6 per cent by 2018 compared with the 2010 area. The estimated GHG emission reductions by 2020 of the action plans are 564 Mt CO<sub>2</sub> eq for the Legal Amazon and 104 Mt CO<sub>2</sub> eq for the Cerrado biome. In addition to these action plans, Brazil has developed a new plan, which was approved by a decree in 2019, for the control of illegal deforestation and the recovery of native vegetation in order to strengthen its efforts to address deforestation.

72. Brazil reported one mitigation action for the agriculture sector, namely the National Plan for Low Carbon Emissions in Agriculture (known as the ABC Plan). Developed in 2010, the plan promotes sustainable agricultural practices through a set of actions focused on restoring degraded pasture land; establishing an integrated system for crops, livestock and agroforestry; increasing no-till farming; and increasing biological nitrogen fixation. In its BUR, the Party reported that in 2010–2019 49.35 million ha land was farmed using sustainable agricultural practices through implementing the plan. The estimated GHG emission reductions from the plan by 2020 include 83–104 Mt CO<sub>2</sub> eq from the restoration of degraded pasture land, 18–22 Mt CO<sub>2</sub> eq from integrated crop–livestock–agroforestry systems, 16–20 Mt CO<sub>2</sub> eq from no-till farming and 16–20 Mt CO<sub>2</sub> eq from biological nitrogen fixation.

73. Brazil reported information on the methodologies and assumptions relating to the scope and implementation of the mitigation actions for all sectors in the BUR (table XVI). During the technical analysis, the Party provided information on the methodologies and assumptions used in monitoring the progress of implementation of the mitigation actions and clarified that the outcomes of mitigation actions are measured against the progress indicators listed in the BUR (table XVI). While noting that it has made improvements to the information reported compared with its previous BURs, the Party indicated that it is willing to further improve its reporting on methodologies and assumptions, given adequate capacity-building and financial support.

74. Information on progress of implementation was not reported for some of the mitigation actions. Although Brazil reported in its BUR that the implementation period of most mitigation actions ended in 2019, it was not clear to the TTE whether this means all mitigation actions have been completed. During the technical analysis, the Party clarified that the mitigation actions for the energy and agriculture sectors are ongoing, while the two LULUCF actions concluded in 2019. Brazil's efforts to combat illegal deforestation are now managed under a new plan (see para. 71 above).

75. Information on results achieved was not clearly reported in the BUR. Although Brazil reported the estimated GHG reduction for each mitigation action by 2020, it was not clear to the TTE how actual emission reductions tracked against these estimates – information that may have been available considering the BUR was submitted in December 2020. During the technical analysis, the Party clarified that, while it can provide information on emission reductions at the sectoral level through its GHG inventory, it requires capacity-building and financial support to quantify the impacts and results achieved at the mitigation action level.

76. Brazil provided information on its involvement in international market mechanisms as a Party to the Kyoto Protocol. Brazil reported that 426 CDM projects were approved by its designated national authority during 2004–2017, with 344 of these being verified CDM projects under the UNFCCC CDM process. The Party provided a summary of its CDM project activities in tabular format in the BUR (table XVII), including the thematic areas covered by the activities (as well as the number of activities and the share of total activities under each theme) and the GHG emission reductions estimated to result from the activities. Projects related to hydropower plants account for the largest share of activities (27.7 per cent of all activities), followed by biogas (18.3 per cent) and wind power (16.5 per cent). Brazil estimated that the 344 CDM project activities will together result in a GHG emission reduction of 380 Mt CO<sub>2</sub> eq during the first crediting period.

77. Brazil reported information on its domestic MRV arrangements in accordance with decision 2/CP.17, annex III, paragraph 13. In 2013, the Party designed a modular system for monitoring mitigation actions, and in 2014 it formulated guidelines for its implementation. However, further work on the modular system has been put on hold pending the finalization of reporting requirements related to the ETF in order to avoid duplication of work and possible extra costs. During the technical analysis, the Party clarified that it will resume implementation of the planned system once the above-mentioned reporting requirements, including details of the information necessary to track progress of nationally determined contributions, are known. Brazil also indicated that it will require financial support to fully implement the system. In addition to cross-cutting MRV information, the Party provided information in the BUR on its efforts to strengthen MRV of mitigation actions for specific sectors (including agriculture and LULUCF) and categories (e.g. steel production).

