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## **Technical analysis of the third biennial update report of Thailand submitted on 25 December 2020**

### **Summary report by the team of technical experts**

#### *Summary*

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

## Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AD	activity data
AR	Assessment Report of the Intergovernmental Panel on Climate Change
BUR	biennial update report
CGE	Consultative Group of Experts
CH <sub>4</sub>	methane
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
EF	emission factor
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
ICA	international consultation and analysis
IPCC	Intergovernmental Panel on Climate Change
IPCC good practice guidance	<i>Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories</i>
IPCC good practice guidance for LULUCF	<i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
MRV	measurement, reporting and verification
N <sub>2</sub> O	nitrous oxide
NA	not applicable
NAMA	nationally appropriate mitigation action
NC	national communication
NCCC	National Committee on Climate Change Policy of Thailand
NDC	nationally determined contribution
NO	not occurring
non-Annex I Party	Party not included in Annex I to the Convention
ONEP	Office of Natural Resources and Environmental Policy and Planning of Thailand
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
Revised 1996 IPCC Guidelines	<i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>
SF <sub>6</sub>	sulfur hexafluoride
TGEIS	Thailand Greenhouse Gas Emission Inventory System
TTE	team of technical experts
UNFCCC guidelines for the preparation of NCs from non-Annex I Parties	“Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention”
UNFCCC reporting guidelines on BURs	“UNFCCC biennial update reporting guidelines for Parties not included in Annex I to the Convention”

## **I. Introduction and process overview**

### **A. Introduction**

1. The process of ICA consists of two steps: a technical analysis of the submitted BUR and a facilitative sharing of views under the Subsidiary Body for Implementation, resulting in a summary report and a record, respectively.
2. According to decision 2/CP.17, paragraph 41(a), non-Annex I Parties, consistently with their capabilities and the level of support provided for reporting, were to submit their first BUR by December 2014. In addition, paragraph 41(f) of that decision states that non-Annex I Parties shall submit a BUR every two years, either as a summary of parts of their NC in the year in which the NC is submitted or as a stand-alone update report.
3. Further, according to paragraph 58(a) of the same decision, the first round of ICA is to commence for non-Annex I Parties within six months of the submission of the Parties' first BUR. The frequency of developing country Parties' participation in subsequent rounds of ICA, depending on their respective capabilities and national circumstances, and the special flexibility for small island developing States and the least developed country Parties, will be determined by the frequency of the submission of BURs.
4. Thailand submitted its second BUR on 29 December 2017, which was analysed by a TTE in the tenth round of technical analysis of BURs from non-Annex I Parties, conducted from 3 to 9 March 2018. After the publication of its summary report, Thailand participated in the seventh workshop for the facilitative sharing of views, convened in Bonn on 19 June 2019.
5. This summary report presents the results of the technical analysis of the third BUR of Thailand, undertaken by a TTE in accordance with the provisions on the composition, modalities and procedures of the TTE under ICA contained in the annex to decision 20/CP.19.

### **B. Process overview**

6. In accordance with the mandate referred to in paragraph 2 above, Thailand submitted its third BUR on 25 December 2020 as a stand-alone update report. The submission was made within three years from the submission of the second BUR. During the technical analysis, the Party explained the reasons for submitting the BUR more than two years after the submission of the last BUR, noting that reviewing and approving the submitted report was particularly time-consuming.
7. During the technical analysis, the Party clarified that it made major changes to the method used for preparing the BUR, including transitioning to using the 2006 IPCC Guidelines, to enable a regular submission every two years consistent with its capabilities and the level of support provided for reporting. The related capacity-building activities delayed the submission of the BUR.
8. A desk analysis of Thailand's BUR was conducted remotely from 8 to 12 March 2021 and was undertaken by the following TTE, drawn from the UNFCCC roster of experts on the basis of the criteria defined in decision 20/CP.19, annex, paragraphs 2–6: Amr Osama Abdel-Aziz (Egypt), Ana-Maria Danila (former member of the CGE from the European Union), Toghrul Fezyiyev (Azerbaijan), Olia Glade (New Zealand), Zammath Khaleel (member of the CGE from Maldives), Mwangi James Kinyanjui (Kenya), Juan Luis Martin Ortega (El Salvador), Naoki Matsuo (Japan), Anne Nyatichi Omambia (former member of the CGE from Kenya), Anand Sookun (Mauritius), Chisa Umemiya (Japan) and Vicente Paolo Yu (Philippines). Mr. Abdel-Aziz and Ms. Umemiya were the co-leads. The technical analysis was coordinated by Marion Vieweg-Mersmann and Hiroaki Odawara (secretariat).
9. 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 Thailand engaged in consultation<sup>1</sup> on the identification of capacity-building needs for the preparation of BURs and participation in the ICA process. Following the technical analysis of Thailand's third BUR, the TTE prepared and shared a draft summary report with Thailand on 31 May 2021 for its review and comment. Thailand, in turn, provided its feedback on the draft summary report on 30 August 2021.

10. The TTE responded to and incorporated Thailand's comments referred to in paragraph 9 above and finalized the summary report in consultation with the Party on 3 September 2021.

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

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

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

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

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

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

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

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

13. The elements of information referred to in paragraph A.11(a) above include the national GHG inventory report; information on mitigation actions, including a description of such actions, an analysis of their impacts and the associated methodologies and assumptions, and information on progress in their implementation; information on domestic MRV; and information on support needed and received.

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

15. The current TTE noted improvements in the reporting in the Party's third BUR compared with that in its previous BUR analysed. Information on the GHG inventory and mitigation actions and their effects reported in the Party's third BUR demonstrates that it has taken into consideration the areas for enhancing the transparency of the information reported noted by the previous TTE in the summary report on the technical analysis of the Party's previous BUR.

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<sup>1</sup> The consultation was conducted via videoconferencing.

## C. Technical analysis of the information reported

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

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

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

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

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

20. In its third BUR, Thailand provided an update on its national circumstances, including a description of national and regional development priorities, objectives and circumstances, including features of geography, climate, population, urbanization and economy that might affect the Party's ability to deal with mitigating and adapting to climate change. Thailand is projected to have an increasingly ageing society by around 2025, while the urban population is projected to comprise three quarters of the total population by 2040. Thailand's economy operates under the Twelfth National Economic and Social Development Plan (2017–2021), with agriculture, industry, tourism, services and natural resources as the main contributing sectors. In 2018, the economy grew by 4.1 per cent, up from 4.0 per cent in 2017, constituting the highest growth rate in six years. Thailand reported that it is one of the most vulnerable countries to climate change impacts in the world, including owing to its extended coastal zones, which are at great risk of intensive flooding, and the periodic water shortages faced by populations in rural areas. To address these issues, Thailand has formulated various strategies and policies, including the Water Resources Management Strategy (2015–2026) and the 20-Year Master Plan on Air Quality Management (2018–2037).

