



United Nations

FCCC/SBI/ICA/2016/TASR.1/IND



Framework Convention on
Climate Change

Distr.: General
24 February 2017

English only

Technical analysis of the first biennial update report of India submitted on 22 January 2016

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), consistent with their capabilities and the level of support provided for reporting, were to submit their first biennial update report (BUR) by December 2014. The least developed country Parties and small island developing States may submit BURs at their discretion. Further, according to paragraph 58(a) of the same decision, the first round of international consultation and analysis (ICA) will be conducted for non-Annex I Parties commencing within six months of the submission of the Party's first BUR. The process of ICA consists of two steps: the technical analysis of the submitted BUR, followed by a workshop for the facilitative sharing of views under the Subsidiary Body for Implementation. This summary report presents the results of the technical analysis of the first BUR of India conducted by a team of technical experts in accordance with the modalities and procedures contained in the annex to decision 20/CP.19.

GE.17-03170(E)



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I. Introduction and process overview

A. Introduction

1. According to decision 2/CP.17, paragraph 41(a), Parties not included in Annex I to the Convention (non-Annex I Parties), consistent with their capabilities and the level of support provided for reporting, were to submit their first biennial update report (BUR) by December 2014. The least developed country Parties and small island developing States may submit BURs at their discretion. Further, according to paragraph 58(a) of the same decision, the first round of international consultation and analysis (ICA) is to be conducted for non-Annex I Parties, commencing within six months of the submission of the Party's first BUR. The process of ICA consists of two steps: the technical analysis of the submitted BUR, resulting in a summary report for each BUR analysed, followed by a workshop for the facilitative sharing of views under the Subsidiary Body for Implementation.

2. This summary report presents the results of the technical analysis of the first BUR of India undertaken by a team of technical experts (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

3. India submitted its first BUR on 22 January 2016. During the technical analysis, India clarified that the funding from the Global Environment Facility (GEF) was received in December 2013, approximately one year after the Party submitted its initial request. Therefore, it was unable to submit its BUR by December 2014, but commenced the preparation of its BUR in 2014 and submitted it within two years.

4. The technical analysis of the BUR took place from 13 to 17 June 2016 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: Mr. Stephen King'uyu (member of the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE) from Kenya), Ms. Julia Meisel (member of the CGE from the United States of America), Ms. Sekai Ngarize (United Kingdom of Great Britain and Northern Ireland), Mr. Igor Ristovski (the former Yugoslav Republic of Macedonia) and Mr. Tan Ching Tiong (Malaysia). Mr. King'uyu and Ms. Meisel were the co-leads. Ms. Alma Jean (secretariat) coordinated the technical analysis.

5. 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 India engaged in consultation via videoconferencing on the identification of capacity-building needs for the preparation of BURs and participation in the ICA process. Following the technical analysis of the BUR, the TTE prepared and shared a draft summary report with India on 17 August 2016 for its review and comment. India, in turn, provided its feedback on the draft summary report on 17 October 2016.

6. The TTE responded to and incorporated the Party's comments referred to in paragraph 5 above and finalized the summary report in consultation with India on 16 February 2017.

II. Technical analysis of the information reported in the biennial update report

A. Scope of the technical analysis

7. 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 biennial update reporting guidelines for Parties not included in Annex I to the Convention” (hereinafter referred to as the UNFCCC reporting guidelines on BURs) contained in annex III to decision 2/CP.17, 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).

8. The remainder of this chapter presents the results of each of the three parts of the technical analysis of India’s BUR outlined in paragraph 7 above.

B. Overview of the elements of information reported

9. The elements of information referred to in paragraph 7(a) above include: the national greenhouse gas (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 measurement, reporting and verification (MRV); and information on support received.

10. Further, 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 9 above have been included in the BUR of the Party concerned. The results of that analysis are presented in tables 1, 2 and 3 below.

1. National greenhouse gas inventory

11. 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, paragraph 41(g), and paragraphs 3–10 of the UNFCCC reporting guidelines on BURs. 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.

12. Table 1 presents the results of the identification of the extent to which the elements of information on GHGs are included in the first BUR of India in accordance with the relevant parts of the UNFCCC reporting guidelines on BURs.