78. The TTE noted that the transparency of the information reported on mitigation actions could be further enhanced by addressing the areas noted in paragraphs 66–67 and 73–75 above, which could facilitate a better understanding of the information reported on mitigation actions.

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

79. As indicated in table I.3, Brazil reported in its BUR, fully in accordance with paragraphs 14–16 of the UNFCCC reporting guidelines on BURs, information on finance, technology and capacity-building needs and support received.

80. Brazil reported information on constraints and gaps, and related financial, technical and capacity-building needs in accordance with decision 2/CP.17, annex III, paragraph 14. In its BUR, the Party presented information in tabular format (table XVIII) for each activity planned for all sectors, while noting that the information should be considered provisional, partial and non-exhaustive. Brazil identified its vast national territory, highly diverse institutional system with a large variety of stakeholders, and limited resources as constraints. The Party reported that its financial, technical and capacity-building needs are primarily in the areas of infrastructure development, technological development, knowledge management and the training of experts. In addition to providing the information on activities in tabular format, Brazil reported that it faces considerable challenges in identifying and assessing constraints and gaps and related needs comprehensively, given the diverse social, economic and environmental factors at play in the country.

81. The information reported in table XVIII of the fourth BUR was similar to that reported in table XVI of Brazil's third BUR; therefore, it was not clear to the TTE whether the information had been updated. During the technical analysis, the Party clarified that some of the constraints and gaps reported for the agriculture sector have not been updated since the third BUR owing to ongoing changes in the implementation strategies of mitigation actions in the sector. For the energy sector, while the need for concentrated solar thermal plants in order to increase renewable energy in the national energy mix is similar to a need reported in the third BUR, additional constraints and gaps and related needs linked to other activities are reported in the fourth BUR.

82. Information on the technical and capacity-building needs for three activities in the agriculture sector was not clearly reported in the BUR. During the technical analysis, the

Party clarified that activities, including these three, should be considered as having no related needs, unless otherwise reported in the table.

83. Brazil reported information on financial resources, technology transfer, capacity-building and technical support received in accordance with decision 2/CP.17, annex III, paragraph 15. In its BUR, in addition to noting that it received support from the GEF (see para. 85 below), the Party provided information on the support it received through multilateral and bilateral channels during 2018–2019 in tabular format (tables XIX–XXII), including for each project its name, sectoral coverage, total amount of funding, share of the climate-specific component and type of financing instrument. The Party reported that the total support it received through these channels for the biennium was approximately USD 1.874 billion, of which less than 6 per cent was allocated through bilateral channels. During the technical analysis, the Party clarified that information on support received through bilateral channels only includes resources received by or implemented under the authority of a public entity. The Party also clarified that this information was compiled from data from the Brazilian Cooperation Agency and relevant ministries, with technical support from the Ministry of the Economy.

84. In the BUR, Brazil noted that the total amount of support received through both bilateral and multilateral channels in 2018–2019 was significantly less than the support received in 2017. During the technical analysis, the Party indicated that this is an ongoing trend that was also noted in its third BUR: the support received during the biennium 2016–2017 was 14 per cent lower than the support received in 2014–2015. The Party noted that access to climate finance remains a considerable challenge to developing countries and indicated that it is making efforts to identify opportunities for receiving additional financial support.

85. In its BUR, Brazil reported that it received USD 500,000 from the GEF, which included allocation for a joint project to prepare both its fourth BUR and its NC4. The project was implemented in partnership with the United Nations Development Programme. The Party reported that the resources used for preparing its BURs and REDD+ technical annexes were not limited to those received from the GEF; financial contributions were also received from national agencies and through international projects.

86. The BUR (tables XIX–XXII) provides comprehensive information on financial resources, technology transfer, capacity-building and technical support received. However, the meaning of “1/2”, which was one of the numerical values Brazil used in those tables to indicate the type of support received, by project, was not clear to the TTE. During the technical analysis, the Party clarified that “1/2” indicates that the project provides both capacity-building and technology transfer support.

87. Brazil reported information on nationally determined technology needs with regard to the development and transfer of technology in accordance with decision 2/CP.17, annex III, paragraph 16. The needs for technology development and transfer were reported in tabular format in the BUR (table XVIII) for all sectors. The needs identified by the Party in the BUR include developing technologies for concentrated solar thermal plants and for energy storage, developing methodologies for MRV of energy efficiency programmes and determining ways of sharing technologies with stakeholders.