21. In addition, Thailand provided a summary of relevant information regarding its national circumstances in tabular and graphic format (e.g. in table 1-1 of the BUR).

22. Thailand transparently reported in its third BUR an update on its existing institutional arrangements relevant to the preparation of its NCs and BURs on a continuous basis. The description covers key aspects of the institutional arrangements, including the roles of the various agencies involved. Thailand established NCCC, chaired by the Prime Minister, to define national climate policies. ONEP serves as the secretariat to NCCC, as well as the national focal point for the GHG inventory. NCCC is composed of five subcommittees, including the Subcommittee on Climate Law established in 2019. The Subcommittee on Climate Change Knowledge and Database is responsible for preparing Thailand's NCs and BURs, while NCCC is tasked with approving the submissions of NCs and BURs to the UNFCCC.

23. In paragraph 24 of the summary report on the technical analysis of Thailand's second BUR, the previous TTE noted that the transparency of the reporting on the roles of different agencies in the Party's institutional arrangements could be enhanced. The current TTE noted that Thailand included relevant information in its third BUR, as outlined in paragraph 22 above, and commends the Party for enhancing the transparency of its reporting.

24. Thailand reported in its third BUR an update on its domestic MRV arrangements. The description covers key aspects of the institutional arrangements, including the involvement and roles of relevant institutions. The MRV arrangements are designed at the national level and cover two main areas: the GHG inventory system and the implementation status of measures in the context of Thailand's NAMA Roadmap. During the technical analysis, the Party clarified that the MRV arrangements for these two areas are linked at the national level but not at the sectoral level. For the arrangements related to the GHG inventory system, lead agencies collect and verify AD to enable ONEP to calculate emission estimates using TGEIS. For the arrangements related to the implementation status of measures in the context of its NAMA, lead agencies submit the calculations of GHG emission reductions to the sectoral-level working groups for their approval.

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

25. As indicated in table I.1, Thailand reported information on its GHG inventory in its BUR mostly in accordance with paragraphs 3–10 of the UNFCCC reporting guidelines on BURs and paragraphs 8–24 of the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties, contained in the annex to decision 17/CP.8.

26. Thailand submitted its third BUR in 2020 and the GHG inventory reported is for 2016. The GHG inventory is consistent with the requirements for the reporting time frame.

27. GHG emissions and removals for the BUR covering the 2016 inventory were estimated using mostly tier 1 and tier 2 methodologies, where possible, from the 2006 IPCC Guidelines, while in some cases the IPCC good practice guidance or the IPCC good practice guidance for LULUCF were applied, as appropriate. Information on methodologies was reported in table 2-1 of Thailand's BUR, including the methodological tiers used for each category and subcategory. Tier 1 methodologies and default EFs were used for the energy sector and almost all categories under the IPPU sector, with the exception of cement production, for which the Party used a combination of tier 1 and tier 2 methodologies. The TTE commends Thailand for reporting the inventory using the 2006 IPCC Guidelines where possible.

28. Tier 1 and tier 2 methodologies, as well as a combination of country-specific and default EFs, were used for the waste, agriculture and LULUCF sectors, but the Party did not clarify which tiers were used for individual activities within categories where a combination of tiers was reported. During the technical analysis, the Party provided additional information on the tiers used for individual activities within categories reported using a combination of tier 1 and tier 2 methodologies. Tier 2 methodologies were used for dairy cattle, beef cattle and buffalo under category 3.A.1 enteric fermentation; for dairy cattle, beef cattle, buffalo and swine under category 3.A.2 manure management; and for some individual land-use activities and facilities under category 5.C incineration and open burning of waste, where data were available.

29. Information on the values and sources of AD and country-specific EFs used was not reported in Thailand's BUR for any sectors and the reason for this was not clear to the TTE. In the BUR, the Party reported that country-specific EFs were used for the agriculture, LULUCF and waste sectors. During the technical analysis, the Party provided the sources for most AD and clarified that AD collection is incorporated in the institutional arrangements for GHG inventory reporting, but challenges still exist in collecting AD for some sectors.

30. Information on the Party's total GHG emissions by gas for 2016 is outlined in table 1 in units of mass. The TTE encountered challenges in identifying the total GHG emissions including and excluding LULUCF as a result of differences in the information provided in summary table 2-4 and the sectoral tables of the BUR. Values in table 1 are derived from sectoral tables 2-7–2-11 owing to errors in the summary data provided in table 2-4. It shows an increase in emissions of 44.2 per cent without LULUCF since 2000 (108,600.47 Gg CO<sub>2</sub> eq).

Table 1  
Greenhouse gas emissions by gas of Thailand for 2016

<i>Gas</i>	<i>GHG emissions (Gg) including LULUCF</i>	<i>GHG emissions (Gg) excluding LULUCF</i>
CO <sub>2</sub>	179 006.58	270 382.12
CH <sub>4</sub>	2 712.28	2 705.13
N <sub>2</sub> O	55.06	54.85
HFCs	NA	NA
PFCs	NA	NA
SF <sub>6</sub>	NA	NA
Other	NA	NA
<b>Total (Gg CO<sub>2</sub> eq)<sup>a</sup></b>	<b>263 223.47</b>	<b>354 357.61</b>

<sup>a</sup> GWP values from the AR4 were used to calculate the totals.

31. Information on other emissions was clearly reported, including 1,384.01 Gg nitrogen oxides, 7,253.94 Gg carbon monoxide, 971.02 Gg non-methane volatile organic compounds and 452.09 Gg sulfur dioxide for 2016.

32. Information on emissions of HFCs, PFCs and SF<sub>6</sub> was not reported in Thailand's BUR. However, the Party clarified in its BUR that this information was not reported owing to difficulties in collecting and classifying data and a lack of detailed information required for estimating emissions. The Party also indicated that efforts are under way to collect information on the consumption, import and export of fluorinated gases, which can be used to report HFC, PFC and SF<sub>6</sub> emissions using a tier 1 methodology.

33. Thailand applied notation keys in tables where numerical data were not provided. The use of notation keys was mostly consistent with the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties. The Party applied the notation key "NO" in summary table 2-4 and sectoral tables 2-5–2-9 of the BUR for gases and sectors that were not occurring, while grey shaded cells and "NA" were reported for gases that were not applicable to the respective sector, as per the 2006 IPCC Guidelines. However, the Party also reported "NA" for some categories and gases, such as international aviation and marine bunker fuels (see para. 53 below) and HFCs, PFCs and SF<sub>6</sub>, and the reason for this was not clear to the TTE. During the technical analysis, the Party clarified that emissions occur but were not estimated owing to issues with data availability.

34. Thailand did not report comparable information addressing the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF and the sectoral reporting tables annexed to the Revised 1996 IPCC Guidelines. The reason for not including comparable information was not clearly reported in Thailand's BUR. During the technical analysis, the Party clarified that the limited availability of land-use change data made it difficult to report emissions and removals consistent with the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF, and that it will develop a land-use classification system using a geographic information system tool to enable the reporting of comparable information in the next BUR.