Table 1

Identification of the extent to which the elements of information on greenhouse gases are included in the first biennial update report of India

<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	No	India submitted its BUR in January 2016; however, the GHG inventory reported is for the calendar year of 2010
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 national communications from non-Annex I Parties approved by the COP or those determined by any future decision of the COP on this matter	Yes	The information reported indicates that India used a combination of the Revised 1996 IPCC Guidelines 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 emission factor may be made in the subsequent full national communication	Yes	
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 removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors)	Yes	Table 1 was not included in the BUR; however, comparable information was provided in table 2.3

<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>
	(b) Table 2 (National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF ₆)	Yes	Table 2 was not included in the BUR; however, comparable information was provided in table 2.3
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) Tables included in annex 3A.2 to chapter 3 of the IPCC good practice guidance for LULUCF	Partly	In table 2.3, the information reported includes a summary of LULUCF emission estimates; however, information on carbon stock changes was not reported as the estimates are mostly based on the 2006 IPCC Guidelines
	(b) The sectoral report tables annexed to the Revised 1996 IPCC Guidelines	Yes	Comparable information was 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 national communications	Yes	India reported a time series of total GHG emissions, including LULUCF for the years 2000–2010
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)	Partly	India reported this information from the year 2000 in figure 2.9, but did not report it for 1994; it reported it for that year in its initial national communication
Decision 2/CP.17, annex III, paragraph 10	Additional or supporting information, including sector-specific information, may be supplied in a technical annex	NA	
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 the following gases by sources and removals by sinks:		

<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>
	(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 HFCs, PFCs and SF ₆	Yes	
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 16	Non-Annex I Parties are encouraged, as appropriate, to report on anthropogenic emissions by sources of other GHGs, such as:		
	(a) CO	No ^a	
	(b) NO _x	No ^a	
	(c) NMVOCs	No ^a	
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 ^a	
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 approaches, and to explain any large differences between the two approaches	No ^a	India reported CO ₂ emissions from fuel combustion using the sectoral approach, but did not report information on these using the reference approach
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 emission factors and activity data. If non-Annex I Parties estimate anthropogenic emissions and removals from country-specific sources and/or sinks that are not part		

<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>
	of the Revised 1996 IPCC Guidelines, they should explicitly describe the source and/or sink categories, methodologies, emission factors and activity data 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	
	(b) Explanation of the sources of emission factors	Yes	The BUR is an update of the second national communication, where this information is reported
	(c) Explanation of the sources of activity data	Yes	The BUR is an update of the second national communication, where this information is reported
	(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	India did not estimate anthropogenic emissions and removals from country-specific sources and/or sinks that are not part of the Revised 1996 IPCC Guidelines
	(i) Source and/or sink categories		
	(ii) Methodologies		
	(iii) Emission factors		
	(iv) Activity data		
	(e) Parties are encouraged to identify areas where data may be further improved in future communications through capacity-building	Yes	
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	Partly	An uncertainty analysis was not reported ² ; however, the information reported in the BUR (section 4.1, page 103) indicated India's efforts to

<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>
			reduce uncertainties in activity data and emission factors
	(b) Underlying assumptions	No	
	(c) Methodologies used, if any, for estimating these uncertainties	No	

Abbreviations: BUR = biennial update report, COP = Conference of the Parties, GHG = greenhouse gas, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry, NA = not applicable, NMVOC = non-methane volatile organic compound, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

^a As per the “UNFCCC biennial update reporting guidelines for Parties not included in Annex I to the Convention” (decision 2/CP.17, annex III), non-Annex I Parties are encouraged to report this information. Moreover, India’s understanding is that this is a non-mandatory reporting item. India further noted that the extent of reporting on non-mandatory items depends on received support and available capacity.

2. Mitigation actions and their effects

13. 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.

14. India reported on mitigation actions in its first BUR. The information on mitigation actions reported is provided in tabular format.

15. Table 2 presents the results of the identification of the extent to which the elements of information on mitigation actions are included in the first BUR of India in accordance with the relevant parts of the UNFCCC reporting guidelines on BURs.

Table 2

Identification of the extent to which the elements of information on mitigation actions are included in the first biennial update report of India

<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 12	For each mitigation action or groups 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	This information is reported for most of the actions
	(b) Information on:		
	(i) Methodologies	Partly	This information is reported for most of the mitigation actions
	(ii) Assumptions		

<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>
	(c) Information on: <ul style="list-style-type: none"> (i) Objectives of the action (ii) Steps taken or envisaged to achieve that action 	Partly	This information is reported for most of the mitigation actions
	(d) Information on the progress of implementation of the mitigation actions and the underlying steps taken or envisaged, and the results achieved, such as estimated outcomes (metrics depending on type of action) and estimated emission reductions, to the extent possible: <ul style="list-style-type: none"> (i) Progress of implementation of the mitigation actions (ii) Progress of implementation of the underlying steps taken or envisaged (iii) Results achieved, such as estimated outcomes (metrics depending on type of action) and estimated emission reductions, to the extent possible 	Partly	This information is reported for most of the mitigation actions
	(e) Information on international market mechanisms	Yes	
Decision 2/CP.17, annex III, paragraph 13	Parties should provide information on the description of domestic measurement, reporting and verification arrangements	Yes	

3. Finance, technology and capacity-building needs and support received

16. 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.

17. Table 3 presents the results of the identification of the extent to which the elements of information on finance, technology and capacity-building needs and support received are included in the BUR of India in accordance with the relevant parts of the UNFCCC reporting guidelines on BURs.

