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Report on the individual review of the annual submission of Spain submitted in 2022*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2022 annual submission of Spain, conducted by an expert review team in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol". The review took place from 19 to 24 September 2022 in Bonn.

* In the symbol for this document, 2022 refers to the year in which the inventory was submitted, not to the year of publication.

Contents

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*
AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
CER	certified emission reduction
CH_4	methane
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
Convention reporting adherence	adherence to the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
COPERT	software tool for calculating road transport emissions
CORINE	Coordination of Information on the Environment (programme)
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
EEA	European Environment Agency
EF	emission factor
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
EMEP/EEA guidebook	EMEP/EEA air pollutant emission inventory guidebook
ERT	expert review team
ERU	emission reduction unit
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FM	forest management
FMRL	forest management reference level
$Frac_{GASF}$	fraction of synthetic nitrogen fertilizer that volatizes as ammonia and nitrogen oxides
$Frac_{GASM}$	fraction of applied organic nitrogen fertilizer materials and of urine and dung nitrogen deposited by grazing animals that volatilizes as ammonia and nitrogen oxides
GE	gross energy intake
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
Kyoto Protocol Supplement	*2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*
LULUCF	land use, land-use change and forestry
N	nitrogen

N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
ODU	oxidation during use
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
TEC	Technology Executive Committee
UNFCCC Annex I inventory reporting guidelines	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
UNFCCC review guidelines	"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention"
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*
Y_m	methane conversion rate

I. Introduction

1. This report covers the review of the 2022 annual submission of Spain, organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (annex to decision 13/CP.20). The review took place from 19 to 24 September 2022 in Bonn and was coordinated by Rocio Lichte, Javier Hanna Figueroa and Claudia do Valle (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Spain.

Table 1
Composition of the expert review team that conducted the review for Spain

Area of expertise	*Name*	*Party*
Generalist	Riccardo De Lauretis	Italy
	Robert Sturgiss	Australia
Energy	Sander Akkermans	Netherlands
	Ulrich Elsenberger	Germany
	Leonidas Osvaldo Girardin	Argentina
	Benon Bibbu Yassin	Malawi
IPPU	Menouer Boughedaoui	Algeria
	Mauro Meirelles de Oliveira Santos	Brazil
	Jacek Skośkiewicz	Poland
	Erhan Unal	Türkiye
Agriculture	Kadir Aksakal	Türkiye
	Paulo Cornejo	Chile
	Yurii Pyrozhenko	Ukraine
LULUCF and KP-LULUCF	Savitri Garivait	Thailand
	Mattias Lundblad	Sweden
	Koki Okawa	Japan
Waste	Maryna Bereznytska	Ukraine
	Hlobsile Sikhosana	Eswatini
Lead reviewers	Menouer Boughedaoui	
	Robert Sturgiss	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2022 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3. The ERT has made recommendations that Spain resolve identified findings, including issues[1] designated as problems.[2] Other findings, and, if applicable, the encouragements of the ERT to Spain to resolve related issues, are also included in this report.

4. A draft version of this report was communicated to the Government of Spain, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

[1] Issues are defined in decision 13/CP.20, annex, para. 81.
[2] Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

5. Annex I presents the annual GHG emissions of Spain, including totals excluding and including LULUCF, indirect CO_2 emissions, and emissions by gas and by sector, and contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.

6. Information to be included in the compilation and accounting database can be found in annex II.

II. Summary and general assessment of the Party's 2022 annual submission

7. Table 2 provides the assessment by the ERT of the Party's 2022 annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2
Summary of review results and general assessment of the 2022 annual submission of Spain

Assessment			*Issue/problem ID#(s) in table 3 or 5[a]*
Date of submission	Original submission: NIR, 12 April 2022; CRF tables (version 1), 12 April 2022; SEF tables, 12 April 2022		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	Yes	L.5
	(b) Selection and use of methodologies and assumptions?	Yes	G.1, I.2, I.8
	(c) Development and selection of EFs?	No	
	(d) Collection and selection of AD?	Yes	L.1, KL.2
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	Yes	L.3, L.8
	(g) Reporting of uncertainties, including methodologies?	Yes	A.1, W.1
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness?[b]	Yes	L.4
	(j) Application of corrections to the inventory?	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	NA	The Party did not report any insignificant categories as "NE"
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:		
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	
	(b) Performance of the national system functions?	No	
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	No	

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
	(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	No	
	Have any issues been identified related to the reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the SIAR?	No	
	Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of the reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No	
	Have any issues been identified related to the following reporting requirements for KP-LULUCF:		
	(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	Yes	KL.5
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	Yes	KL.6
	(c) Reporting requirements of decision 6/CMP.9?	No	
	(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	No	
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	NA	Spain does not have a previously applied adjustment
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	
Questions of implementation	Did the ERT list any questions of implementation?	No	

[a] Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.
[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

III. Status of implementation of recommendations included in the previous review report

8. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 23 February 2022,[3] and had not been resolved by the time of publication of the report on the review of the Party's 2021 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

Table 3
Status of implementation of recommendations included in the previous review report for Spain

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
General		No recommendations were made in the previous review report.	
Energy			
E.1	Fuel combustion – reference approach – other non-fossil fuels – CO_2 (E.13, 2021) Transparency	Analyse the discrepancies related to values for biogenic and non-biogenic fractions of waste available from different sources in the country, report on the results in the NIR and report data for other non-fossil fuels (biogenic waste) in CRF table 1.A(b), ensuring consistency with the data reported under the sectoral approach.	Addressing. The Party provided improved information by reporting under the reference approach (CRF table 1.A(b)) an apparent consumption of 10,079.97 TJ for the non-biomass fraction of waste (waste, non-biomass fraction) and under biomass, a consumption of another 10,079.97 TJ from biogenic waste (other non-fossil fuels) (reported as "NO" in the previous submission). Under the sectoral approach (CRF table 1.A(a)s4), the Party reported under the information item "waste incineration with energy recovery", a biomass consumption of 21,204.59 TJ and a fossil fuel consumption of 21,204.59 TJ from waste incineration with energy recovery. This difference between the values under the reference approach and those under the sectoral approach was not explained in the NIR. During the review, the Party clarified that the discrepancy in the 2021 submission relating to values for biogenic and non-biogenic fractions of municipal waste was due to the information reported in CRF table 1.A(b), which comes from energy statistics (IEA questionnaires). Data on production of biogenic waste (other non-fossil fuels) from IEA that would correspond to "municipal waste (renewable)" were not reported in CRF table 1.A(b) because their reliability was considered uncertain. Following the ERT recommendation, the inventory team made an enquiry to the ministry responsible for the questionnaires for submission to IEA, and the ministry's response indicated that the renewable and non-renewable fractions of municipal waste are considered equal and reported as such in IEA questionnaires. Collaborative work is ongoing to refine this 50:50 ratio for upcoming inventories. Information on production of biogenic waste (other non-fossil fuels) from IEA that would correspond to "municipal waste (renewable)" is now (i.e. in the 2022 submission) reported in CRF table 1.A(b).

