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Summary report on the technical analysis of the first biennial update report of Singapore submitted on 8 December 2014

In accordance with 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, should 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, in accordance with 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 their first BURs. The process of ICA includes two steps: the technical analysis of the submitted BURs, followed by a workshop on 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 Singapore undertaken by a team of technical experts in accordance with the modalities and procedures contained in the annex to decision 20/CP.19.

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I. Introduction and process overview

A. Introduction

1. In accordance with 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, should 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, in accordance with 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 their first BURs. The process of ICA includes two steps: the technical analysis of the submitted BURs resulting in a summary report for each BUR analysed, followed by a workshop on 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 Singapore 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. Singapore submitted its first BUR on 8 December 2014.
4. The technical analysis of the BUR took place from 18 to 22 May 2015 in Bonn, Germany, and was undertaken by the following TTE drawn from the UNFCCC roster of experts on the basis of the criteria defined in decision 20/CP.19, annex, paragraphs 2–6: Ms. Selam Kidane Abebe (Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE) member from Ethiopia), Mr. Sangay Dorji (Bhutan), Mr. Takeshi Enoki (CGE member from Japan), Ms. Baasansuren Jamsranjav (Mongolia), Mr. Christoph Streissler (Austria) and Mr. Jongikhaya Witi (South Africa). Mr. Enoki and Mr. Witi were the co-leads. Mr. Nalin Srivastava and Mr. Gopal Joshi from the secretariat provided administrative support to the TTE.
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 Singapore also engaged in discussion via videoconferencing, primarily to reach a common understanding on the identification of the capacity-building needs. Following the technical analysis of the BUR, the TTE prepared and shared a draft summary report with Singapore on 28 July 2015 for its review and comments. Singapore, in turn, provided its feedback on the draft summary report on 8 September 2015.
6. The TTE responded to and incorporated the comments referred to in paragraph 5 above from Singapore and finalized, in consultation with Singapore, the summary report on 12 October 2015.

II. Technical analysis of 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 these actions, increase transparency of mitigation actions and their effects, and shall entail the following:

(a) Identification of the extent to which the elements of information listed in the ICA guidelines contained in decision 2/CP.17, annex IV, paragraph 3(a), are included in the BUR of the Party concerned (see chapter II.B);

(b) A technical analysis of the information contained 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);

(c) Identification of, in consultation with the Party concerned, capacity-building needs related to the facilitation of reporting in accordance with annex III to decision 2/CP.17 and to the participation in ICA in accordance with annex IV to decision 2/CP.17, taking into account Article 4, paragraph 3, of the Convention (see chapter II.D).

8. The remainder of this chapter presents the results of each of the three parts of the technical analysis of Singapore’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; 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 support received.

10. Further, in accordance with decision 20/CP.19, annex, paragraph 15(a), in undertaking the technical analysis of the submitted BUR, the TTE shall identify the extent to which the elements of information listed in the guidelines contained in decision 2/CP.17, annex IV, paragraph 3(a), are included in the BUR of the Party concerned. The results of this 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 annex III, paragraphs 3–10, of the same decision. Further, as per decision 2/CP.17, annex III, paragraph 3, non-Annex I Parties should submit updates of national GHG inventories according to paragraphs 8–24 of the “Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention” as contained in the annex to decision 17/CP.8. The scope of the updates on national GHG inventories should be consistent with capacities, time constraints, data availabilities and the level of support provided by developed countries Parties for biennial update reporting.

12. Table 1 below presents results of the identification of the extent to which the elements of information on GHGs are included in the first BUR of Singapore 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 Singapore

<i>Decision</i>	<i>Reporting requirements</i>	<i>Yes/ Partly /No</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	Yes	
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 for National GHG Inventories, the IPCC good practice guidance and Uncertainty Management in National GHG Inventories 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: <ul style="list-style-type: none"> 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) Table 2 (National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF₆) 	Yes Yes	
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: <ul style="list-style-type: none"> Tables included in annex 3A.2 to chapter 3 of the IPCC good practice guidance for LULUCF The sectoral report tables annexed to the Revised 1996 IPCC Guidelines 	No Yes	In its first BUR, Singapore has not provided information on the LULUCF sector because this sector was considered small and there was no existing system for tracking the requisite parameters. Singapore has put in place steps to address the LULUCF sector in future BURs as explained in paragraph 31 below

