United Nations FCCC/ETF/TERR.1/2024/ESP/Add.1

Framework Convention on Climate Change

Distr.: General
10 September 2025

English only

Report on the technical expert review of the first biennial transparency report of Spain

Addendum

Summary

This addendum to the report on the technical expert review of the first biennial transparency report of Spain, 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 areas of improvement identified by the technical expert review team in consultation with the Party during the review. The review took place from 24 to 28 February 2025 in Madrid.

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	carbon monoxide
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRT	common reporting table
CTF	common tabular format
EF	emission factor
EU	European Union
GHG	greenhouse gas
HFC	hydrofluorocarbon
IE	included elsewhere
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
MITECO-SEI	Ministry for Ecological Transition and the Demographic Challenge–Spanish Inventory System
MPGs	modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement
N_2O	nitrous oxide
NA	not applicable
NDC	nationally determined contribution
NE	not estimated
NFI	national forest inventory
NID	national inventory document
NIR	national inventory report
NMVOC	non-methane volatile organic compound
NO	not occurring
PaMs	policies and measures
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
SF_6	sulfur hexafluoride
SWDS	solid waste disposal site(s)
TERT	technical expert review team
WAM	‘with additional measures’
WM	‘with measures’
WOM	‘without measures’
Ym	methane conversion rate

Areas of improvement[1] identified during the technical expert review of the Party's first biennial transparency report

Tables 1–20 present the results of the review of the consistency with the MPGs[2] of the information submitted by Spain in its BTR1. All recommendations and encouragements contained in the tables are for the next BTR or NIR, 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 44 of the MPGs Uncertainty analysis	Spain's uncertainty analysis, presented in the NID, did not transparently include the emission and removal estimates, methods used and underlying assumptions for all source categories. The estimates, methods and underlying assumptions for some, but not all, source categories are presented both in the sectoral chapters and in the overall uncertainty of emission and removal estimates for source and sink categories (NID annex II, p.733), while the estimates for some source categories are reported in an aggregated manner and collectively reported under the category other categories. The categories for which estimates are not presented in the sectoral chapters or not reported on a disaggregated basis in the national analysis are as follows: 2.A.3 (CO_2), 2.B.1 (CO_2), 2.B.4.a (N_2O), 2.B.5 (CO_2 and CH_4), 2.B.7 (CO_2), 2.C.2 (CO_2 and CH_4), 2.C.5 (CO_2), 2.C.6 (CO_2), 2.C.7 (CO_2), 2.D.1 (CO_2), 2.D.2 (CO_2), 2.D.3 (CO_2), 2.F.2 (HFC), 2.F.3 (HFCs and PFCs), 2.F.4 (HFCs), 2.G.1 (SF_6), 2.G.2 (SF_6), 2.G.3 (N_2O), 5.C (CH_4 and N_2O) and 5.E (CH_4 and N_2O). The categories for which estimates are included in the sectoral chapters but not reported on a disaggregated basis in the overall analysis at the national level are as follows: 3.C (CH_4), 3.D.2 (N_2O), 3.G (CO_2), 3.H (CO_2), 3.I (CO_2), 5.A (CH_4) and 5.B (CH_4 and N_2O). During the review, Spain confirmed that an uncertainty analysis was undertaken for these source categories and that the results are presented in annex II to the NID (pp.733–738). However, the TERT noted that the estimates are aggregated and presented together under the entry other categories, preventing an analysis of the uncertainty for each estimated source category. The TERT recommends that Spain include in future NIDs the estimates, methods used and assumptions underlying the uncertainty analysis for all source and sink categories and present the results of the uncertainty analysis on a disaggregated basis across different sectors and by gas.
2.G.2	Specified in paragraph 31 of the MPGs Notation keys	Spain's CRTs include empty cells and notation keys without an accompanying justification. Empty cells were found, for example, in: • CRT 2(I) for categories 2.D.3 (nitrogen oxides and sulfur oxides), 2.E.1–2.E.2 (N_2O, unspecified mix of HFCs and PFCs, and SF_6), 2.E.3–2.E.4 (unspecified mix of HFCs and PFCs, and SF_6), 2.F.1 (SF_6), 2.F.2–2.F.6 (unspecified mix of HFCs and PFCs, and SF_6), 2.G.1 (unspecified mix of HFCs and PFCs), 2.G.4

[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*
		(SF_6) and 2.H.3 (HFCs, PFCs, unspecified mix of HFCs and PFCs, SF_6 and nitrogen trifluoride); • Table 2(I).A-H for categories 2.E.1 and 2.E.2 (AD, N_2O implied EFs, N_2O emissions and N_2O recovery); • Table 2(II) for categories 2.B.9.a, 2.C.3, 2.C.4, 2.E.1, 2.E.2, 2.E.3, 2.E.4, 2.F and 2.G.1 (for some gases); • Table 2(II).B-Hs2 for categories 2.F.1 (recovery emissions) and 2.G.1 (recovery emissions); • CRT 6 for indirect CO_2 and N_2O emissions from the atmospheric oxidation of CH_4, CO and NMVOCs from the energy sector. Examples of notation keys not accompanied by a justification were found in CRT 9: "NE" for N_2O emissions from the energy sector (subcategories 1.B.1.b and 1.B.2.a.iv) and "IE" for CO_2, CH_4 and N_2O emissions from the energy sector (category 1.A.4.b.i) (liquid, solid, gaseous and biomass fuels). During the review, Spain explained that most of this reporting was made in error, noting that cells in the CRTs should have been populated with the notation keys recorded in the GHG inventory local files. The TERT recommends that Spain review and improve its QA/QC processes to ensure that future CRTs are complete and contain only numerical values or the correct notation keys accompanied by a justification of their use.

