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Report on the technical expert review of the first biennial transparency report of China*

Addendum

Summary

This addendum to the report on the technical expert review of the first biennial transparency report of China, conducted by a technical expert review team in accordance with the modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement, contains the results of the review of the consistency of the information submitted by the Party with those modalities, procedures and guidelines, and presents capacity-building needs identified by the Party and by the technical expert review team in consultation with the Party during the review. The review took place from 15 to 19 September 2025 in Bonn.

* In the symbol for this document, 2024 refers to the year in which the biennial transparency report was submitted, not to the year of publication.



Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AD	activity data
BFG	blast furnace gas
BTR	biennial transparency report
C ₂ F ₆	hexafluoroethane
CF ₂	difluorocarbene
CF ₄	tetrafluoromethane
CH ₄	methane
CNMIA	China Nonferrous Metals Industry Association
CO ₂	carbon dioxide
COPERT	software tool for calculating road transport emissions
CRT	common reporting table
CTF	common tabular format
EF	emission factor
GDP	gross domestic product
GHG	greenhouse gas
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
k	methane generation rate
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
MMS	manure management system(s)
MPGs	modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement
MSW	municipal solid waste
N	nitrogen
N ₂ O	nitrous oxide
NA	not applicable
NDC	nationally determined contribution
NE	not estimated
NIR	national inventory report
NO	not occurring
PaMs	policies and measures
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
SF ₆	sulfur hexafluoride
TERT	technical expert review team
VS	volatile solid(s)

I. Areas of improvement¹ identified during the technical expert review of the Party's first biennial transparency report

1. Tables 1–14 present the results of the review of the consistency with the MPGs² of the information submitted by China in its BTR1. All recommendations and encouragements contained in the tables are for the next BTR or NIR, unless otherwise specified.³

A. General reporting provisions

Table 1

Areas of improvement relating to general reporting provisions

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
1.1	Specified in paragraph 6, in conjunction with paragraphs 29, 34 and 48 of the MPGs, and paragraph 2 of decision 5/CMA.3 Flexibility	China applied the flexibility provided for in the MPGs in relation to reporting information in its GHG inventory and tracking progress towards achieving the NDC. However, the Party did not clearly provide in the BTR1 (table 1-54) or in the relevant summary table of the CRTs clear self-determined estimated time frames for improvements in relation to the constraints on its capacity to perform a quantitative uncertainty analysis for trends, develop a QA/QC plan for the NIR, report nitrogen trifluoride emissions, and report projections of GHG emissions and removals. During the review, China explained that the inventory compilation team has had extensive communication and exchange with relevant statistical departments relevant to the trend uncertainty analysis and reporting on fluorinated gases. Owing to the lack of underlying data on trend uncertainty and F-gases, it is not currently possible to conduct the trend uncertainty analysis, or calculations for nitrogen trifluoride. The Party also explained that it is carrying out capacity-building activities to enhance QA/QC and expects to develop a QA/QC plan for the BTR3. Moreover, China stated that, regarding the flexibility applied in reporting projections as per paragraph 92 of the MPGs, it was considered that providing general time frames for improvements, in particular medium to long term instead of specific years, would suffice. The TERT recommends that the Party further clarify the self-determined estimated time frames for improvements in relation to the constraints on its capacity to report information in its GHG inventory. The TERT encourages the Party, in doing so, to provide this information in a section on flexibility included in the BTR, covering all areas where flexibility was applied, as per chapter VII of the BTR outline contained in annex IV to decision 5/CMA.3.

B. Greenhouse gas emissions and removals

Table 2

Areas of improvement relating to general findings on greenhouse gas emissions and removals

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
2.G.1	Specified in paragraphs 29 and 44 of the MPGs Uncertainty analysis	China reported quantitative information on the overall uncertainty of its estimates of total emissions and removals by year as ranges for all sectors and reported years. The Party applied the flexibility provided for with respect to reporting a quantitative analysis of trend uncertainty but did not provide a qualitative discussion of uncertainty for key categories, as would be expected when applying this flexibility. In addition, no detailed information was provided in the BTR on the underlying assumptions for the reported uncertainty values.

¹ As referred to in paras. 7, 8, 146(d) and 162(d) of the MPGs, contained in the annex to decision 18/CMA.1.

² Decision 18/CMA.1, annex.

³ References in this report to pages, tables, figures and information in the BTR1 relate to the non-official English translation thereof made available by China. References to information in the CRTs and CTF tables relate to the submission for mainland China, unless otherwise specified.

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		During the review, the Party provided additional information on uncertainty for the LULUCF and waste sectors, explaining that the uncertainty of the inventory is driven mainly by the uncertainties of AD and EFs and was evaluated using the method for combining uncertainties recommended in the 2006 IPCC Guidelines (vol. 1, chap. 3) for individual categories. For LULUCF, China clarified that the uncertainty of AD is due mainly to errors in the statistical data and errors associated with the analysis of the statistical data (e.g. caused by interpolation), while the uncertainty of the EFs depends mainly on the quantity, accuracy, representativeness and applicability of the sample data used in calculating the EFs. For the waste sector, China explained that the uncertainties for categories mostly arise from variations in MSW composition, while data for the waste generation rates are relatively robust. In addition, China noted that the statistical system for obtaining AD is being refined to enable an enhanced MSW composition analysis. The TERT recommends that China enhance its reporting by including a qualitative discussion of the trend uncertainty analysis for key categories, for example by relating the reported uncertainty of the AD and EFs used within the methodologies applied for the inventory. In addition, the TERT encourages the Party to provide a quantitative estimate for the trend in line with paragraph 29 of the MPGs. In line with paragraph 44 of the MPGs, the TERT also recommends that the Party report the underlying assumptions for the uncertainty analysis, as applicable.
2.G.2	Specified in paragraph 30 of the MPGs Notation keys	The Party reported “IE” and “NE” in the CRTs across all sectors and provided in the BTR1 some explanations regarding emission allocation for certain categories for which emissions were reported as “IE” or “NE”. However, this information was not provided in a comprehensive manner for all such cases as the TERT could not find any explanations in the BTR1 or CRT 9 with regard to the reasons for using “NE” or as “IE”, which were reported for several categories of emissions sources and removals. During the review, the Party explained that the explanations for the use of notation keys in CRT 9, which would be useful for enhancing understanding of the completeness of the GHG inventory, were not reported owing to difficulties in using the tools for reporting under the enhanced transparency framework under the Paris Agreement. In addition, the Party indicated that these explanations will be included in subsequent submissions. The TERT encourages the Party to include in its submitted information on the NIR a comprehensive explanation of the reasons for reporting categories as “NE” for which estimation methodologies are included in the 2006 IPCC Guidelines.
2.G.3	Specified in paragraph 32 of the MPGs Notation keys	The Party included information in the BTR1 (table 1-54) regarding its use of flexibility in reporting SF₆ and PFC emissions from other product manufacture and use (category 2.G) and N₂O emissions from wetlands (category 4.D) as “NE” because they were below the level of significance. However, the TERT could not find in the BTR1 or the CRTs estimates of the likely level of these emissions to justify the emissions sources being excluded on the basis of insignificance. The TERT encourages the Party to assess and, where applicable, justify the level of emissions for categories considered insignificant, in accordance with the threshold for the level of significance for individual categories determined by the Party in line with its decision to apply flexibility, by using approximated AD and default IPCC EFs to derive a likely level of emissions for the respective categories, also ensuring that the total national aggregate of estimated emissions for all gases for categories considered insignificant remains below the percentage threshold for the national total GHG emissions, as determined by the Party in line with its decision to apply flexibility in accordance with the MPGs.
2.G.4	Specified in paragraph 39 of the MPGs Methods	Descriptions of the methods used for the GHG inventory, including the rationale for the choice of methods, and the assumptions, references and sources of information used for the EFs and AD used for the GHG inventory were not provided in the BTR1 for all categories and sectors. In particular, the following are missing: the country-specific EFs, as well as explanations for assumptions and references and sources of information used for their development, applied as part of the tier 2 method used to estimate CO₂ emissions from stationary combustion (categories 1.A.1, 1.A.2 and 1.A.4) under the energy sector (see ID# 3.E.1 in table 3); EFs and parameters used to estimate them for livestock types applied when