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

Table 2  
Shares of greenhouse gas emissions by sector of Thailand for 2016

<i>Sector</i>	<i>GHG emissions (Gg CO<sub>2</sub> eq)</i>	<i>% share<sup>a</sup></i>	<i>% change 2000–2016</i>
Energy	253 895.61	71.6	53.7
IPPU	31 531.41	8.9	48.9
Agriculture	52 158.70	14.7	6.5
LULUCF	–91 134.15	NA	–47.1

<i>Sector</i>	<i>GHG emissions (Gg CO<sub>2</sub> eq)</i>	<i>% share<sup>a</sup></i>	<i>% change 2000–2016</i>
Waste	16 771.89	4.7	60.2

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

36. Thailand reported information on its use of GWP values consistent with those provided by the IPCC in its AR4 based on the effects over a 100-year time-horizon of GHGs. During the technical analysis, the Party clarified that it used the GWP values from the AR2 in its second BUR; however, after consulting with experts, it decided to use the GWP values from the AR4 in its third BUR.

37. For the energy sector, information was clearly reported on GHG emissions, methodological tier levels, EFs, key categories, notation keys used and other information specific to the sector. Thailand estimated emissions from the energy sector using tier 1 methodology and IPCC default EFs. In 2016, the energy sector accounted for 71.7 per cent of the Party’s total emissions excluding LULUCF. Electricity and heat production (energy industries) was reported as the largest source of GHG emissions in the sector, contributing 42.8 per cent of Thailand’s energy sector emissions in 2016. This was followed by transport (category 1.A.3), manufacturing industries and construction (category 1.A.2) and other (category 1.A.4), which contributed 27.2, 19.5 and 6.1 per cent, respectively, of the energy sector emissions. Total emissions from the energy sector increased by 53.7 per cent between 2000 and 2016, from 165,143.84 to 253,895.61 Gg CO<sub>2</sub> eq. AD for fuel used in power generation and refineries and for fuel combustion in industry and transport are collected from relevant agencies by the Energy Policy and Planning Office and the Office of Transport and Traffic Policy and Planning, which are the sectoral lead agencies.

38. For the IPPU sector, information was clearly reported on GHG emissions, methodological tier levels, EFs, key categories, notation keys used and other information specific to the sector. In 2016, IPPU emissions accounted for 8.9 per cent of the Party’s total emissions excluding LULUCF. Emissions from the sector increased by 49.0 per cent between 2000 and 2016, from 21,168.48 to 31,531.41 Gg CO<sub>2</sub> eq. CO<sub>2</sub> emissions from cement production and the chemical industry accounted for 57.9 and 38.0 per cent, respectively, of the total emissions from the IPPU sector. The Party applied a combination of tier 1 and tier 2 methodologies to estimate emissions from cement production using available data. AD for cement, steel, chemical and food production were collected from relevant agencies by the Department of Industrial Works, which is the sectoral lead agency.

39. For the agriculture sector, rice cultivation (CH<sub>4</sub>), enteric fermentation (CH<sub>4</sub>) and direct N<sub>2</sub>O emissions from managed soils were identified as key categories and the most relevant emissions sources in the sector, accounting for 51.1, 16.3 and 16.2 per cent, respectively, of the total agriculture emissions in 2016. Thailand used a combination of tier 1 and tier 2 methodologies, along with a combination of country-specific EFs and default EFs from the 2006 IPCC Guidelines, for estimating CH<sub>4</sub> emissions from enteric fermentation and manure management, while tier 2 methodology and country-specific EFs were applied for estimating CH<sub>4</sub> emissions from rice cultivation. Emissions from agriculture increased from 48,976.48 to 64,112.18 Gg CO<sub>2</sub> eq between 2000 and 2012 and then decreased to 52,158.70 Gg CO<sub>2</sub> eq in 2016. AD for livestock, agricultural production and agricultural residues are collected from relevant agencies by the Office of Agricultural Economics, which is the sectoral lead agency.

40. Information was not reported on the values of the country-specific EFs used for the agriculture sector. Although Thailand’s institutional arrangements for GHG inventory reporting include AD collection, challenges still exist in collecting relevant data for some sectors. During the technical analysis, the Party clarified that there was a lack of information for some categories, such as area of cropland burned, and it is currently using proxy data to estimate emissions for those categories.

41. For the LULUCF sector, Thailand reported annual GHG emissions and removals for 2000–2016. The Party reported that it used a combination of tier 1 and tier 2 methodologies, along with country-specific and default EFs. Overall, net removals from the LULUCF sector fluctuated between a minimum of 45,432.78 Gg CO<sub>2</sub> eq in 2002 and a maximum of 103,292.72 Gg CO<sub>2</sub> eq in 2014. Cropland remaining cropland dominates GHG removals from LULUCF, with net removals of 73,457.96 Gg CO<sub>2</sub> eq. AD for land use, land-use change, harvested wood products and soil organic matter are collected from relevant agencies by the



Department of National Parks, Wildlife and Plant Conservation, which is the sectoral lead agency.

42. Information on the country-specific EFs used for the LULUCF sector was not clearly reported in Thailand's BUR. During the technical analysis, the Party provided additional information on the methodologies and country-specific EFs used and clarified that information on the specific methodological tiers and country-specific EFs used for the subcategories under the LULUCF sector can be reported in the BUR if required. The Party also clarified that the limited availability of data made it difficult to report emissions and removals from wetlands.

43. Thailand reported emissions from field burning of agricultural residues under the agriculture sector and biomass burning in cropland under the LULUCF sector. The category field burning of agricultural residues is provided in the Revised 1996 IPCC Guidelines and was subsequently integrated into the category biomass burning on cropland in the 2006 IPCC Guidelines. From the information provided by the Party, it was not clear to the TTE whether steps were taken to avoid the double counting of emissions when estimating emissions for these two categories in the GHG inventory. During the technical analysis, the Party clarified that emissions from field burning of agricultural residues were estimated for biomass burning in cropland that remained cropland, whereas emissions from biomass burning in cropland were estimated for biomass burning in forest land converted to cropland. The TTE noted that, when overlapping sectors from different methodologies are reported, clarifying the distinction between such emission estimates would facilitate a better understanding of the information reported in the BUR.

44. For the waste sector, information was clearly reported on GHG emissions, key categories, notation keys used and other information specific to the sector. CH<sub>4</sub> emissions from solid waste disposal and from wastewater treatment and discharge are the key sources of emissions from the waste sector, accounting for 48.5 and 45.3 per cent, respectively, of the total sectoral emissions in 2016. Emissions from the waste sector increased from 10,466.94 to 17,652.74 Gg CO<sub>2</sub> eq between 2000 and 2008, then decreased to 11,866.89 Gg CO<sub>2</sub> eq in 2012 and increased again to 16,771.89 Gg CO<sub>2</sub> eq in 2016. AD for municipal solid waste composition, industrial waste, hazardous waste and wastewater are collected from relevant agencies by the Pollution Control Department, which is the sectoral lead agency.

