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Report on the technical expert review of the first biennial transparency report of South Africa

Addendum

Summary

This addendum to the report on the technical expert review of the first biennial transparency report of South Africa, 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 12 to 16 May 2025 in Pretoria, South Africa.

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
2019 Refinement to the 2006 IPCC Guidelines	*2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AD	activity data
BTR	biennial transparency report
CH_4	Methane
CO_2	carbon dioxide
CRT	common reporting table
CTF	common tabular format
EF	emission factor
F-gas	fluorinated gas
GHG	greenhouse gas
HFC	Hydrofluorocarbon
IE	included elsewhere
IEF	implied emission factor
IFA	International Fertilizer Association
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
MMS	manure management system(s)
MODIS	Moderate Resolution Imaging Spectroradiometer
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_2O	nitrous oxide
NA	not applicable
NDC	nationally determined contribution
NE	not estimated
Nex	nitrogen excretion
NH_3	Ammonia
NID	national inventory document
NO_X	nitrogen oxides
PaMs	policies and measures
PFC	Perfluorocarbon
QA/QC	quality assurance/quality control
SF_6	sulfur hexafluoride
TERT	technical expert review team

I. Areas of improvement[1] 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 MPGs[2] of the information submitted by South Africa in its BTR1. All recommendations and encouragements contained in the tables are for the next BTR or NID, unless otherwise specified.

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*
NA	NA	No areas of improvement identified

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 paragraph 52 of the MPGs Completeness – indirect CO_2, indirect N_2O	The NID chapter on indirect CO_2 and N_2O emissions (chap. 8, p.420) only includes information on indirect N_2O emissions, and indirect CO_2 emissions are not mentioned. In addition, CRT 6 does not include estimates of indirect emissions of CO_2 and N_2O; cells were left blank under IPPU, and notation keys "NE" and "NA" were used (incorrectly in some cases, e.g. "NA" was reported for agriculture, even though indirect N_2O emissions were reported in CRT 3.B(b)). During the review, South Africa confirmed that estimates of indirect CO_2 emissions were omitted owing to lack of data and committed to exploring estimation methodologies and updating the relevant chapter of the NID and the relevant CRT with a view to improving clarity in future submissions. The TERT encourages South Africa to report emission estimates for indirect CO_2 from the atmospheric oxidation of CH_4, carbon monoxide and non-methane volatile organic compounds, or clearly explain in the NID why such estimates were not reported, providing consistent information in CRT 6 and the NID.
2.G.2	Specified in paragraphs 20 and 34–35, 46 of the MPGs QA/QC and verification	The Party reported on its QA/QC plan and procedures in the overview section in and annex IV to the NID, detailing the QA/QC procedures at the sectoral and category-specific level. However, the TERT noted that, in some cases, the Party reported that the data provided for the IPPU sector were externally verified without providing further details thereon. Furthermore, several inconsistencies between the NID and the CRTs were detected for most sectors. During the review, South Africa explained that it implemented comprehensive QA/QC checks in accordance with IPCC guidance and the guiding principles of the MPGs in the IPPU sector, promoting transparency, accuracy, completeness, consistency and comparability through a range of measures, including data checks, cross references and expert reviews. However, the Party acknowledged that insufficient documentation was provided and stated that it will improve its reporting in this regard for the next submission. The TERT recommends that South Africa improve the implementation of its QA/QC procedures and the documentation of the general and category-specific checks performed.

[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.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
2.G.3	Specified in paragraphs 6 and 32 of the MPGs Completeness	South Africa applied flexibility to consider emissions insignificant if the likely level of emissions was below 0.1 per cent of the national total GHG emissions, excluding LULUCF, or 1,000 kt CO_2 eq, whichever is lower. NID table 1.12 lists the categories reported as "NE" in the CRTs for each sector. According to the MPGs, Parties should use approximated AD and default IPCC EFs to derive a likely level of emissions for the respective category. However, for several categories reported as "NE", the Party did not provide information on how the likely level of emissions was derived, preventing the TERT from assessing their insignificance according to the thresholds contained in the MPGs and determining whether the total aggregate of emissions for those categories is within the limits specified in the MPGs. During the review, South Africa affirmed its commitment to assessing by 2028 the significance of categories that are not yet estimated, which will involve collecting data and carrying out studies with a view to addressing data gaps and gaining a better understanding of potential emission levels. Noting the flexibility applied, the TERT recommends that South Africa, in line with paragraph 32 of the MPGs, demonstrate that the total national aggregate of estimated emissions for all gases from categories considered insignificant is below 0.2 per cent of the national total GHG emissions, excluding LULUCF. The TERT encourages South Africa to derive and report the likely level of emissions considered as insignificant using approximated AD and default IPCC EFs. The TERT also encourages the Party to clearly document in future submissions how the likely level of emissions was calculated and explain why it is considered insignificant on the basis of the thresholds contained in the MPGs.

Table 3
Areas of improvement of the reporting on greenhouse gas emissions and removals – energy sector

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
3.E.1	Specified in paragraph 36 of the MPGs Fuel combustion – reference approach CO_2 – all fuels	In the NID, the Party compared the reference and sectoral approaches, reporting the results for 2000–2020 in figure 3.21 (p.91) and providing detailed breakdowns of fuel consumption across solid, liquid and gaseous fuels in annex III. The emission estimates reported under the reference approach are higher than those reported under the sectoral approach and, although the Party provided reasons for the discrepancies, it did not clearly explain the reasons for the significant gap between the CO_2 emission estimates under the reference and sectoral approaches for 2000–2020 (19 per cent on average). In addition, in the comparison, the estimates for the reference approach end in 2020 rather than 2022, and the Party did not explain why estimates for 2021 and 2022 were not included for the reference approach. During the review, South Africa clarified that energy balance data were not available for 2021–2022 at the time of compilation and that comprehensive energy data-collection systems were not fully established before 2000 or were limited in scope, resulting in incomplete or inconsistent records of fuel consumption by sector and by fuel type. In addition, there are gaps in disaggregated historical AD, especially for certain subsectors, which were not systematically recorded. An assessment of historical records available from 1990 has been conducted, and the disaggregated energy balances for South Africa for 1992–2000 will be used to fill the gaps for the next inventory. The TERT encourages South Africa to perform planned revisions to data, report complete time series for the reference approach and explain the reasons for any remaining discrepancies between the reference and sectoral approaches, addressing methodological, data and structural considerations, in order to improve the transparency of the NID.