<i>Decision</i>	<i>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 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	
Decision 2/CP.17, annex III, paragraph 8	Non-Annex I Parties that have previously reported on their national GHG inventories contained in their national communications are encouraged to submit summary information tables of inventories for previous submission years (e.g. for 1994 and 2000)	Yes	
Decision 2/CP.17, annex III, paragraph 10	Additional or supporting information, including sector-specific information, may be supplied in a technical annex	Yes	
Decision 17/CP.8, annex, paragraph 13	Non-Annex I Parties are encouraged to describe procedures and arrangements undertaken to collect and archive data for the preparation of national GHG inventories, as well as efforts to make this a continuous process, including information on the role of the institutions involved	Yes	
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:	Yes	
	• CO ₂	Yes	
	• CH ₄	Yes	
	• 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:		
	• International aviation	No	In its first BUR, Singapore has not provided a separate estimate for emissions from international aviation. In its first BUR, Singapore has clarified that data on international bunker fuels have been reported in a separate memo to the secretariat because emissions from such bunker fuels are to be excluded from the national GHG totals
	• Marine bunker fuels	No	In its first BUR, Singapore has not provided a separate estimate for emission from marine bunker fuels. In its first BUR, Singapore has

<i>Decision</i>	<i>Reporting requirements</i>	<i>Yes/ Partly /No</i>	<i>Comments on the extent of the information provided</i>
			clarified that data on international bunker fuels have been reported in a separate memo to the secretariat because emissions from such bunker fuels are to be excluded from the national GHG totals
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: <ul style="list-style-type: none"> • CO • NO_x • NMVOCs 	No No No	In its first BUR, Singapore has not reported CO emissions In its first BUR, Singapore has not reported NO _x emissions In its first BUR, Singapore has not reported NMVOC emissions
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	In its first BUR, Singapore has not reported emissions of any other gas including SO _x
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 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: <ul style="list-style-type: none"> • Information on methodologies used in the estimation of anthropogenic emissions by sources and removals by sinks of GHGs not controlled by the Montreal Protocol • Explanation of the sources of emission factors • Explanation of the sources of activity data • 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: 	Yes Yes Yes No	In its first BUR, Singapore has not reported any country-specific sources and/or sinks

<i>Decision</i>	<i>Reporting requirements</i>	<i>Yes/ Partly /No</i>	<i>Comments on the extent of the information provided</i>
	<ul style="list-style-type: none"> ○ Source and/or sink categories ○ Methodologies ○ Emission factors ○ Activity data • Parties are encouraged to identify areas where data may be further improved in future communications through capacity-building 	No	In its first BUR, Singapore has not identified any areas where data may be further improved through capacity-building
Decision 17/CP.8, annex, paragraph 24	<p>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:</p> <ul style="list-style-type: none"> • Level of uncertainty associated with inventory data • Underlying assumptions • Methodologies used, if any, for estimating these uncertainties 	<p>Yes</p> <p>Yes</p> <p>Yes</p>	

Abbreviations: BUR = biennial update report, 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, NMVOC = non-methane volatile organic compound, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*.

2. Mitigation actions and their effects

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

14. Singapore did report mitigation actions in its first BUR. The mitigation actions reported are provided in tabular format. Singapore reported on 16 mitigation measures grouped into six broad actions and provided more detailed explanation in textual format.

15. Table 2 below presents results of the identification of the extent to which the elements of information on mitigation actions are included in the first BUR of Singapore 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 Singapore

<i>Decision</i>	<i>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 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,	Yes	

<i>Decision</i>	<i>Reporting requirements</i>	<i>Yes/ Partly /No</i>	<i>Comments on the extent of the information provided</i>
	coverage (i.e. sectors and gases), quantitative goals and progress indicators		
(b)	Information on methodologies and assumptions:		
	• Methodologies	Yes	
	• Assumptions	Yes	
(c)	Objectives of the action and steps taken or envisaged to achieve that action:		
	• Objectives of the action	Yes	
	• Steps taken or envisaged to achieve that action	Yes	
(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:		
	• Progress of implementation of the mitigation actions	Yes	
	• Underlying steps taken or envisaged	Yes	
	• 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 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 reporting information on finance, technology and capacity-building needs and support received in the BUR are contained in decision 2/CP.17, annex III, paragraphs 14–16.