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		using the tier 2 method for estimating emissions from enteric fermentation (category 3.A) and manure management (category 3.B) under the agriculture sector (see ID#s 5.A.1 and 5.A.2 in table 5); the definitions used for the different land-use categories and carbon pools reported and the land-representation approach used according to the 2006 IPCC Guidelines (vol. 4, chap. 3) for consistent land representation for the LULUCF sector (see ID# 6.L.1 in table 6); and the actual MCFs used by management by category, region and year, the corresponding shares of types of solid waste disposal sites, and the half-life or half-lives used to derive k, any temporal or regional variation in k, or associated uncertainty ranges, for the waste sector (see ID# 7.W.2 in table 7). During the review, the Party provided additional explanations regarding the methodology used, and assumptions for EFs and AD used. For the energy sector, China provided a link to the national GHG EF database and clarified that country-specific EFs were estimated by analysing direct measurement data collected at plants for the energy sector. For the IPPU sector, China explained that the AD descriptions could not be transferred to the CRTs owing to technical issues. For the agriculture sector, China explained that information on the parameters used to derive EFs was obtained from surveys based on many detailed management types and animal types which do not fit the CRT format. For the LULUCF sector, the Party stated that approach 2 from the 2006 IPCC Guidelines (vol. 4, chap. 3) was used to represent land-use changes over the time series, as well as detailed national land-classification data and spatial information at the county and city level. For the waste sector, China clarified that methane correction factors were assigned by year on the basis of production data from businesses and companies, and that k was based on expert judgment. The TERT recommends that the Party enhance the transparency of the methodological information provided in the BTR by including additional information on methods used to estimate emissions, as provided during the review, including information on the country-specific EFs and the references and sources of information for tier 2 methods applied, in particular by providing the link to the national GHG EF database for the energy sector; explaining that the parameters used to derive the EFs were based on surveys for many types of management of animal waste and types of animal for the agriculture sector; clarifying that approach 2 from the 2006 IPCC Guidelines was used to represent land-use changes for the LULUCF sector; and explaining that, for the waste sector, methane correction factors were assigned by year on the basis of biomass data from businesses and companies and that k values were based on expert judgment.

Table 3

Areas of improvement of the reporting on greenhouse gas emissions and removals – energy sector

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
3.E.1	Specified in paragraphs 39–40 of the MPGs 1. General (energy sector)	China reported in its BTR1 (p.29) that tier 2 methods were used for estimating emissions for some of the key categories listed in BTR table 1-3, such as CO₂ emissions from stationary combustion (categories 1.A.1, 1.A.2 and 1.A.4) and CH₄ and N₂O emissions from energy industries (category 1.A.1). In addition, the tier 3 method was used for estimating CH₄ and N₂O emissions from road transport (category 1.A.3.b), applying the COPERT model, and the tier 2 method was used for estimating CO₂ emissions from road transport. The tier 3 method was also used to estimate CO₂ emissions from domestic navigation and fugitive CH₄ emissions from solid fuels and oil and natural gas (categories 1.B.1 and 1.B.2). The Party also reported in BTR table 1-8 the individual fuels included per fuel type. However, the BTR does not include any further information on any fuel-specific EFs at the subcategory and fuel level. For example, the Party did not report the country-specific EFs used or explanations for any assumptions, or references and sources of information used for their development. During the review, the Party provided additional information on the country-specific EFs used, including a transparent description of the assumptions, references and sources of information used for developing them. The Party also provided a link to the national GHG EF database (https://data.ncsc.org.cn/factories/index), which is only available in Chinese. In addition, the Party explained that the country-specific

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
		EFs are based mostly on direct measurements collected at power plants and other industrial plants in the national carbon market reporting system. However, these measurement data were not directly applied for the inventory, but rather used for estimating country-specific EFs after further analysis. The Party also explained that, in the energy sector, country-specific EFs include solid fuels, gaseous fuels and biomass and have different values for specific fuel types and other parameters. China added that it considers that it is not practical to list all that information in the BTR. The TERT recommends that the Party improve the transparency of the methodological information reported for the sector, to the extent possible, by providing additional information, in line with the information provided during the review, at the most disaggregated level for the CO₂, CH₄ and N₂O estimates for categories and subcategories, and taking into consideration the 2006 IPCC Guidelines, on country-specific EFs applied for the energy sector inventory, including the values and the underlying assumptions, references and sources of information used for developing them, within the main body of the BTR or using annexes as appropriate. The TERT notes that, in particular, the Party could provide the link to the national GHG EF database and present the methodology used for estimating country-specific EFs, which is based on direct measurements collected at power plants and other industrial plants under the national carbon market reporting system.
3.E.2	Specified in paragraphs 20 and 53 of the MPGs 1.D.1.b International navigation – liquid fuels – all gases	China reported in its BTR1 (p.33) that, for domestic navigation companies, emissions were calculated using data on domestic ships refuelling abroad and, for foreign water transport companies, emissions were calculated using data on overseas ships refuelling in China. The AD and methodology used to estimate emissions from international navigation were not transparently reported, as required by the 2006 IPCC Guidelines (vol. 2, chap. 3.5.1.3). During the review, the Party explained that, owing to the unavailability of domestic fuel consumption data for Chinese ships used for international navigation, it is assumed that the fuel consumption for departure and return is the same; that is, the domestic fuel consumption for Chinese ships used for international navigation is equal to the overseas fuel consumption of Chinese ships. On the basis of the information in the BTR1 and clarifications provided during the review, the TERT considers that the disaggregation of data on domestic and marine bunker fuels is not in line with the 2006 IPCC Guidelines and may affect the accuracy of the estimates for domestic and international navigation. In addition, the 2006 IPCC Guidelines provide several options for obtaining fuel use data if they are not reported in national statistics, which do not include the use of data about ships refuelling abroad as a possible option. It is not necessarily accurate that the amount of fuel refuelled when leaving the home port is equal to the amount of fuel refuelled abroad. The TERT encourages the Party to make every effort to apply and report according to the method contained in the 2006 IPCC Guidelines for separating domestic and international navigation emissions and to provide transparent information on the assumption used to estimate fuel used for international navigation, justifying the use of the approach whereby fuel filled at ports of departure in China is equated with fuel filled at ports of destination overseas by the domestic fleet, or, alternatively, use one of the options provided in the 2006 IPCC Guidelines for obtaining fuel use data if they are not reported in national statistics.
3.E.3	Specified in paragraphs 39–40 of the MPGs 1.A Fuel combustion – sectoral approach – all fuels – CO₂, CH₄ and N₂O	China reported the total amount of solid, liquid and natural gas disaggregated by category in CRTs 1.A(a)s1–1.A(a)s4, but did not report in the BTR1 the AD at the most disaggregated level per fuel used for estimating emissions in accordance with the 2006 IPCC Guidelines (e.g. separately by individual fuel, such as gasoline, diesel fuel and lignite). The information per fuel was provided only for the reference approach (see CRT 1.A(b)). The TERT noted that reporting requirements for data disaggregation are different for reporting in the CRTs and for transparently reporting information on methodologies in accordance with the 2006 IPCC Guidelines. During the review, China provided the energy information on the <i>China Statistical Yearbook 2023</i>. The TERT noted that the statistical information for the energy part of fuel consumption available in the Yearbook is also aggregated and the units of the data reported seem to be different from those reported in the CRTs, so they could not be directly compared. In order to compare the two sources of information, the