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 30 of the MPGs 1.B.1.a Coal mining and handling – CO_2 and CH_4	The Party did not provide information in its NID regarding the emissions from flaring of drained CH_4 or conversion of CH_4 to CO_2 from underground mines (subcategory 1.B.1.a.i.4). During the review, the Party clarified that this field was not available in the previous reporting tool used by Spain and was therefore omitted in the CRTs. Spain also clarified that this activity does not occur in the country and that in future CRT submissions it will report "NO" for all fields under subcategory 1.B.1.a.i.4. The TERT recommends that the Party provide complete information for subcategory 1.B.1.a.i.4.

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 39 of the MPGs 2.A.1 Cement production – CO_2	Category 2.A.1 is a key category for Spain. The Party reported in its NID (p.293) that it used the tier 2 methodology from the 2006 IPCC Guidelines to estimate CO_2 emissions for this category, applying a country-specific EF to the quantities of clinker produced. However, it did not clarify in the NID how this national EF was calculated. The TERT noted that Spain included in its NID (p.294) a reference to a document ("Guía de seguimiento y notificiación de emisiones GEI del sector cemenero español en el marco del IV periodo ETS (2021-2030)") that contains detailed information on the CO_2 emission estimation methodology at the plant level, but that this document does not specify the method used to calculate the national CO_2 EF. During the review, the Party clarified that the national CO_2 EF is calculated as the ratio between total CO_2 emissions (i.e. the sum of CO_2 emissions from each plant) and total clinker production. The TERT recommends that the Party include in its NID information on the method for calculating the national CO_2 EF for category 2.A.1.
4.I.2	Specified in paragraph 40 of the MPGs	Spain reported in its NID (p.306) that CO_2 emissions for category 2.B.1 were estimated on the basis of the natural gas used as feedstock in the ammonia production process (using a tier 3 approach). The TERT noted that the 2006 IPCC Guidelines (vol. 3, chap. 3.2.2, p.3.11) state that, in the case of ammonia

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
	2.B.1 Ammonia production – CO_2	production, no distinction is made between fuel and feedstock emissions, with all emissions to be accounted for under the IPPU sector. The EF provided by Spain (0.468–0.907 t CO_2/t ammonia) is lower that the default EF from the 2006 IPCC Guidelines (1.666–3.273 t CO_2/t ammonia), which could indicate an underestimation of the CO_2 emissions. During the review, the Party confirmed that it used a tier 3 method for estimating CO_2 emissions from ammonia production, and that fuels used as feedstock were utilized as the AD. Spain noted that some CO_2 emissions are captured and used in urea production. It also noted that CO_2 emissions from fuel combustion are reported under the energy sector (subcategory 1.A.2.c). Noting that the current reporting has not resulted in any double counting or underestimation in the inventory, the TERT recommends that Spain report all CO_2 emissions from ammonia production (from both fuels and feedstock) under the IPPU sector, category 2.B.1, to ensure comparability of its reporting in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 3.2.2).
4.I.3	Specified in paragraphs 33 and 52 of the MPGs 2.D.3 Other (non-energy products from fuels and solvent use) – indirect CO_2 emissions	The TERT noted that Spain reported in previous submissions under the Convention CO_2 emissions generated by solvent use under category 2.D.3. These were indirect CO_2 emissions, which were supposed to be considered separately in the inventory. However, Spain did not report in the 2024 NID or CRT 6 indirect CO_2 emissions from the IPPU sector. The TERT also noted that, according to the MPGs, once emissions or removals have been estimated for a category and if they continue to occur, the Party shall report them in subsequent submissions. During the review, the Party confirmed that indirect CO_2 emissions from the IPPU sector were not estimated for its 2024 NID. The TERT recommends that Spain continue to estimate indirect CO_2 emissions from the IPPU sector and report the values in CRT 6 and the underlying methodology in the NID. The TERT further recommends that the national totals be presented with and without indirect CO_2 emissions.