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 first biennial update report of India

<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 constraints and gaps, and related financial, technical and capacity-building needs:		
	(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 updated information on financial resources, technology transfer, capacity-building and technical support received from the Global Environment Facility, Annex II Parties 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 biennial update report	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 technology needs, which must be nationally determined, and technology support received:		
	(a) Technology needs, which must be nationally determined	Yes	
	(b) Technology support received	Yes	

C. Technical analysis of the information reported

18. The technical analysis referred to in paragraph 7(b) above aims to increase the transparency of mitigation actions and their effects, without engaging in discussion on the appropriateness of those actions. Accordingly, the technical analysis focused on the transparency of the information reported in the BUR.

19. 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 Intergovernmental Panel on Climate Change (IPCC) and referred to in the UNFCCC reporting guidelines on BURs.

20. 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

21. 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 national communications, including, among other things, information on national

circumstances and institutional arrangements relevant to the preparation of national communications on a continuous basis. For their national communications, non-Annex I Parties report on their national circumstances following the reporting guidance contained in decision 17/CP.8, annex, paragraphs 3–5.

22. In accordance with decision 17/CP.8, annex, paragraph 3, India, in its BUR, reported the following information on its national circumstances: a description of its national and regional development priorities, objectives and circumstances, on the basis of which it will address climate change and its adverse impacts. This description includes information on features of its geography, climate and economy that may affect India's ability to deal with mitigating and adapting to climate change, as well as information regarding its specific needs and concerns arising from the adverse effects of climate change.

23. As encouraged in decision 17/CP.8, annex, paragraph 4, India provided a summary of relevant information regarding its national circumstances in tabular format. This information transparently describes its national circumstances, in particular the geography, population, education and economy. India also included additional tables and figures on its geography, temperature and precipitation, population, land use and the economy (including poverty, agriculture and livestock, energy and transport).

24. India reported that the country has great geographic diversity and a variety of climate regimes and regional and local weather conditions. The BUR includes information on climatic influence (monsoon); water resources (surface water, groundwater river systems); agriculture, forests and other land-use patterns; and natural catastrophes (earthquakes, cyclones, river basin floods). India is the second most populous country in the world, with nearly 17.5 per cent of the world's human population and only 2.4 per cent of the global land area, it has a declining fertility rate and is urbanizing. India expects growing demand for energy, transport, urban housing and use of household appliances. Poverty remains a concern. India reports that its energy policy is inseparable from the overall national developmental strategy, and environmental concerns are integral to governance. The Government of India is committed to the welfare of its people with regard to poverty eradication, food security and improvement in living standards. Sustainable development activities and programmes are at the core of India's economic development.

25. India described its BUR the institutional arrangements relevant to the preparation of its national communications and BURs on a continuous basis. The description covers key aspects of the institutional arrangements, such as: roles and responsibilities of the overall coordinating entity; involvement and roles of other institutions and experts; mechanisms for information and data collection; and provisions for public consultation and other forms of stakeholder engagement.

26. The information reported transparently describes the existing institutional arrangements of India and mentions that institutional arrangements will be formalized for sustained BUR preparation and submission with continued international support.

27. India reported that the government has taken steps towards creating an institutional arrangement for the preparation of national communications and BURs on a continuous basis. India constituted a National Steering Committee, chaired by the Secretary of the Ministry of Environment, Forest and Climate Change (MoEFCC), to prepare and submit the BUR and created three committees, with members from government, academia and civil society, to oversee the preparation of the BUR. MoEFCC assigned activities and studies for preparing the BUR to 17 expert institutions. India built upon the existing network of institutions used for previous national communications and added new institutional arrangements to strengthen the reporting system. India also highlighted the need for continuous capacity-building for preparation of future BURs and national communications.

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

28. As indicated in table 1 above, India reported information on its GHG inventory in its BUR, 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.

29. India reported in its BUR information on its national GHG inventories covering GHG emissions and removals for 2010 and time series for the years 2000–2010, using the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) and the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines). Elements of the 2006 IPCC Guidelines were used along with the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* for the LULUCF sector.

30. India reported its 2010 GHG inventory as an update of its second national communication, which it attributed to the delayed receipt of funds from the GEF and the time-intensive nature of the inventory preparation process.

31. India reported its total anthropogenic GHG emissions without and with land use, land-use change and forestry (LULUCF) for 2010 as 2,136,841.24 gigagrams of carbon dioxide equivalent (Gg CO₂ eq) and 1,884,309.46 Gg CO₂ eq, respectively. Information was reported by gas and by sector; CO₂ emissions without LULUCF dominate total GHG emissions, accounting for 73.68 per cent, followed by methane (CH₄) at 19.3 per cent, nitrous oxide (N₂O) at 5.3 per cent and halogenated gases at 1.7 per cent. GHG emissions from the energy sector accounted for 71 per cent, followed by agriculture at 18 per cent, industrial processes and product use at 8 per cent and waste at 3 per cent. The LULUCF sector constitutes a net removal of GHG emissions.