45. Information on methodological tier levels and country-specific EFs used for the waste sector was not clearly reported in Thailand's BUR. During the technical analysis, the Party clarified that a combination of tier 1 and tier 2 methodologies was applied. A tier 2 methodology was applied for some incinerators where country-specific EFs were available, while a tier 1 methodology was applied in cases where no country-specific EFs were available.

46. The BUR provides an update to some of the GHG inventories reported in the Party's previous BURs. The information reported provides an update of the Party's second BUR, which addressed anthropogenic emissions and removals for 2000–2013. The update was carried out for 2000–2013 using the methodologies contained in the 2006 IPCC Guidelines, thus generating a consistent 14-year time series. The Party reported that it recalculated emissions from all sectors for 2000–2013 owing to a change in the guidelines used by Thailand. The Party reported that recalculations were performed using the 2006 IPCC Guidelines instead of the Revised 1996 IPCC Guidelines, which resulted in an increase of estimated emissions for 2000–2013 by 5.8–8.0 per cent. The GHG inventories for 2000–2013 reported in the BUR are consistent.

47. Information on years prior to 2000 was not reported in Thailand's BUR. During the technical analysis, the Party clarified that for the NC1 a consultant was hired to prepare the GHG inventory for 1994 and that recalculations could not be performed since historical AD for 1994 were not available.

48. Thailand described in its BUR the institutional framework for the preparation of its 2016 GHG inventory. The Party reported that NCCC is the governmental body responsible for its climate change policy and ONEP is the national focal point for the GHG inventory, which was prepared with the support of the Government of Australia, which assisted Thailand in developing TGEIS.

49. Information on data archiving was clearly reported in Thailand's BUR. The Party reported that data are transferred to the TGEIS database. The Party also indicated that the current TGEIS database requires periodical updates to reflect improvements in the quality of the GHG inventory and that phase two of the further development of the TGEIS database will include establishing an archiving system for the relevant inventory sectors.

50. Thailand clearly reported that a key category analysis was performed for both the level of emissions and the trend in emissions.

51. The BUR provides information on QA/QC measures for all sectors. The information reported includes information on the Party's use of the 2006 IPCC Guidelines for conducting QA/QC procedures, as well as information on Thailand's national system for QC of data collection and the final QA process. The TTE commends Thailand for providing information in accordance with the 2006 IPCC Guidelines.

52. Thailand reported information on CO<sub>2</sub> fuel combustion using only the sectoral approach. Information on the reference approach was not reported in Thailand's BUR, and the Party clarified during the technical analysis that this was due to time constraints. Thailand further clarified that it is in the process of improving the information reported on fuel consumption and will include emissions estimated using the reference approach in its next BUR.

53. Information on international aviation and marine bunker fuels was not reported in Thailand's BUR. However, the Party provided relevant clarification in its BUR, explaining that the Ministry of Transport, via the Civil Aviation Authority of Thailand, is developing an approach to collecting data on fuel consumption for international aviation. During the technical analysis, the Party clarified that the available data on fuel consumption for international aviation are not complete because the Ministry of Energy reported information on Thailand's fuel use for the aviation sector but did not differentiate between domestic and international aviation. The Party also clarified that the Civil Aviation Authority of Thailand, as the national focal point of the International Civil Aviation Organization, has reported fuel use for international aviation to the International Civil Aviation Organization since 2017, and hence Thailand may report such emissions in the next BUR.

54. Thailand reported information on the uncertainty assessment (level) of its national GHG inventory. The results obtained, as reported in the BUR, reveal that the level uncertainty for emissions is 24.5 per cent (11.5 per cent excluding LULUCF). Thailand did not report uncertainty using the trend methodology.

55. Information on the underlying assumptions and methodologies used to estimate the uncertainty values was not clearly reported in Thailand's BUR. During the technical analysis, the Party clarified that it estimated the uncertainty values using the methodologies included in the 2006 IPCC Guidelines and that assumptions were mainly based on the default values in the 2006 IPCC Guidelines for the energy, IPPU and agriculture sectors, while those for the LULUCF sector were from the IPCC good practice guidance for LULUCF.

56. The TTE noted that the transparency of the information reported on GHG inventories could be enhanced by addressing the areas noted in paragraphs 28, 29, 32, 33, 34, 40, 42, 43, 45, 47, 52, 53 and 55 above, which could facilitate a better understanding of the information reported on GHG inventories.

57. In paragraph 48 of the summary report on the technical analysis of the Party's second BUR, the previous TTE noted areas where the transparency of the reporting on GHG inventories (including in relation to country-specific EFs, disaggregated sectoral reporting tables and the use of GWP values and notation keys) could be enhanced. The current TTE noted the improvements referred to in paragraphs 36–38 above and commends the Party for enhancing the transparency of its reporting.

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

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

59. The information reported provides a clear overview of the Party's mitigation actions and their effects. In its BUR, Thailand reported information on its national context and framed its national mitigation planning and actions in the context of its NAMA Roadmap for pre-2020 activities and its NDC for the post-2020 phase. In its NAMA, Thailand pledged to reduce GHG emissions by 7–20 per cent below the projected baseline level by 2020, subject to the level of international support received. Thailand's NDC includes commitments to reduce national GHG emissions by 20 and 25 per cent below the projected baseline level by 2030 as unconditional and conditional targets, respectively. Thailand reported that climate change has been mainstreamed in and integrated into its National Strategy 2018–2037, including mitigation.

60. The Party reported a summary of the 10 groups of mitigation actions, mainly targeting the energy and transport sectors, included under its NAMA Roadmap (2021–2030) in tabular format in accordance with decision 2/CP.17, annex III, paragraph 11, as well as an overview of 15 groups of actions, including in the IPPU and waste sectors, included under Thailand's NDC Action Plan 2021–2030, without providing further detail on individual actions. The Party also reported information in narrative format on generic aspects of actions under the (pre-2020) NAMA Roadmap and (post-2020) NDC Roadmap, but not for individual actions.

61. Consistently with decision 2/CP.17, annex III, paragraph 12(a), Thailand reported in the BUR the names of mitigation actions or groups of actions specified in the NAMA Roadmap, as well as information on quantitative goals and progress indicators. Thailand included an overall description of its NAMA and NDC as the national emission reduction targets against the baseline for 2020 and 2030, respectively. The TTE noted that detailed information on mitigation actions is reported for Thailand's NAMA, but not for its NDC, because the NDC Action Plan will only be operationalized from 2021 onward.