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
3.E.4	Specified in paragraphs 3(g), 21, 39, 40 and 54 of the MPGs 1.A.2.a Iron and steel – solid fuels – CO ₂	TERT used the net calorific values provided in CRT 1.A(b) for natural gas and converted them into TJ. Total energy consumption of natural gas by sector in 2021 (table 9-9 of the <i>China Statistical Yearbook 2023</i>) equals 377,300 million m³ and 13,861,130 TJ, which is 2.9 per cent higher than the 13,476,563 TJ reported as total gaseous fuels used for the sectoral approach in CRT 1.A(a)s1. During the review, the Party also clarified that combusted gaseous fuels reported in CRT 1.A(a) also include liquified natural gas. China also provided the national energy balance, clarifying that data further disaggregated by fuel cannot be reported or provided for confidentiality reasons, and noting that the guidance in CRT 1.A(a) states that a minimum level of aggregation may be needed to protect confidential commercial information. China further explained that the inventory compilation team combines data such as the energy balance table, final energy consumption by industrial activities and some other data by category and fuel type to derive the AD used for estimating emissions. The TERT encourages the Party to find ways of reporting the AD used in the inventory for the energy sector categories at the most disaggregated level according to the methodologies used and as per the 2006 IPCC Guidelines, to the extent possible, while considering the confidentiality issues, and ensure the necessary transparency by, for example, providing the aggregated information in a way that does not violate confidentiality and enables all stages of the calculation of emission estimates to be traced. In the BTR1 (p.75 on cross-cutting issues), when explaining the allocation of emissions between the energy and IPPU sectors, China reported that, to avoid double counting converter gas emissions, only emissions from the use of carbonate fluxes were reported for iron and steel production under IPPU, and CO₂ emissions from converter steelmaking were not reported under the IPPU sector. China also reported in the BTR1 (p.32 on energy) that emissions from BFG and converter gas emissions were reported under iron and steel (subcategory 1.A.2.a) instead of public electricity and heat production (subcategory 1.A.1.a). The TERT also noted that in CRT 1.A(d) aggregated information on fuel uses was provided, and no non-energy use of fuels under iron and steel was indicated. The TERT considered that the reporting is not fully transparent as AD used were not reported and it was not clearly indicated how feedstocks and non-energy use of fuels have been accounted for and allocated in the inventory. During the review, the Party confirmed that to avoid double counting between converter gas combustion under energy and emissions for category 2.C.1 iron and steel production under the IPPU sector, it only reported emissions from the use of carbonate fluxes in iron and steel production. The CO₂ emissions resulting from carbon transformation during steelmaking were reported under subcategory 1.A.2.a iron and steel under fuel combustion. China also explained that BFG and converter gas are by-product fuels generated during iron and steel production and are used as end-use fuels in sectors such as thermal power generation and heat production. To avoid double counting between coal combustion emissions reported under subcategory 1.A.2.a and emissions from BFG and converter gas combustion in thermal power generation and heat production, emissions are no longer separately reported from the combustion of BFG or converter gas under the energy sector. Instead, all relevant emissions from coal consumption are reported under subcategory 1.A.2.a using the carbon mass balance approach. The TERT recommends that the Party increase transparency, to the extent possible, in line with the explanations provided during the review. In addition, the TERT encourages the Party to clearly indicate how feedstocks and non-energy use of fuels have been accounted for in the inventory, under the energy or IPPU sector, providing the relevant information in CRT 1.A(d) and the BTR.
3.E.5	Specified in paragraphs 30, 31 and 39 of the MPGs 1.A.5 Other (not specified elsewhere) – all fuels – all gases	Emissions from combustion of liquid, solid and gaseous fuels, and biomass and other fossil fuels were not reported under other (category 1.A.5), while emissions from peat combustion were reported as “NO” in CRT 1.A(a)s4. At the same time, the China Energy Statistical Yearbook reports fuels used under other purposes (see e.g. table 9-9 of the <i>China Statistical Yearbook 2022</i>). During the review, the Party explained that other energy use as reported in the China Statistical Yearbook mainly includes urban waste, biomass and hydrogen energy, as well as other non-specified fuels, which were reported in the NIR at a disaggregated

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		level under different categories under fuel combustion (category 1.A). China also noted that emissions from off-road transportation other than agricultural machinery and construction sites, which should have been reported under other mobile (subcategory 1.A.5.b), were reported under road transportation (subcategory 1.A.3.b) owing to limitations in the underlying statistics. China stated that, in the future, the inventory compilation team will coordinate with the relevant statistical ministerial departments to further improve the quality of the emission calculations related to other energy use, as reported in the Yearbook. The TERT welcomes the explanations provided during the review and recommends that the Party further explain in the BTR the allocation of emissions from fuel combustion (other) in line with the explanations provided during the review, and use appropriate notation keys.

Table 4

Areas of improvement of the reporting on greenhouse gas emissions and removals – industrial processes and product use sector

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
4.I.1	Specified in paragraphs 30, 31, 45 and 47 of the MPGs 2.A.4 Other process uses of carbonates – CO ₂	The TERT noted from the BTR1 and the CRTs that neither estimated emissions nor notation keys were reported for other process uses of carbonates (category 2.A.4); the BTR1 explains that this is due to a lack of underlying data. During the review, the Party explained that, according to the China Building Materials Federation, the consumption of carbonates in ceramics production is considered confidential for each enterprise for commercial reasons and varies significantly across ceramic products. In addition, the Party explained that national statistical data on carbonate consumption in ceramics production are not available. The Party concluded that this makes it impossible to provide a comprehensive estimate of carbonate use for this category, which is necessary to comply with the 2006 IPCC Guidelines. The TERT recommends that the Party investigate all potential uses of carbonates in the country (for ceramics and under other subcategories) and estimate the relevant emissions. If this is not possible, the TERT recommends that the Party report emissions from other process uses of carbonates as “NE” in CRT 2(I)A-Hs and explain the rationale for not estimating emissions for that category, or indicate that such emissions are insignificant.
4.I.2	Specified in paragraph 39 of the MPGs 2.B.2 Nitric acid production – N ₂ O	According to the BTR1 (p.43) the Party applied a tier 2 method to estimate emissions from nitric acid production (category 2.B.2) using surveys on output data reported by nitric acid producers to estimate EFs. However, the TERT did not find any details regarding the type of data reported by the producers or the type of process used in the country for nitric acid production. During the review, the Party explained that the low-pressure process for producing nitric acid has been completely phased out in China owing to its outdated nature, and that the dual-pressure process, which is specific to China, has become the mainstream technology. The Party clarified that all nitric acid producers are included in the data reporting system, including surveys. The TERT recommends that the Party, in order to enhance the transparency of its reporting and in line with the information provided during the review, explain that the low-pressure process has been completely phased out in China owing to its outdated nature, and that the dual-pressure process, which is specific to China, has become the mainstream technology for nitric acid production in the country. The TERT also recommends that the Party enhance the description of the relevant data reporting system in the methodological description in the BTR, as well as the type of data reported by the nitric acid producers used in the estimates, and clarify that the surveys for producers cover all nitric acid installations in China.
4.I.3	Specified in paragraph 39 of the MPGs 2.B.3 Adipic acid production – N ₂ O	According to the BTR1 (p.43) the Party applied a tier 2 method to estimate N₂O emissions from adipic acid production (category 2.B.3), and EFs by type of technology used were calculated on the basis of surveys conducted by adipic acid producers. The TERT did not find any other information in the BTR1 regarding the types of process used to produce adipic acid or how the EFs were determined.

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
4.I.4	Specified in paragraph 39 of the MPGs 2.B.7 Soda ash production – CO ₂	During the review, the Party explained that adipic acid is produced in cyclohexane- and cyclohexene-based processes. The Party clarified that the N₂O EFs by type of production technology were calculated on the basis of data compiled from surveys provided to all adipic acid producers and relevant research institutions. The TERT recommends that the Party, in line with the additional information provided during the review, explain in the BTR that adipic acid is produced in cyclohexane- and cyclohexene-based processes in China and that the data from the surveys used to estimate N₂O EFs by production technology cover all adipic acid producers in the country. According to the BTR1 (p.44) CO₂ emissions from soda ash production (category 2.B.7) were estimated by applying a tier 1 method and using the default EF from the 2006 IPCC Guidelines. However, the TERT noted that, according to CRT 2(I).A-H, the CO₂ IEF used is 0.137 t CO₂/t soda ash, which differs from the default EF of 0.138 t CO₂/t soda ash from the 2006 IPCC Guidelines (vol. 3, chap. 3, pp.3–52). During the review, the Party explained that the default EF from the 2006 IPCC Guidelines for CO₂ emissions from soda ash production was adjusted to account for the lower purity of the soda ash produced in China (99.4 per cent compared with the 100 per cent purity assumed in the Guidelines). The Party added that, owing to the limited number of natural soda ash producers in China, specific purity values cannot be disclosed in the BTR to protect corporate confidentiality. The TERT recommends that the Party, in line with the information provided during the review, provide information in the BTR on the aggregated purity value of the soda ash produced in China and justify the adjustment made to the default EF from the 2006 IPCC Guidelines to account for the purity of the soda ash produced in the methodological description in the BTR.
4.I.5	Specified in paragraphs 31 and 39 of the MPGs 2.B.8 Petrochemical and carbon black production – CO ₂	The Party did not report in CRT 2(I).A-H emission estimates or notation keys for ethylene dichloride and vinyl chloride monomer, ethylene oxide, acrylonitrile, carbon black or other under petrochemical and carbon black production (category 2.B.8). During the review, China explained that emissions from ethylene dichloride and vinyl chloride monomer, ethylene oxide and acrylonitrile were reported collectively under the ethylene production process (subcategory 2.B.8.b) as all are produced in ethylene plants in integrated refining and chemical complexes in China, and the relevant emissions were reported collectively under the ethylene production process. The Party also explained that emissions from carbon black were reported under the energy sector. The TERT recommends that the Party report CO₂ emissions from ethylene dichloride and vinyl chloride monomer, ethylene oxide, acrylonitrile and carbon black production as “IE” in CRT 2(I).A-H. The TERT also recommends that the Party explain in CRT 9 and in the BTR where these emissions were allocated.
4.I.6	Specified in paragraph 39 of the MPGs 2.C.1 Iron and steel production – CO ₂	The TERT noted from the BTR1 (p.46) that the Party applied a tier 2 method to estimate emissions from iron and steel production (category 2.C.1) related to the consumption of limestone, dolomite and magnesite as fluxes, using EFs gathered from country-specific research. The TERT also noted from CRT 2(I).A-H that only AD for sinter production were reported under iron and steel. In addition, the BTR1 does not clarify which production activities under iron and steel production are covered by the estimates. During the review, the Party explained that, owing to difficulties with separately measuring carbonate flux consumption for individual processes in the iron and steel production facilities, carbonate consumption was reported as a whole. The Party clarified that the reported estimates account for emissions from sinter production, pellet production and direct reduced iron, and that no emissions were omitted from the inventory. The TERT recommends that the Party enhance the methodological description in the BTR by adding the information provided during the review regarding production processes covered in the estimate of emissions from iron and steel production – that is, carbon consumption in sinter production, pellet production and direct reduced iron was reported as a whole.