Table 4
Areas of improvement of the reporting on greenhouse gas emissions and removals – industrial processes and product use sector

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
4.I.1	Specified in paragraph 26 of the MPGs IPPU – General – CO_2 and CH_4	For several categories, there are inconsistencies across the time series (2000–2020) with regard to the methods used for estimating GHG emissions in the latest inventory. In the NID (chap. 4), the Party mentioned a move towards higher-tier methodologies (tiers 2 and 3) for some categories, particularly for recent years (i.e. for 2020 and onward), including: • Cement production: for 2022, most cement producers used a tier 2 methodology, where previously a tier 1 approach was used; • Carbide production: for 2022, emissions were estimated using tier 3 methodologies, where a tier 1 methodology was used for previous years; • Iron and steel production: tier 1 and 3 approaches were applied before 2020, and a tier 3 approach was used in 2022; • Ferroalloy production: historically, tier 1 and 3 approaches were applied across the different ferroalloy production plants for different types of ferroalloy, but a tier 3 approach was applied in 2022; • Glass production: a tier 3 approach was used by industry actors to estimate GHG emissions from glass production in 2022, while a tier 1 method was used from 2000 to 2017 and then a mix of tier 2 and 3 methods thereafter. When asked during the review whether it used the same methods and a consistent approach to underlying AD and EFs for each reported year, South Africa responded that higher-tier methodologies were consistently applied from the year of change onward, but backcasting was not used owing to a lack of data. The Party acknowledged that the lack of data affects consistency in the time series and noted that recalculations are a priority for future submissions. The TERT encourages the Party to use the same methods and a consistent approach to underlying AD and EFs for each reported year and to recalculate the GHG estimates for previous years, as needed.
4.I.2	Specified in paragraph 48 of the MPGs IPPU – HFCs, PFCs, SF_6, NF_3	In CRT Flex_Summary, the Party reported that it applied flexibility by not reporting SF_6 and NF_3; however, CRT 2(II) indicates that flexibility was applied for all F-gases. Moreover, actual emissions of HFCs, PFCs and SF_6 were not fully reported in the CRTs or the NID. The NID (section 1.3.1.2, p.13) states that, while IPPU data were primarily obtained through the South African GHG emission reporting system and the national GHG reporting programme, data on HFCs and PFCs were collected through the Chemicals and Waste Management branch of the Department of Forestry, Fisheries and the Environment and a survey conducted in 2016, but no formal processes for ongoing data collection are in place. The MPGs require Parties to report any of the F-gases that are included in their NDCs under Article 4 of the Paris Agreement or have been previously reported. For South Africa, this will mean reporting at least on HFCs and PFCs. In response to questions during the review on the mechanism used for collecting data on HFCs and PFCs since the 2016 survey and on the Party's plans to formalize data-collection processes and ensure continuous, up-to-date data collection for these GHGs, which are important for IPPU sector reporting, with a view to improving the accuracy and consistency of the reporting of emissions over time, South Africa acknowledged that it continued to rely on the 2016 survey and ad hoc consultations for data on HFCs and PFCs. The Party explained that it is exploring the possibility of formalizing a regular data-collection mechanism through the national GHG reporting programme and collaboration with industry actors. Noting the flexibility applied, the TERT recommends that South Africa systematically collect data and report actual emissions of F-gases, providing disaggregated data by chemical and category in units of mass and in CO_2 equivalent, covering at least the F-gases that are included in their NDCs under Article 4 of the Paris Agreement or have been previously reported (HFCs, PFCs). During the review the Party indicated that it will, as an interim reporting approach, estimate HFC and PFC emissions applying tier 1 method and proxy data, including import statistics, industry surveys and leakage rates.

Table 5
Areas of improvement of the reporting on greenhouse gas emissions and removals – agriculture sector