62. A more detailed description of each mitigation action, which could enable a better understanding of the coverage and nature of individual actions, such as underlying policies and measures, was not reported. The Party clarified during the technical analysis that this information was collected by the implementing agencies and that additional information will be provided in future submissions.

63. Thailand clearly reported information on the methodologies used to calculate emission reductions for each action included under its NAMA.

64. The mitigation actions included under the NAMA focus mainly on promoting renewable energy sources and biofuels and enhancing energy efficiency in the energy industry. All mitigation actions in the context of the NAMA were reported as implemented. The information reported in the BUR on these mitigation actions includes details on objectives, methodologies, achieved outcomes, and GHG emission reductions achieved for 2016–2018. Thailand reported a total GHG emission reduction of 57.84 Mt CO<sub>2</sub> eq, or 15.8 per cent, below the baseline level in 2018 as a result of implementing the mitigation actions under the NAMA, which is already within the range of the emission reduction pledged by Thailand in its NAMA (a 7–20 per cent reduction) (see para. 59 above). The mitigation actions with the largest GHG emission reduction impact are mainly supply-side measures involving bioenergy (heat, electricity and transportation fuels), representing 78.1 per cent of total emission reductions under Thailand's NAMA in 2018.

65. In its BUR, Thailand reported seven actions in the energy supply sector under the NAMA Roadmap. Four relate to electricity and heat supply from bioenergy and non-bioenergy renewables. The goal is to achieve a share of 20 per cent of electricity generation from renewables by 2036. For heat generation, the target is to supply 30–35 per cent of heat demand from renewables by 2036. Heat generation and electricity generation from biorenewable energy (biomass and biogas) accounted for the largest emission reductions in 2018, representing 45.9 and 19.2 per cent of total emission reductions, respectively, under Thailand's NAMA. Other renewable electricity generation represented 12.6 per cent of total emission reductions.

66. The promotion of renewable energies is driven by the Alternative Energy Development Plan (2015), under which Thailand aims to increase the share of renewable energy in gross final consumption to 24.1 per cent by 2030, up from 14.5 per cent at the end of 2017, and to 30 per cent by 2036. In addition, Thailand included information on three

actions implemented under the Power Development Plan (2015) to improve the power generation efficiency of existing lignite and natural gas fired power plants, contributing 8.0 per cent of total emission reductions under Thailand's NAMA in 2018.

67. One action reported in the BUR aims to improve the demand side regarding the energy efficiency of electrical devices through standard labelling, as part of the activities under the Energy Efficiency Plan 2015, with the aim of saving 4,149 ktoe electricity by 2036. In 2018, a saving of 134 ktoe (3.2 per cent of the target) was achieved, equivalent to 0.75 Mt CO<sub>2</sub> eq (only 1.3 per cent of total emission reductions under Thailand's NAMA).

68. Thailand specified two mitigation actions under its NAMA Roadmap that aim to promote biofuels. The targets are to achieve a consumption of 14.0 million and 11.3 million litres per day for biodiesel and bioethanol, respectively, by 2036. In 2018, 1.55 million litres of biodiesel and 1.53 million litres of bioethanol were consumed, contributing emission reductions of 4.18 and 3.34 Mt CO<sub>2</sub> eq (7.2 and 5.8 per cent of total emission reductions under Thailand's NAMA), respectively. As biodiesel and bioethanol are renewable energies, these actions are implemented under the Alternative Energy Development Plan (2015).

69. Information on the status of implementation of each of the actions reported under the NAMA and the actions and steps taken or envisaged to achieve each of them was not provided in the BUR. During the technical analysis, the Party clarified that the actions are implemented as part of responsible ministries' action plans. Information on the baseline concept used by the Party to measure the progress of mitigation actions was not sufficiently clear, especially whether emission reductions for actions that started before 2013 are included in the baseline. The TTE noted that, in table 3-1 of the BUR, assumptions were specified only for the targeted energy type, and grid EFs were reported as one of the assumptions used in the calculation of emission reductions. However, no information was provided on how the grid EFs used were calculated or their sources. During the technical analysis, the Party clarified how the grid EFs are generated as part of the MRV processes.

70. The mitigation actions reported under the NDC focus on the energy, transportation, IPPU and industrial wastewater and municipal waste management sectors. The NDC Action Plan 2021–2030 includes several actions related to power generation, energy consumption in households and buildings, biofuel consumption for the transport sector, IPPU and industrial wastewater, and municipal wastewater. These measures are based on five sectoral action plans. The BUR indicates that the mitigation actions reported are included in the NDC Action Plan, which has been approved by NCCC and includes a plan to support implementation of the actions. During the technical analysis, the Party clarified that the information reported in the BUR was collected from NDC sectoral action plans developed by key agencies in the respective sectors. It clarified that the NDC Action Plan provides annual quantitative goals for the associated mitigation measures but does not include the same level of detail provided for the measures under the NAMA Roadmap.

71. Thailand did not provide information on its involvement in international market mechanisms. During the technical analysis, the Party clarified that it is not at the stage of introducing a cap-and-trade emissions trading system owing to the lack of baseline data on subsectoral GHG emissions. According to the Party, the Climate Change Act, which is currently under development, will help Thailand to collect relevant information for inclusion in future BURs.

72. Thailand reported information on its domestic MRV arrangements in accordance with decision 2/CP.17, annex III, paragraph 13. The information reported indicates that the working group on GHG inventory and mitigation measures is responsible for selecting measures to be monitored, selecting methodologies and EFs and preparing GHG emission reduction reporting. Sectoral lead agencies and the Subcommittee on Climate Change Knowledge and Database verify GHG emission reduction reporting and NCCC approves the final results.

73. The TTE noted that the transparency of the information reported on mitigation actions could be further enhanced by addressing the areas noted in paragraphs 62, 69 and 70 above, which could facilitate a better understanding of the information reported on mitigation actions.

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

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

75. Thailand reported information on constraints and gaps, and related financial, technical and capacity-building needs in accordance with decision 2/CP.17, annex III, paragraph 14. In its BUR, Thailand identified insufficient capacities and resources of governmental agencies, the private sector and the wider public sector as constraints. Thailand provided lists of its financial, technical and capacity-building needs in the three areas of mitigation, adaptation and enabling environment. The primary sectors and areas where the Party identified needs include energy and transportation for mitigation; water management, agriculture and food security for adaptation; and NDC development and the monitoring and evaluation system for climate finance projects to strengthen the enabling environment.

76. Thailand also reported information on constraints, gaps and related needs in the specific chapters of the GHG inventory. Thailand's support needs are largely related to developing country-specific EFs, including for biofuel; upgrading data-collection approaches to tier 3 for the categories under manufacturing industries and construction; and enhancing the capacities of national experts to apply tier 2 and tier 3 methodologies, particularly for key categories. In section 2.4 of its BUR, Thailand reported detailed information on the support needed for each sector of the GHG inventory.