[3] FCCC/ARR/2021/ESP.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
			The ERT considers that the recommendation has not yet been fully addressed because the Party did not fully demonstrate consistency between the data reported under the reference and sectoral approach in its NIR.
E.2	Feedstocks, reductants and other non-energy use of fuels – gaseous fuels – CO_2 (E.4, 2021) (E.14, 2019) Transparency	(a) Include information on the disposition of non-energy use of fuels in the energy balance discussion in annex 2 to the NIR to clarify that the non-energy use of fuels is accounted for and there is no underestimation of emissions from fuel combustion. (b) Include the use of natural gas for hydrogen production in CRF table 1.A(d), as appropriate, and ensure consistency between the information in CRF tables 1.A(b) and 1.A(d) and the information in the NIR.	(a) Addressing. The Party provided information in its NIR (annex 2, table A.2.5, p.796) showing that the total consumption of natural gas for non-energy use in ammonia production and hydrogen production in the chemical industry (reported in CRF table 1.A(d) as 24,628 TJ) and for non-energy use in hydrogen plants in refineries (reported in the NIR, annex 4, table A.4.5, p.903 as 29,269 TJ) is consistent with the information on natural gas consumption for non-energy uses reported in the national energy balance. In both cases total consumption is 53,897 TJ, as shown in the NIR (annex 2, table A.2.13, p.827). During the review, the Party confirmed that CO_2 emissions for non-energy use of natural gas reported in CRF table 1.A(d) come from ammonia production and hydrogen production in the chemical industry and that this will be explained more clearly in the next annual submission. The ERT considers that the recommendations have not been fully addressed because the Party did not fully clarify in the NIR that the non-energy use of fuels is accounted for and there is no underestimation of emissions from fuel combustion. (b) Addressing. Emissions of CO_2 from hydrogen plants in refineries were reported as fugitive emissions under subcategory 1.B.2.a.4. During the review, the Party informed the ERT that the consistency between the information in CRF tables 1.A(b) and 1.A(d) and the information in the NIR will be more clearly demonstrated in the next annual submission. The ERT considers that the recommendation has not been fully addressed because the Party did not fully demonstrate consistency between the information in CRF tables 1.A(b) and 1.A(d) and the information reported in the national energy balance with respect to the 29,269 TJ value corresponding to the non-energy use of natural gas in hydrogen plants in refineries.
E.3	1.A Fuel combustion – sectoral approach – other fossil fuels – CO_2, CH_4 and N_2O (E.14, 2021) Comparability	(a) Revise the use of "NE" in CRF table 1.A(a)s4 under the information item "waste incineration with energy recovery" and report "NO" for CO_2 captured from waste incineration, ensuring that AD for biomass and fossil fuels are accurately reported; (b) Report the total estimated values of CH_4 and N_2O emissions under fossil fuels and report "IE" under biomass, providing information in CRF table 9 and the documentation box of CRF table 1.A(a) to clarify that such emissions were estimated and reported as aggregated under fossil fuels	(a) Resolved. The Party reported "NO" for CO_2 capture from waste incineration in CRF table 1.A(a)s4 under the information item "waste incineration with energy recovery", providing the corresponding AD for both biomass and fossil fuels; (b) Resolved. The Party reported the respective total CH_4 and N_2O emissions from waste incineration with energy recovery under fossil fuels and reported "IE" for biomass, providing the corresponding information in CRF table 9 that respective CH_4 and N_2O emissions from biomass have been aggregated and reported under fossil fuels.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
		under the information item "waste incineration with energy recovery".	
E.4	1.A.1.a Public electricity and heat production – other fossil fuels – CO_2 (E.15, 2021) Transparency	Correct the CO_2 EF values for municipal waste incineration provided in the NIR and the fact sheet referenced therein, report explicitly the CO_2 EF values for 2000–2005 calculated using linear interpolation, and ensure full consistency and transparency of the information provided in the NIR, the referenced fact sheet and annex 2 thereto.	Resolved. The Party has corrected the CO_2 EF values for municipal waste incineration and provided the updated values in the NIR (section 7.6.1.2.2, table 7.6.12, p.553). This information is consistent with that reported in the energy section of its NIR (section 3.2.2.2, p.152), where the Party reported explicitly the values of the CO_2 EF for waste incineration for each year of the 2000–2005 period, obtained through a linear interpolation. The Party provided a reference to the information on the website of the Ministry for the Ecological Transition and the Demographic Challenge regarding municipal waste incineration with energy recovery, which also provides information regarding the methodology applied.
E.5	1.A.3.b Road transportation – diesel oil – CO_2 (E.10, 2021) (E.20, 2019) Accuracy	Use the decision tree in the 2006 IPCC Guidelines (vol. 2, chap. 3, p.3.11) for determining EFs or either evaluate the applicability of the CO_2 EF used for road transportation – diesel oil and update the EF based on the results of the evaluation, or provide a justification as to how the CO_2 EF applied for diesel oil is appropriate to the national circumstances, including comparisons (e.g. with the COPERT model) to the values from the 2014 Joint Research Centre report and values used by other European countries.	Resolved. The Party reported in its NIR (section 3.8.2.2, p.217) that it has undertaken a comprehensive evaluation of the fuel characteristics and has updated its CO_2 EFs on the basis of country-specific information on the carbon content and calorific values of the fuels, to obtain country-specific EFs that are more appropriate to the national circumstances. The recalculation was implemented for the entire time series, revising the CO_2 EFs from 73.20 to 73.68 t/TJ. These values were reported in NIR table 3.8.8 (p.217). Unlike the previous inventory, where the Party reported the use of European instead of country-specific data, in the current inventory the Party used country-specific EFs for diesel oil and gasoline, with carbon content and calorific values from information provided by Spain's sole operator of the liquid hydrocarbons fuel distribution and transport system.
IPPU			
I.1	2.B.7 Soda ash production – CO_2 (I.7, 2021) Transparency	Provide accurate explanations on the rationale for any recalculations for category 2.B.7 soda ash production, where they occur, and correct the information reported on the use of a CO_2 EF as part of the tier 3 methodology for its next annual submission.	Resolved. The Party explained in its NIR (section 4.11, p.302) that CO_2 emissions for this category were calculated by applying the tier 3 method from the 2006 IPCC Guidelines (vol. 3, chap. 3, figure 3.7, p.3.53) and using CO_2 emission data provided by Spain's only soda ash plant, which the Party verified against the values declared by the plant to the European Union Emissions Trading System. Furthermore, given that the plant also provides information regarding production, a plant-specific implicit EF is available for the entire time series. There was no recalculation in this submission.
I.2	2.D.3 Other (non-energy products from fuels and solvent use) – CO_2 (I.12, 2021) Comparability	Report the national totals in the relevant CRF tables including and excluding indirect CO_2, as required by paragraph 29 of the UNFCCC Annex I inventory reporting guidelines, ensuring that indirect CO_2 emissions for category 2.D.3 other – solvent	Not resolved. The Party did not report the required data in the CRF tables and reported indirect CO_2 emissions in the same way as in the previous submission. In its NIR (section 10, appendix 10.2, pp.632–633) the Party stated that the approach taken was recommended to member States by an EU working group, which suggested reporting these emissions in CRF table 2(l).A-Hs2 under category 2.D non-energy products from fuels and solvent use, using the predefined option for "solvent use", which is considered