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 paragraph 39 of the MPGs 3.A Enteric fermentation – CH_4	The Party indicated in its NID (p.374) that, starting with the 2021 inventory submission, the default value of 6.5 per cent from the 2006 IPCC Guidelines for the cattle Ym parameter (methane conversion factor) has been considered; and that, from the 2023 inventory submission onward, the disaggregated value available in table 10.12 of the 2019 Refinement to the 2006 IPCC Guidelines has been implemented, which takes into account the variation in Ym in relation to changes in diet formulation and digestibility over the historical time series, as well as its production level. During the review, the TERT noted that the Party is still using the default value of 6.5 per cent for the Ym parameter for cattle from the 2006 IPCC Guidelines (vol. 4, chap. 10, p.30, table 10.20). The Party clarified that its inventory team has made several attempts to implement the Ym values from the 2019 Refinement to the 2006 IPCC Guidelines, but this will not be possible until after the current submission; only in the next submission of the NID in 2025 will these changes be implemented. The TERT recommends that the NID contain correct information on the sources of the Ym values used for the inventory. The TERT encourages Spain to use the Ym values for cattle from the 2019 Refinement to the 2006 IPCC Guidelines for the next submission as planned.
5.A.2	Specified in paragraphs 39 and 43 of the MPGs 3.A Enteric fermentation – CH_4; 3.B Manure management – CH_4 and N_2O; 3.D Direct and	Spain indicated in its NID that it recalculated CH_4 emissions from enteric fermentation (p.378), CH_4 emissions from manure management (p.390), N_2O emissions from manure management (p.406), N_2O emissions from agricultural soil (p.425) and CH_4 and N_2O emissions from field burning of agricultural residues (p.437) owing in part to (1) the revision of some zootechnical coefficients, such as excreted volatile solids, grazing redistributions with slight changes in some animal weight values within the time series coming from the national zootechnical

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
	indirect N_2O emissions from agricultural soils – N_2O; and 3.F Field burning of agricultural residues – CH_4 and N_2O	documents of cattle, white pigs and horses and (2) an update to the methodology for estimating the nitrogen and phosphorus balance, which resulted in changes to the values of crop residues burned, affecting the activity variable of category 3.F, and also resulted in the reallocation of emissions from the burning of floral residues to category 5.C.2.1.b. However, the TERT noted that Spain did not fully explain the reasons for the recalculations such as by accurately reporting the update of the zootechnical coefficients used and given on the website (https://www.mapa.gob.es/es/ganaderia/temas/ganaderia-y-medio-ambiente/balance-de-nitrogeno-e-inventario-de-emisiones-de-gases/default.aspx) cross-referenced in the NID (p.371). Additionally, it did not provide detailed information on the impact of recalculations on the emission trend for the affected categories. For example, in category 3.F the annual increases vary between 0.5 and 4.6 per cent from 1990 to 2000, but it rises to as much as 32.6 per cent (2008) from 2001 to 2021. During the review, the Party clarified that the above-mentioned zootechnical document for cattle, white pigs and horses was updated to include information from 2020, but that it has not been published on the official website yet since it was prepared in 2022 and only approved in 2024. It also explained that the horse weight data used for the current NID differed from those in the previous NID owing to the application of different rounding criteria, causing changes to the estimated gross energy, and thus equine enteric fermentation emissions, to decrease by 0.054 per cent across the respective animal subcategory. Finally, the Party shared tables showing the changes in emissions for category 3.F, which resulted from new values of crop residues burned and from variations in the burned area as well as the annual production of each crop. The TERT recommends that Spain provide explanatory information on and justification for recalculations for all categories, including any changes throughout the time series and their impact on emission trends. The TERT further recommends that the Party make a complete cross check of the references and information used in each submission to ensure that the cross references in the NID to the new data sources for all EFs and AD used in the recalculations are up to date.
5.A.3	Specified in paragraphs 30 and 32 of the MPGs 3.B Manure management – CH_4 and N_2O	In its NID (p.372), Spain reported that livestock production for species such as mink and ostriches is irrelevant for several reasons, but did not indicate whether mink and ostrich livestock emissions were included in its GHG inventory estimations. During the review, Spain clarified that ostrich farming emissions are reported under other poultry because, when the animal census took place, the number of ostriches was included with other poultry and the livestock emission estimations were included also with all other poultry. The Party mentioned that mink farming is very limited compared with other livestock species. It also mentioned that 2022 emissions from mink farming account for less than 0.05 per cent of Spain's total GHG emissions and less than 0.1 per cent of livestock sector emissions, and noted the restrictions associated with mink farming owing to its classification as an invasive alien species, according to national decree 630/2013, which has led to the gradual abandonment of mink farming. The TERT encourages the Party to include information on each livestock category not reported in CRTs 3.B.a and 3.B.b for which IPCC default EFs exist, indicating the reason for not estimating any emissions. In particular, the TERT recommends that the Party clearly explain the allocation of emissions from ostrich and mink farming and to justify, if necessary, the lack of reporting on emissions owing to their insignificance.