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
5.A.1	Specified in paragraphs 20, 21, 31, 32 and 47 of the MPGs 3. Agriculture – CH_4, N_2O	South Africa's NID references du Toit et al. (2013) for many input parameters for the emission estimates in the agriculture sector. However, this publication contains no information on ostriches, which are not currently included in the emission inventory, and indicates that emissions are higher than for some reported animal types, such as horses. During the review, South Africa explained that there is currently no reliable, sustainable data source or nationally standardized and endorsed statistical record available for ostrich population figures in the country and that the Abstract of Agricultural Statistics, published annually by the Department of Agriculture, Land Reform and Rural Development, does not include any data on ostrich numbers or production trends. The Party noted that this is also the case for other animal types because the inventory currently only considers animal types included in the Abstract of Agricultural Statistics. The TERT recommends that South Africa include in the inventory estimates for any additional animal types that exist in the country where guidance is available in the 2006 IPCC Guidelines (e.g. ostriches) or, if this is not possible, report "NE" in CRT 9 and include an explanation in the NID. If the emissions are considered insignificant under paragraph 32 of the MPGs, an explanation should be provided in the NID.
5.A.2	Specified in paragraphs 20–21 of the MPGs 3. Agriculture – CH_4, N_2O	Table 5.13 of the NID lists the livestock categories for swine (boars, cull boars, replacement boars, cull sows, replacement sows, dry gestating sows, lactating sows and pre-wean piglets). Although these are consistent with the categories used in the referenced publication (du Toit et al., 2013), the publication also includes two additional categories of growing swine (porkers and baconers) that are not included in the inventory. During the review, South Africa explained that the porkers and baconers categories were excluded from the emission calculations under the current inventory framework but could be included in future inventories. The TERT acknowledged the difficulties involved in obtaining animal livestock numbers for the detailed classification but noted that excluding the growing swine categories affects the accuracy of the emission estimates. In response to the draft review report, South Africa clarified that the total swine population reported in the Abstract of Agricultural Statistics, published by the Department of Agriculture, Land Reform and Rural Development, is an aggregated figure that includes all pig subcategories, including porkers and baconers. The TERT recommends that South Africa include transparent documentation in the NID on the categorization of swine and how growing swine (i.e. porkers and baconers) are included in the emission estimation.
5.A.3	Specified in paragraphs 20–21 of the MPGs 3. Agriculture – CH_4, N_2O	The NID (chaps. 5.2.3.2 and 5.2.4.1) indicates that, for some animal types, the level of uncertainty associated with the population numbers is rather high (e.g. ±50 per cent for the swine population), and that the total livestock numbers produced by different studies vary considerably for some animal categories. The TERT noted that many countries use animal registries according to animal identification requirements, and the Party may be able to use such a registry to verify its livestock numbers. During the review, South Africa explained that not all animals are tagged or branded, especially on smallholder, communal or subsistence farms, where a significant portion of South Africa's livestock population is located. The TERT recommends that South Africa take steps to improve livestock data to meet the reporting requirements for the emission inventory and to ensure uncertainty values consistent with the 2006 IPCC Guidelines (vol. 4, chap. 10.2.3), noting that the Party could improve livestock data by establishing a data expert group consisting of experts from government departments, research institutions and the agriculture industry.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
5.A.4	Specified in paragraph 40 of the MPGs 3.B Manure management – CH_4	The MCF values reported in CRT 3.B(a) are consistent with the 2019 Refinement to the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.17); however, although the Party indicated in the NID that the climate zone is classified as warm for all animals, noting that the annual average temperature is above 25 °C, the MCF values listed in CRT 3.B(a) are consistent with the warm temperate dry category of the 2019 Refinement to the 2006 IPCC Guidelines. During the review, South Africa confirmed that its climate zone is considered warm temperate dry according to the classification system used by the IPCC (table 10.17 of the 2019 Refinement to the 2006 IPCC Guidelines). The TERT recommends that South Africa correct the information reported on the climate zone allocation in CRT 3.B(a).
5.A.5	Specified in paragraphs 20, 21 and 39 of the MPGs 3.B Manure management – CH_4	South Africa applied an MCF of 0.32 for liquid systems (additional information to that provided in CRT 3.B(a)), which is consistent with the value for liquid systems with four months of storage for the warm temperate dry climate zone provided in table 10.17 of the 2019 Refinement to the 2006 IPCC Guidelines. For liquid MMS, the 2019 Refinement to the 2006 IPCC Guidelines provides different values depending on the amount of time the manure is stored, clarifying that, if the retention time is unknown, the value at six months (0.41 for the warm temperate dry climate zone) should be considered the default. South Africa did not include an explanation in the NID of how its MCF value was chosen. During the review, South Africa explained that it intends to investigate this matter further. The TERT recommends that the Party apply an MCF value for the liquid system consistent with the 2006 IPCC Guidelines and, if default assumptions are not applied, that the Party explain its choice of MCF in the NID and include references to documentation for the retention time.
5.A.6	Specified in paragraph 40 of the MPGs 3.B Manure management – N_2O	In CRT 3.B(b), information on Nex and emissions was not reported by MMS, but rather as totals for livestock categories. The distribution of MMS was reported in CRT 3.B(a), but no explanation was provided as to why Nex was reported as "NA" or why the cells for direct N_2O emissions by MMS were left blank (row 37) in CRT 3.B(b). During the review, South Africa explained that, although data on Nex were not reported by MMS, category-specific Nex values for various livestock types are available, and it will be possible to report this information in future. The TERT recommends that South Africa provide information on total Nex by MMS and animal type in CRT 3.B(b).
5.A.7	Specified in paragraphs 20–21 of the MPGs 3.D.1.a Inorganic N fertilizers – N_2O	The NID (p.261) states that the values for inorganic fertilizer use reported for 2000–2009 are actual data, while estimates were used for the remaining years of the time series. The TERT noted that the same value was reported for the last three years of the time series (2020–2022). In addition, although the values reported for South Africa for 2000–2009 by IFA[a] are very similar to the values reported by South Africa in the CRT 3.D.1.a (especially for 2000–2008), there are large discrepancies between the two sources for later years (up to 107 and 74 per cent for 2021 and 2022 respectively). During the review, South Africa explained that it will evaluate the data reported by IFA to determine their relevance and applicability to the South African context in the next inventory cycle. The TERT recommends that South Africa gather the most up-to-date data on the use of inorganic fertilizers across the time series from either a domestic source or an international source, such as IFA.
5.A.8	Specified in paragraphs 34–35 and 40 of the MPGs 3.D.1 Direct N_2O emissions from managed soils – N_2O	According to the NID (p.263), the default EF (0.005 kg N_2O–N/kg N applied) from the 2019 Refinement to the 2006 IPCC Guidelines (table 11.1, dry climate) was used for inorganic and organic fertilizers, crop residues and mineralization. However, this is not consistent with the IEFs reported in CRT 3.D (0.01 kg N_2O–N/kg N for inorganic fertilizers, sewage sludge, other organic fertilizers, crop residues and mineralization, and 0.30 kg N_2O–N/kg N for animal manure applied to soils). In addition, the value of 0.01 kg N_2O–N/kg N is consistent with the default value with no disaggregation based on climate.