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
		use are not included in national totals of direct emissions.	to be more transparent than reporting in table 6, where indirect CO_2 emissions are aggregated at the sectoral level. During the review, the Party acknowledged that including indirect CO_2 emissions as direct CO_2 emissions in CRF table 2(I).A-Hs2 is not in line with the UNFCCC Annex I inventory reporting guidelines, and indicated its intention to address this in its next annual submission.
I.3	2.G.3 N_2O from product uses – N_2O (I.10, 2021) Transparency	Explain in the NIR the reasons for any recalculations for category 2.G.3.b other – propellant for pressure and aerosol products, where they occur, such as a correction to the AD for N_2O used as a propellant.	Resolved. The Party reported in its NIR (section 4.24.2, p.345) and in CRF table 10.s4 the same emission estimates across the time series that were in the 2021 submission and did not report any recalculations for this category in the 2022 submission. The type and sources of the AD used are also explained in the NIR (section 4.24.2, pp.344–345).
I.4	2.F.1 Refrigeration and air conditioning – HFC-134a (I.8, 2021) Transparency	Provide detailed and clear information in the NIR on the methodology used to estimate recovery of HFC-134a and related emissions for subcategory 2.F.1.e mobile air conditioning and information on the existing regulations on recovery of refrigerants from mobile air conditioning implemented in Spain, in addition to explaining the reasons for any recalculations for category 2.F.1 refrigeration and air conditioning or its subcategories, where they occur.	Addressing. The Party described the methodology in its NIR (section 4.22.2, p.337) and provided a link to a reference, *Uso de HFCs en los equipos de aire acondicionado de vehículo*s, which indicates that, according to the working group of EU regulation 517/2014, 25 per cent of the HFC-134a is recovered at the end of life. The ERT noted that although this percentage is in line with the 2006 IPCC Guidelines (vol. 3, chap. 7, table 7.9), which gives a range of 0–50 per cent for recovery efficiency for mobile air conditioning, the quoted EU regulation does not specify this percentage as the reference appears to indicate, and there is no information on how Spain determined this recovery figure. The quoted EU regulation does, however, provide information on recovery of refrigerants from mobile air conditioning. The NIR (section 4.22.5, p.342) contains explanations for recalculations made due to small changes in methodology for subcategory 2.F.1.b domestic refrigeration from 2015 to 2019, and for subcategory 2.F.1.e mobile air conditioning from 2005 to 2013, which resulted in minor revisions of the estimates of the time series. Some further explanations on recalculations in category 2.F.1 refrigeration and air conditioning were indicated in the NIR (appendix 10.4, p.645). During the review, the Party clarified that the explanations in the above-mentioned reference can be misleading and that the percentage it applied is taken from the range shown in the 2006 IPCC Guidelines (vol. 3, chap. 7, table 7.9), and is considered representative of the situation in Spain. The Party indicated that it will update the methodological information accordingly in its next annual submission.
I.5	2.F.1 Refrigeration and air conditioning – HFC-134a (I.11, 2021) Transparency	Explain in the NIR that the fluctuations of emissions from the recovery of HFC-134a observed between 2016 and 2018 are linked to annual fluctuations in the percentage of vehicles removed from the vehicle fleet.	Addressing. The Party reported in its NIR (section 10, appendix 10.2, p.632) that an explanation of the fluctuations of emissions from the recovery of HFC-134a observed between 2016 and 2018 is provided in the "NIR 2022 edition: chap. 4.22". Nevertheless, the ERT could not find such an explanation. During the review, the Party acknowledged that it had not included the required explanation about recovery fluctuations and that it will expand and clarify the

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
			methodological description of recovery currently provided in NIR section 4.22.2.1 in its next annual submission.
I.6	2.F.4 Aerosols – HFC-134a and HFC-152a (I.9, 2021) Transparency	Explain in the NIR that for subcategory 2.F.4.a aerosols – metered dose inhalers, data are collected from two pharmaceutical companies through questionnaires, where one provides information on losses in the manufacturing phase, the other provides information on amounts of propellant incorporated into products during the manufacturing process, and both provide sales data, and explain the reasons for any recalculations for category 2.F.4 aerosols and its subcategories, in particular subcategory 2.F.4.b aerosols – domestic and industrial applications, where they occur.	Resolved. The Party explained in its NIR (section 4.22.2.4, p.340) that data on metered dose inhalers are collected through questionnaires from two pharmaceutical companies: one provides information on losses during manufacturing and sales data, and the other provides information on amounts of propellant incorporated into products during the manufacturing process and sales data. In the present submission no recalculations have been made.
Agriculture			
A.1	3. General (agriculture) – CH_4 and N_2O (A.4, 2021) Convention reporting adherence	Calculate the uncertainties of the EFs for enteric fermentation and manure management on the basis of existing local data, given that the uncertainty values provided in the 2006 IPCC Guidelines are extremely conservative and are not aligned with Spain's efforts to gather local information on EFs, and report the results of the uncertainty analysis using such values in its next annual submission. If Spain intends to continue using default uncertainty values from the 2006 IPCC Guidelines, while using country-specific EFs, provide arguments in the NIR demonstrating that the default uncertainty values from the 2006 IPCC Guidelines used by Spain in its uncertainty analysis are valid for those country-specific EFs used in its emission estimates for the relevant categories.	Addressing. The Party reported in its NIR (section 5.2.3, p.363, and section 5.3.3, p.368) that tier 1 default uncertainty values (30 per cent) were used for the EFs for enteric fermentation and manure management, in order to be in line with the 2006 IPCC Guidelines (section 10.3.4, p.10.33, and section 10.4.4, p.10.48), which indicate that "inventory compilers using the tier 2 method should undertake an analysis of uncertainties reflecting their particular situation, and in the absence of this analysis the uncertainty under the tier 2 method should be assumed similar to the uncertainty under the tier 1 method". The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet calculated the uncertainties of the EFs for enteric fermentation and manure management on the basis of existing local data, although Spain applied the procedure from the 2006 IPCC Guidelines.
A.2	3.A Enteric fermentation – CH_4 (A.5, 2021) Accuracy	Further examine the issue related to the use of the previously used country-specific Y_m values based on a national study (Jaurena et al., 2015) and explain in the NIR why the Y_m	Resolved. The Party reported in its NIR (section 5.2.2.2, p.360) that data from the study by Jaurena et al. (2015) were initially used for calculating Y_m values but that for the current inventory it applied the default Y_m value of 6.5 per cent from the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.12, p.10.30) as a result of a technical correction