77. Information on whether the constraints, gaps and related needs reported across the different chapters of the BUR overlap was not clearly reported in Thailand's BUR. During the technical analysis, the Party clarified that the information reported across the chapters of the BUR is complementary.

78. Thailand reported information on financial resources, technology transfer, capacity-building and technical support received in accordance with decision 2/CP.17, annex III, paragraph 15. In its BUR, Thailand reported that it received USD 9.5 million from the Global Environment Facility for facilitating climate action. Additionally, it received USD 852,000 from the Global Environment Facility for preparing both its third BUR and NC4. Thailand reported information on support received in the areas of mitigation, adaptation and enabling environment. The information reported indicates that Thailand received support from a number of multilateral and bilateral partners, including the Green Climate Fund, the World Bank and the Asian Development Bank, and bilateral support from the Governments of Australia, Germany, Japan and the United Kingdom of Great Britain and Northern Ireland.

79. Thailand also reported information on support received based on quantitative data using graphs, which categorize support received in terms of amount and number of projects by sector and support type. On the basis of this categorization, Thailand clearly reported that it needs more support in the form of technology development and transfer and direct financial support, among others. The TTE commends the Party for reporting information on support received using quantitative data and for using this information to identify support needed, which enabled the TTE to understand that the Party has strengthened its ability to systematically monitor and report both support needed and received.

80. Thailand reported information on nationally determined technology needs with regard to the development and transfer of technology in accordance with decision 2/CP.17, annex III, paragraph 16. In its BUR, Thailand reported that these needs included sensor technology for improving energy efficiency in buildings and industry, artificial intelligence for improving energy efficiency and electrification of transportation.

81. Thailand reported that information on technology needs was determined nationally through a participatory process. However, information was not provided on how this participatory process was undertaken. During the technical analysis, the Party provided additional information explaining that the participatory process included organizing focus group meetings, an NCCC meeting and a public hearing. The focus group meeting was attended by more than 50 participants from various public entities responsible for climate change actions.

82. The TTE noted that the transparency of the information reported on needs and support received could be further enhanced by addressing the areas noted in paragraphs 77 and 81 above, which could facilitate a better understanding of the information reported on needs and support received.

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

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

- (a) With regard to the GHG inventory:
  - (i) Enhancing capacity for carrying out the uncertainty analysis, including methodologies to enable the application of expert judgment;
  - (ii) Estimating country-specific EFs;
  - (iii) Estimating CO<sub>2</sub> emissions from fuel combustion using the reference approach;
  - (iv) Collecting data, conducting QA/QC procedures and reporting on AD, especially for the IPPU and agriculture sectors, in particular for area of cropland burned;
  - (v) Enhancing the technical capacity for reporting comparable information addressing the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF;
  - (vi) Estimating emissions and removals from wetlands;
- (b) With regard to mitigation:
  - (i) Quantifying the co-benefits of mitigation actions;
  - (ii) Reporting on the Party's participation in international market mechanisms;
- (c) Related to technology, financial, technical and capacity-building needs and support:
  - (i) Documenting the steps taken to collect and report information on support needed, including a technology needs assessment at the sectoral level for mitigation and adaptation;
  - (ii) Improving the capacity to systematically collect and report information on constraints, gaps and needs across all areas related to climate change;
  - (d) Related to reporting cross-cutting issues, enhancing the capacity of the national system to prepare and submit BURs every two years on a continuous basis.

84. In consultation with Thailand, the TTE identified the following needs for capacity-building that could facilitate the transition of the Party to the enhanced transparency framework under the Paris Agreement:

- (a) Training in the preparation of common reporting format tables, which are currently only used for reporting by Parties included in Annex I to the Convention, in order to prepare for future reporting requirements;
- (b) Training in the use of methodologies to prioritize support needed based on national circumstances.

85. The TTE noted that, in addition to those identified during the technical analysis, Thailand reported several capacity-building needs in sections 2.4 and 4.2 of the BUR covering the following areas:

- (a) GHG inventory preparation;
- (b) Smart-grid system and hybrid or electric vehicles in public transport;
- (c) Climate-smart agriculture;

- (d) Forecasting, monitoring and warning systems for extreme events;
- (e) Enhanced public health systems to respond to climate impacts;
- (f) Climate information services for decision-making;
- (g) Funding proposals for implementing climate action;
- (h) Formal and non-formal education and training programmes on climate change.

86. In paragraph 73 of the summary report on the technical analysis of Thailand's second BUR, the previous TTE, in consultation with Thailand, identified capacity-building needs. In its third BUR, Thailand reflected that some of those capacity-building needs have been addressed. Ongoing capacity-building needs relate to data collection, especially for the IPPU sector, development of country-specific EFs and cross-cutting issues related to reporting NCs and BURs on a continuous basis.

### III. Conclusions

87. The TTE conducted a technical analysis of the information reported in the third BUR of Thailand in accordance with the UNFCCC reporting guidelines on BURs and concludes that the information reported is mostly consistent. It provides an overview of national circumstances and institutional arrangements relevant to the preparation of NCs on a continuous basis; the national inventory of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol; mitigation actions and their effects, including associated methodologies and assumptions; constraints and gaps, and related financial, technical and capacity-building needs, including a description of support needed and received; the level of support received to enable the preparation and submission of BURs; and domestic MRV. The TTE concluded that the information analysed is mostly transparent.

88. Thailand reported an update on the institutional arrangements relevant to the preparation of its BURs, covering the two main areas of the GHG inventory system and the progress of implementation of measures under the NAMA. The information reported includes the involvement and roles of relevant institutions. Thailand has taken significant steps to establish institutional arrangements that allow for the sustainable preparation of its BURs. These include making organizational improvements and introducing TGEIS for the preparation of the GHG inventory.

89. In its third BUR, submitted in 2020, Thailand reported information on its national GHG inventory for 2000–2016. This included GHG emissions and removals of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O for all relevant sources and sinks, as well as the precursor gases. The inventory was developed on the basis of the 2006 IPCC Guidelines, although in some cases the IPCC good practice guidance or the IPCC good practice guidance for LULUCF and EFs from the 2006 IPCC Guidelines were applied for individual categories. The total GHG emissions for 2016 were reported as 263,223.47 Gg CO<sub>2</sub> eq (including LULUCF) and 354,357.61 Gg CO<sub>2</sub> eq (excluding LULUCF). Key categories and main gases were identified as energy (public electricity and heat production, and road transportation) and LULUCF (forest and cropland), and CO<sub>2</sub>, respectively. Estimates of fluorinated gases were not provided owing to difficulties in obtaining the necessary data, as clarified by the Party in the BUR. CO<sub>2</sub> emissions from fuel combustion were not provided using the reference approach owing to a lack of reliable data, as clarified by the Party during the technical analysis. Values for the AD and country-specific EFs used were not provided in the BUR, although the Party clarified the sources for most AD during the technical analysis, while also highlighting capacity constraints in relation to collecting AD for some subcategories.