32. The tables encouraged by decision 17/CP.8, annex, paragraphs 6 and 9, are not reported in the BUR. However, comparable information is reported in table 2.2 (containing a summary of total national emissions and removals of CO₂, CH₄, N₂O, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride, covering all five sectors) and table 2.3 (information on disaggregation by subcategories). Both tables are reported on a gas-by-gas basis and in units of mass for each sector. Information on GHG emission estimates under their respective IPCC reporting categories, nor the use of notation keys are reported.

33. India reported information on emissions and removals of GHGs for 2000. However, the inventory for the previous submission year of 1994 (the year included in its first national communication) is not reported in the BUR.

34. Table 2.1 provides information on methodological choices and emission factors (default or country-specific); however, information on the sources of activity data and how country-specific emission factors were derived is not explicitly reported in the BUR. During the technical analysis, India indicated that the BUR is an update of its second national communication, where this information is reported. India also clarified that for some categories default factors from the 2006 IPCC Guidelines were used, while for others country-specific emission factors have been used.

35. A quantitative value of 0.00 CO₂ eq has been used to denote the value of emissions for some of the sectors reported in table 2.3 of the BUR, rather than the notation keys that are encouraged by decision 17/CP.8, annex, paragraph 2. During the technical analysis,

India clarified that values of 0.00 reported in the table imply that either emissions are not estimated in that particular sector or the values of the emissions are lower than 0.00.

36. Information on the level of the uncertainty associated with inventory data and their underlying assumptions, and a description of the methodologies used, if any, for estimating these uncertainties, as encouraged by decision 17/CP.8, annex, paragraph 24, are not reported in the BUR. During the technical analysis, India clarified that the information was provided in the second national communication; however, this information was not reported in the BUR due to the increased frequency of reporting and limited availability of time and resources.

37. Information on key source analysis, as encouraged by decision 17/CP.8, annex, paragraph 12, is not included in the BUR. During the technical analysis, India clarified that this information was provided in the second national communication, but due to the increased frequency of reporting and limited availability of time and resources, it was not reported in the BUR.

38. India reported information on the institutional arrangements for its GHG inventory preparation. The preparation of the GHG inventory was led by MoEFCC, which assigned 12 institutions to carry out the inventory preparation exercise according to their expertise in the respective sectors. The information reported outlines how the roles and responsibilities of each institution and their reporting lines are arranged to reflect different inventory sectors. The TTE commends India for establishing these institutional arrangements.

39. GHG emissions from the energy sector were estimated to be 1,510,120.76 Gg CO₂ eq, which accounts for 80 per cent of total GHG emissions (including LULUCF) in 2010. During the technical analysis, India clarified that the BUR is an update of its second national communication, where the information on methods and data used to estimate GHG emissions for the energy sector are reported in detail. Further, India clarified that the overall approach has not changed, except for use of the 2006 IPCC Guidelines wherever possible.

40. Several key categories were identified for the energy sector including energy industries, manufacturing industries and transport, while fugitive emissions contributed 3 per cent of total emissions in the energy sector. The IPCC tier 2 methodologies were used for some of the categories, while tier 1 methodologies were used for some of the key categories. TTE commends India for the development and use of tier 3 methodologies for key categories such as solid fuels.

41. Information on the differences in estimates of CO₂ emissions from fuel combustion using the sectoral and reference approaches, as encouraged by decision 17/CP.8, annex, paragraph 18, is not reported in the BUR. During the technical analysis, India clarified that owing to a minimal difference in the estimates of CO₂ emissions between the two approaches, it did not report an explanation of the differences.

42. GHG emissions from the industrial processes and product use sector in 2010 were 171,502.87 Gg CO₂ eq, which accounts for 8 per cent of total emissions. Several categories dominate emissions, in particular, mineral industries, including cement production, lime production, glass and ceramics, followed by metal production and chemicals. Information on methods and data used to estimate emissions for the industrial processes is not reported in the BUR. During the technical analysis, India clarified that the BUR is an update of its second national communication, where the information on methods and data used to estimate GHG emissions are explained.

43. India reported two key subsectors of the waste sector for 2010, namely, solid waste disposal and wastewater treatment and discharge. Total GHG emissions from the waste sector for 2010 were estimated to be 65,052.47 Gg CO₂ eq, with wastewater treatment and discharge being the main source. Information on methods and data used to estimate

emissions for the waste sector is not reported in the BUR. During the technical analysis, India clarified that the BUR is an update of its, second national communication where the information on methods and data used to estimate GHG emissions are explained.