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
		values from that study led to a misrepresentation of national circumstances and data resulting in an overestimation of the Y_m values. While awaiting verification and revision of national Y_m values, as a conservative and temporary approach, use the default Y_m value from the 2006 IPCC Guidelines (i.e. 6.5 per cent) until this can be replaced by newly validated country-specific Y_m values, applying either a constant value for the whole time series or a series of decreasing values, as suggested by the Party during the review.	made during the 2020 review under the EU effort-sharing decision. It further explained that, in the absence of a national Y_m value for cattle, Spain continues to use the default Y_m value from the 2006 IPCC Guidelines for estimating CH_4 emissions from enteric fermentation for cattle. In addition, the Party reported in the NIR (section 5.2.6, p.363) that Y_m values for cattle from a national zootechnical document on cattle ("Cattle – Zootechnical basis for the calculation of the nitrogen and phosphorus food balance") will be analysed with the aim of substituting currently used values as a future improvement.
A.3	3.A.4 Other livestock – CH_4 (A.6, 2021) Transparency	Include in the NIR transparent and well-documented information supporting the country-specific values for the Y_m and GE for goats, including an accurate reference to the zootechnical document on goats provided to the ERT during the review ("Caprine – Zootechnical basis for the calculation of the nitrogen and phosphorus food balance").	Resolved. The Party provided in its NIR (section 5.2.2.2, table 5.2.4, p.360) a reference to the national zootechnical document on goats ("Caprine – Zootechnical basis for the calculation of the nitrogen and phosphorus food balance"), which sets out in a transparent manner information supporting the country-specific value for the Y_m and GE for goats.
A.4	3.B.3 Swine – CH_4 and N_2O (A.7, 2021) Transparency	Explain in the NIR why adopting a constant value for the share of different manure management systems for swine for 2015 onward is a better approach than maintaining the linear trend adopted for 1990–2015.	Resolved. The Party reported in its NIR (section 5.3.2.2, p.366) that until new data on manure management systems for swine become available, it has decided to keep the 2015 values constant instead of prolonging the interpolation over time because such prolongation would lead to negative values in the distribution fractions of the various manure management systems, which result in unrealistic values.
A.5	3.D.b.1 Atmospheric deposition – N_2O (A.8, 2021) Accuracy	Ensure full consistency with the 2006 IPCC Guidelines when adopting the methodology from the EMEP/EEA guidebook for calculating indirect N_2O emissions and replacing the parameters related to the vaporization of ammonia and nitrates, such as $Frac_{GASF}$ or $Frac_{GASM}$, with a view to enhancing the accuracy of its estimates for indirect N_2O emissions from agricultural soils, and provide the relevant documentation and justifications in the NIR.	Resolved. The Party reported in its NIR (section 5.6.2.2, pp.394–395) that the amounts of N input from animal manure applied to soils and N excretion on pasture, range and paddock were obtained using the N balance process included in the EMEP/EEA guidebook (section 3.4.1), replacing the previous emission calculations based on the volatilization fractions provided in the 2006 IPCC Guidelines ($Frac_{GASF}$ and $Frac_{GASM}$). The Party further indicated in that section of its NIR (p.395) that it followed the 2006 IPCC Guidelines (vol. 4, chap. 10.5.2, p.10.61), which encourage countries to estimate the amounts of N volatilized as ammonia and nitrogen oxides from manure management using the EMEP/EEA methodology. For this reason, recalculations have been undertaken in category 3.D as shown in the NIR (section 5.6.5, figure 5.6.14, p.401, and figure 5.6.15, p.402).

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
LULUCF			
L.1	Land representation – (L.4, 2021) (L.20, 2019) Transparency	Include in the NIR a detailed explanation of the project for the improvement of LULUCF cartography (i.e. the spatial data sources used, the procedure implemented for the remote sensing and cartographical data, elaboration of methods and the hierarchy established among land-use categories) and use its results. Provide information on how time-series consistency is ensured and harmonization of the various data sources is achieved.	Addressing. In the NIR (section 6.1.3, p.428) and during the review, the Party explained the ongoing work on a project to develop a consistent and spatially explicit cartography (approach 3) for the complete time series. The new LULUCF cartography will be implemented in the 2023 submission. Spain further indicated that the next NIR will include a detailed explanation of the project, including the data sources used, the methodology applied and the efforts made to ensure time-series consistency and data quality.
L.2	Land representation (L.10, 2021) Accuracy	Correct the inconsistencies in the total national land areas reported in CRF tables 4.1 and 4.A–4.F, giving consideration to areas affected by peat extraction within the areas reported in all relevant tables.	Resolved. The Party reported in CRF tables 4.1 and 4.A–4.F consistent areas across the entire time series (1990–2020), including peat extraction areas.
L.3	4.B.1 Cropland remaining cropland – CO_2 (L.11, 2021) Consistency	Consider other, more appropriate, splicing techniques, as set out in the 2006 IPCC Guidelines (vol. 1, section 5.3.3, pp.5.8–5.14), including the use of surrogate data such as crop production or harvested crop area by crop type (e.g. almonds, apples, etc.), by year and by source of information type (e.g. official data, FAO estimate) available from the statistics published by the FAO for 1961 onward, to improve time-series consistency, in particular for 1990–2004 for CSCs in the living biomass carbon pool for category 4.B.1 cropland remaining cropland. If the Party finds that no other splicing techniques as set out in the 2006 IPCC Guidelines can be applied to improve the consistency and accuracy of its CSCs in living biomass estimates for cropland remaining cropland, document this in the NIR with a clear explanation demonstrating why other splicing techniques, less uncertain than the trend extrapolation currently used, cannot be applied.	Addressing. The Party reported in its NIR (section 6.3.1.1, p.452) how the distribution of crops was calculated for the first half of the time series (1990–2004); that is, as an average distribution for 2005–2014. This is the same information as in the NIR of the 2021 submission. However, the 2022 NIR contains no documentation to justify the advantages of the selected approach. During the review, the Party clarified that it has studied the feasibility of applying alternative techniques and data sources to improve time-series consistency for its estimates of CSCs in the living biomass carbon pool for cropland remaining cropland. The result of the analysis will be provided in the NIR of the next annual submission. The Party concluded that the correlations between the transitions of crop types reported in the Spanish crop surface area and yield survey (known as ESYRCE) and other available national data are low during the years when such data sources can be used; and that this is partially due to differences in definitions, classifications and groupings of crop types between the data sources. The Party finally concluded that (1) none of the data sources and options analysed seems adequate to complete the time series and improve its consistency; and (2) the low correlation indicates that these data are not accurate enough to be used for generating a model. The Party is therefore of the view that, after having studied the issue, it may be more reasonable to continue using an average to complete the time series. Although the Party's view on this matter seems reasonable to the ERT, the ERT considers that the recommendation has not yet been fully addressed because the Party