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
4.I.7	Specified in paragraphs 21 and 23 of the MPGs 2.C.2 Ferroalloys production – CO ₂	According to the BTR1 (p.46) the Party applied a tier 1 method to estimate CO₂ emissions from ferroalloys production (category 2.C.2), which is a key category. The TERT did not find any explanation in the BTR1 regarding why the methodological choice is not in line with the corresponding decision tree of the 2006 IPCC Guidelines (vol. 3, chap. 4, figure 4.9). During the review, the Party explained that, owing to limited finances and the basic technical capabilities in the inventory team, a higher-tier methodology could not be applied for estimating emissions from ferroalloys production. The Party indicated its intention to adopt a higher-tier method to calculate emissions from ferroalloys production in the future. The TERT recommends that the Party justify using a tier 1 method by explaining its resource limitations in the BTR. The TERT encourages the Party to make efforts to use a higher-tier method to estimate emissions from ferroalloys production in line with the good practice in the 2006 IPCC Guidelines.
4.I.8	Specified in paragraph 39 of the MPGs 2.C.3 Aluminium production – CO ₂ , CF ₂ and C ₂ F ₆	According to the BTR (p.46) the Party applied a tier 2 method to estimate emissions from aluminium production (category 2.C.3), using EFs sourced from CNMIA. However, the TERT did not find any information in the BTR1 regarding the type of process used to produce aluminium and how the EFs were determined by CNMIA. During the review, the Party explained that only primary aluminium production is included in the inventory and that all aluminium is produced using advanced pre-baked anode electrolytic cells. China clarified that CNMIA developed country-specific EFs by compiling facility-level measurements of carbon anode consumption and anode effect parameters from representative aluminium production facilities. The TERT recommends that the Party enhance the description in the BTR of the methodology to estimate emissions, and of the assumptions, references and sources of information used for calculating the EFs, in particular by including the information provided during the review that CNMIA developed country-specific EFs by compiling facility-level measurements of carbon anode consumption and anode effect parameters from aluminium production facilities.
4.I.9	Specified in paragraph 39 of the MPGs 2.C.4 Magnesium production – CO ₂	According to the BTR1 (p.46) CO₂ emissions from magnesium production (category 2.C.4) were estimated by applying a tier 1 method and an EF based on China's 2018 GHG inventory. However, the TERT did not find any information in the BTR on the used EFs or the types of material used in magnesium production that would allow for a comparison with the default IPCC EFs for the tier 1 method (2006 IPCC Guidelines, vol. 3, chap. 4, table 4.19). During the review, the Party explained that magnesium is produced exclusively using the silicothermic reduction process, with dolomite as the sole raw material. The Party clarified that the EF used in the calculation of emissions is a country-specific value (5.09 t CO₂/t magnesium) provided by CNMIA. The TERT recommends that the Party enhance the methodological description in the BTR by clarifying that the magnesium smelting industry uses the silicothermic reduction process, with dolomite as the sole raw material, and that no magnesite or other raw materials are employed. The TERT also recommends that the Party explain that the CO₂ EF for dolomite calcination provided by CNMIA was used to estimate emissions for the inventory because it is considered to better reflect the national conditions for the industry.
4.I.10	Specified in paragraph 39 of the MPGs 2.C.6 Zinc production – CO ₂	According to the BTR1 (p.47) CO₂ emissions from zinc production (category 2.C.6) were estimated by applying a tier 1 method and the default EF from the 2006 IPCC Guidelines, but the TERT noted that the IEF reported in CRT 2(I).A-H is 0.55 t CO₂/t zinc, while the IPCC default EF is 1.72 t CO₂/t zinc where the zinc production process is not defined (2006 IPCC Guidelines, vol. 3, chap. 4, table 4.24). The BTR does not explain the deviation in the EF used by China. During the review, the Party explained that the IEF is substantially lower than the IPCC default EF because hydrometallurgical zinc production constitutes a high proportion of total zinc produced in China and that this process does not result in GHG emissions. The TERT recommends that the Party enhance the transparency of the methodological description in the BTR by indicating that hydrometallurgical zinc production constitutes a high proportion of total zinc produced in the country and

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		that this process does not result in CO ₂ emissions, and that the default EF provided in the 2006 IPCC Guidelines was only used for estimating emissions from the rest of zinc production, which represents a smaller proportion of the total emissions, which resulted in a lower IEF.
4.I.11	Specified in paragraph 39 of the MPGs 2.E.1 Integrated circuit or semiconductor – CF ₄ and C ₂ F ₆	According to the BTR1 (p.48) PFC emissions from the electronics industry, which were only reported for integrated circuits or semiconductors (category 2.E.1), covering both semiconductor manufacturing and manufacturing of liquid crystal displays, were estimated by applying a tier 2a method, with EFs derived from expert judgment and other parameters based on default EFs from the 2006 IPCC Guidelines (vol. 3, chap. 6, table 6.2). The TERT did not find any other information in the BTR1 regarding the EFs or other parameters used. During the review, the Party explained that the tier 2a method was applied to estimate emissions from electronics industry. The Party provided the TERT with the EFs used for estimating PFC emissions, specifying that the EFs for CF₄ and C₂F₆ were 43.56 and 3.76 per cent respectively. The TERT recommends that the Party enhance the methodological description in the BTR by specifying that a tier 2a method was applied to estimate emissions from electronics industry and that the EFs for CF₄ and C₂F₆ were 43.56 and 3.76 per cent respectively.
4.I.12	Specified in paragraph 39 of the MPGs 2.G.1 Electrical equipment – SF ₆	The BTR1 (p.51) states that SF₆ emissions from electrical equipment (category 2.G.1) were estimated by applying a tier 2 method and that the consumption and filling volume of SF₆ in new electrical equipment, as well as the increased use over time of SF₆ from retired electrical equipment by grid companies, was derived from the Party's statistical reporting system on climate change. The BTR also states that EFs were based on the Party's 2018 GHG inventory. However, the TERT did not find any information in the BTR1 regarding how these EFs were determined. During the review, the Party explained that AD and country-specific EFs for electrical equipment containing SF₆ were calculated at each stage of the life cycle for that gas. The Party explained that, according to national research, manufacturers of electrical equipment containing SF₆ are responsible for equipment production and on-site installation in China, and that it is difficult to clearly distinguish emissions from their production process from the installation stage; therefore, emissions from the production process and installation stage were combined in the reported estimates. The Party further explained that the EFs for the equipment manufacturing (including installation) and operation stages, which are 8.5 and 2.6 per cent respectively, were based on the default values for sealed pressure equipment containing SF₆ (high-voltage switchgear) provided in the 2006 IPCC Guidelines (vol. 3, chap. 8, table 8.3). Finally, the Party stated that SF₆ recovery was taken into account in estimating emissions from the equipment decommissioning and disposal stages, which were estimated on the basis of industry-wide data. The TERT recommends that the Party improve the transparency of the description of the method used to estimate SF₆ emissions in the BTR by including the descriptive information provided during the review regarding the references and assumptions used for determining the EFs for SF₆ from electrical equipment.