17. Table 3 below presents 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 Singapore 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 Singapore

<i>Decision</i>	<i>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:		
	• Constraints and gaps	No	In its first BUR, Singapore has not reported on constraints and gaps
	• Related financial, technical and capacity-building needs	No	In its first BUR, Singapore has not reported related financial, technical and

Decision	Reporting requirements	Yes/ Partly /No	Comments on the extent of the information provided
			capacity-building needs
Decision 2/CP.17, annex III, paragraph 15	Non-Annex I Parties should also provide updated information on financial resources, technology transfer, capacity-building and technical support received from the GEF, Annex II Parties and other developed country Parties, the GCF and multilateral institutions for activities relating to climate change, including for the preparation of the current BUR	No	In its first BUR, Singapore has not reported on financial resources, technology transfer, capacity-building and technical support received
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:		
	• Technology needs, which must be nationally determined	No	In its first BUR, Singapore has not reported on technology needs
	• Technology support received	No	In its first BUR, Singapore has not reported on technology support received

Abbreviations: BUR = biennial update report, GCF = Green Climate Fund, GEF = Global Environment Facility.

C. Technical analysis of the information reported

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

19. In addition to covering the information in the BUR and any additional technical information provided by the Party concerned, the technical analysis also focused, in relation to information reported on national GHG inventories, on the consistency of the methods used for developing 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. The results of the technical analysis are presented in the remainder of the chapter.

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

20. As per the scope defined in decision 2/CP.17, annex III, paragraph 2, the BURs should provide an update to 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 national communications, non-Annex I Parties report national circumstances following reporting guidance contained in decision 17/CP.8, annex, paragraphs 3–5.

21. In accordance with decision 17/CP.8, annex, paragraph 3, Singapore, in its BUR, reported the following information on national circumstances: a description of national and regional development priorities, objectives and circumstances, including information on features of geography, climate and economy that may affect the ability to deal with mitigating and adapting to climate change, as well as information regarding national

circumstances and constraints on their specific needs and concerns arising from the adverse effects of climate change and/or the impact of the implementation of response measures, as contained in Article 4, paragraph 8, and, as appropriate, in Article 4, paragraphs 9 and 10, of the Convention.

22. As encouraged in decision 17/CP.8, annex, paragraph 4, Singapore provided a summary of relevant information regarding its national circumstances. This information transparently describes national circumstances, in particular, the geography, climate, population, economy, and national circumstances and constraints for reduction efforts.

23. Singapore is a small island developing State, with a total land area (including that of smaller surrounding islands) of about 716 km² and a flat, relatively low-lying topography. Singapore has a population density of about 7,540 people per km², which is among the highest in the world. Lack of access to alternative and renewable energy sources due to its small size, dense urban landscape and geographical features poses considerable challenges to Singapore in its emission reduction efforts.

24. Singapore, in its BUR, described institutional arrangements relevant to the preparation and implementation of climate change policies and programmes. Singapore has established an Inter-Ministerial Committee on Climate Change (IMCCC) to ensure coordination of Singapore's approach to climate change. The committee is chaired by the Deputy Prime Minister, Coordinating Minister for National Security and Minister for Home Affairs, and includes other ministers from relevant ministries. An Executive Committee comprising the permanent secretaries of the respective ministries supports the IMCCC and oversees the work of three working groups dealing with international negotiations, long-term emissions and mitigation, and resilience.

25. The TTE, however, notes that Singapore's first BUR does not provide transparent information on the preparation and submission procedures for national communications and BURs on a continuous basis that would further enhance the transparency of information on this element. During the videoconference with the TTE, Singapore explained that the institutional arrangements described on page 59 of the BUR were also used for the preparation and submission of national communications and BURs on a continuous basis. Therefore, it was not considered necessary to repeat the information on Singapore's institutional arrangements specifically in the context of its BUR/national communication reporting. The TTE notes that the provision of specific information on this element in future BURs would significantly enhance the transparency of the reported information.