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
			has not yet included in the NIR the information that justifies continuing to use the average value to complete the time series.
L.4	4.C.1 Grassland remaining grassland – CO_2 (L.6, 2021) (L.11, 2019) (L.11, 2017) Completeness	Implement and/or report on progress in the implementation of the reporting of CSC in the soil pool in grassland remaining grassland.	Addressing. The Party continued to report the CSC in mineral soils in grassland remaining grassland as "NE" in CRF table 4.C. In its NIR (section 6.4.5, p.469) and during the review, the Party reported information on progress to include CSC for grassland remaining grassland in the inventory. Work is ongoing to collect sufficient information on herbaceous grasslands to make a first estimate of the CSC in the soil organic carbon pool using the tier 1 approach from the 2006 IPCC Guidelines (vol. 4, chap. 6, p.6.14). The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet estimated CSC in the soil organic carbon pool for grassland remaining grassland.
L.5	4.C.1 Grassland remaining grassland – CO_2 (L.7, 2021) (L.12, 2019) (L.3, 2017) (L.8, 2016) (L.8, 2015) Accuracy	Develop an approach to collect sufficient information on this category so as to be able to determine if it is a key category and therefore whether applying tier 1 methodologies to the dead organic matter and living biomass pools is appropriate.	Addressing. The Party reported CSCs in living biomass and dead organic matter pools under grassland remaining grassland in CRF table 4.C as "NE" and "NA" respectively. The Party reported in its NIR (section 6.4.5, p.469), and explained during the review, that work is currently under way to improve the information used for estimating CSC in grassland remaining grassland (see also ID# L.4 above). This is essential to assess whether the category is a key category.
L.6	4(V) Biomass burning – CO_2 (L.9, 2021) (L.14, 2019) (L.13, 2017) Completeness	Estimate and report the CO_2 emissions from biomass burning on cropland remaining cropland and grassland remaining grassland if suitable data become available, or either use "NA" if the emissions released can be assumed to be absorbed in the next growing season in accordance with the 2006 IPCC Guidelines, or use "IE" to indicate that they are included elsewhere if Spain can demonstrate that these emissions are already covered in CRF tables 4.B and 4.C.	Resolved. The Party now reports CO_2 emissions from woody crop wildfires using notation keys in table CRF 4(V), which is also described in the NIR (section 6.13, p.498). The Party reported "IE" when woody crops are burned because these emissions are already included in the calculation of the decrease in carbon stock of living biomass in cropland remaining cropland. For emissions of CO_2 from burning of non-woody biomass on cropland remaining cropland and grassland remaining grassland the Party used "NA" because it is assumed that the carbon released during the combustion process is reabsorbed by the vegetation during the following growing season.
Waste			
W.1	5.A Solid waste disposal – CH_4 (W.2, 2021) (W.2, 2019) (W.2, 2017) (W.3, 2016) (W.3, 2015) (87, 2014) (96, 2013) Accuracy	Continue the efforts to reduce the uncertainties of the AD and EFs.	Not resolved. The Party reported in its NIR (section 7.2.3, table 7.2.8, p.526) uncertainties of 30 per cent for AD and 36 per cent for EFs, which are the same as in the previous submission. During the review, the Party clarified that consultations with the Sub-directorate General for Circular Economy found that the electronic processing of AD (using the Electronic Waste Management Platform designed to reduce uncertainties) has not yet been implemented. The changes to data processing will also improve the uncertainty value of EFs.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
W.2	5.A.1 Managed waste disposal sites – CH_4 (W.8, 2021) Transparency	Explain in the NIR that the inter-annual changes in the CH_4 IEFs for subcategory 5.A.1.a anaerobic result from the dynamic of AD for municipal waste disposal sites associated with fluctuations in the amount of CH_4 captured and used for energy recovery over the years, as explained to the ERT during the review.	Resolved. The Party reported the AD for municipal waste disposal sites (quantity of waste deposited in landfills) in NIR table 7.2.5 (section 7.2.2.1, p.522); reported the AD for the CH_4 captured and burned (with and without energy recovery) in NIR table 7.2.6 (section 7.2.2.2, p.524); and explained the inter-annual changes of the CH_4 IEFs (section 7.2.2.2, p.525) as being caused by the fluctuations in the AD (tonnes of waste deposited), as well as the amount of biogas captured and used for energy production purposes throughout the time series, as shown in NIR tables 7.2.5 and 7.2.6 respectively.
W.3	5.D.2 Industrial wastewater – CH_4 (W.10, 2021) Transparency	(a) Report in the NIR the correct methane correction factor value for 2006, ensuring accurate reporting of CH_4 IEFs, and update the methodological fact sheet accordingly. (b) Clarify in the NIR the nature of the CH_4 capture measures in place in the country and when they were introduced.	Resolved. (a) The Party corrected the methane correction factor values for 1996 and 2006 and described this in its NIR (section 7.5.2.2, pp.545–546). The Party further explained that the recalculations were made to correct the error in the previous submission (section 7.5.5, p.548), and showed that the recalculations resulted in decreases in CH_4 emissions of 2 and 3 per cent in 1996 and 2006 respectively (section 7.5.5, figure 7.5.4, p.548). The corresponding methodological fact sheet referenced in the NIR (available in Spanish only at https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/091001-trat-ag-res-industr_tcm30-429867.pdf) was also updated accordingly (see p.2, and annex II, pp.10–11 of that reference). (b) Spain provided in the NIR (section 7.5.2.3, table 7.5.9, pp.547–548) information on the nature of the CH_4 capture process and the percentage shares of the CH_4 captured for the different burning devices and the amounts captured by year and used for energy purposes.
W.4	5.D.2 Industrial wastewater – N_2O (W.11, 2021) Comparability	Report "IE" instead of "NE" for N_2O emissions for category 5.D.2 industrial wastewater.	Resolved. The Party has changed its reporting of "NE" to "IE" for N_2O emissions under category 5.D.2 in CRF table 5.D and indicated that these emissions are included under category 5.D.1 domestic wastewater. During the review, Spain indicated that N_2O emissions from on-site industrial treatment will be calculated according to the 2019 Refinement to the 2006 IPCC Guidelines using the default methodology (vol. 5, chap. 6, equation 6.12) in future submissions.
W.5	5.E Other (waste) – CH_4 (W.7, 2021) Transparency	Provide in the NIR of its next annual submission an analysis of the impact of recalculations of CH_4 emissions from sludge spreading and explain the reasons for any recalculations, where they occur.	Resolved. The Party provided in its NIR (section 7.6.2.4, pp.562–563) an analysis of the impact of recalculations of CH_4 emissions from sludge spreading and explained that recalculations were made owing to new information obtained through the National Sludge Registry.
KP-LULUCF			
KL.1	General (KP-LULUCF) – (KL.1, 2021) (KL.8,	Include a technical annex to or reference in the NIR where the full documentation on land classification assessment and the	Resolved. The Party included in its NIR (section 6.1.3, p.426) information related to the land classification assessment and the identification of areas subject to KP-LULUCF as originally included in its 2018 submission, where the Party had reported this information