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 39 of the MPGs Land representation – CO_2	The Party reported in NID section 6.3.1 a series of cartographic data used to construct spatially explicit land-use conversion data for the entire time series. However, Spain did not report complete information regarding this new procedure of using different cartographic data sources to estimate land use and land-use change. For example, it did not explain how the different data are combined to produce land-use conversion data that meet the operational IPCC definitions of land-use categories in the GHG inventory. During the review, the Party explained that the new procedure uses the available national cartographic data sources for each reference date, with correspondence tables created to classify the information provided by each data source in line with the land-use category definitions provided in NID section 6.2.1 (p.464). The Party also provided the TERT with an introductory sheet to the LULUCF mapping project, which sets out a description of the methodology used to integrate and homogenize the data sources as well as the above-mentioned correspondence tables according to the IPCC land-use category definitions. However, the hyperlinks to the introductory sheet provided in the NID (p.460, p.461, p.462, p.466, p.470, p.480, p.491, p.511, p.801, p.815) are not working and thus the document is not publicly available. The TERT recommends that the Party include in the NID transparent information on the use of different national cartographic data sources for reporting land representation and the correspondence of the classification in the national data sources to the IPCC definitions of land-use categories and ensure that weblinks to any relevant background information are operational.
6.L.2	Specified in paragraph 35 of the MPGs Land representation – CO_2	The development of the new cartographic data sources project (NID section 6.3.1, p.466; see ID# 6.L.1 above) involved significant methodological changes and data revisions, which had a substantial impact on emission trends in the LULUCF sector. NID section 6.1.4 (pp.460–461) reports that QC activities were undertaken in developing the procedure for elaborating the LULUCF cartographic series, noting that those QA/QC activities are set out in the introductory sheet to the LULUCF mapping project (see ID# 6.L.1 above), which was shared with the TERT during the review. However, the TERT noted that the sheet does not include a specific section on the QC activities. During the review, Spain elaborated on the QC activities undertaken during the development of the LULUCF cartographic series. Firstly, essential requirements were established for the cartographic data sources (e.g. development at the national level and use of a hierarchical data model). Secondly, many land-use changes were analysed with the help of external sources to confirm their accuracy and ensure time-series consistency. Those external sources included the Spanish Land Cover and Land Use Information System, remote observation (e.g. to develop cartographic layers for rocky terrain), dam and reservoir inventories, and cadastral cartography. Lastly, an accuracy assessment was conducted by interpreting orthophotos and through stratified random sampling by LULUCF category for each year in the time series (1970, 1990, 2000, 2006, 2009, 2012, 2015, and 2018), which resulted in an estimated overall weighted accuracy for the series of cartographic data used for the LULUCF sector of 91.8 per cent, resulting in an uncertainty value of 8.2 per cent. Given the significant data revisions posed by the new cartographic data sources project, the TERT encourages Spain to include in the NID information on the sector-specific QC activities undertaken, as detailed in the document “Introductory sheet to the LULUCF mapping project” shared during the review.
6.L.3	Specified in paragraph 43 of the MPGs	The Party reported in NID section 10.2.1.1.4 (p.614) that the main reason for the change in removals in the LULUCF sector (2.38 per cent increase compared with the 2023 NID for the entire inventory period) was that there was a new estimate of the carbon content of living biomass in category 4.A.1. The Party explained in NID section 6.6.4 (p.476) that the recalculations for 2004–2021 in this category were

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
	4.A.1 Forest land remaining forest land – CO_2	due to the incorporation of provincial living biomass data for Castilla–La Mancha provinces from the fourth NFI. The TERT found no issues in the consistency in the estimation methodology applied to the recalculation of carbon stock change of living biomass in the category forest land remaining forest land. However, the TERT noted that the NID does not clearly indicate how the provincial living biomass data are applied in the estimation process or specify the impact of the relevant changes in living biomass data on emission trends. The methodology to obtain the annual biomass increments of forest land remaining forest land is presented on the MITECO-SEI web page "Change in carbon stocks of living biomass in forest land remaining forest land", which was hyperlinked in NID section 6.4.2.1.1 (p.473). During the review, Spain explained that the annual biomass increments depend on the difference between the different provinces' NFI data cycles, between either the second and third or the third and fourth, and the years to be estimated for the submission. Also, for the period after the third NFI to the latest reporting year, the increments depended on the incorporation of provincial living biomass data coming from the fourth NFI, which may replace the annual biomass increments for respective provinces that were previously estimated in the second and third NFIs as extrapolations. The Party also highlighted that, while the increments for individual provinces calculated on the basis of the third and fourth NFIs may be larger or smaller than the increments used in the 2023 NID, the overall incorporation of data from the fourth NFI into the 2024 NID has resulted in larger biomass increments on average, which lead to an increase of removals compared with the 2023 NID due to the recalculations. The TERT recommends that Spain include explanatory information on how provincial living biomass data are applied in estimating removals from forest land remaining forest land, as relevant, and specify any impact of recalculations made due to the incorporation of updated provincial living biomass data on emission trends in the LULUCF sector.
6.L.4	Specified in paragraph 39 of the MPGs 4.A.1 Forest land remaining forest land – CO_2	Spain did not fully describe the method for obtaining the single provincial value of carbon stock change per unit area, which is used as the EF for living biomass in forest land remaining forest land. According to the web page "Change in carbon stocks of living biomass in forest land remaining forest land", which is referenced in the NID (p.473), the total living biomass is calculated by multiplying the provincial timber volume collected in the NFIs, in cubic metres per hectare and species, by the national values of biomass expansion factor, the root–stem coefficient and the carbon fraction per species. However, the NID does not explain how the single provincial value of carbon stock change per unit area was obtained. During the review, the Party explained that the results from NFIs for one province can be analysed with regard to a number of forest strata with different compositions of species. The number of strata and the areas for different strata vary across provinces. The provincial timber volume for one species is obtained as the sum of timber volume for the species included in different forest strata. The total carbon stock for the province, which becomes the basis of the single provincial value of carbon stock change per unit area, is then obtained as the sum of provincial carbon stock for different species calculated using the above-mentioned method. The TERT recommends that Spain describe in its NID in more detail the method for obtaining the single provincial value of carbon stock change used in the estimates for category 4.A.1 forest land remaining forest land.
6.L.5	Specified in paragraph 21 of the MPGs 4.C.1 Grassland remaining grassland – CO_2	Spain reported carbon stock changes in the living biomass and dead organic matter pools under grassland remaining grassland in CRT 4.C as "NE" and "NA" respectively, explaining that this was due to lack of information on living biomass and the use of the tier 1 methodology for dead organic matter. The Party mentioned in its NID (section 6.6.5), and further explained during the review, that work is under way to improve the information used for estimating carbon stock changes in grassland remaining grassland. The TERT encourages Spain to develop an approach to collecting sufficient information on the category grassland remaining grassland, following the