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		During the review, South Africa acknowledged that data were not transferred correctly to the CRT 3D1 from the national data set and stated that it will check all the links between the calculation files and the input files for the CRTs. The TERT notes that South Africa's current GHG inventory reporting system is not compatible with the CRT and that implementing the new reporting tools was challenging. Adapting the national inventory system to the reporting tools has been identified as a capacity-building need (see ID#12 in table 15). The TERT recommends that South Africa correct the data reported in CRT 3.D and include a QC check to ensure that the IEF is consistent with the EFs applied.
5.A.9	Specified in paragraphs 20–24, 34–35 and 40 of the MPGs 3.D.1.c Urine and dung deposited by grazing animals – N_2O	In the NID (p.263), the Party listed the N_2O EFs as 0.002 kg N_2O-N/kg N for cattle, poultry and pigs, and 0.003 kg N_2O-N/kg N for sheep and other animals, referencing the 2019 Refinement to the 2006 IPCC Guidelines. However, the IEF reported in CRT 3.D for 2022 is 0.018 k N_2O-N/kg N, which is significantly higher than the value expected (0.002–0.003). During the review, South Africa explained that data were not transferred correctly to the CRT from the national data set and stated that it will check all the links between the calculation files and the input files for the CRT. The TERT recommends that South Africa correct the data reported and include a QC check to ensure that the IEF is consistent with the EFs applied.
5.A.10	Specified in paragraphs 34–35 and 40 of the MPGs 3.D.2 Indirect N_2O emissions from managed soils – N_2O	South Africa reported in the NID references to the 2019 Refinement to the 2006 IPCC Guidelines for the EFs used to estimate indirect N_2O emissions from managed soils. This implies EFs of 0.01 kg N_2O–N (kg NH_3–N + NO_X–N volatilized)$^{-1}$ and 0.011 kg N_2O–N (kg N leaching/run-off)$^{-1}$ for atmospheric deposition and leaching/run-off respectively. In the CRT3D2 for 2022, the IEFs were reported as 0.00168 kg N_2O–N (kg NH_3–N+NO_X–N volatilized)$^{-1}$ and 0.0000982 kg N_2O–N (kg N leaching/run-off)$^{-1}$. During the review, South Africa explained that data were not transferred correctly to the CRT3D2 from the national data set and stated that it will check all the links between the calculation files and the input files for the CRTs. The TERT recommends that South Africa correct the data reported in CRT 3.D and include a QC check to ensure that the IEF is consistent with the EFs applied.
5.A.11	Specified in paragraph 20 of the MPGs 3.F.4 Sugar cane – CH_4 and N_2O	The biomass burned reported in CRT 3.F for 2022 is 777.21 kt dry matter. This is based on a combustion factor of 1, which is in accordance with the reporting in the NID (p.269). However, in the CRT, a combustion factor of 0.8 was reported. There is also a discrepancy between the IEFs reported in CRT 3.F (2.16 kg/t dry matter for CH_4 and 0.056 kg/t dry matter for N_2O) and the IPCC default values (2.8 kg/t dry matter for CH_4 and 0.07 kg/t dry matter for N_2O), and the ratio between the IEFs and the default EFs was reported as exactly 0.8. During the review, South Africa confirmed that the combustion factor of 1 was applied and that the value of 0.8 reported in the CRT will be corrected for the next submission. The TERT recommends that South Africa correct the combustion factor for sugar cane reported in CRT 3.F.
5.A.12	Specified in paragraphs 20 and 39 of the MPGs 3.G Liming – CO_2	The source of the AD for liming is not clear from the description provided in the NID (chap. 5.8, p.270). Furthermore, the same figure was reported in CRT 3.G-J for the amount of limestone and dolomite applied (2,029.87 kt/year) for 2022, but no explanation was provided. During the review, South Africa explained that emissions from lime application were estimated for each crop type using crop area data and application rates from a national study, and the split between limestone and dolomite applied (50/50) was based on an assumption. The Party provided the data on crop areas and liming rates for each crop type to the TERT. The TERT recommends that South Africa include information on the methodology and data used for estimating emissions from liming in the NID, including a justification for the assumptions applied for splitting consumption between limestone and dolomite applied.

[a] Available at https://www.ifastat.org/databases/plant-nutrition.

Table 6
Areas of improvement of the reporting on greenhouse gas emissions and removals – land use, land-use change and forestry sector

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
6.L.1	Specified in paragraph 20 of the MPGs LULUCF – General – CO_2, CH_4, N_2O	The Party reported in its BTR (table 1.3, p.11) "NE" for land-use change emissions from overseas territories, which were considered insignificant on the basis of a basic assessment based on area. The TERT noted that insignificance only applies to a category, gas or pool, and not to a territory. In addition, in the NID (p.276), the Party noted that overseas territories, which are categorized as unmanaged land, were not included in the inventory because of their small area (0.027 per cent of the national area). This reporting is not in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 8, p.8.4), which state that national inventories should include GHG emissions and removals taking place within national territory and offshore areas over which the country has jurisdiction. Furthermore, GHG emissions and removals do not need to be reported for unmanaged land. However, it is good practice for countries to quantify and track, over time, areas categorized as unmanaged land in order to maintain consistency and ensure that anthropogenic activities on unmanaged land result in that land being categorized as managed. Carbon stocks on unmanaged land can be assumed to remain constant (consequently, carbon stock changes would be zero) until the year in which that land is classified as managed. During the review, the Party clarified that the overseas territory is part of its territory under the Paris Agreement, and an approach based on insignificance was applied because the area of overseas territory is small; however, the Party is making an improvement plan to include the area in the next inventory cycle. The TERT recommends that the Party estimate emissions from its overseas territories and report them in future submissions or justify their exclusion consistent with the 2006 IPCC Guidelines.
6.L.2	Specified in paragraph 35 of the MPGs LULUCF – CO_2, CH_4, N_2O – QA/QC	A number of reporting errors identified by the TERT indicated issues with the implementation of QC procedures. The Party reported in the NID (section 6.3.2.4, p.333) a calculation error, which was only discovered late in the submission process, regarding inflated land-area estimates, which led to an overestimation of emissions. The TERT also observed a number of discrepancies between NID table A.VI.6 on land-sector emissions and the CRTs for 2022 relating to total land area (reported as 127,764.1 and 121,974.2 kha in the NID and CRT 4.1 respectively); cropland area (reported as 14,814.8 and 15,626.59 kha in the NID and CRT 4.B respectively); grassland area (reported as 62,648.8 and 79,319.56 kha in the NID and CRT 4.C respectively) and net CO_2 emissions/removals (reported as –54,360.8 and –56,707.25 Gg CO_2 in the NID and CRT Summary1 respectively). During the review, the Party explained that, when the data on land area from the Department of Forestry, Fisheries and the Environment were entered into the calculation files, embedded automatic checks were implemented to ensure the accuracy of the total area, including consistency checks against maps showing land-use changes and a review of the applied data and methodologies by a quality controller. The Party acknowledged that there were challenges with QC because the 2022 inventory involved very large and complex files, highlighting the need for capacity-building. The Party also highlighted the steps it is taking to address these challenges, which include restructuring the calculation files, improving data on land-use change, developing a system for land-use management and building capacity for compiling the LULUCF inventory. The TERT recommends that the Party improve its general QC procedures to ensure consistency between the CRTs and the NID and encourages the Party to improve the category-specific QC procedures for LULUCF and build its capacity to check for and address errors related to land representation and tracking land-use changes across the time series.
6.L.3	Specified in paragraph 39 of the MPGs	The Party reported in its NID (p.297, caption 25 to table 6.8) that the burned area for planted forests reported in the data set obtained from MODIS, was much higher than that reported by Forestry South Africa; therefore, the data from Forestry South Africa were applied to planted forests, with the excess