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

26. Singapore reported, in its BUR, information on national GHG inventories covering GHG emissions and removals for 2010 using the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance), the *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).

27. Singapore also provided the results of the emissions by sources and removals by sinks of GHGs for the years 1994 and 2000 in an annex, as reported in Singapore's first and second national communications, respectively.

28. In 2010, the total GHG emissions in Singapore were 46,832 Gg carbon dioxide equivalent (CO₂ eq). Carbon dioxide (CO₂) is the dominant gas, making up approximately 96.5 per cent of total emissions, followed by methane (CH₄), nitrous oxide (N₂O) and

fluorinated gases (F-gases), which make up 2.1 per cent, 0.9 and 0.5 per cent of the total, respectively. Singapore reported that GHG emissions grew slower than the economic growth rate during that time period at a compound annual growth rate of 2.0 per cent from 2000 to 2010, which corresponds to an increase of 21 per cent over the same period.

29. In its first BUR, Singapore provided information on methodologies and data used for its inventory estimates. According to the first BUR, IPCC tier 1 methodologies were used for most inventory categories, while tier 2 methodologies were used for estimating emissions of CH₄ and N₂O from the combustion of petrol and diesel in road transport, in conjunction with activity data from vehicle statistics. F-gas emissions were estimated using tier 2 methods and default conversion and emission factors from the 2006 IPCC Guidelines. In addition to providing general information on the sectors, Singapore reported sectoral worksheets in the Revised 1996 IPCC Guidelines as an annex to the BUR. The TTE commends Singapore for providing the background data and the worksheets to enhance the transparency of its GHG inventory estimation.

30. In its first BUR, Singapore did not provide activity data for semiconductor manufacturing in the GHG inventory worksheet. During the technical analysis, Singapore explained that confidential activity data for semiconductor manufacturing was collected from companies through annual surveys. Singapore further explained that it would include this explanation in future BURs and national communications and use the notation key “C” (confidential) for the activity data in the worksheet. The TTE welcomes this development and notes that confidential information can be reported as the notation key “C” in the worksheet. The TTE also notes that this could enhance the transparency while ensuring confidentiality of the data from the private sector.

31. Singapore did not estimate emissions from the agriculture and land use, land-use change and forestry (LULUCF) sectors because they are deemed negligible, given Singapore’s small land size and highly urbanized landscape. During the technical analysis, Singapore informed the TTE that it has a long-term programme to collect data on the five carbon pools in the LULUCF sector with the use of satellite imagery in combination with field measurements in permanent plots. Singapore also explained that establishment of permanent plots poses a significant difficulty due to the pace of development in Singapore, which affects land ownership. Singapore is putting in place capacity-building in this programme, through training, as well as the use of hardware and software, and the next BUR is expected to include inventory estimates from the LULUCF sector. The TTE welcomes this development and considers this as an area of future improvement through capacity-building.

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

32. As indicated in table 2 above, Singapore reported, in its BUR, information on mitigation actions and their effects.

33. Singapore’s first BUR provides transparent information on the description, nature, coverage, goals, progress indicators, methodologies and assumptions, objectives of the mitigation actions and steps taken or envisaged to achieve them, and progress in implementation and results achieved in tables 1–6; more detailed information including on steps taken and expected outcomes (e.g. expected GHG reduction) is also provided in textual format in the first BUR. The BUR presents information on 16 mitigation measures (one is completed and others are ongoing) grouped under six broad mitigation actions. The TTE finds that the information provided is well organized, transparent and consistent with the UNFCCC reporting guidelines on BURs. The TTE commends the Party for this effort.