Table 5

Areas of improvement of the reporting on greenhouse gas emissions and removals – agriculture sector

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
5.A.1	Specified in paragraphs 39–40 of the MPGs 3.A Enteric fermentation – CH ₄	The Party reported in the BTR1 (p.53) that CH₄ emissions from enteric fermentation (category 3.A) were calculated using a tier 2 method for major sources such as beef cattle, dairy cattle, buffalo, sheep and goats. The TERT noted that some data used to estimate emissions using the tier 2 method were not transparently reported. China reported “NA” in the additional information table to CRT 3.A for weight, feeding situation, milk yield, hours of work, percentage of animals pregnant and digestibility of feed in relation to all livestock, and provided no information in the BTR1 on the input parameters used for the tier 2 method. During the review, the Party explained that CH₄ emissions from enteric fermentation of ruminants in China were calculated in detail on the basis of feeding types, animal types and feeding stages, using the EFs determined for various types

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
5.A.2	Specified in paragraphs 39–40 of the MPGs 3.B Manure management – CH ₄ and N ₂ O	of animal (such as dairy cows, which are classified into intensive, household and grazing feeding, with the feeding stages further divided into calves, other adult livestock and lactating cows). Owing to the format of the table providing additional information to CRT 3.A, it was not possible to provide detailed parameters for livestock characteristics. Moreover, detailed classification parameters cannot be provided with specific data as they involve commercial production data and sensitive information from the related enterprises. The TERT encourages the Party to provide information regarding the integrated average value of several types of animals and age classes by livestock type for the parameters milk yield, hours of work, percentage of animals pregnant and digestibility of feed in relation to all livestock in the additional information table to CRT 3.A. The Party explained in the BTR1 (p.55) that, to estimate emissions using a tier 2 method for major livestock sources such as dairy cattle, non-dairy cattle, sheep, swine, buffalo, goats and poultry, it used information collected at the local level for several parameters, including daily VS excretion, N excreted in animal manure and manure management practices. The TERT noted that detailed information on daily VS excretion and the allocation of livestock numbers by climate region was not provided in the BTR1 and “NA” was reported in CRT 3.B(a) for the major livestock sources. The Party also reported the allocation of livestock numbers by climate region as “NA” in CRT 3.B(a). Further, no detailed information on manure management practices was reported in the BTR1, and the Party reported “NA” for all 12 types of MMS in CRTs 3.A(a) (additional information table) and 3.A(b) (columns F to Q) for N₂O emissions. In addition, China did not report detailed data for the CH₄ generation potential of manure, MCFs or N excreted in animal manure in the BTR1 or the CRTs. During the review the Party explained that: (a) It calculated the VS excreted for livestock subcategories on the basis of information collected at the local level; (b) It intended to use data showing further disaggregation, including data disaggregated by feeding type and feeding stage, but it was not possible to reflect these details in CRT 3.B(a) owing to the structure of the table; (c) All 12 types of MMS for different animal types reported in the CRTs exist in China, and it calculated emissions for each MMS by collecting data for different livestock for different regions, feeding methods and feeding stages, but it could not report this diversity of MMS and associated MCF values in the CRTs and reported them as “NA” instead; (d) The parameters CH₄ generation potential of manure and MCF were mainly determined in accordance with the 2006 IPCC Guidelines, and N excreted was derived for the main emissions sources from research published by relevant Chinese institutions. The TERT recommends that the Party report, to the extent possible, without compromising on the level of aggregation required to address confidentiality matters, the weighted average values of daily VS excretion (average), the percentage allocation of livestock by climate region, the MCF values for several types of MMS and their percentage of occurrence and the N excretion values for the most significant livestock sources.
5.A.3	Specified in paragraph 39 of the MPGs 3.C Rice cultivation – CH ₄	The Party reported in the BTR1 (table 1-35) AD for areas under cropping systems using the following four classifications: harvested area with mid-season rice and single cropping late rice; harvest area with early rice; harvest area with double cropping late rice; and winter-flooding paddy fields in non-rice growing season. The TERT noted that, although the total area reported in the BTR1 is the same as the total harvested area reported in CRT 3.C (31.44 Mha), the Party did not transparently report how the subcategories reported in the BTR relate to the subcategories in CRT 3.C. During the review, China explained that the continuously flooded area reported under subcategory 3.C.1.a is equal to the area under subcategory 3.C.4.a, and the rest of the harvest area (28.398 Mha), for 2021 for example, was assumed to be intermittently flooded – multiple aeration, reported under subcategory 3.C.1.b.ii, which is the total harvest area (sum of the 20.097 Mha harvest area with mid-

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		season rice and single cropping late rice, 4.734 Mha harvest area with early rice and 5.09 Mha harvest area with double cropping late rice, as reported in BTR table 1-35, equalling 29.921 Mha) minus the continuously flooded area (1.523 Mha). The TERT recommends that the Party include in the BTR additional information on Chinese rice cultivation to explain the areas for the four rice cultivation systems reported in BTR table 1-35 and indicate how the areas for each of those four systems were allocated in accordance with the IPCC subcategories provided in CRT 3.C.
5.A.4	Specified in paragraphs 35 and 39 of the MPGs 3.D Direct and indirect N ₂ O emissions from agricultural soils – CH ₄	The TERT noted that, while the cells in BTR table 1-3 for reporting methods and EFs used for estimating CH₄ emissions are greyed out for agricultural soils (category 3.D), in the similar list in CRT summary 3 those methods and EFs for estimating CH₄ emissions are reported as default. During the review, the Party clarified that the data in the BTR1 are accurate, and an error occurred during the process of entering data in the CRTs. The TERT encourages the Party to report consistent information on methods and EFs between the BTR and CRT summary 3.
5.A.5	Specified in paragraph 39 of the MPGs 3.F.1 Cereals – CH ₄ and N ₂ O	The Party reported area burned, biomass available, combustion factor and total biomass burned for barley as “IE” in CRT 3.F, but there is no information in the BTR1 or the CRTs explaining where the emissions from barley are included. During the review, the Party explained that there are no specific data available for barley owing to the relatively small planting area for this crop. Consequently, emissions from barley straw field burning were categorized under other cereals (subcategory 3.F.1.d.2). The TERT recommends that the Party state in the BTR or CRT 3.F that emissions from field burning of barley residues are included under other cereals.

Table 6

Areas of improvement of the reporting on greenhouse gas emissions and removals – land use, land-use change and forestry sector

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
6.L.1	Specified in paragraph 39 of the MPGs Land representation – CO ₂ and N ₂ O	China reported in the BTR1 (p.58) the different land-use categories and carbon pools included in the inventory but did not provide the definitions used for them. The TERT notes that, according to the 2006 IPCC Guidelines (vol. 4, chap. 3), clearly stating the national definitions applied for each of the six IPCC land-use categories is necessary for transparency and completeness and to avoid overlaps or omissions (e.g. double counting) in area accounting. The 2006 IPCC Guidelines also note that countries may use their own definitions but should describe and apply these in such a way as to ensure that the national land area is consistent over time. Reported information should be reported transparently, including clear descriptions of data sources, definitions, methodologies and assumptions. Further, the TERT noted that the 2006 IPCC Guidelines (vol. 4, chap. 3) describe three approaches for consistent land representation, but the Party did not identify which approach was followed. During the review, the Party clarified that it used approach 2 from the 2006 IPCC Guidelines to represent land-use changes over the time series, while also using detailed national land-classification data and spatial information at the county and city level, which are aggregated at the provincial and national level. In addition, the Party clarified that land was classified into six independent and non-overlapping first-level categories consistent with the 2006 IPCC Guidelines classification, while additional detailed second-level classifications were also established. For example, forest land was further subcategorized into arboreal forests, bamboo forests, shrublands, sparse woodlands, unstocked afforested areas and nursery lands, among others. The Party referenced two documents used at the national level to define the land-use categories used for national statistics: the industry standard TD/T 2055-2019 Technical Regulation for the Third National Land Survey and the Ministry of Natural Resources 2020 <i>Classification Guidelines for Land and Sea Use for Territorial Space Survey, Planning, and Regulation</i>. The TERT noted that these documents, describing China’s land-use classification, follow a three-tier