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
	LULUCF – 4.A Forest land – CO_2, CH_4, N_2O	burned area obtained from MODIS allocated to thickets to ensure that it was still accounted for. However, the Party did not explain the assumptions behind its decision to add the excess burned area under MODIS to thickets. The 2006 IPCC Guidelines (vol. 4, chap. 4, p.4.45) state that, when AD are not obtained directly from databases, the information and assumptions used to derive the AD should be provided, as well as estimates of the uncertainty associated with the derived AD. During the review, the Party clarified that, in some areas, plantations and thickets are adjacent, and the plantation areas on the land-cover maps are slightly overestimated relative to the data from Forestry South Africa. The area that is overestimated must also have a dense woody appearance and is assumed to be thicket. The TERT recommends that the Party provide in its NID a more detailed and transparent explanation of the methods and assumptions applied in determining the data on burned area for the various land categories.
6.L.4	Specified in paragraphs 31 and 47 of the MPGs LULUCF – 4.A Forest land – CO_2	The Party reported carbon stock changes for deadwood as "IE" in CRT 4.A without specifying in the documentation box under CRT 4.A or CRT 9 or in the NID where this information was included. Instead, the Party reported values for deadwood carbon stocks in forest land in its NID (table 6.27, p.348) and noted in its improvement plan (table 9.1 of the NID, p.428) that deadwood was included for forest land. During the review, the Party explained that, since carbon stock changes for deadwood were aggregated with litter (i.e. dead organic matter) in the calculation files, deadwood was reported as "IE" in the CRTs as it is included under litter. The Party noted that deadwood will be reported separately in the next inventory. The TERT recommends that the Party report the actual values of carbon stock changes for deadwood in forest land in CRT 4.A or, if values are not available, report the appropriate notation key, accompanied by an explanation, in the NID and CRT 9.
6.L.5	Specified in paragraph 55 of the MPGs LULUCF – CO_2, CH_4, N_2O	The Party discussed in its NID (section 6.3.3, p.336) the impact of fire disturbances on its sink and its plans to improve the accuracy of its reporting on emissions from disturbances by disaggregating burned areas between controlled fires and wildfires. However, it did not explain how its approach is consistent with IPCC guidance or whether the estimates are indicated in its national totals. The TERT noted that emissions from burned areas are included in the LULUCF sections of the NID and the CRTs. The TERT also noted that the Party's NDC target excludes emissions from wildfires and the need to consistently track burned areas and accurately estimate emissions and subsequent removals from those areas. During the review, the Party explained that two sources of controlled fires are plantations and national parks. Controlled fire data from large plantation companies is reported through the South African GHG emission reporting system, but these data are only available for 2021 onward. There is no reporting system for national parks. The TERT recommends that the Party disaggregate between controlled fires and wildfires, including by tracking burned areas by land-use category over time and tracking subsequent removals. The TERT also recommends that the Party explain how its approach to addressing the emissions and subsequent removals from natural disturbances on managed land is consistent with IPCC guidance and indicate whether the estimates are indicated in national totals.

Table 7
Areas of improvement of the reporting on greenhouse gas emissions and removals – waste sector