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		improvement plan specified in its NID (section 6.6.5) and to determine if it is a key category and therefore whether applying the tier 1 methodology is appropriate.

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 47 of the MPGs 5.A.2 Unmanaged waste disposal sites – CH_4	In NID section 7.2.2, the Party reported the AD and methodology used to estimate CH_4 emissions from managed and unmanaged SWDS. However, in CRT 5.A, the Party reported that since 2013 there has been no disposal of waste in unmanaged waste disposal sites, reporting "NO" for CH_4 emissions from 2013 to the latest inventory year (2022) for category 5.A.2. According to the 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.24), even if waste disposal has not occurred since 2013, unmanaged SWDS will continue to emit CH_4 emissions, which are automatically accounted for in the first-order decay method applied by the Party because historical waste disposal data were used. Additionally, Spain provided in the NID (section 7.2.2) a reference to a methodology document in which emissions from unmanaged SWDS are reported, which contradicts the information in the CRT that such emissions do not occur. During the review, the Party clarified that it experienced challenges with the tool for reporting under the enhanced transparency framework, which led to it erroneously reporting "NO" instead of the CH_4 emission data for category 5.A.2. The TERT recommends that the Party report CH_4 emissions from unmanaged SWDS in CRT 5.A instead of reporting "NO" and enhance its QC procedures to ensure consistency between the information reported in the CRTs and the NID.
7.W.2	Specified in paragraphs 18 and 40 of the MPGs 5.D Wastewater treatment and discharge – CH_4 and N_2O	The Party reported sludge removal in the wastewater inventory of its NID under the following categories: 1.A.2.d, 1.A.2.f, 3.D.1.b.ii, 5.A.1, 5.B.2, 5.C.1.a.ii.4 and 5.E. Such removal was reported as "NA" for category 5.D.1 domestic wastewater, while sludge removals were only reported under category 5.D.2 industrial wastewater. In CRT 5.B under category 5.B.2, only municipal solid waste was reported and no data on the treatment of sludge were reported, and it was not specified if the anaerobic digestion of sludge occurred for category 5.B.2.b. The TERT noted that estimates for sludge applied to agricultural soils, sludge incinerated, and sludge deposited in solid waste disposal sites might be inconsistent as not all the relevant AD are reported in CRTs 5.B and 5.D. During the review, the Party clarified that for the first reporting years of the time series (1998–2010), Spain used the CH_4 emission values from sludge anaerobically digested from a technical report on sludge production and treatment evolution over time. This report allowed the Party to calculate a correlation factor between total organic load in wastewater and CH_4 generated (in tonnes), which was used to estimate CH_4 emissions since 2010 without needing to know the amount of sludge removed. In response to the TERT question on the sludge treatment reported inconsistently in CRT 5.B in the 2024 NID submission (where all waste was reported under category 5.B.2.a as municipal solid waste, without any information on sludge treatment), Spain noted that it has already planned how to address this issue for the upcoming 2025 NID submission, namely by adding two additional subcategories under category 5.B.2.b to include sewage sludge and slurry. Lastly, Spain clarified that the total production of sludge originating in wastewater treatment plants and the final destination of sludge is obtained from the focal point (National Sludge Registry) with a one-year time lag in the data received. Also, the Party mentioned that additional information on sludge deposited in solid waste disposal sites, in particular sludge coming from sewer cleaning and septic tanks, is obtained from a different focal point. The TERT commends the Party for collecting and maintaining detailed data on sludge removal and treatment. The TERT recommends that Spain enhance the transparency of its reporting by including the actual AD values of sludge in CRTs 5.B and 5.D. The TERT encourages the Party to undertake a waste stream analysis with respect to sludge treatment and disposal and to enhance institutional arrangements to ensure that sludge-related data are made available to the appropriate inventory teams in time and to avoid any potential double counting estimates for sludge applied to