44. The total CO₂ emissions and removals from the LULUCF sector for 2010 is 58,261.70 Gg CO₂ eq and 314,586.77 Gg CO₂ eq, respectively, resulting in net removals of 252,531.78 Gg CO₂ eq in 2010. The sector has been a net sink of GHG emissions since 2000, which India attributed to progressive national forest conservation policies, especially the Forest Conservation Act of 1980, and large afforestation programmes being implemented throughout the country over the years. GHG emissions and removals were estimated using the IPCC good practice guidance for LULUCF along with the elements from the 2006 IPCC Guidelines for agriculture, forestry and other land use. India used a tier 2 methodology and country-specific emission factors for all the four categories (forest land, cropland, grassland and settlement) reported in the BUR. The TTE commends India for this improvement since its second national communication. During the technical analysis, India clarified that the information on emission factors reported in the BUR is available in its second national communication. Furthermore, information on activity data remains the same in the BUR, and the data sources are additional to those provided in the second national communication. However, the BUR does not provide an update of the categories of wetlands and other land due to insufficient data.

45. Total CO₂ emissions from the agriculture sector for 2010 is estimated to be 390,165.14 Gg CO₂ eq, which comprises 14,612.78 Gg of CH₄ and 268.70 Gg of N₂O. Among the five subsectors covered, enteric fermentation is the highest emitting source, followed by agricultural soils and rice cultivation. The emissions were estimated using the Revised 1996 IPCC Guidelines. The TTE commends India for the improvement in the use of higher-tier and country-specific emission factors in the subsector of manure management and field burning of agricultural residues. The information reported in the BUR suggests a change in the methodology used for the subsectors of enteric fermentation and rice cultivation, from tier 3 in the second national communication to tier 2 in the BUR. During the technical analysis, India clarified that a similar methodological approach was used in the second national communication and the BUR, and a mix of tier methods was applied in the agriculture sector.

46. The TTE noted that the transparency of reporting on GHG inventories could be further enhanced by including the information highlighted in paragraphs 35–44 above.

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

47. As indicated in table 2 above, India reported in its BUR, in accordance with paragraphs 11–13 of the UNFCCC reporting guidelines on BURs, information on mitigation actions and their effects, to the extent possible.

48. India reported information on mitigation actions and their effects in chapter 3 (pages 66–98) and chapter 6 (pages 128–163) of its BUR, to the extent possible, following the UNFCCC reporting guidelines on BURs. In this respect, it reported information on its voluntary 20–25 per cent GHG emission intensity reduction pledge below the 2005 level by 2020. India further reported that in 2005, the GHG emission intensity of its gross domestic product was 35.14 kg CO₂ eq/1,000 Indian rupees (at constant 2004–2005 prices). This intensity declined to 31.01 kg CO₂ eq/1,000 Indian rupees (at 2004–2005 prices) in 2010. This is equivalent to a reduction of about 12 per cent over the five-year period 2005–2010.

49. India reported that its National Action Plan on Climate Change (NAPCC), launched in 2008, includes eight missions representing “multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change”. These are the National

Water Mission, National Mission for Sustainable Agriculture, National Mission for Enhanced Energy Efficiency, National Mission on Strategic Knowledge on Climate Change, National Mission on Sustaining Himalayan Ecosystem, National Mission on Green India, National Mission on Sustainable Habitat and Jawaharlal Nehru National Solar Mission. India reported information on the description of the objectives and targets for each of the eight missions in the NAPCC. The TTE commends India for reporting an extensive list with information on national and state policies and measures mapped for various sectors across the country in tables 6.2, 6.3 and 6.4.

50. Consistent with decision 2/CP.17, annex III, paragraphs 11–13, India reported, to the extent possible, detailed information on 45 mitigation actions and their effects, as summarized in tables 3.9–3.14 (BUR pages 88–98). The reported mitigation actions were categorized by sector, namely, 9 actions in energy (6 in energy efficiency, 3 in renewable energy); 6 actions in forestry; 5 in agriculture; 11 in transport and 14 in sustainable habitat (buildings and waste). India reported further information on the mapping of 72 national-level actions and 194 state-level actions in tables 6.3 (BUR page 138) and 6.4 (BUR page 146), respectively. Tables 6.2 (a) and 6.2 (b) provide national and regional perspectives on various types of mitigation actions. Information on the nature of the action, gases, quantitative goals and progress indicators is reported for most of the mitigation actions. The TTE commends India for the detailed description of mitigation actions, categorized by sector.

51. India reported information on 9 mitigation actions in the energy sector in tables 3.9 and 3.10 (BUR pages 88–90) and over 80 actions in tables 6.3 and 6.4. India also reported in table 6.2 (a and b) overall classifications, including regulatory measures, economic and fiscal measures and supportive measures of mitigation actions, spectrally and geographically. In this respect, it reported information on the name and description of the mitigation actions; associated methodologies and assumptions; objectives and the steps taken or envisaged; progress made in the implementation of the mitigation actions and the underlying steps taken or envisaged; and the qualitative results achieved, such as estimated outcomes for most of the mitigation actions. The TTE commends India for its efforts.