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
7.W.1	Specified in paragraph 29 and 44 of the MPGs 5. General (waste) – CO_2, CH_4, N_2O – uncertainty assessment	South Africa reported in its NID (table A.II.1, p.494) the uncertainties of the AD and EFs for all waste sector categories, but chapter 7 of the NID does not contain sufficient information on the values used in the uncertainty assessment, including references to their sources, with the exception of the IPCC default values used for the EFs for category 5.C.2 open burning of waste (NID, p.410). During the review, South Africa clarified that expert judgment was used to generate most of the uncertainties associated with AD and EFs owing to a lack of relevant information. The TERT recommends that South Africa report information on data sources and any underlying assumptions for the uncertainty analysis for all EFs and AD in the waste sector, as it did during the review. In addition, the TERT encourages South Africa to further explore, as appropriate, the uncertainties of all AD and EFs across all waste sector categories.
7.W.2	Specified in paragraph 35 of the MPGs 5. General (waste) – CO_2, CH_4, N_2O – QA/QC	In South Africa's waste sector inventory, there were inconsistencies in the Party's reporting between the CRTs and the NID: 1. With regard to CH_4 and N_2O emissions reported for category 5.B biological treatment of solid waste and the corresponding AD reported in CRT 5.B, inconsistencies in reporting were identified with regard to the waste type reported for category 5.B.1 composting (reported as MSW in CRT 5.B, whereas the AD were reported as industrial waste in the NID (p.406)); the AD for category 5.B.2 anaerobic digestion at biogas facilities (e.g. industrial waste for 2022 was reported as 5,994 kt in the CRT, compared with 6,005 kg in the NID (p.406)); and the amount of CH_4 recovered under category 5.B.2 (reported as "NA" in CRT 5.B, whereas the NID (table 7.7, p.406) includes the amounts of CH_4 recovered). 2. The NID (p.409) includes information on the AD for the amount of waste for open burning. South Africa reported CO_2, CH_4 and N_2O emissions for category 5.C.2 open burning of waste in CRT 5.C, but AD were reported as "NA" in CRT 5.C, and the reasons for reporting this notation key were not explained in the NID. 3. The Party explained the estimation methodology, including the AD used for total organic product and potential N in effluent, in the NID (pp.411–418) and reported CH_4 and N_2O emissions for category 5.D.1 and CH_4 emissions for category 5.D.2 in CRT 5.D. Although additional information on AD was reported in the CRT, South Africa reported AD for total organic product, sludge removed and N in effluent as "NA" without providing a reason for this reporting in its NID. The reporting in the subparagraphs 2 and 3 provided above is not consistent with the MPGs, which require notation keys to be used if numerical data are not available; the AD for amount of waste disposed of through open burning should be reported in the CRT as numerical data for total organic product and N in effluent, rather than "NA". During the review, South Africa explained that the descriptions in the NID that are mentioned above are correct, and the reporting in CRT 5.B is inaccurate. In addition, the Party confirmed that the reporting of AD as "NA" in subparagraphs 2 and 3 is incorrect. The TERT recommends that South Africa report the correct values for AD and the amount of CH_4 recovered in CRTs 5.B, 5.C and 5.D, and enhance the QA/QC procedures defined in the NID. To ensure that information is reported correctly in the CRTs, the TERT considers that South Africa should implement sufficient QA/QC procedures, as mentioned in the NID (table 7.4, p.400).
7.W.3	Specified in paragraphs 39–40 of the MPGs 5. General (waste) – CO_2, CH_4, N_2O	South Africa did not report in its NID detailed information on estimating disaggregated AD for categories 5.A solid waste disposal on land (i.e. population, gross domestic product and waste generation rates, fraction of waste disposed of as solid waste), 5.C.2 open burning of waste (i.e. waste composition) and 5.D.2 industrial wastewater production tonnage, wastewater

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		generation by industry type and wastewater share by treatment pathway. This is not in accordance with the MPGs, which require information on the methodologies, EFs and AD used to be provided at the most disaggregated level. During the review, South Africa provided the spreadsheets used to estimate GHG emissions, which include information on estimating disaggregated AD for the above-mentioned categories. The TERT recommends that South Africa provide in its NID a detailed AD and information on the methodologies applied at the most disaggregated level for all waste sector categories.
7.W.4	Specified in paragraphs 21 and 39 of the MPGs 5.A Solid waste disposal on land – CH_4	South Africa reported in its NID (pp.401–402) the methodology used to estimate emissions from MSW, industrial waste and sewage sludge, which involved applying the IPCC bulk waste option (vol. 5, chap. 3, p.3.11). Figure 7.1 of the NID (p.396) presents the trend in emissions. For CH_4 emissions for this category, the TERT identified outliers in the inter-annual changes for 2012–2018, ranging from –33 to 24 per cent. The TERT considers that such outliers are unlikely to occur in the IPCC first-order decay method, which smooths the emission trend using historical AD. The Party reported in CRT 5.A and the CH_4 recovery from flaring and energy recovery as "NE" without providing any explanation. During the review, South Africa provided the spreadsheet used to calculate emissions. In the spreadsheet, the amount of CH_4 recovered was subtracted from CH_4 generated from disposal sites, which was first applied in this submission and resulted in the outliers in the trend of CH_4 emission estimates. According to the 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.19), CH_4 recovery should be based on metered data; however, South Africa was unable to indicate whether metered data were used. Moreover, the TERT found that South Africa's methodology involved the IPCC waste composition option (vol. 5, chap. 3, p.3.10) for MSW, rather than the bulk waste option mentioned in the NID (p.402). Moreover, South Africa did not include sewage sludge landfilled in its GHG inventory, which is not consistent with the description provided in the NID. The TERT recommends that South Africa correct the reference to the method used to reflect the IPCC waste composition option rather than the bulk waste option used for the category. The TERT also recommends that the Party estimate and report on CH_4 recovery and sewage sludge in line with the 2006 IPCC Guidelines (e.g. specifying and reporting whether the amount of CH_4 recovered is based on measured data and how sewage sludge is treated across waste categories).
7.W.5	Specified in paragraphs 21 and 39 of the MPGs 5.B Biological treatment of solid waste – CH_4, N_2O	South Africa reported in CRT 5.B AD on a dry weight basis for this category. However, data on waste amounts are usually obtained on a wet weight basis by measurement, and the NID contains no information on the properties of the AD or whether a wet or dry weight basis was used. During the review, South Africa explained that the AD gathered from statistics, which are based on data collected from several municipalities, include amounts on a wet or dry weight basis, as well as amounts with no information relating to a weight basis (wet or dry). Nonetheless, South Africa estimated all CH_4 emissions for this category using EFs on a dry weight basis (see NID p.407). The TERT recommends that South Africa report in its NID the properties of the AD, which include wet weight, dry weight and unidentified values, and estimate CH_4 and N_2O emissions using appropriate default EFs from the 2006 IPCC Guidelines (vol. 5, chap. 4, p.4.6), given the properties of the AD (wet or dry weight), and adopt appropriate assumptions for AD with unidentified properties (e.g. using a wet weight basis for all unidentified AD since it is assumed that data on waste amounts were obtained on a wet weight basis by measurement). In addition, the TERT encourages South Africa to investigate the properties of all the AD (wet or dry) collected from all municipalities to ensure that the reported AD, and therefore the emission estimates, are accurate.