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
		agricultural soils, sludge incinerated, and sludge deposited in solid waste disposal sites.
7.W.3	Specified in paragraph 32 of the MPGs 5.C.2 Open burning of waste – CO_2, CH_4 and N_2O	In NIR section 7.6.1.2.5 and CRT 5.C, the Party reported on the parameters used to estimate emissions from open burning of waste. The Party also reported that open burning of waste was used in the past (until its prohibition in 2001) to reduce volumes of waste in unmanaged SWDS. For 2001–2022 Party reported "NO" for emissions for category 5.C.2.b.i. However, the TERT found Internet resources suggesting that unintentional open burning of waste continues to occur in Spain (e.g. https://www.afvalzorg.com/news/landfill-fire-fighting-spain and https://www.ifema.es/en/sicur/news/protection-industries-sicur). During the review, the Party clarified that only the GHG emissions from one accidental fire event that took place in 2016 were reported, under category 5.E. It explained that open burning of waste is strictly regulated in Spain and considered illegal, but mentioned that there might be a lack of data to monitor other unintentional combustion that might have occurred in the Party's territory, noting that the inventory team could work with the Sub directorate General for Circular Economy (the focal point) to collect necessary information for identifying any unintentional burning in the future. The TERT recommends that the Party investigate the occurrence of illegal or unintentional open burning of waste in the country and report any related emissions under category 5.C.2. If the likely level of emissions is below 0.05 per cent of the national total GHG emissions, excluding LULUCF, or 500 kt CO_2 eq, whichever is lower, the TERT recommends that the Party report "NE" in CRT 5.C and justify the use of the notation key in accordance with paragraph 32 of the MPGs.
7.W.4	Specified in paragraph 40 of the MPGs 5.D.1 Domestic wastewater – CH_4 and N_2O	In NID section 7.4.2, the Party reported on the AD used for the different wastewater treatment systems used in the country. The TERT noted that the reporting is not in accordance with paragraph 40 of the MPGs as the NID does not include information that provides a characterization (e.g. collected versus uncollected and treated versus untreated wastewater) of the various wastewater treatment and discharge pathways nor on how the use of these systems and pathways has evolved over time in Spain. According to the 2006 IPCC Guidelines (vol. 5, chap. 6, p.6.7), it is good practice to draw a diagram (similar to figure 6.1 in the Guidelines) of all potential wastewater treatment and discharge systems and pathways in the country. During the review, Spain provided a diagram that characterizes wastewater treatment plants and discharge systems in accordance with figure 6.1 from the 2006 IPCC Guidelines. The TERT recommends that the Party enhance its reporting of sectoral background data for category 5.D.1 by providing further details on the characterization of the various wastewater treatment systems and discharge pathways in the country and on how the use of these systems and pathways has evolved over time.
7.W.5	Specified in paragraph 31 of the MPGs Notation keys	Spain's CRT 5.A had an incorrect use of notation keys, in which CH_4 emissions from unmanaged waste disposal were reported as "NO" when a value should have been reported since such emissions do occur. During the review, Spain explained that there was a reporting error when completing the CRT and the referred table should have been populated with emission values recorded in the GHG inventory local files. The TERT recommends that Spain review and improve its QA/QC processes to ensure that future CRTs are complete and contain only numerical values or the correct notation keys accompanied by a justification of their use.

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*
8.1	Specified in paragraphs 60 and 63 of the MPGs	Spain did not report in its BTR information on how its national circumstances affect GHG emissions and removals over time. Specifically, no information is included on how changes in population and national geographical, climate and economic features affect GHG emissions and removals over time and progress in achieving the NDC. Furthermore, BTR section 3.1 includes sector gross value added, but there is no accompanying text that explains how the evolution of the different sectors impacts GHG emissions. During the review, Spain provided extensive information on its approach to modelling GHG emission projections, which includes using key input data sets that represent national circumstances. Spain also provided relevant references to its NID and national energy and climate plan, which include a detailed analysis of the impacts of national circumstances on GHG emission projections. The TERT recommends that the Party either add descriptive text to the BTR on how GHG emissions and removals and progress in achieving the NDC are affected by changes in population and national geographical, climate and economic features or provide references in the BTR to relevant information in other reports, such as the NID and national energy and climate plan, where the information can be found.
8.2	Specified in paragraphs 62–63 of the MPGs	BTR section 3.1 provides information on legal, institutional, administrative and procedural arrangements for NDC implementation at the EU and domestic level. It also refers to working groups established in Spain for reporting emissions trading, impacts and adaptation, and mitigation. However, Spain did not report in its BTR information on the management and coordination of stakeholder engagement or the archiving of information related to the implementation and achievement of its NDC under Article 4 of the Paris Agreement. During the review, Spain provided extensive information on its approach to stakeholder engagement and referenced national legislation aimed at ensuring effective public consultation and stakeholder engagement activities reported in the national energy and climate plan. It also provided details of its digital reporting tool (HERMES) that allows Spain to manage all requested data flows with regard to the national energy and climate plan, and which has an archiving functionality. The TERT recommends that Spain either add descriptive text to the BTR on the management and coordination of stakeholder engagement and archiving of information related to the implementation and achievement of its NDC under Article 4 of the Paris Agreement or provide in the BTR references to relevant information (e.g. in the national energy and climate plan, reports on the website of the Ministry for Ecological Transition and the Demographic Challenge and www.HERMES-reporting.com).