ID#	*Issue/problem classification[a]*	*Recommendation from previous review report*	*ERT assessment and rationale*
	2019) Transparency	identification of areas subject to KP-LULUCF are clearly reported. Include in the technical annex the correspondence matrices between CORINE land cover, the national forestry map of Spain at 1:50,000 and the map of crops and land-use categories and UNFCCC land-use categories.	in a more comprehensive manner compared with subsequent submissions. The NIR also includes references to the 2018 NIR, where further information related to the land-use estimation procedure can be found. In addition, the Party provided in the NIR (appendix 6.1, p.504) information on mapping CORINE land cover land-use classes to UNFCCC land-use categories.
KL.2	General (KP-LULUCF) – (KL.2, 2021) (KL.8, 2019) Accuracy	Update and improve cartographic data to implement IPCC approach 3 on the basis of the ongoing project.	Addressing. During the review, the Party clarified that the new LULUCF cartography is under development and will be implemented for the next annual submission, including a detailed explanation of the project, the data sources used, the methodology applied and the efforts made to ensure time-series consistency and data quality. Although the Party has not yet updated and improved its cartographic data to implement IPCC approach 3 owing to the delay in the implementation of the project, the ERT found that there was sufficient information in the NIR for the purpose of assessing accounting and that this issue does not influence the Party's ability to fulfil its commitments for the second commitment period under the Kyoto Protocol. For this reason, this issue was not included in the possible list of potential problems and further questions raised by the ERT.
KL.3	FM – CO_2, CH_4 and N_2O (KL.5, 2021) KP reporting adherence	Include in NIR section 11 transparent information on the technical correction and information demonstrating methodological consistency between the FMRL and reporting for FM in accordance with decision 2/CMP.8 (annex II, para. 5(e–f)), decision 2/CMP.7 (annex, para. 14) and the methodological guidance provided in the Kyoto Protocol Supplement (chap. 2.7.6, pp.2.98–2.103), similar to the information provided in the addendum to NIR section 11 of the 2021 annual submission.	Resolved. A technical correction of the FMRL has been included in the NIR (section 11.5.2.5, p.684), including all the required elements. The resulting technical correction has also been reported in CRF table 4(KP-I)B.1.1. The technical correction in the NIR included revisions due to (1) updated areas of forest land, (2) updates of CSC in the living biomass pool for forest land, (3) updated estimates of biomass burning and (4) updated historical data for the semi-finalized harvested wood products. During the review, the Party also provided the ERT with an updated version of NIR table 11.5.3 (section 11.5.2.4, p.686) to better illustrate how the different elements included in the FMRL were corrected, especially those related to the inclusion of net removals for harvested wood products.
KL.4	CM – CO_2, CH_4 and N_2O (KL.6, 2021) Transparency	Clearly describe in the NIR how the exclusion of transitions from cropland to grassland, wetlands, settlements and other land that occurred between the base year and the commitment period affects emissions and removals accounted for under CM during the second commitment period of the Kyoto Protocol and provide any additional information that enhances transparency with regard to the application of the exclusion of	Resolved. The Party reported in its NIR (section 11.3.1, table 11.3.5, p.668) all areas converted from cropland to other land-use categories in 1990–2007. NIR table 11.3.5 also includes the unaccounted emissions and removals related to this withdrawal of areas from the accounting of CM. The additional information sufficiently improved transparency with regard to the application of the exclusion of the transitions from cropland to grassland, wetlands, settlements and other land that occurred between the base year and the commitment period.

ID#	*Issue/problem classification*[a]	*Recommendation from previous review report*	*ERT assessment and rationale*
		the above-mentioned transitions, as required by the Kyoto Protocol Supplement (chap. 2.9.2, p.2.136).	

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) in which the issue or problem was raised. Issues are identified in accordance with paras. 80–83 of the UNFCCC review guidelines and classified as per para. 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with para. 69 of the Article 8 review guidelines in conjunction with decision 4/CMP.11.

IV. Issues and problems identified in three or more successive reviews and not addressed by the Party

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2022 annual submission of Spain, and had not been addressed by the Party by the time of publication of this review report.

Table 4
Issues and/or problems identified in three or more successive reviews and not addressed by Spain

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
General	No issues identified.	
Energy		
E.2	Include information on the disposition of non-energy use of fuels in the energy balance discussion in annex 2 to the NIR to clarify that the non-energy use of fuels is accounted for and there is no underestimation of emissions from fuel combustion. Include the use of natural gas for hydrogen production in CRF table 1.A(d), as appropriate, and ensure consistency between the information in CRF tables 1.A(b) and 1.A(d) and the information in the NIR.	3 (2019–2022)
IPPU	No issues identified.	
Agriculture	No issues identified.	
LULUCF		
L.1	Include in the NIR a detailed explanation of the project for the improvement of LULUCF cartography (i.e. the spatial data sources used, the procedure implemented for the remote sensing and cartographical data, elaboration of methods and the hierarchy established among land-use categories) and use its results. Provide information on how time-series consistency is ensured and harmonization of the various data sources is achieved.	3 (2019–2022)
L.4	Implement and/or report on progress in the implementation of the reporting of CSC in the soil pool in grassland remaining grassland.	4 (2017–2022)
L.5	Develop an approach to collect sufficient information on this category so as to be able to determine if it is a key category and therefore whether applying tier 1 methodologies to the dead organic matter and living biomass pools is appropriate.	5 (2015/2016–2022)

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
Waste		
W.1	Continue the efforts to reduce the uncertainties of the AD and EFs.	7 (2013–2022)
KP-LULUCF		
KL.2	Update and improve cartographic data to implement IPCC approach 3 on the basis of the ongoing project.	3 (2019–2022)

[a] Reports on the reviews of the 2018 and 2020 annual submissions of Spain have not yet been published. Therefore, 2018 and 2020 were not included when counting the number of successive years for this table. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive reviews and 2015/2016 is counted as one year.

V. Additional findings made during the individual review of the Party's 2022 annual submission

10. Table 5 presents findings made by the ERT during the individual review of the 2022 annual submission of Spain that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2022 annual submission of Spain

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General			
G.1	CRF tables	The Party reported national total emission estimates with and without LULUCF in CRF tables 10s1 and 10s6, with indirect CO_2 reported as "NA" throughout even though indirect CO_2 emissions had been estimated and reported in the GHG inventory together with direct emissions. The ERT noted that this is not in accordance with the mandatory requirement set out in paragraph 29 of the UNFCCC Annex I inventory reporting guidelines, which states that for Parties that decide to report indirect CO_2 the national totals are to be presented with and without indirect CO_2. The Party reported in CRF table 6 indirect CO_2 emissions as "IE" for IPPU and as "NE" for the other sectors. For IPPU the indirect CO_2 emissions are included in category 2.D.3 other in CRF table 2(I).A-H s2 (see also ID# I.2 above). During the review, the Party provided, for the entire time series, national total emission estimates (with and without LULUCF) including and not including those indirect CO_2 emissions that had been reported as direct CO_2, as requested by the ERT. Spain further stated that its reporting in this regard will be revised in future annual submissions. The ERT recommends that the Party report the national total emission estimates with and without indirect CO_2 emissions in the relevant CRF tables in accordance with paragraph 29 of the UNFCCC Annex I inventory reporting guidelines, and make any necessary revisions in CRF table 6 and the respective IPPU sectoral tables.	Yes. Convention reporting adherence
Energy		No findings for the energy sector additional to those included in table 3 were made by the ERT during the review.	