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

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
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

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
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

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

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

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
11.1	Specified in paragraph 83 of the MPGs	The Party reported a description of its PaMs by sector in both narrative and tabular format and included a description of interactions between PaMs in the annex to the BTR (section 8). However, the Party did not provide information on costs and non-GHG mitigation benefits for its PaMs. During the review, the Party indicated that this information was not provided because limited data were available at the time of reporting. Additionally, owing to time and capacity constraints, South Africa prioritized compliance with the "shall" reporting requirements under the MPGs. Furthermore, South Africa recently finalized an investment plan aimed at assessing the cost of mitigation PaMs. The Party has also developed a socioeconomic modelling framework for estimating the socioeconomic impacts of these PaMs, including co-benefits such as job creation, public health improvements and contributions to the Sustainable Development Goals. Moreover, South Africa recognizes the importance of such information for effective policy planning and is taking steps to strengthen assessments of the costs and co-benefits of PaMs, including by improving data collection, developing analytical tools and enhancing interdepartmental coordination. South Africa intends to report information on the costs of its PaMs and non-GHG mitigation benefits in its next BTR. The TERT encourages the Party to include information on costs and non-GHG mitigation benefits for each action, policy and measure reported, as appropriate.
11.2	Specified in paragraph 85 of the MPGs	The Party reported on achieved GHG emission reductions in narrative format and in tabular format in CTF table 5 and described in the annex to the BTR (section 8) the methodologies and assumptions used for estimating the GHG emission reductions and removals for most of its PaMs. However, the Party did not report on expected GHG emission reductions. During the review, the Party indicated that its measurement, reporting and verification system currently lacks the functionality for reporting expected GHG emission reductions, noting that assumptions have to be compiled from sectoral institutions, and reported that projections of expected emission reductions will be reported in the next BTR to the extent possible. Sectoral emission targets are

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		allocated to different ministries and the first reporting period is due to end in 2026; these targets will support the mapping of expected GHG emission reductions. The TERT recommends that the Party provide, to the extent possible, estimates of expected GHG emission reductions resulting from its actions.
11.3	Specified in paragraph 88 of the MPGs	The Party did not identify actions and PaMs that influence GHG emissions from international transport. During the review, the Party indicated that it plans to include information on the mitigation actions taken in international transport as a member of the International Civil Aviation Organization and International Maritime Organization. The TERT encourages the Party to report information on its actions and PaMs that influence GHG emissions from international transport.
11.4	Specified in paragraph 90 of the MPGs	The Party did not report on the assessment of economic and social impacts of response measures. During the review, the Party highlighted the challenges faced, including in relation to time and capacity constraints. South Africa expects information on the economic and social impacts of response measures in key sectors to be provided through the ongoing just transition process, planning and the socioeconomic framework tool developed by the Department of Forestry, Fisheries and the Environment. The TERT encourages the Party to provide detailed information, to the extent possible, on the assessment of economic and social impacts of response measures.

Table 12
Areas of improvement of the summary of greenhouse gas emissions and removals

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

Table 13
Areas of improvement of the projections of greenhouse gas emissions and removals

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
13.1	Specified in paragraph 94 in conjunction with paragraph 102 of the MPGs	The Party reported ‘with measures’ projections but did not report ‘with additional measures’ or ‘without measures’ projections as such reporting is not mandatory under the MPGs. During the review, the Party presented the in-house integrated model used by the Department of Forestry, Fisheries and the Environment for GHG projections, as well as assessments of the mitigation potential of PaMs, long-term pathways and socioeconomic impacts, which inform development pathways and support the development of sectoral emission targets. While GHG emission modelling was completed in February 2024, analysis is ongoing as part of the process for developing sectoral mitigation plans, which involves consultations with heads of government ministries and stakeholder engagement. Owing to the later timeline for these plans, the Party plans to include detailed modelling outputs and sectoral findings in its BTR3, scheduled for submission in 2028. Noting the flexibility applied by the Party, the TERT encourages the Party to include the ‘with additional measures’ and ‘without measures’ scenarios, which would help to capture the outlook of the various planned policies that will be reported in accordance with its self-determined timeline or earlier.
13.2	Specified in paragraph 96(a), (c) and (d) in conjunction with	Although the Party reported ‘with measures’ scenarios, it did not provide certain information on the methodology used to develop projections, in particular information on key underlying assumptions and parameters, assumptions on PaMs included in the ‘with measures’ projections and a

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
	paragraph 102 of the MPGs	sensitivity analysis. In addition, values were not provided in CTF table 11 for the projections of key parameters. During the review, the Party explained that it applied flexibility with respect to this provision in accordance with paragraph 102 of the MPGs. However, the TERT noted that the flexibility provision refers to the use of a less detailed methodology or coverage of the projections and not to the description of the methodology used to develop reported scenarios. Noting the flexibility applied by the Party, the TERT encourages it to include in the BTR a description of key underlying assumptions and parameters used for projections (e.g. gross domestic product growth rate/level, population growth rate/level) in textual and tabular format (as requested in CTF table 11); the assumptions used for PaMs included in the projections; and a sensitivity analysis, together with a brief explanation of the methodologies and parameters used, in accordance with its self-determined timeline or earlier.
13.3	Specified in paragraph 97 in conjunction with paragraph 102 of the MPGs	The Party did not report on projections of key indicators to determine progress towards its NDC in CTF table 10 owing to limited data and insufficient understanding of the key drivers for natural disturbances. During the review, the Party added that time constraints also prevented the information from being included. Noting the flexibility applied by the Party, the TERT recommends that it include projections of key indicators in CTF table 10, in accordance with its self-determined timeline or earlier.