88. The TTE noted that the transparency of the information reported on needs and support received could be further enhanced by addressing the areas noted in paragraphs 81, 82 and 86 above, which could facilitate a better understanding of the information reported on needs and support received.

#### **D. Identification of capacity-building needs**

89. In consultation with Brazil, the TTE identified the following needs for capacity-building that could facilitate the preparation of subsequent BURs and participation in ICA in the areas of:

- (a) GHG inventory preparation:

- (i) Collecting the data required for applying higher-tier methodologies;
- (ii) Preparing a national GHG inventory on a biennial basis;
- (iii) Reporting the results of key category analyses;
- (iv) Reporting on the methodologies and assumptions used for uncertainty analyses;
- (v) Reporting GHG emissions and removals from the LULUCF sector by land-use category;
- (vi) Using notation keys in GHG inventory tables;
- (b) Mitigation actions and their effects:
  - (i) Reporting on the methodologies and assumptions used for estimating the outcomes of mitigation actions;
  - (ii) Reporting GHG emission reductions achieved by implementing mitigation actions;
- (c) Needs and support:
  - (i) Analysing and reporting information on constraints and gaps, including the associated financial needs;
  - (ii) Enhancing the domestic MRV of support received.

90. The TTE noted that, in addition to those identified during the technical analysis, Brazil reported several capacity-building needs in the BUR (table XVIII), covering the following areas:

- (a) Training of experts and stakeholders involved in implementing the mitigation actions for the energy, agriculture and LULUCF sectors;
- (b) Research and development related to implementing the mitigation actions for the energy, agriculture and LULUCF sectors;
- (c) Knowledge management and dissemination of information related to alternative energy sources and energy efficiency.

91. In paragraph 67 of the summary report on the technical analysis of Brazil's third BUR, the previous TTE, in consultation with Brazil, identified a capacity-building need to strengthen the institutional framework for GHG inventories such that it facilitates their preparation on a biennial basis and enables data collection and the application of higher-tier methodologies (in particular for the IPPU and LULUCF sectors). During the technical analysis, the Party confirmed that this remains a capacity-building need and that it is especially important in the context of preparing for ETF implementation.

### III. Conclusions

92. The TTE conducted a technical analysis of the information reported in the fourth BUR of Brazil in accordance with the UNFCCC reporting guidelines on BURs and concludes that the information reported is mostly consistent. It 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 removals by sinks of all GHGs not controlled by the Montreal Protocol; mitigation actions and their effects; constraints and gaps, and related financial, technical and capacity-building needs, including a description of support received; the level of support received to enable the preparation and submission of BURs; and domestic MRV. During the technical analysis, additional information was provided by Brazil on institutional arrangements, the GHG inventory, mitigation actions, constraints and gaps, support needed and received, and domestic MRV. The TTE concluded that the information analysed is partially transparent.

93. Brazil reported an update on the institutional arrangements relevant to the preparation of its NCs and BURs. The Ministry of Science, Technology and Innovation coordinates preparation of NCs, while the Ministry of Foreign Affairs, with support from other relevant

ministries, coordinates preparation of BURs. The Inter-ministerial Committee on Climate Change and the Commission for the Coordination of Meteorology, Climatology and Hydrology Activities are the key institutions involved in the governance of Brazil's national policy on climate change. Brazil also reported information on its domestic MRV arrangements, which cover GHG inventory preparation and mitigation actions. The Party is planning to introduce improvements to its MRV arrangements, including a modular system for monitoring mitigation actions; these improvements are pending the finalization of reporting requirements related to the ETF.

94. In its fourth BUR, submitted in 2020, Brazil reported information on its national GHG inventory for 1990–2016. This included GHG emissions and removals of CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs and SF<sub>6</sub> for all relevant sources and sinks as well as the precursor gases. The inventory was developed on the basis of the Revised 1996 IPCC Guidelines, although in some cases the IPCC good practice guidance or the IPCC good practice guidance for LULUCF, and specific EF values from the 2006 IPCC Guidelines, were applied for individual key categories. The total GHG emissions for 2016 were reported as 1,014,702.38 Gg CO<sub>2</sub> eq (excluding LULUCF) and 1,305,569.78 Gg CO<sub>2</sub> eq (including LULUCF). The agriculture sector was the largest source of GHG emissions for 2016 (43.4 per cent of total emissions), followed by the energy sector (41.6 per cent), when excluding LULUCF.