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 86 of the MPGs	Spain reported the expected GHG emission reductions or removals for individual PaMs in CTF table 5. However, it did not report in the BTR the methodologies and assumptions used to estimate those GHG emission reductions. During the review, Spain explained that all information regarding GHG emissions is included in its NIR and that details of emission reductions from PaMs are described in the report entitled "Projections of emissions and absorptions into the atmosphere: Interactive report" (available at https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/proyecciones-emisiones.html). Spain also elaborated on a number of PaMs so as to better clarify their effects on emission reductions, and referred to regulation (EU) 2018/1999 on the governance of the Energy Union and climate action, a new tool for requesting and tracking information provided by government departments on mitigation actions, and national legislation. The digital reporting tool created by Spain (HERMES) that allows for the integrated management of all the information necessary to comply with EU Regulations facilitates the assignment of mitigation action reporting responsibilities among Spanish entities and administrations. Spain noted that it plans to improve its reporting of the relevant information in its next BTR. The TERT recommends that Spain include in its BTR, to the extent possible, more detailed information on the methodologies and assumptions used to estimate the GHG emission reductions or removals resulting from its PaMs or provide a reference to where such detailed description can be found, if it is not reported in the BTR.
11.2	Specified in paragraph 89 of the MPGs	Spain did not provide information about how its actions and PaMs are modifying longer-term trends in GHG emissions and removals. During the review, Spain clarified the scope of its WAM scenario reported in the BTR. However, the TERT noted that this does not clarify how its actions and PaMs are modifying longer-term trends in GHG emissions and removals. The TERT encourages Spain to include in its BTR, to the extent possible, information on how its actions and PaMs are modifying longer-term trends in GHG emissions and removals.
11.3	Specified in paragraph 90 of the MPGs	BTR section 3.4.10 provides a high-level statement on the assessment of economic and social impacts of response measures within the EU, analysing the positive and negative impacts of those measures, including on third countries. However, the Party did not provide any details, for example on the results of these assessments, including identifying the social and economic impacts of the current and planned PaMs. During the review, Spain explained that economic and social consequences of new PaMs were assessed not only within the EU, but also in relation to the developing countries that may be affected by them, and provided a reference to detailed information on the matter. The TERT encourages the Party to provide in its BTR 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 95 of the MPGs	The BTR and CTF NDC table 7 report GHG emission projections that are based on the 2023 version of the historical 2023 GHG emissions inventory (1990–2021 emissions). BTR section 3.6 explains that this was the most up-to-date version of the inventory when the projections were prepared. The TERT noted that this results in Spain's BTR not complying with the requirements of the MPGs, which state that projections shall begin from the most recent year in the Party's NIR. Furthermore, BTR section 3.6 explains that the WM scenario is calculated up to 2030 (p.36), but reference is also made to 2040 (p.36), with figure 4 (p.45) showing this scenario up to 2050. However, projections under the WM scenario are reported as "NO" for 2040 in CTF NDC table 7 and the reporting of underlying assumptions in CTF NDC table 11 for 2040 is incomplete for 2040. During the review, Spain explained that more up-to-date projections were not available at the time of preparation of the BTR because emission projections are prepared every two years. Spain also clarified that the WM projections were calculated up to 2050. The TERT recommends that Spain ensure that the emission projections included in the BTR begin from the most recent year in the NIR. The TERT also recommends that Spain amend the text and figures in BTR section 3.6 to correctly show the years included in the WM scenario, and report WM projections for 2040 in CTF table 7 and the underlying assumptions for all projections in CTF table 11.
13.2	Specified in paragraphs 94–95 of the MPGs	BTR section 3.6 states that the WAM scenario is calculated up to 2030. However, in the BTR, data are presented to 2050 (figure 4, p.45). The TERT noted that, according to paragraph 95 of the MPGs, projections should extend at least 15 years beyond the next year after the most recent year in the NIR ending in zero or five. During the review, Spain explained that, while data up to and including 2050 were available, the WAM scenario was not fully validated for 2030 onward, so the publication of data for 2050 in the BTR was an error. The TERT encourages Spain to report projections under the WAM scenario that extend at least 15 years beyond the next year after the most recent year in the NIR ending in zero or five.
13.3	Specified in paragraph 96(a) of the MPGs	BTR section 3.6 includes only a brief description of the methodology for projections on a sector-by-sector basis. For example, table 9 and CTF NDC table 11 present only high-level projected AD used in the projections, with no information on whether EFs will change in future years. The TERT noted that including more information on the models and/or approaches used and key underlying assumptions and parameters used for projections would improve transparency. During the review, Spain explained that it is continuously striving to improve the quality and transparency of its reporting and remains committed to further improving the provision of information and thus strengthening that reporting. The TERT encourages Spain to enhance the transparency of its reporting by including in the BTR more detailed information on the models and/or approaches used and key underlying assumptions and parameters used for projections.