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

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
NA	NA	No areas of improvement identified

II. Capacity-building needs[3] 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. ID#s 2.G_CBN.1, 2.G_CBN.2, 4.I_CBN.1, 6.L_CBN.4, 10_CBN.1, 10_CBN.2 and 10_CBN.3 in table 15 were identified by the TERT on the basis of the findings from the technical expert review, and ID#s 6.L_CBN.1, 6.L_CBN.2, 6.L_CBN.3, 7.W_CBN.1 and 2.G_CBN.3 were informed by the planned and proposed improvements specified in BTR table 4.16.

Table 15
Capacity-building needs identified in consultation with the Party

ID#	*Reporting requirement*	*Area in which capacity-building is needed*
National inventory report – General		
2.G_CBN.1	Specified in paragraph 57–58 of the MPGs	Estimating GHG emissions for the time series 1990–2000 (high priority)
2.G_CBN.2	Specified in paragraph 32 of the MPGs	Developing a data-collection and GHG emission estimation system for categories for which estimates are not yet reported and are currently considered insignificant or reported as “NE” (high priority)

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

ID#	*Reporting requirement*	*Area in which capacity-building is needed*
2.G_CBN.3[a]	Specified in paragraph 12(a) of decision 18/CMP.1	Adapting the national inventory system to the tools for reporting under the enhanced transparency framework under the Paris Agreement by developing tools for automatically inputting GHG inventory data into the JavaScript Object Notation format files of the CRTs and by providing training on reporting information in tabular format
National inventory report – IPPU		
4.I_CBN.1	Specified in paragraph 48 of the MPGs	Developing a data-collection and emission estimation system for F-gases (high priority)
National inventory report – LULUCF		
6.L_CBN.1[a]	Specified in paragraphs 20, 47 and 50 of the MPGs	Developing a national forest inventory, beginning by initiating discussions with the Forestry branch of the Department of Forestry, Fisheries and the Environment
6.L_CBN.2[a]	Specified in paragraphs 20, 47, 50 and 56 of the MPGs	Enhancing the data-collection and emission estimation system for harvested wood products
6.L_CBN.3[a]	Specified in paragraphs 20, 47, 50 and 55 of the MPGs	Establishing a system for monitoring-controlled fires in the LULUCF sector, collecting data and reporting information thereon
6.L_CBN.4	Specified in paragraphs 20, 47, 50 and 55 of the MPGs	Improving the methodology for identifying land use and land-use changes, including by tracking changes in land use over time
National inventory report – waste		
7.W_CBN.1[a]	Specified in paragraph 47 of the MPGs	Establishing the data-collection and information management system for obtaining and managing data on waste streams and a bucket system
Information necessary to track progress in implementing and achieving the NDC under Article 4 of the Paris Agreement		
13_CBN.1	Specified in paragraphs 83, 85, 90 and 93–101 of the MPGs	NDC tracking/PaMs/GHG projections: strengthening institutional and technical capacity in modelling and assessing the effects of PaMs by increasing capacity in modelling projections of GHG emissions and removals and in reporting long-term emission reductions, socioeconomic impacts and a cost–benefit analysis related to PaMs; for example, by securing qualified, trained staff in a dedicated administrative unit (high priority)
13_CBN.2	Specified in paragraphs 83, 85, 90 and 93–101 of the MPGs	NDC tracking/parameters for GHG projections: Strengthening institutional and technical capacity in modelling and assessing the effects of PaMs by improving data availability and the quality of the macroeconomic framework, parameters and assumptions used in developing projections, including projections of energy demand by sector (e.g. transport, household) (high priority)
13_CBN.3	Specified in paragraphs 83, 85, 90 and 93–101 of the MPGs	Strengthening institutional and technical capacity in modelling and assessing the effects of PaMs by developing GHG projections by sector, with a focus on the LULUCF sector (high priority)

Note: South Africa reported ongoing and planned or proposed capacity support needed for improvements to the GHG improvement plan in its BTR (table 4.16).

[a] Capacity-building need identified by the Party in its BTR1.

Annex

Documents and information used during the review

A. Reference documents

BTR1 of South Africa. Available at https://unfccc.int/first-biennial-transparency-reports.

BTR1 CTF tables of South Africa. Available at https://unfccc.int/first-biennial-transparency-reports.

CRTs of South Africa. Available at https://unfccc.int/first-biennial-transparency-reports.

NID of South Africa. Available at https://unfccc.int/first-biennial-transparency-reports.

"Guidance for operationalizing the modalities, procedures and guidelines for the enhanced transparency framework referred to in Article 13 of the Paris Agreement". Decision 5/CMA.3. FCCC/PA/CMA/2021/10/Add.2. Available at https://unfccc.int/documents/460951.

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.

IPCC. 2019. *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*, E Buendia, K Tanabe, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc-nggip.iges.or.jp/public/2019rf/.

"Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement". Annex to decision 18/CMA.1. FCCC/PA/CMA/2018/3/Add.2. Available at https://unfccc.int/documents/193408.

B. Additional information provided by the Party

Responses to questions during the review were received from Sandra Smotshwanedi and Jongikhaya Witi (Department of Forestry, Fisheries and the Environment of South Africa), including additional material. The following references were provided by South Africa and may not conform to UNFCCC editorial style as some have been reproduced as received:

Government of the Republic of South Africa, Climate Change Act, July 2024 available on: www.gov.za/sites/default/files/gcis_document/202407/50966climatechangeact222024.pdf

Department of Forest, Fisheries and Environment of South Africa, 2024, *Sectoral Emissions Targets 2025 to 2030. Implementation* of South Africa's updated Nationally Determined Contribution. Available on www.dffe.gov.za/sites/default/files/legislations/draft_sectoralemissionstargets2024_g50571gon4763.pdf

Du Toit, C.J.L., van Niekerk, W.A. and Meissner, H.H., 2013c. Direct methane and nitrous oxide emissions of monogastric livestock in South Africa. South African Journal of Animal Science, 43. 43 (3): 362–375