52. In the forestry sector (table 3.11), India reported information on 6 mitigation actions, and in tables 6.3 and 6.4, it reported over 15 actions. The TTE commends India for reporting information on: the description of mitigation actions; gases covered; associated methodologies and assumptions; objectives and the steps taken or envisaged; progress made; and the qualitative results achieved.

53. In the agriculture sector (table 3.12), India reported information on five mitigation actions and in tables 6.3 and 6.4 reported 16 actions. In this respect, it reported information on: the name and description of the mitigation actions; objectives and the steps taken or envisaged; progress made in the implementation of the mitigation actions and the underlying steps taken or envisaged; and the qualitative results achieved, such as estimated outcomes.

54. In the transport sector (table 3.13), India reported information on 11 mitigation actions and in tables 6.3 and 6.4, it reported more than 15 actions. The information included the name and description of the mitigation action (including the nature of the action), coverage, objectives, quantitative goal and progress indicators, methodologies and assumptions, and steps taken or envisaged and results achieved.

55. In the sustainable habitat (building and waste) sector, India reported information on 14 mitigation actions and in tables 6.3 and 6.4, it reported over 45 actions.

56. Pursuant to decision 2/CP.17, annex III, paragraph 12(e), India reported information on international market mechanisms. In this respect, India reported that it is involved in several projects targeting the regulated carbon market, specifically the clean development

mechanism (BUR page 83). Within the biomass energy subsector, for example, India reported that 260 projects were registered as of March 2015, with an envisaged total emission reduction portfolio of 36.814 Mt CO₂ eq.

57. Within the voluntary market scope, India reported information on projects that were registered and implemented aiming at voluntary markets, including: the voluntary carbon markets and the Climate, Community and Biodiversity Alliance. India also reported that 31 projects are in operation in this category, with an achieved emission reduction of about 4,304,574 t CO₂ eq.

58. The TTE commends India for the comprehensive reporting of its mitigation actions on a sectoral basis. It notes that India has presented the information on various aspects of implementation of mitigation actions in a transparent and comprehensive manner. Transparency of reporting may be enhanced in subsequent BURs by including certain information that, due to specific capacity-building needs identified, could not be reported in the present BUR.

59. While acknowledging the challenges clarified by India during the technical analysis, the TTE noted that the transparency of reporting on mitigation actions could be further enhanced by including information that was not reported in the BUR, as highlighted in paragraph 58 above.

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

60. As indicated in table 3 above, India reported in its BUR, in accordance with paragraphs 14–16 of the UNFCCC reporting guidelines on BURs, information on finance, technology and capacity-building needs and support received, as follows.

61. India stated that this section of the BUR should be read in conjunction with the information provided on technology and finance needs in its second national communication, as the needs remain largely relevant for present reporting. Four institutions carried out studies to identify constraints and gaps and related financial, technical and capacity-building needs, including information on financial support needed and received.

62. India reported primarily on gaps and constraints in GHG inventory estimation, specifically: data organization (e.g. mismatch in sectoral details across different published documents); non-availability of relevant data (e.g. time-series data for some inventory subcategories); data non-accessibility (e.g. data not in electronic format); technical and institutional capacity-building needs (e.g. training institutions that generate activity data in GHG inventory methodologies); and non-representative emission coefficients (e.g. inadequate sample size). India also reported on constraints, gaps and needs in the energy, industrial processes and product use, agriculture, waste and forestry sectors, and those related to clean coal, shale gas, hydropower, nuclear power and rail transport. Capacity-building needs for other aspects of the BUR were not reported. During the technical analysis, India indicated that capacity-building needs also exist in areas that were not included in the chapter on constraints and gaps. Further, India explained its need to build both expert and institutional capacity to utilize technology.

63. With regard to technology needs, the information reported relates primarily to renewable energy technologies. India reported on needs for the development and deployment of low-carbon technologies, specifically, for solar power, clean coal technology, shale gas technology, hydropower, nuclear power and rail transport.

64. India reported that it received financial resources from the GEF for the preparation of the BUR and that it had accessed USD 327 million in GEF grants since 1991. India also reported on financial and technical support received for clean coal, shale gas, hydropower,

nuclear power and rail transport projects. Although other multilateral and bilateral arrangements for support were not included in the BUR, India clarified during the technical analysis that it requires further support to meet its financial, technology transfer, capacity-building and technical support needs.

65. While acknowledging the challenges clarified by India during the technical analysis, the TTE noted that the transparency of reporting on constraints and gaps and support needed and received could be further enhanced by including the information highlighted in paragraphs 61–63 above.

5. Domestic measurement, reporting and verification

66. As indicated in table 2 above, India reported in its BUR, in accordance with paragraph 13 of the UNFCCC reporting guidelines on BURs, information on the description of domestic MRV arrangements.

67. India reported the existence of several MRV arrangements for individual schemes/programmes under different sectors, such as the perform, achieve and trade scheme; Renewable Purchase Obligation in the energy sector; and the monitoring and reporting scheme in the forestry sector. In addition, India reported that it does not have an integrated countrywide MRV system in place, and that monitoring and review is confined to various measurable financial and physical parameters that are embedded in the project design.