95. Brazil reported information on mitigation actions and their effects in both tabular and narrative format and framed mitigation actions in the context of its national policy on climate change. The Party reported eight mitigation actions in the energy, LULUCF and agriculture sectors. The five actions in the energy sector focus on promoting renewable energy in the energy mix, increasing energy efficiency and promoting sustainable production in the steel industry. The two mitigation actions in the LULUCF sector are action plans for preventing and controlling deforestation in the Legal Amazon and the Cerrado biome. The mitigation action for the agriculture sector promotes sustainable agricultural practices in the country. The highest estimated emission reduction by 2020 was reported for the LULUCF sector: 564 Mt CO<sub>2</sub> eq from the Legal Amazon action plan and 104 Mt CO<sub>2</sub> eq from the Cerrado biome action plan. The Party also reported information on its involvement in international market mechanisms and MRV arrangements.

96. Brazil reported information on key constraints, gaps and related needs across all sectors, while noting that it experienced considerable challenges in providing in-depth information owing to the diverse social, economic and environmental factors at play in the country. Information was reported on the technical, technology transfer and capacity-building support received through bilateral and multilateral channels during 2018–2019, which totalled approximately USD 1.874 billion. The Party also reported that it received financial support of USD 500,000 from the GEF for preparing its latest BUR through a joint project to also prepare its NC4. Brazil further reported information on needs it identified for technology development and transfer, such as developing technologies for concentrated solar thermal plants and for energy storage.

97. The current TTE noted improvements in the reporting in the Party's fourth BUR compared with that in its third BUR. The information reported demonstrates that the Party has taken into consideration the areas for enhancing the transparency of the information reported noted by the TTE in the summary report on the technical analysis of the third BUR. However, improvements are ongoing, and the Party has taken note of outstanding areas for future improvement.

98. The TTE, in consultation with Brazil, identified the 10 capacity-building needs listed in chapter II.D above and needs for capacity-building that aim 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. Brazil identified the following as priority capacity-building needs:

- (a) Collecting the data required for applying higher-tier methodologies;
- (b) Preparing a national GHG inventory on a biennial basis;
- (c) Analysing and reporting information on constraints and gaps, including the associated financial needs.



## Annex I

### Extent of the information reported by Brazil in its fourth biennial update report

Table I.1

**Identification of the extent to which the elements of information on greenhouse gases are included in the fourth biennial update report of Brazil**

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</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	Brazil submitted its fourth BUR in December 2020; the GHG inventory reported is for 1990–2016.
Decision 2/CP.17, annex III, paragraph 4	Non-Annex I Parties should use the methodologies established in the latest UNFCCC guidelines for the preparation of NCs from non-Annex I Parties approved by the Conference of the Parties or those determined by any future decision of the Conference of the Parties on this matter.	Yes	Brazil used a combination of the Revised 1996 IPCC Guidelines, IPCC good practice guidance, IPCC good practice guidance for LULUCF and 2006 IPCC Guidelines.
Decision 2/CP.17, annex III, paragraph 5	The updates of the section on 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	Brazil reported information on the sources of AD but did not provide any of the actual AD used to estimate emissions and removals.
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:		
	(a) The tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF;	No	
	(b) The sectoral report tables annexed to the Revised 1996 IPCC Guidelines.	Yes	Comparable information was reported in the BUR (tables VIII–XIII).
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 its 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 NCs 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 1994, 2000, 2010, 2012, 2015 and 2016.
Decision 2/CP.17, annex III, paragraph 9	The inventory section of the BUR should consist of a national inventory report as a summary or as an update of the information contained in decision 17/CP.8, annex, chapter III (National greenhouse gas inventories), including:		
	(a) Table 1 (National greenhouse gas inventory of anthropogenic emissions by sources and	Yes	