34. The six broad mitigation actions that Singapore reported are:

(a) **Shifting to cleaner energy sources:** this measure comprises the ongoing efforts of switching from fuel oil to natural gas, ensuring a resilient and more diverse supply of natural gas through a liquefied natural gas terminal and exploring ways to increase the use of solar energy, which is the most practicable option of renewable energy in Singapore;

(b) **Improving industrial energy efficiency:** this measure focuses on encouraging industries to adopt energy-efficient technologies by providing grants and incentives and through private sector financing schemes (e.g. encouraging investments into cogeneration plants and energy efficiency retrofits in data centres);

(c) **Greening buildings:** this measure targets energy consumption and other environmental parameters in buildings through a combination of prescribed minimum standards for energy efficiency and financial incentives to exceed these standards. It applies to new buildings and to existing buildings when they undergo major renovations. In addition, office buildings, hotels and retail buildings have to submit building-related information and energy consumption data annually. Periodic energy audits on building cooling systems (i.e. central chilled water plants, if any) of these types of buildings would also be performed to ensure that they operate efficiently throughout their life cycle;

(d) **Shifting travel demand to low-emission modes and reducing vehicular emissions:** recognizing that public transport generates considerably less emissions than individual transport, Singapore aims to achieve a 70 per cent share of public transport by 2020 using a combination of improvements in the public transport network and investments in cycling and pedestrian infrastructure. These measures are complemented by others such as a fuel efficiency labelling scheme for cars;

(e) **Improving energy performance standards of household appliances and promoting energy efficiency to households:** this measure combines minimum energy performance standards for certain household appliances with an energy consumption labelling scheme. These standards are complemented by awareness-raising campaigns;

(f) **Reducing emissions from waste and wastewater treatment:** this measure comprises the incineration of waste and wastewater sludge instead of landfilling and an increase of the recycling rate, by implementing mandatory waste reporting and submission of waste reduction plans for large commercial premises.

35. The TTE notes that 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, is presented in a consistent and comparable way. The results achieved so far are all given for the year 2012. These results and the quantitative goals for 2020 are both calculated compared to the 'business as usual' scenario based on the year 2005. The goal for emission reductions by 2020 through the shift to natural gas is about 4.0 Mt (4,000 Gg) CO₂ eq, while improvements in industrial energy efficiency are expected to generate 1.15 Mt (1,150 Gg) CO₂ eq of emission reductions, the mitigation measures in the building sector about 1.21 Mt (1,210 Gg) CO₂ eq, the measures in the transport sector about 1.16 Mt (1,160 Gg) CO₂ eq, the energy efficiency measures in the household sector between 0.71 and 1.07 Mt (710–1,070 Gg) CO₂ eq, and the measures in the waste sector about 0.15 Mt (150 Gg) CO₂ eq.

36. The TTE noted that Singapore did not provide sufficient information on methods used for estimating emission reductions for two mitigation actions. One of these related to the way information on the emission reductions from cogeneration is collected, and the other to the calculation methodologies and assumptions for the abatement from energy efficiency programmes for households. In response to an earlier written request from the TTE for clarification, Singapore provided written information on these calculation methods and explained that this information would be included in future BURs. The TTE considers

that provision of this additional information in the BUR would further improve the transparency of the information reported in the next BUR.

37. Singapore provided information on international market mechanisms in its BUR. Singapore is participating in clean development mechanism (CDM) projects and had six registered CDM projects as of October 2014. The total estimated emission reduction from these projects is about 473 kt CO₂ eq annually, and most of the CDM projects are in the energy sector.

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

38. Singapore, in the national circumstances section of its BUR, identifies its small size and lack of access to alternative energy as its constraints. However, the TTE notes that Singapore did not include information on constraints and gaps, and related financial, technical and capacity-building needs and financial resources, technology transfer, capacity-building and technical support received in accordance with decision 2/CP.17, annex III, paragraphs 14–16. During the technical analysis, Singapore informed the TTE that this was not done because Singapore did not receive any support. During the technical analysis, Singapore further informed the TTE that it has benefited from participation in technical workshops on GHG inventories, mitigation, domestic MRV and ICA, and that information on these would be reported in the next BUR submission. The TTE notes that this information could be considered as support needs and that the inclusion of this information in the next BUR could enhance the transparency of the report.

39. During the technical analysis, Singapore informed the TTE that Singapore carries out various international technical cooperation programmes for fellow developing countries in collaboration with the United Nations Environment Programme, the secretariat and other agencies; the TTE commends Singapore for these activities. The TTE notes that this information could be useful to understand the circumstances with regard to support needs and support provided.