90. Thailand reported information on mitigation actions and their effects in narrative format for its NAMA and NDC as the economy-wide targets for 2020 and 2030, respectively, and in tabular format for each group of actions under the NAMA Roadmap. In its NAMA, Thailand pledged to reduce GHG emissions by 7–20 per cent below the projected baseline level by 2020, subject to the level of international support received. Thailand's NDC includes commitments to reduce national GHG emissions by 20 and 25 per cent below the projected

baseline level by 2030 as unconditional and conditional targets, respectively. The Party reported the progress of implementation of its mitigation actions and the results achieved, including a total GHG emission reduction of 57.84 Mt CO<sub>2</sub> eq, or 15.8 per cent, below the baseline level in 2018 as a result of implementing mitigation actions under its NAMA, which is already within the range of the emission reduction pledged by Thailand in its NAMA.

91. Thailand reported 10 groups of actions under its NAMA targeting the energy and transport sectors, mainly consisting of supply-side measures relating to bioenergy (heat, electricity and transportation fuels), representing 78.1 per cent of total emission reductions under Thailand's NAMA in 2018. Among those measures, heat generation and electricity generation from biorenewable energy (biomass and biogas) dominate, representing 45.9 and 19.2 per cent of total emission reductions under Thailand's NAMA in 2018, respectively, followed by the contribution of biodiesel and bioethanol consumption, representing 7.2 and 5.8 per cent of total emission reductions, respectively. Thailand also developed the NDC Action Plan 2021–2030 supported by NDC sectoral action plans developed by key agencies in the respective sectors and reported the names of 15 groups of actions that are planned under the NDC Action Plan. Thailand did not provide information on its involvement in international market mechanisms.

92. Thailand reported information on key constraints, gaps and related needs, including the list of its related needs in the three areas of mitigation, adaptation and enabling environment, as well as detailed information on needs related to the GHG inventory by sector. Information was reported on the technical, technology transfer and capacity-building support received, including a list of support received, as well as quantitative data categorized by sector and support type. The Party also reported that it received financial support of USD 852,000 from the Global Environment Facility for preparing its latest BUR and NC. The Party further reported information on the transfer of technology received, including energy-efficient cooling technologies. However, the Party reported that technology transfer support received is not sufficient. Information on how technology needs were nationally determined was not reported, despite the Party undertaking a participatory process involving various entities and a public hearing, as clarified by the Party during the technical analysis.

93. The TTE, in consultation with Thailand, identified the 11 capacity-building needs listed in chapter II.D above and needs for capacity-building that aim to facilitate reporting in accordance with the UNFCCC reporting guidelines on BURs and participation in ICA in accordance with the ICA modalities and guidelines, taking into account Article 4, paragraph 3, of the Convention. The Party, in consultation with the TTE, also identified the two needs for capacity-building to facilitate transition to the enhanced transparency framework under the Paris Agreement listed in paragraph 84 above. Thailand identified the following as priority capacity-building needs:

- (a) Enhancing capacity for carrying out the uncertainty analysis, including methodologies to enable the application of expert judgment;
- (b) Estimating country-specific EFs;
- (c) Estimating CO<sub>2</sub> emissions from fuel combustion using the reference approach;
- (d) Collecting data, conducting QA/QC procedures and reporting on AD, especially for the IPPU and agriculture sectors, in particular for area of cropland burned;
- (e) Reporting comparable information addressing the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF;
- (f) Documenting the steps taken to collect and report information on support needed, including a technology needs assessment at the sectoral level for mitigation and adaptation.



## Annex I

### Extent of the information reported by Thailand in its third biennial update report

Table I.1

#### Identification of the extent to which the elements of information on greenhouse gases are included in the third biennial update report of Thailand

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, paragraph 41(g)	The first BUR shall cover, at a minimum, the inventory for the calendar year no more than four years prior to the date of the submission, or more recent years if information is available, and subsequent BURs shall cover a calendar year that does not precede the submission date by more than four years.	Yes	Thailand submitted its third BUR in December 2020; the GHG inventory reported is for 2016.
Decision 2/CP.17, annex III, paragraph 4	Non-Annex I Parties should use the methodologies established in the latest UNFCCC guidelines for the preparation of NCs from non-Annex I Parties approved by the Conference of the Parties or those determined by any future decision of the Conference of the Parties on this matter.	Yes	Thailand used the 2006 IPCC Guidelines.
Decision 2/CP.17, annex III, paragraph 5	The updates of the section on national inventories of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol should contain updated data on activity levels based on the best information available using the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF; any change to the EF may be made in the subsequent full NC.	No	Thailand did not report updated data on activity levels.
Decision 2/CP.17, annex III, paragraph 6	Non-Annex I Parties are encouraged to include, as appropriate and to the extent that capacities permit, in the inventory section of the BUR:		
	(a) The tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF;	No	Comparable information was not reported.
	(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 its previous NCs.	Partly	The time series reported in the BUR includes 2000–2016 but not 1994, which was included in the inventory reported in the NC1.
Decision 2/CP.17, annex III, paragraph 8	Non-Annex I Parties that have previously reported on their national GHG inventories contained in their NCs are encouraged to submit summary information tables of inventories for previous submission years (e.g. for 1994 and 2000).	Partly	This information was not reported for 1994.
Decision 2/CP.17, annex III, paragraph 9	The inventory section of the BUR should consist of a national inventory report as a summary or as an update of the information contained in decision 17/CP.8, annex, chapter III (National greenhouse gas inventories), including:		
	(a) Table 1 (National greenhouse gas inventory of anthropogenic emissions by sources and	Yes	Comparable information was reported in table 2-4 of the BUR.

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
	removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors);		
	(b) Table 2 (National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF <sub>6</sub> ).	No	
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 12	Non-Annex I Parties are also encouraged, to the extent possible, to undertake any key source analysis as indicated in the IPCC good practice guidance to assist in developing inventories that better reflect their national circumstances.	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:		
	(a) CO <sub>2</sub> ;	Yes	
	(b) CH <sub>4</sub> ;	Yes	
	(c) N <sub>2</sub> O.	Yes	
Decision 17/CP.8, annex, paragraph 15	Non-Annex I Parties are encouraged, as appropriate, to provide information on anthropogenic emissions by sources of:		The Party clarified in the BUR that information could not be reported owing to lack of data.
	(a) HFCs;	No	
	(b) PFCs;	No	
	(c) SF <sub>6</sub> .	No	
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) Carbon monoxide;	Yes	
	(b) Nitrogen oxides;	Yes	
	(c) Non-methane volatile organic compounds.	Yes	
Decision 17/CP.8, annex, paragraph 17	Other gases not controlled by the Montreal Protocol, such as sulfur oxides, and included in the Revised 1996 IPCC Guidelines may be included at the discretion of Parties.	Yes	The Party reported on other gases, such as sulfur oxides.
Decision 17/CP.8, annex, paragraph 18	Non-Annex I Parties are encouraged, to the extent possible, and if disaggregated data are available, to estimate and report CO <sub>2</sub> fuel combustion emissions using both the sectoral and the reference approach and to explain any large differences between the two approaches.	No	The information was reported only for the sectoral approach.