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
IPPU			
I.7	2.B.1 Ammonia production – CO_2	The Party reported in its NIR (section 4.6, p.295) that, until 2004, it could not use the consumption data for natural gas, naphtha or refinery gas used as raw material in the manufacturing process owing to confidentiality reasons. The Party's estimation method was chosen to reflect this circumstance and the plants themselves estimated emissions based on EFs and fuel consumption. However, the ERT noted that, firstly, there is information on non-energy use of natural gas in CRF table 1.A(d) for ammonia production that could be used to cross-check the emission estimates, and secondly, that previous submissions showed ammonia production as AD for all years, suggesting that the methodology applied might have been tier 2 instead of tier 3 as reported in the NIR. During the review, the Party clarified that, for 1990–2003, emissions were estimated using EFs related to ammonia production for each plant gathered through individual questionnaires, which also provided information on total fuel consumption (without differentiating between the fuel used as feedstock and that used for combustion). Regarding the data in CRF table 1.A(d), the Party explained that, in order to split the total fuel consumption between process and combustion for completing the non-energy use part of CRF table 1.A(d), it applied a ratio estimated using the known data on fuel consumption (for 2004 onward) for each plant. The Party indicated that it would improve its explanation of the methodology in its next annual submission. It also noted that the consumption of natural gas for non-energy uses reported in CRF table 1.A(d) corresponds not only to ammonia production but also to hydrogen production. The ERT recommends that the Party improve the explanation in the NIR of the methodology used for ammonia production from 1990 to 2003, confirm that natural gas is used only for ammonia production and update the explanation on consumption of natural gas for non-energy uses reported in CRF table 1.A(d).	Yes. Transparency
I.8	2.D.1 Lubricant use – CO_2	The Party reported in its NIR (section 10, appendix 10.4, table 10A.4.1, p.645) that it undertook recalculations in this category owing to updating the methodology for road transportation. However, no further explanations on this update were provided. The ERT noted recalculations affecting the AD, emissions and IEF across the entire time series, but with continued reference to the use of a tier 1 method and default EF. In addition, the ERT noted that the AD were reported in CRF table 2(I).A-Hs2 as "lubricant production" instead of "lubricant use" as requested in that CRF table. During the review, the Party clarified that use of the new model for road transportation resulted in a change in the data for the consumption of lubricants and thus the related emissions. The Party explained that it did not use an ODU factor but only the lubricant oil consumption rate and a stoichiometric factor. The ERT could not see information on whether lubricant use resulting from the new model for road transportation has been cross-checked against the energy balance. In addition, the methodology for estimating emissions from lubricant use was not clear to the ERT, because the 2006 IPCC Guidelines (vol. 3, chap. 5, p.5.5) indicate that an ODU factor, rather than the stoichiometric factor, should be used for the tier 1 method. Furthermore, the use of the new road transportation model recalculated not the AD but the EF, estimated on the basis of information in the EMEP/EEA guidebook (section 1.A.3.b.i–iv, Road transport), which incorporates the ODU factor from the 2006 IPCC Guidelines. During the review, Spain clarified that the data provided in CRF table2(I).A-Hs2 are indeed for lubricant use and that the information referring to lubricant production is due to a limitation in the reporting software, which will be addressed in the next annual submission with the addition of clarifying information. Finally, Spain confirmed that lubricant use is reported in the energy balance as a non-energy use, and that it will consult the Spanish energy	Yes. Accuracy