68. India also reported that establishing an integrated domestic MRV system for GHG mitigation actions is a capacity-building need for India (BUR page 120). Further, during the technical analysis week, India acknowledged that appropriate institutional mechanisms and capacity-building are required for the establishment of an integrated domestic MRV arrangement.

6. Any other information

69. India provided an “Additional information” chapter with details of the reforms in different sectors and their potential implications for GHG emission reduction. The chapter also explains details of the policies and measures for different sectors, the targets for the specific measures and the policy instruments at the national and state levels that contribute to GHG mitigation. India classified the policies and measures driving these reforms as regulatory measures, economic and fiscal measures and supportive measures (market development, cooperative measures, capacity-building, research, development and demonstration, green procurement, information, education and public awareness).

70. India also provided information on its national- and state-level funding for enhancing adaptation to climate change, as well as on reforms in the electricity, renewable energy, hydrocarbons, coal, petroleum and natural gas and transport sectors; on citizens and private-sector contribution to combating climate change; on forest policies, afforestation and forest conservation; and on policies and measures for sustainable development and mitigation of climate change.

D. Identification of capacity-building needs

71. In consultation with India, the TTE identified the following capacity-building needs related to the facilitation of the preparation of subsequent BURs and participation in ICA:

- (a) Estimating and reporting of GHG inventories:

- (i) Establishing a long-term institutional and operational system for periodic, continuous and enhanced GHG emission estimation for national reporting under various UNFCCC reporting requirements (a national inventory management system (NIMS));
- (ii) Enhancing the GHG inventory to higher-tier levels in all sectors using key category analysis;
- (iii) Refining energy sector data for reference and sectoral approaches, including non-commercial and other sectors;
- (iv) Estimating country-specific emission factors for key categories (level and trend) for all sectors and gases;
- (v) Collecting and mapping data on individual industrial processes and product use plants and micro, small and medium enterprises;
- (vi) Collecting agricultural data, including for the establishment of country-specific emission factors for fruit tree systems, for allometric equations and biomass expansion factors for horticultural species, and for enhancing and refining data on livestock dung production and collection;
- (vii) Establishing an inventory system for estimating GHG emissions from municipal solid waste and industrial wastewater;
- (viii) Establishing a national forest inventory system;
- (ix) Adopting the IPCC approach 3 for activity data on areas under different land categories and conversions;
- (x) Georeferencing areas under different land categories and areas subjected to change for the GHG inventory by using remote sensing and global information systems;
- (xi) Modelling for tier 3 estimation of carbon stock changes in forests, plantations and land area subjected to mitigation actions;
- (xii) Estimating carbon stocks and collecting data on changes in baseline carbon stocks for the estimation of mitigation potential;
- (xiii) Identifying carbon sequestration rates for different forest types and plantations;
- (xiv) Additional finance for designing and implementing afforestation/reforestation projects;
- (xv) Strengthening local capacity to collect LULUCF data at the regional level;
- (xvi) Capacity-building for data collection from primary sources in the forestry sector;
- (xvii) Coordinating the dispersed technical and institutional capacity for REDD-plus;¹
- (xviii) Enhancing capacity in forest resource assessment and improving the process at the state and local levels;

¹ In decision 1/CP.16, paragraph 70, the Conference of the Parties encouraged developing country Parties to contribute to mitigation actions in the forest sector by undertaking the following activities: reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks.

- (xix) Enhancing resolution of forest data generated through satellite imagery;
- (xx) Capacity-building at all levels (including state- and district-level forest departments, research organizations and non-governmental organizations) to enable the design, implementation and MRV, to implement the REDD-plus mechanism;
- (b) Establishing and implementing an integrated domestic MRV system for GHG mitigation actions, including integrating it with NIMS, institutional arrangements, building capacity for government officials, national focal points (such as for the GHG inventory, intended nationally determined contributions and other mitigation actions, REDD-plus, etc.) and other stakeholders;
- (c) Improving the capacity of government ministries and other agencies to provide sectoral information and other inputs for reporting on a continuous basis;
- (d) Developing a dynamic training plan for existing, new and upcoming technical experts involved in the reporting process;
- (e) Enabling better coordination among relevant regions and institutions to design, implement and measure, report and verify a REDD-plus system;
- (f) Identifying the most appropriate methodologies to develop progress indicators to facilitate reporting the progress of the implementation of mitigation actions, including emission reductions.