40. Singapore also informed the TTE during the technical analysis that Singapore has partnered with various tertiary institutes, both within the country and internationally, to carry out research and development and build human capacity in the area of technology development, but it was confirmed that there is no capacity-building need in that respect. The TTE notes that this information could be useful to understand the circumstances with regard to technology transfer and technology support.

5. Domestic measurement, reporting and verification

41. In accordance with decision 2/CP.17, annex III, paragraph 13, Singapore's first BUR provides information on the domestic MRV arrangement of domestically supported mitigation actions. According to the information provided in the BUR, sectoral lead agencies monitor, measure and document the progress of implementation of mitigation actions under their purview. However, the TTE notes that the BUR did not provide information on how data are collected for domestic MRV. In response to a question for clarification from the TTE, Singapore explained that the sectoral lead agencies in charge of each of the mitigation measures collect the relevant data based on the progress indicators and methodologies and assumptions, as indicated in tables 1–5 of the first BUR. The TTE notes that this information would enhance the transparency of information provided on domestic MRV arrangements.

D. Identification of capacity-building needs

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

(a) With regard to GHG inventories, the TTE identified areas where information may be further improved in future communications potentially through capacity-building (see paras. 29 and 30 above). However, in consultation with Singapore, the TTE concluded that while the transparency could be enhanced by inclusion of this information, it is not a capacity-building need;

(b) The TTE identified a few issues for clarification on some of the mitigation actions (see para. 36 above). Singapore provided relevant clarification during the technical analysis week. The TTE did not identify any capacity-building needs related to the reporting of information on mitigation actions;

(c) The TTE noted that Singapore did not provide information on constraints and gaps, and related financial, technical and capacity-building needs and financial resources, technology transfer, capacity-building and technical support received in the BUR (see para. 38 above). However, after consultation with Singapore during the technical analysis week, the TTE concluded that this is not necessarily a capacity-building need.

43. In consultation with Singapore, the TTE concluded that while the issues discussed above are areas of possible enhancement of transparency for future BUR submissions, they are not necessarily areas of capacity-building needs.

III. Conclusions

44. The TTE concludes that:

(a) Most of the elements of information listed in paragraph 3(a) of the ICA guidelines are included in the first BUR of Singapore;

(b) In summary, the TTE commends Singapore for the comprehensive BUR and highlights the following from its analysis:

(i) Singapore reported information on national GHG inventories covering GHG emissions for 2010 estimated using the Revised 1996 IPCC Guidelines, the IPCC good practice guidance, the IPCC good practice guidance for LULUCF and the 2006 IPCC Guidelines. In 2010, the total GHG emissions in Singapore were 46,832 Gg CO₂ eq. GHG emissions grew slower than the economic growth rate during that time period at a compound annual growth rate of 2.0 per cent from 2000 to 2010;

(ii) Singapore reported 16 mitigation measures grouped into six broad actions. Sectoral lead agencies in charge of each of the mitigation measures collect the relevant data based on the progress indicators and methodologies and assumptions used, as well as monitor, measure and document the progress of implementation of mitigation actions under their purview. Singapore is participating in CDM projects, and it had six registered CDM projects as of October 2014;

(iii) Singapore did not provide information on constraints and gaps, and related financial, technical and capacity-building needs and financial resources, technology transfer, capacity-building and technical support received in its first BUR, because it did not receive any support for the preparation and submission of BURs or for its climate change activities. During the technical analysis, Singapore informed the TTE that it has benefited from participation in technical workshops on GHG

inventories, mitigation, domestic MRV and ICA. Singapore also noted that it has learned from experiences in organizing various international technical cooperation programmes for fellow developing countries in collaboration with the United Nations Environment Programme, the secretariat and other partners. Singapore further explained that information on these initiatives would also be reported in the next BUR submission to enhance its transparency.

45. The TTE, in consultation with Singapore, identified no capacity-building needs related to the facilitation of reporting in accordance with annex III to decision 2/CP.17 and to the participation in ICA in accordance with annex IV to decision 2/CP.17, taking into account Article 4, paragraph 3, of the Convention.

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

Third national communication of Singapore. Available at <http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php>.