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
	removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors);		
	(b) Table 2 (National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF <sub>6</sub> ).	Yes	
Decision 2/CP.17, annex III, paragraph 10	Additional or supporting information, including sector-specific information, may be supplied in a technical annex.	Yes	The Party submitted two subnational REDD+ technical annexes.
Decision 17/CP.8, annex, paragraph 12	Non-Annex I Parties are also encouraged, to the extent possible, to undertake any key source analysis as indicated in the IPCC good practice guidance to assist in developing inventories that better reflect their national circumstances.	No	
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	
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 <sub>2</sub> ;	Yes	
	(b) CH <sub>4</sub> ;	Yes	
	(c) N <sub>2</sub> 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:		
	(a) HFCs;	Yes	
	(b) PFCs;	Yes	
	(c) SF <sub>6</sub> .	Yes	
Decision 17/CP.8, annex, paragraph 16	Non-Annex I Parties are encouraged, as appropriate, to report on anthropogenic emissions by sources of other GHGs, such as:		
	(a) CO;	Yes	
	(b) NO <sub>x</sub> ;	Yes	
	(c) NMVOCs.	Yes	
Decision 17/CP.8, annex, paragraph 17	Other gases not controlled by the Montreal Protocol, such as SO <sub>x</sub> , and included in the Revised 1996 IPCC Guidelines may be included at the discretion of Parties.	Yes	Brazil stated in its BUR that it decided not to estimate sulfur dioxide emissions as they are not considered relevant for the country.
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 <sub>2</sub> fuel combustion emissions using both the sectoral and the reference approach and to explain any large differences between the two approaches.	Yes	

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
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	
Decision 17/CP.8, annex, paragraph 20	Non-Annex I Parties wishing to report on aggregated GHG emissions and removals expressed in CO <sub>2</sub> eq should use the GWP provided by the IPCC in its AR2 based on the effects of GHGs over a 100-year time-horizon.	Yes	The Party used the GWP provided in the AR2 and presented comparisons of sectoral totals using the GWP and global temperature change potential values from the AR5.
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	Brazil used a combination of the Revised 1996 IPCC Guidelines, IPCC good practice guidance, IPCC good practice guidance for LULUCF and 2006 IPCC Guidelines. Tier 1, 2 or 3 methodologies were used for specific sectors.
	(b) Explanation of the sources of EFs;	Yes	
	(c) Explanation of the sources of AD;	Yes	
	(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 1–2 of the guidelines annexed to decision 17/CP.8 in reporting its national GHG inventory, taking into account the provisions established in	Yes	Notation keys were used.

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
	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.		
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;	Yes	
	(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, paras. 3–10 and 41(g). Further, as per para. 3 of those guidelines, non-Annex I Parties are to submit updates of their national GHG inventories in accordance with paras. 8–24 of the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties, 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 I.2

**Identification of the extent to which the elements of information on mitigation actions are included in the fourth biennial update report of Brazil**

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</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 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;	Partly	A description was not provided for the mitigation actions in the energy sector. Coverage of gases was not reported for the mitigation actions in the energy and LULUCF sectors.
	(b) Information on:		
	(i) Methodologies;	Yes	
	(ii) Assumptions;	Yes	
	(c) Information on:		
	(i) Objectives of the action;	Yes	
	(ii) Steps taken or envisaged to achieve that action;	Yes	

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
	(d) Information on:		
	(i) Progress of implementation of the mitigation actions;	Partly	The Party did not report information on status of implementation for some of the mitigation actions, although it provided information on the implementation period of each mitigation action.
	(ii) Progress of implementation of the underlying steps taken or envisaged;	Yes	
	(iii) Results achieved, such as estimated outcomes (metrics depending on type of action) and estimated emission reductions, to the extent possible;	Yes	
	(e) Information on international market mechanisms.	Yes	
Decision 2/CP.17, annex III, paragraph 13	Parties should provide information on 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, paras. 11–13.

Table I.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 fourth biennial update report of Brazil**

<i>Decision</i>	<i>Provision of the reporting requirements</i>	<i>Assessment of whether the information was reported</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;	Yes	
	(b) Related financial, technical and capacity-building needs.	Yes	
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;	Yes	
	(b) Information on technical support received from the GEF, 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	
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) Nationally determined technology needs;	Yes	
	(b) Technology support received.	Yes	

*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, paras. 14–16.

## Annex II

### Reference documents

#### A. Reports of the Intergovernmental Panel on Climate Change

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

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/gpglulucf/gpglulucf.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>.

#### B. UNFCCC documents

First, second, third and fourth BURs of Brazil. Available at <https://unfccc.int/BURs>.

NC3 and NC4 of Brazil. Available at <https://unfccc.int/non-annex-I-NCs>.

Summary reports on the technical analysis of the first, second and third BURs of Brazil, contained in documents FCCC/SBI/ICA/2015/TASR.1/BRA, FCCC/SBI/ICA/2017/TASR.2/BRA and FCCC/SBI/ICA/2019/TASR.3/BRA, respectively. Available at <https://unfccc.int/ICA-reports>.

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