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
Decision 17/CP.8, annex, paragraph 19	Non-Annex I Parties should, to the extent possible, and if disaggregated data are available, report emissions from international aviation and marine bunker fuels separately in their inventories:		
	(a) International aviation;	No	The Party reported such emissions as “NA”.
	(b) Marine bunker fuels.	No	The Party reported such emissions as “NA”.
Decision 17/CP.8, annex, paragraph 20	Non-Annex I Parties wishing to report on aggregated GHG emissions and removals expressed in CO <sub>2</sub> eq should use the GWP provided by the IPCC in its AR2 based on the effects of GHGs over a 100-year time-horizon.	NA	The Party used the GWP values provided in the AR4.
Decision 17/CP.8, annex, paragraph 21	Non-Annex I Parties are encouraged to provide information on methodologies used in the estimation of anthropogenic emissions by sources and removals by sinks of GHGs not controlled by the Montreal Protocol, including a brief explanation of the sources of EFs and AD. If non-Annex I Parties estimate anthropogenic emissions and removals from country-specific sources and/or sinks that are not part of the Revised 1996 IPCC Guidelines, they should explicitly describe the source and/or sink categories, methodologies, EFs and AD used in their estimation of emissions, as appropriate. Parties are encouraged to identify areas where data may be further improved in future communications through capacity-building:		
	(a) Information on methodologies used in the estimation of anthropogenic emissions by sources and removals by sinks of GHGs not controlled by the Montreal Protocol;	Yes	Thailand used the 2006 IPCC Guidelines. Tier 1 methodology was used for most source and sink categories for all sectors, while tier 2 was used for some categories in the IPPU, agriculture, forestry and other land use, and waste sectors.
	(b) Explanation of the sources of EFs;	No	
	(c) Explanation of the sources of AD;	Yes	
	(d) If non-Annex I Parties estimate anthropogenic emissions and removals from country-specific sources and/or sinks that are not part of the Revised 1996 IPCC Guidelines, they should explicitly describe:	NA	
	(i) Source and/or sink categories;		
	(ii) Methodologies;		
	(iii) EFs;		
	(iv) AD;		
	(e) Parties are encouraged to identify areas where data may be further improved in future communications through capacity-building.	Yes	
Decision 17/CP.8, annex, paragraph 22	Each non-Annex I Party is encouraged to use tables 1–2 of the guidelines annexed to decision 17/CP.8 in reporting its national GHG inventory,	Yes	Notation keys were used.

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
	taking into account the provisions established in paragraphs 14–17. In preparing those tables, Parties should strive to present information that is as complete as possible. Where numerical data are not provided, Parties should use the notation keys as indicated.		
Decision 17/CP.8, annex, paragraph 24	Non-Annex I Parties are encouraged to provide information on the level of uncertainty associated with inventory data and their underlying assumptions, and to describe the methodologies used, if any, for estimating these uncertainties:		
	(a) Level of uncertainty associated with inventory data;	Yes	
	(b) Underlying assumptions;	No	
	(c) Methodologies used, if any, for estimating these uncertainties.	Yes	

*Note:* The parts of the UNFCCC reporting guidelines on BURs on reporting information on GHG emissions by sources and removals by sinks in BURs are contained in decision 2/CP.17, paras. 3–10 and 41(g). Further, as per para. 3 of those guidelines, non-Annex I Parties are to submit updates of their national GHG inventories in accordance with paras. 8–24 of the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties, contained in the annex to decision 17/CP.8. The scope of such updates should be consistent with the non-Annex I Party’s capacity and time constraints and the availability of its data, as well as the level of support provided by developed country Parties for biennial update reporting.

Table I.2

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

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 11	Non-Annex I Parties should provide information, in tabular format, on actions to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol.	Yes	Information on the mitigation actions included under the NAMA Roadmap was reported in tabular format.
Decision 2/CP.17, annex III, paragraph 12	For each mitigation action or group of mitigation actions, including, as appropriate, those listed in document FCCC/AWGLCA/2011/INF.1, developing country Parties shall provide the following information, to the extent possible:		The information required under paragraph 12(a–d) was analysed for actions included under the NAMA Roadmap.
	(a) Name and description of the mitigation action, including information on the nature of the action, coverage (i.e. sectors and gases), quantitative goals and progress indicators;	Yes	
	(b) Information on:		
	(i) Methodologies;	Yes	
	(ii) Assumptions;	Partly	Assumptions were specified only for the targeted energy type.
	(c) Information on:		
	(i) Objectives of the action;	Yes	Objectives were specified within the name of the actions.

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
	(ii) Steps taken or envisaged to achieve that action;	Partly	Information on the steps taken to implement the NAMA Roadmap was not reported.
	(d) Information on:		
	(i) Progress of implementation of the mitigation actions;	Yes	
	(ii) Progress of implementation of the underlying steps taken or envisaged;	No	
	(iii) Results achieved, such as estimated outcomes (metrics depending on type of action) and estimated emission reductions, to the extent possible;	Yes	
	(e) Information on international market mechanisms.	No	
Decision 2/CP.17, annex III, paragraph 13	Parties should provide information on domestic MRV arrangements.	Yes	Information was reported on developing a web-based tracking system for Thailand's GHG emission reductions and an application for tracking progress under its NDC.

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

Table I.3

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

<i>Decision</i>	<i>Provision of the reporting requirements</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 14	Non-Annex I Parties should provide updated information on:		
	(a) Constraints and gaps;	Yes	
	(b) Related financial, technical and capacity-building needs.	Yes	
Decision 2/CP.17, annex III, paragraph 15	Non-Annex I Parties should provide:		
	(a) Information on financial resources received, technology transfer and capacity-building received;	Yes	
	(b) Information on technical support received from the Global Environment Facility, Parties included in Annex II to the Convention and other developed country Parties, the Green Climate Fund and multilateral institutions for activities relating to climate change, including for the preparation of the current BUR.	Yes	
Decision 2/CP.17, annex III, paragraph 16	With regard to the development and transfer of technology, non-Annex I Parties should provide information on:		
	(a) Nationally determined technology needs;	Yes	
	(b) Technology support received.	Yes	

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

## Annex II

### Reference documents

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

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

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

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

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

#### B. UNFCCC documents

NC1 and NC3 of Thailand. Available at <https://unfccc.int/non-annex-I-NCs>.

Summary report on the technical analysis of the second BUR of Thailand. Available at <https://unfccc.int/ICA-reports>.

Third BUR of Thailand. Available at <https://unfccc.int/BURs>.

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