72. In addition to the capacity-building needs identified mutually during the technical analysis, India also outlined the following additional specific capacity-building, technology transfer and financial support needs in its BUR:

- (a) Conducting impact and vulnerability assessments at the sectoral, subregional and integrated levels;
- (b) Sensitizing the Indian population vulnerable to the adverse impacts of climate change;
- (c) Implementing adaptation needs assessments;
- (d) Providing training and upgrading skills across sectors;
- (e) Providing funding for solar power and wind power projects;
- (f) Improving technology for renewable energy;
- (g) Reactivating the implementation of clean coal technologies;
- (h) Developing advanced ultra-supercritical technology for clean coal;
- (i) Developing integrated gasification combined cycle technology suitable for high ash content Indian coal;
- (j) Improving access to technology for hydropower;
- (k) Building capacity to manufacture nuclear equipment in India;
- (l) Financing to scale up and deploy other atomic energy technologies;
- (m) Identifying linkages between impacts of climate change and adaptation and mitigation options;
- (n) Developing cost-effective solutions for mitigation at the local level;
- (o) Providing finance and technology for planned dedicated freight corridors;
- (p) Capacity-building and improved technology related to implementing metro rail transport.

73. The TTE notes that India reported that the capacity-building needs reported in its second national communication are still relevant, that capacity-building is a dynamic process and that new needs continue to emerge with time. The Party also reported that prioritization for a vast developing country like India may not be possible, especially as its needs are dynamic and evolving. India considers all capacity-building needs equally important.

III. Conclusions

74. The TTE concludes that:

(a) All of the elements of information listed in paragraph 3(a) of the ICA modalities and guidelines have been included in the first BUR of India;

(b) India reported transparently in its BUR on its national circumstances and institutional arrangements relevant to the preparation of its national communications and BURs on a continuous basis. It reported that the government has taken steps towards creating institutional arrangements for the preparation of national communications and BURs on a continuous basis, subject to continued provision of international financial support;

(c) India reported mostly transparent and updated information on its national GHG inventory covering GHG emissions and removals for 2010 and time series for the years 2000–2010 using the Revised 1996 IPCC Guidelines, the IPCC good practice guidance for LULUCF and the 2006 IPCC Guidelines. India also reported its total anthropogenic GHG emissions excluding and including LULUCF for 2010 as 2,136,841.24 Gg CO₂ eq and 1,884,309.46 Gg CO₂ eq, respectively; this information was reported by gas and by sector. India updated the methodology used and some activity data and emission factors for some sectors. During the communication between the TTE and the Party, India confirmed its plan to take into account the need to continuously improve transparency, consistency, comparability, completeness and accuracy in its national GHG inventories;

(d) India reported mostly transparent information on various aspects of implementation of mitigation actions, including its voluntary 20–25 per cent GHG emission intensity reduction pledge below the 2005 level by 2020. Information was also reported on its NAPCC, launched in 2008, which includes eight missions representing “multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change”. The comprehensive reporting of its mitigation actions is outlined on a sectoral basis, which the TTE commends. India reported information on a comprehensive list of mitigation actions in the context of various sectors, namely, agriculture, energy, forestry, transport and sustainable habitat (housing and waste), covering information on the coverage, nature of actions, goals, progress indicators, methodologies and assumptions, steps taken and qualitative results achieved. The TTE commends India for the effort and dedication invested in reporting on the wide range of mitigation actions;

(e) On international market mechanisms, India reported that it was already participating in both regulatory and voluntary market mechanisms. In addition, India reported the existence of several MRV arrangements for individual schemes/programmes under different sectors and projects, and identified the establishment of an integrated domestic MRV system for GHG mitigation actions as a capacity-building need;

(f) India transparently identified several constraints and gaps, and related financial, technical and capacity-building needs in its BUR, which focused on GHG inventories;

(g) India reported that capacity development should be at both the institutional level (which requires financial and technological support, instrumentation and networking) and the level of individual researchers (which is needed to sensitize and train data-generating teams for better data collection and reporting on a continuous basis and for modelling impacts of mitigation actions). India described policies and measures requiring international financial support and appropriate technology transfer. India noted that it received financial support from the GEF for preparation of its BUR and committed national resources to mitigation and adaptation;

(h) While acknowledging the challenges clarified by India during the technical analysis, the TTE noted that the transparency of reporting highlighted in chapter II.C above could be further enhanced by including the information highlighted in paragraphs 45, 58 and 64 above, which was not reported in the BUR.

75. The TTE, in consultation with India, identified 6² overarching 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, with 21 sub-needs identified at a detailed level for GHG inventory estimation and reporting on a continuous basis. India also outlined 16 additional specific capacity-building, technology transfer and financial support needs in its BUR, taking into account Article 4, paragraph 3, of the Convention. The Party prioritized all of these capacity-building needs.

² This refers to the number of capacity-building needs listed in chapter II.D above.

Annex

Documents and information used during the technical analysis

Reference documents

“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 India. Available at <<http://unfccc.int/8722.php>>.

Initial national communication of India. Available at <<http://unfccc.int/resource/docs/natc/indnc1.pdf>>.

Second national communication of India. Available at <http://unfccc.int/essential_background/library/items/3599.php?rec=j&preref=7626#beg>.