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
		hierarchical system including 24 primary categories, 113 secondary categories and 140 tertiary categories. However, the TERT also noted that information on the definitions of the land-use categories used in the inventory cannot be easily tracked against the definitions provided in the 2006 IPCC Guidelines. The TERT recommends that the Party enhance the information in the BTR regarding the land-use definitions used for the inventory compilation by providing basic national definitions and their mapping to each of the six IPCC land-use categories in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 3) and specifying that it used approach 2 from the 2006 IPCC Guidelines.
6.L.2	Specified in paragraph 26 of the MPGs Land representation – CO₂ and N₂O	China reported in the BTR1 that it used as sources of AD different land-use databases (e.g. on p.60 for forest land), including national forest resources inventories (e.g. the ninth inventory, for 2014–2018), the 2021 nationwide comprehensive ecology monitoring of forest and grassland, and the first, second and third national territorial spatial surveys. However, China provided no information on how it ensured consistency when using different land-use databases for inventory preparation or on the extent to which the different sources of information are consistent across the time series and regions with each other and with land categories (including subcategories). During the review, the Party clarified that, by using national standards (TD/T 2055-2019 Technical Regulation for the Third National Land Survey and the 2020 Classification Guidelines for Land and Sea Use for Territorial Space Survey, Planning, and Regulation), land-use data for all years prior to 2019 were spatially reclassified and integrated with data for other periods to ensure consistency in the land-classification methodology across the entire time series. However, the TERT noted that, although the information provided during the review is helpful, it still does not clarify how the Party ensured that all data sources used are consistent across the time series and regions with each other and with land categories. Further, the TERT noted that this information is essential for assessing the consistency of the data used and the alignment with the 2006 IPCC Guidelines methodologies and good practices. The TERT encourages the Party to provide information in the BTR on the different land-use databases used for compiling the land-use data used to estimate emissions for the LULUCF sector, including specific information used from each database, and how the different sources of information are consistent across the time series and across land areas with each other and areas for other land categories, as well as information on how data from each database were reconciled to represent land areas, and how consistency across time, categories and subcategories was ensured.
6.L.3	Specified in paragraphs 31 and 47 of the MPGs 4. General (LULUCF) – CO₂ and N₂O	The Party reported emission estimates and parameters used for estimating emissions from the pool organic soils as “NA” for categories reported in CRTs 4.A–4.F, while in the BTR1 (p.61) it explained that, owing to the small proportion of organic soils in Chinese cropland, all agricultural soils were assumed to be mineral soils. During the review, the Party clarified that national data do not differentiate between organic and mineral soils in China, and no specific AD are available for organic cropland soils. Therefore, all emissions were reported under mineral soils. The Party acknowledged that “NA” should be revised to “IE” for reporting purposes, and that it will consider reporting the data separately for organic and mineral soils when they are available. The TERT recommends that the Party report organic soils as “IE” in CRTs 4.A–4.F, including the reasons for reporting “IE” and information on where the emissions are allocated for each land-use category.
6.L.4	Specified in paragraphs 39 and 55 of the MPGs 4. General (LULUCF) – CO₂ and N₂O	The BTR1 does not include information on whether the Party addressed natural disturbances on managed lands, or, if appropriate, the approach taken to address emissions from natural disturbances and whether the estimates of emissions and removals from natural disturbances were included in national totals for the GHG inventory. The TERT observed that biomass burning under wildfires was reported in CRT 4(IV) and did not find any information in the CRTs or the BTR1 on whether emissions from biomass burning under wildfires and other natural disturbances were considered when addressing national disturbances.

ID#	Reporting requirement	Description of area of improvement with recommendation or encouragement
6.L.5	Specified in paragraphs 39–40 of the MPGs 4. General (LULUCF) – CO ₂ and N ₂ O	During the review, the Party clarified that all fires were reported as wildfires as there are no national data available distinguishing wildfires from natural disturbances from other types of fire, and the Party faced challenges in obtaining that information. The Party clarified that no other natural disturbances were considered in the inventory, and all emissions associated with carbon stock changes on land are accounted for in national GHG totals. The TERT encourages the Party to include information in the BTR to clarify that natural disturbances on managed lands were not separately accounted for and are included in the inventory. To estimate emissions for LULUCF categories in the BTR1 (chap. 6), the Party described the methodologies used to estimate emissions and removals in general for IPCC categories by referring to the tier method used in accordance with the 2006 IPCC Guidelines and the application of default parameters or country-specific EFs. For example, the Party indicated that, for forest land remaining forest land, it used the tier 2 method and country-specific parameters to estimate changes in carbon stock in biomass, dead organic matter and soil organic matter (BTR1, p.60). The TERT noted that the description provided is insufficient to fully understand which AD were used, which parameters were selected and used, and how the emissions and removals were calculated. The TERT also noted that, although the CRTs provide aggregated AD and IEFs, the aggregation level of the information reported does not allow the TERT to understand the type of AD used for each land-use category and carbon pool, the specific parameters and assumptions applied for estimating emissions and removals, and the references and sources of information for the AD, parameters and EFs used. During the review, the Party explained that carbon stock changes were calculated using the carbon difference approach, with carbon stocks derived from land area multiplied by carbon density. Biomass carbon density was estimated from stand volume and biomass expansion factors or allometric models, multiplied by carbon fraction values. Soil carbon in cropland was estimated using the Agro-C model (Yu et al., 2012; and Huang et al., 2009), balancing inputs (crop residues, straw and organic fertilizer) and decomposition losses. HWP were estimated using a decay function, and non-CO₂ emissions from forest and grassland burning were calculated directly from AD, EFs and global warming potential values in line with the 2006 IPCC Guidelines. The Party provided detailed information on country-specific EFs and parameters, including biomass volume equations, root-to-shoot ratios and carbon fractions for 74 forest types based on permanent sample plots (for 1999–2018); dead organic matter ratios derived from 151 published studies across 17 forest types; soil organic carbon density from more than 3,000 profiles collected in the national soil survey; CH₄ EFs for eight wetland types across four climate zones based on 106 studies; and revised EFs for grassland management practices derived from meta-analysis of national data. AD sources were clarified as the national land surveys (for 1996, 2009 and 2019), the continuous national forest inventory (for 1979–2018) and the 2021 national forest inventory monitoring survey, remote sensing classifications, agricultural and grassland yearbooks, national statistical data and relevant technical standards. The TERT recommends that the Party include in the BTR a transparent description in line with the information provided during the review, disaggregated by land-use category, carbon pool and year, to the extent possible, of the AD used; the parameters and EFs applied, specifically describing how country-specific EFs were derived and applied, as well as their sources; and the specific data sources, with clear references to national standards, surveys and published data sets.
6.L.6	Specified in paragraphs 39 and 47 of the MPGs 4.G HWP – CO ₂ and N ₂ O	In the BTR1 (p.69), the Party reported that changes in carbon stocks in bamboo and shrub wood products were not estimated for HWP owing to lack of statistical information. The Party also noted in the BTR1 (p.70) that statistical data on other industrial log products are incomplete. During the review, the Party acknowledged that lack of data on carbon stock changes in these other products may lead to an underestimation of carbon stocks in HWP, noting that it has initiated research to enhance the completeness of HWP statistics, especially related to bamboo products. The TERT notes that the 2006 IPCC Guidelines (vol. 4, chap. 12, p.12.5) define HWP in general terms as all

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		wood material leaving harvest sites for all land categories and provide for the use of higher-tier, country-specific methods where tier 1 defaults are not available.
		The TERT encourages the Party to use the results of the research it is conducting to improve the completeness of the AD for bamboo and other industrial log products, given their potential significance in the national context.
6.L.7	Specified in paragraphs 32, 45 and 47 of the MPGs 4(I) Direct and indirect N ₂ O emissions from N input to managed soils and 4(III) Direct and indirect N ₂ O emissions from N mineralization or immobilization – N ₂ O	The Party reported “NE” in CRTs 4(I) and 4(III) for direct and indirect N₂O emissions from N inputs to managed soils, as well as for direct and indirect N₂O emissions from N mineralization or immobilization associated with the loss or gain of soil organic matter. The TERT noted that neither the BTR1 nor CTF 9 clarify the reasons for not estimating these emissions. During the review, the Party explained that the application of N fertilizers or organic manure on forest land, grassland and other land in China is rare, and that data on such activities are lacking. The TERT noted, however, that N₂O emissions from soils may also arise from N mineralized through the loss of soil organic carbon in mineral soils as a result of land-use change or management practices, and that such land-use changes are reported in CRT 4.1. The TERT recommends that the Party estimate N inputs from mineralization resulting from the loss of soil carbon owing to land-use change or management practices and estimate and report the associated direct and indirect N₂O emissions in the BTR. Furthermore, noting that these emissions are very likely insignificant, the TERT encourages the Party to use approximated AD and default IPCC EFs to derive a likely level of N₂O emissions from the application of N fertilizers or organic manure on forest land, grassland and other land and transparently report that these emissions are insignificant.