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

D. Financial, technology development and transfer, and capacity-building support provided under Articles 9–11 of the Paris Agreement

Table 15
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 16
Areas of improvement of the reporting on underlying assumptions, definitions and methodologies relating to financial, technology development and transfer, and capacity-building support provided under Articles 9–11 of the Paris Agreement

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

Table 17
Areas of improvement of the information on financial support provided under Article 9 of the Paris Agreement – bilateral, regional and other channels

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

Table 18
Areas of improvement of the information on financial support provided under Article 9 of the Paris Agreement – multilateral channels

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

Table 19
Areas of improvement of the information on technology development and transfer provided under Article 10 of the Paris Agreement

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
19.1	Specified in paragraph 126(f) of the MPGs	Spain reported, in textual format, the information required under all subparagraphs under paragraph 126 of the MPGs except for paragraph 126(f), on knowledge generated related to technology development and transfer under Article 10 of the Paris Agreement. Though the Party mentioned some knowledge generation activities, these were limited to communication with the private sector (e.g. preparation and publication of technology watch bulletins with information related to patents or dissemination of technology alerts on patents). The BTR does not include a specific section detailing knowledge generation for transparent reporting on knowledge generated. During the review, Spain elaborated on its knowledge generation activities, emphasizing that its efforts aim to facilitate the creation, dissemination and practical application of information and expertise to strengthen local capacities and enhance decision-making processes. Such activities include research and innovation projects, the development of technical tools, and information-sharing platforms that address specific challenges faced by developing countries. The TERT recommends that the Party provide in the BTR, to the extent possible, detailed information on knowledge generated in relation to support for technology development and transfer provided under Article 10 of the Paris Agreement.

Table 20
Areas of improvement of the information on capacity-building support provided under Article 11 of the Paris Agreement

ID#	*Reporting requirement*	*Description of area of improvement with recommendation or encouragement*
20.1	Specified in paragraph 128(c) of the MPGs	Spain reported, in textual format, the information required under all subparagraphs under paragraph 128 of the MPGs except for paragraph 128(c): it did not report in its BTR policies that promote capacity-building support under Article 11 of the Paris Agreement. During the review, Spain explained that capacity-building is a cross-cutting priority within its international cooperation framework, aligned with the Paris Agreement and the 2030 Agenda for Sustainable Development. It emphasized that Law 1/2023 on Sustainable Development Cooperation and Global Solidarity establishes a general framework for international cooperation, ensuring effective contributions to sustainable development and global solidarity. The Party elaborated that its policies encourage decentralized cooperation by involving Spanish autonomous communities and local authorities in development cooperation and facilitate knowledge and experience transfer programmes that strengthen institutional capacities in partner countries. Spain also highlighted that its ministries, such as the Ministry for Ecological Transition and the Demographic Challenge and the Ministry of Agriculture, Fisheries and Food, have assigned responsibilities for implementing cooperation projects, particularly in areas related to natural resource management and adaptation. The TERT recommends that the Party either provide in its BTR, to the extent possible, information on specific policies that promote capacity-building support under Article 11 of the Paris Agreement, or reference existing cross-cutting policies with a capacity-building component under the general cooperation framework.

Annex

Documents and information used during the review

A. Reference documents

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

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

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

BTR1 of the EU. Available at https://unfccc.int/first-biennial-transparency-reports.

BTR1 CTF tables of the EU. 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. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/.

IPCC. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at https://www.ipcc.ch/publication/2013-revised-supplementary-methods-and-good-practice-guidance-arising-from-the-kyoto-protocol/.

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/184700.

B. Additional information provided by the Party

Responses to questions during the review were received from María Navarro González-Valerio (Ministry for Ecological Transition and the Demographic Challenge of Spain), including additional material. The following references were provided by Spain and may not conform to UNFCCC editorial style as some have been reproduced as received:

Sistema Español de Inventario de Emisiones. 2023. *FICHA INTRODUCTORIA AL PROYECTO CARTOGRÁFICO DE LULUCF (introductory sheet to the LULUCF mapping project).* Available at intro-proyecto-cartografia_tcm30-553028.pdf.

Ministerio de Agricultura, Pesca, Alimentación y Medio Ambiente. 2022. Bases Zootécnicas para el Cálculo del Balance del Nitrógeno y Fosforo de Bovinos, Actualización para 1990 y 2020, Madrid. (Approved in 2024 but not published).