Table 7

Areas of improvement of the reporting on greenhouse gas emissions and removals – waste sector

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
7.W.1	Specified in paragraphs 26–27 of the MPGs 5.A Solid waste disposal on land – CH ₄	China reported in its BTR1 (p.72) that CH₄ emissions from solid waste disposal on land (category 5.A) were estimated using the first-order decay method (tier 2), with AD on MSW generation and landfilling for 1966–2021, which were derived from the China urban construction statistical yearbooks, China population and employment statistics yearbooks, and China statistical yearbooks. However, BTR table 1-51 presents data only for 2005, 2020 and 2021, making it difficult to assess how time-series consistency was ensured. During the review, the Party clarified that, since 50-year traceable historical data on solid waste disposal were unavailable, and consistently with the 2006 IPCC Guidelines (vol. 5, chap. 3), alternative drivers (e.g. historical urban population, GDP) were used to estimate values in the time series. Accordingly, for years from 1979 onward, the landfilled amount of waste was estimated using waste removal quantities from the China urban construction statistical yearbooks; for years prior to 1979, the landfilled quantity was estimated using data on population and per capita waste removal and the disposal fraction in landfills, and, to ensure time-series consistency, the inventory team adjusted the post-1979 data using the same driver-based method and verified the values against the yearbook-based time series, finding the results to be broadly consistent with each other. The TERT encourages the Party to include in the BTR the explanations showing how it ensured time-series consistency, including any correlation analyses or gap-filling techniques used to link the pre- and post-1979 data series, by including in the BTR information, in line with what was provided during the review, on how the time series of data on solid waste disposal on land was derived as a basis for the first-order decay method, together with the assumptions applied.
7.W.2	Specified in paragraph 39 of the MPGs 5.A Solid waste disposal on land – CH ₄	The Party reported in its BTR1 (p.72) that the methane correction factor was derived from survey data and regional information, and k was determined through expert judgment. However, it did not provide the actual methane correction factors used, disaggregated by waste management type and year, or the corresponding shares of waste or landfill sites assigned to each management

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		type. For k, the BTR does not provide the half-life or half-lives, or the assumptions for waste type or climate region used to derive it (e.g. wet or dry and tropical or temperate), or associated uncertainty ranges, as per the requirements of the 2006 IPCC Guidelines (vol. 5, chaps. 3.2.1.1 and 3.8). During the review, the Party clarified that the methane correction factors were assigned considering the year the waste was generated, but it considered, in its determination, production data and sensitive information from enterprises that cannot be disclosed. China explained that k was derived on the basis of expert judgment; however, no supporting data sources or information on the parameters considered were provided. The TERT recommends that the Party improve the transparency of its methodological information regarding the estimates of CH₄ emissions from solid waste disposal by elaborating on the assumptions, references and sources of information used for determining the methane correction factors applied by waste management type and year and the assumptions used for determining the k values, such as half-life or half-lives or any variation in k due to climate conditions, in line with the information provided during the review.
7.W.3	Specified in paragraph 39 of the MPGs 5.A Solid waste disposal on land – CH ₄	China reported in its BTR1 (p.72) that CH₄ recovery from landfills was estimated indirectly from the electricity generated by landfill gas power plants, without direct metering of recovered CH₄. This approach is consistent with the 2006 IPCC Guidelines (vol. 5, chap. 3, p.19), which allow the reporting of CH₄ recovery based on electricity generation if the Party clearly provides load factors, heating value, heat rate and other relevant factors. However, China did not report in the BTR the specific values applied for these parameters and any assumptions applied (e.g. correlation between energy generation and the quantity of waste disposed of). In addition, China did not provide information on the CH₄ fraction in landfill gas, generator efficiency, plant availability, capture efficiency and the allocation of the gas generated between the final purposes of flaring and energy use. During the review, the Party confirmed that the recovery estimates were based on back calculation from net electricity output as plant-level data are not yet available, but it did not provide detailed equations, parameter values or information on sources and QA/QC checks relevant to the conversion of electricity generation to recovered CH₄. The Party clarified that information is based on surveys and expert judgments. The TERT recommends that the Party enhance the description of the methodology for estimating CH₄ recovery from landfills in the BTR by including the assumptions used for the conversion of electricity generation to recovered CH₄, together with supporting information for any future measurements made, if available.

C. Information necessary to track progress in implementing and achieving the nationally determined contribution under Article 4 of the Paris Agreement

Table 8

Areas of improvement of the reporting on national circumstances and institutional arrangements

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
NA	NA	No areas of improvement identified

Table 9

Areas of improvement of the description of the nationally determined contribution under Article 4 of the Paris Agreement, including updates

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
NA	NA	No areas of improvement identified

Table 10

Areas of improvement of the reporting of the information necessary to track progress in implementing and achieving the nationally determined contribution under Article 4 of the Paris Agreement

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
10.1	Specified in paragraphs 74(a), 74(c), 75(a) and 75(d)(iii) of the MPGs	China provided in its BTR1 (pp.93 and 95) information on each of its NDC targets and the indicators selected to track progress in implementing and achieving the NDC, including target type, target descriptions, target year, base year, scope and sectors included in the target. In CTF table 3, China referred to the BTR for information on methodologies and accounting approaches used for targets and indicators, as well as for information on key parameters, assumptions, definitions, data sources and models used for targets and indicators, as applicable and available. The TERT noted that the Party did not provide traceable data sources containing absolute values of key parameters used specifically for calculating targets and indicators that are expressed in percentages, that is reduction of energy-related CO₂ emissions per unit of GDP (carbon intensity) and share of non-fossil fuels in primary energy consumption. The TERT also noted that China did not provide information on the approach used to address the effects of age-class structure in forests when calculating its target and indicator values related to forest stock volume, which the TERT considers relevant. During the review, the Party provided traceable data sources via web links for key parameters, which provide information such as absolute values for relevant parameters. The Party also provided a table showing the energy-related CO₂ emissions and GDP values that enabled the TERT to check the reported values related to its carbon intensity reduction target and associated indicator. The Party also confirmed that no assumptions or models were applied for determining its NDC targets or calculating indicator values. China explained that age-class structure is not applicable for the forest stock volume target because it is classified as a non-GHG target; thus, the age-class structure effects referred to in paragraph 75(d)(iii) of the MPGs do not apply. The TERT recommends that China (1) provide publicly accessible web links, as applicable, when reporting data sources for key parameters used for the calculation of indicators that are expressed in percentages; that is, reduction of CO₂ emissions per unit of GDP and share of non-fossil fuels in primary energy consumption, in accordance with the information provided during the review, and (2) provide information, as available and applicable, on the approach used to address the effects of age-class structure in forests to track progress in the implementation and achievement of its target related to increasing forest stock volume or provide a rationale with regard to why this approach is not applicable.

Table 11

Areas of improvement of the reporting on mitigation policies and measures, actions and plans, including those with mitigation co-benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving the nationally determined contribution under Article 4 of the Paris Agreement

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
11.1	Specified in paragraph 83 of the MPGs	China did not report information on the costs of mitigation actions, their non-GHG mitigation benefits or how the mitigation actions interact with each other, as appropriate. During the review, China explained that, because this information may be provided to the extent possible but is not mandatory, it prioritized the completeness of the BTR1 in relation to core elements, that is coverage of major PaMs linked to NDC targets, gases affected, status, implementing entities and, where estimation methods are mature, quantified impacts on GHGs. Although China did not include information on costs or non-GHG mitigation benefits in CTF table 5, it did report these qualitatively in relevant sections of the BTR1. China stated that it is enhancing its analytical capacity so that subsequent BTRs can include more of this information in tabular format. The TERT encourages China to provide information on the costs of mitigation actions, their non-GHG mitigation benefits and how the mitigation actions interact with each other, as appropriate, or explain why it has elected not to report this information.

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
11.2	Specified in paragraph 85 of the MPGs	The TERT noted that China reported in CTF table 5 estimates of achieved GHG emission reductions for some of its actions and PaMs and reported “NE” for others; for expected GHG emission reductions, China reported “NE” for all actions and PaMs. The Party did not provide an explanation in a footnote to CTF table 5 or in the BTR1 as to why estimates of expected and achieved GHG emission reductions could not be provided where “NE” was reported. During the review, China explained that, even when a policy or measure has a clear objective (e.g. electric vehicle uptake, modal shift or increasing forest area or stock), converting that objective into a value in kt CO₂ equivalent requires modelling choices that can materially change the results. Key challenges in that regard include estimating interactions among PaMs, baseline uncertainty and data readiness for measurement, reporting and verification of measures. The Party reported that it will progressively enhance methodologies and data foundations so that quantified estimates of impacts can be provided for more PaMs in future, in a way that is consistent with the MPGs to the extent possible, taking into account the flexibility provided for. The TERT recommends that China, to the extent possible, gradually enhance the scope of its actions and PaMs for which achieved and expected GHG emission reductions are estimated or report “NE” for some individual actions and PaMs where it is not yet possible to estimate emission reductions, providing in the BTR a clear explanation as to why providing an estimate is not possible. The TERT notes that, in this regard, capacity-building is required. For those actions and PaMs that may interact with each other and where estimating GHG emission reductions is feasible only for a group of PaMs, the Party should clearly explain linkages between individual PaMs and explain why GHG emission reductions could not be estimated for those individual PaMs.
11.3	Specified in paragraph 88 of the MPGs	China did not identify its actions and PaMs that influence GHG emissions from international transport. During the review, China explained that most of its mitigation actions and PaMs in the transport sector are formulated with a unified consideration for all transportation policies, without deliberately distinguishing between domestic and international policies. It can be considered that many actions and PaMs have similar impacts on GHG emissions from both domestic and international transportation; therefore, the current climate change mitigation actions and PaMs in the transport sector, especially those related to railways, highways and civil aviation, all fall under actions and PaMs that influence GHG emissions from international transport. The TERT encourages the Party to clearly identify in the BTR its actions and PaMs that influence GHG emissions from international transport, including by providing the reasoning behind its reporting provided during the review.
11.4	Specified in paragraph 89 of the MPGs	China did not provide information about how its actions and PaMs are modifying longer-term trends in GHG emissions and removals. During the review, China referred to the Outline of the 14th Five-Year Plan for National Economic and Social Development and Long-Range Objectives through the Year 2035 of the People’s Republic of China and China’s Mid-Century Long-Term Low Greenhouse Gas Emission Development Strategy, which list PaMs aimed at modifying longer-term trends in GHG emissions and removals, including establishing a green, low-carbon and circular economic system; building a clean, low-carbon, safe and efficient energy system; establishing an industrial system characterized by low emissions; fostering green and low-carbon urban–rural development; building a low-carbon integrated transport system; strengthening the control of non-CO₂ GHG emissions; promoting nature-based solutions; driving low-emission technology innovations; mobilizing community-wide participation; and modernizing the climate governance system and governance capabilities. The TERT encourages the Party to report, to the extent possible, not only the PaMs aimed at modifying longer-term trends in GHG emissions and removals, but also how its actions and PaMs are modifying longer-term trends in GHG emissions and removals.
11.5	Specified in paragraph 90 of the MPGs	China did not provide detailed information, to the extent possible, on the assessment of economic and social impacts of response measures. During the review, China explained that it has long been actively addressing climate change and has adopted and implemented numerous domestic mitigation policies. It

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
		noted that it is at the formulation stage of relevant PaMs, including thorough comprehensive internal assessments, that the impact of relevant response measures at the domestic level can be offset through interactions with other policies, and, at the international level, impacts on other countries can be avoided; therefore, this requirement is considered not applicable to China. China urges Parties that have adopted unilateral measures to actively report information on the impacts of their response measures.
		The TERT encourages the Party to provide detailed information, to the extent possible, on the assessment of the economic and social impacts of its response measures or explain why such information was not provided.

Table 12

Areas of improvement of the summary of greenhouse gas emissions and removals

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
NA	NA	No areas of improvement identified

Table 13

Areas of improvement of the projections of greenhouse gas emissions and removals

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
13.1	Specified in paragraph 92 in conjunction with paragraph 6 of the MPGs	China did not report GHG emission and removal projections in its BTR1, explaining (on p.97) that it applied the relevant flexibility available to those developing country Parties that need it in the light of their capacities. The Party further explained that it has not yet developed an official emission projection model with associated scenarios and parameter assumptions and that it plans to continue using international financial support and its own resources to strengthen relevant capacity over the medium to long term. In this regard, no specific capacity-building need was identified. During the review, China clarified that lack of relevant data for the entire time series (e.g. GHG inventory data) is an additional barrier to preparing GHG emission and removal projections. Noting the flexibility applied, the TERT encourages China to estimate and report projections within the self-determined estimated time frame for improvement provided by the Party in its BTR.

Table 14

Areas of improvement of other information relevant to tracking progress in implementing and achieving the nationally determined contribution under Article 4 of the Paris Agreement

<i>ID#</i>	<i>Reporting requirement</i>	<i>Description of area of improvement with recommendation or encouragement</i>
NA	NA	No areas of improvement identified

II. Capacity-building needs⁴ identified by the Party and by the technical expert review team in consultation with the Party during the technical expert review of its first biennial transparency report

2. Table 15 presents capacity-building needs identified by the Party and by the TERT in consultation with the Party during the technical expert review of its BTR1.

⁴ As referred to in paras. 7, 8 and 162(d) of the MPGs.

Table 15

Capacity-building needs identified in consultation with the Party

<i>ID#</i>	<i>Reporting requirement</i>	<i>Area in which capacity-building is needed</i>
General reporting		
NA	NA	No capacity-building needs identified
NIR – general		
2.G_CBN.1 ^{a, b}	Specified in paragraph 29 of the MPGs	Conducting trend uncertainty assessments
2.G_CBN.2 ^{a, b}	Specified in paragraph 32 of the MPGs	Conducting statistical data collection and analysis of needs to report, and, depending on the results, determining whether to report in subsequent annual GHG inventories without applying flexibility provisions for relevant provisions
2.G_CBN.3 ^{a, b}	Specified in paragraphs 34–35 of the MPGs	Developing a QA/QC plan, and conducting QA/QC procedures in accordance with the plan
2.G_CBN.4 ^b	Specified in paragraphs 39–40 of the MPGs	Enhancing the reporting of methods used for the GHG inventory, including the rationale for the choice of methods, EFs and parameters used and other underlying information regarding estimating emissions
NIR – energy		
3.E_CBN.1	Specified in paragraphs 24 and 39 of the MPGs	Improving the system for developing and transparently reporting country-specific parameters used for estimating GHG emissions from the energy sector, methods for estimating emissions and information reported on country-specific EFs used for the energy sector disaggregated by fuel type and category according to the 2006 IPCC Guidelines
3.E_CBN.2	Specified in paragraphs 39–40 of the MPGs	Collecting statistical data on fuel consumption for domestic and international navigation (as indicated in China's improvement plan)
NIR – IPPU		
NA	NA	No capacity-building needs identified
NIR – agriculture		
NA	NA	No capacity-building needs identified
NIR – LULUCF		
6.L_CBN.1	Specified in paragraph 39 of the MPGs	Providing information by land-use category, carbon pool and year on the AD, EFs and parameters used in estimating emissions, providing evidence of the 2006 IPCC Guidelines' method followed, and detailing explanations on the underlying information used and its sources and references, and reconciliation approaches for data representation that were followed
NIR – waste		
NA	NA	No capacity-building needs identified
Information necessary to track progress in implementing and achieving the NDC under Article 4 of the Paris Agreement		
11_CBN.1	Specified in paragraphs 80, 83 and 85 of the MPGs	Developing and enhancing approaches, methodologies, analytical tools and skills, and data systems for reporting costs and non-GHG mitigation benefits of PaMs, their expected and achieved GHG emission reductions, and on how mitigation actions interact with each other, and for attributing impacts across overlapping actions and PaMs

^a Capacity-building need identified by the TERT in consultation with the Party relating to the flexibilities applied by it as per the MPGs.

^b Capacity-building need identified by the Party in its BTR1.

Annex

Documents and information used during the review

A. Reference documents

BTR1 of China. Available at <https://unfccc.int/first-biennial-transparency-reports>.

BTR1 CTF tables of China. Available at <https://unfccc.int/first-biennial-transparency-reports>.

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B. Additional information provided by the Party

Responses to questions during the review were received from Tian Wang, Beiyang Zhang and Danhui Xu (National Center for Climate Change Strategy and International Cooperation of China), including additional material. The following references were provided by China and may not conform to UNFCCC editorial style as some have been reproduced as received:

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National Center for Climate Change Strategy Research and International Cooperation, *Guidelines for Greenhouse Gas Emission Accounting and Reporting for China's Chemical Manufacturing Enterprises (Trial)* available at:

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