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
		statistics unit to check the sources of information and allocation of data, with the aim of ensuring the coherence of the reported data in its next annual submission. The ERT recommends that the Party report in the NIR enhanced information on the methodology and the EF for lubricant use, consistent with the information on method and EF used reported in CRF Summary table 3, and make sure that the information on the AD in CRF table 2(I).A-Hs2 refers to lubricant use and is cross-checked against the national energy balance and CRF table 1.A(d).	
Agriculture			
A.6	3. General (agriculture) – CH_4 and N_2O	The Party reported in its inventory GHG emissions from the following animal categories: cattle (dairy cattle and non-dairy cattle), sheep, swine (white swine and Iberian swine), goats, horses, mules and asses, poultry and other (turkeys, ducks, geese, partridges and common quail). The ERT noted that other animal categories could exist on Spanish territory, such as rabbits, ostriches and minks. During the review, the Party clarified that rabbit production is a minor livestock production, representing less than 1 per cent of total meat production (see https://www.mapa.gob.es/es/estadistica/temas/estadisticas-agrarias/ganaderia/encuestas-sacrificio-ganado), and an even smaller share of GHG emissions from livestock. Furthermore, Spain is collecting the necessary data to obtain the AD for the time series for rabbits and it expects to be able to report on these in the next annual submission. Regarding ostriches, the Party explained that these are irrelevant to livestock production because of a strong decreasing trend due to changes in market demand. In the case of minks, Spain explained that there are legal limitations derived from their status as an invasive alien species that prevent new authorizations or extensions of existing farms. Therefore, given the minimal level of production and the lack of official data from which to obtain AD or EFs on minks and ostriches, Spain does not plan to include these in the inventory of its future annual submissions. The ERT considers that the clarifications provided by Spain during the review are reasonable and encourages the Party to start to estimate the emissions from rabbits, even if it is considered a minor source, and provide transparent information on the status of other animal categories (such as ostriches and minks) in the next annual submission.	Not an issue/problem
LULUCF			
L.7	Land representation	The Party reported in its NIR (section 6.1.3, table 6.1.4, p.427) the approach used for assessing land use and land-use change for the land-use matrix (CRF table 4.1) and for estimating CSCs for the reported land use and land-use change categories. The ERT noted that there is a large difference in detail relating to the estimation of areas for different land-use categories because some land-use transfers are based on historical maps and trends whereas afforestation is estimated using annual statistics. This makes it very challenging to detect and follow consecutive land-use changes (e.g. when forested land is deforested sooner than 20 years after it was forested, or when land that was deforested is replanted sooner than 20 years after it was deforested). During the review, the Party clarified that the areas of land use and land-use changes are balanced, and thus, the total area of the country remains constant over the time series. The Party also noted that consecutive land-use transfers are not likely to or only rarely occur in the country (e.g. consecutive changes such as forest land converted to cropland and cropland converted to forest land).	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT recommends that the Party include in the NIR information on how consecutive land-use changes will be handled in conjunction with the reporting on the project for the improvement of LULUCF cartography (see also ID# L.1 in table 3).	
L.8	Land representation	The Party reported land areas as well as associated CSC for forest land converted to other land-use categories in CRF tables 4.1, 4.B (category 2.1), 4.C (category 2.1), 4.D (category 2.2.1), 4.E (category 2.1) and 4.F (category 2.1). In the NIR (section 6.1.3, p.426), and during the review, the Party explained how the land use and land-use changes are estimated.	Yes. Consistency
		The ERT noted that the approach to estimate the land-use change from forest land to other land uses differs among categories. For 2013 onward the transition from forest land to cropland and to settlements the values from 2012 are maintained, whereas the average of the last seven years (2006–2012) is applied for the transition from forest land to wetlands. For the transitions from forest land to grassland the annual transition area for 2000–2005 is extrapolated.	
		The ERT recommends that the Party use the same approach (i.e. using the average of a period of years reflecting the average situation, rather than a single year) to estimate the annual land-use transfer rate for all subcategories for the years where no data are available.	
L.9	4.A.2 Land converted to forest land – CO_2	The Party reported in its NIR (section 6.2.2.2, p.447, and annex 3, sections A3.2.1, p.834, and A3.2.7, p.855) the methods used for estimating CSCs in living biomass, litter, deadwood and soil organic carbon for land conversions to forest land. The CSCs in biomass and soil organic carbon are based on provincial values of carbon stocks, where available, whereas the CSCs for other carbon pools are based on national averages.	Yes. Transparency
		During the review, the Party emphasized that most of the estimates of CSCs in soils for land-use transfers are estimated at the national level, since the estimates of land-use changes areas are also national. However, as some CSC estimates were also based on provincial values, the IEF does not always match the national values provided in NIR table 6.1.10 (section 6.1.4, p.432).	
		To enhance transparency when using different CSCs for different provinces, the ERT recommends that the Party include in the NIR or in an annex to the NIR a table presenting the annual area of afforestation per province and per land-use category (source category) and the associated CSCs per carbon pool.	
L.10	4.A.2.5 Other land converted to forest land – CO_2	The Party reported conversions to forest land in CRF table 4.A. It appears that subcategory 4.A.2.5 other land converted to forest land represents a significant part of the total annual land area converted to forest land. However, the ERT noted that the NIR does not include information on the type of land that is forested under this subcategory.	Yes. Transparency
		During the review, the Party clarified that the category other land includes all land areas that do not fall into any of the other five land-use categories. In Spain, other land includes beaches, dunes, sands, bare rock, sparsely vegetated areas, and glaciers and perpetual snow. The Party also emphasized that these categories do not correspond to sterile soils and that, for instance, a coastal dune could be revegetated with trees for conservation purposes.	
		The ERT recommends that the Party enhance transparency by including in the NIR information on the type of land (areas) that is forested within subcategory 4.A.2.5 other land converted to forest land.	
Waste		No findings for the waste sector additional to those included in table 3 were made by the ERT during the review.	

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
KP-LULUCF			
KL.5	General (KP-LULUCF)	The ERT observed that some of the information required according to decision 2/CMP.8, annex II, paragraph 2, was not provided in the NIR; namely the information related to (1) the geographical location of the boundaries of the areas that encompass KP-LULUCF and (2) the unit used for determining the area of accounting for AR and deforestation. During the review, the Party informed the ERT that the geographical location of the boundaries of the areas that encompass units of land under KP-LULUCF is the national territory divided into autonomous regions, with the autonomous regions representing the geographical location of the boundaries for these activities. Moreover, the procedure established by Spain for identifying areas for each land use includes statistical data of areas that are forested, making it possible to directly identify areas subject to AR. The Party used hectares as the unit for determining whether the land areas under AR meet the area threshold selected for Spain to define forest (1 hectare). Deforestation activities related to forest land converted to grassland were obtained using the best available cartographic sources for identifying these transitions, with a minimum map unit of 2–5 hectares, depending on the map used. Transitions of forest land to cropland, wetlands or settlements were obtained from the still photographs from the Spanish forest map, whose resolution allows identification of forest areas in Spain. The information provided by the Party during the review sufficiently addressed the information required by decision 2/CMP.8, annex II, paragraph 2. Based on the information received from the Party during the review, the ERT concluded that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised by the ERT.	Yes. KP reporting adherence
KL.6	General (KP-LULUCF)	The ERT noted that, according to the Kyoto Protocol Supplement (p.2.97) it is good practice to provide information in the NIR on the main factors generating the accounted quantity (i.e. the difference in net emissions between reporting of FM during the second commitment period and the FMRL) and whether the accounting quantity (AQ = FM – FMRL) is consistent with those factors, with the aim of showing that the accounting quantity can be explained as deviations in actual policies compared with those historical policies included in the FMRL, rather than as differences in the methodological elements as factors/parameters, including increments, used in the FMRL and in the actual GHG emissions and removals. The average reported accounted quantity for FM is –28,885 kt CO_2 eq per year which results in –1,524 kt CO_2 eq per year of additional removals compared with the FMRL after technical correction. During the review, the Party explained that a growing trend in biomass accumulation was observed, when considering the available information provided by more than half of the regions in Spain (26 out of 50 provinces), which was also used for the estimates of CSC provided in the NIR. The Party also explained that the growing trend continues to be observed in recently compiled data that have not yet been published. The Party also stated that forest growth depends on multiple factors, such as drought periods, fires, heatwaves, soil water availability, drying winds and harvest. Therefore, it is difficult to quantify the direct effect of the implemented measures on the observed biomass accumulation. However, the Party stated that it is certain, based on available information, that the investments made have had a positive effect on forest growth and that without these measures forests would have	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		grown less or, in the worst case, been affected by forest fires. The ERT accepted the explanation provided by the Party. The ERT concluded that, despite the lack of transparency of the information provided in the NIR, this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised by the ERT.	

[a] Recommendations made by the ERT during the review are related to issues as defined in para. 81 of the UNFCCC review guidelines or problems as defined in para. 69 of the Article 8 review guidelines.

VI. Application of adjustments

11. The ERT did not identify the need to apply any adjustments for the 2022 annual submission of Spain.

VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol

12. Table I.5 presents the accounting quantities for KP-LULUCF reported by Spain and the final values agreed by the ERT. The final quantities of units to be issued and cancelled are presented in table I.6.

VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2022 annual submission.

Annex I

Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Spain in its 2022 annual submission

1. Tables I.1–I.4 provide an overview of the total GHG emissions and removals as submitted by Spain.

Table I.1
Total greenhouse gas emissions and removals for Spain, base year–2020
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions and removals including indirect CO_2 emissions*[a]		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)*[b]	*KP-LULUCF (Article 3.3 of the Kyoto Protocol)*[c]	*KP-LULUCF (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR*	*FM*
FMRL								–23 100.00
Base year[d]	256 861.06	292 858.04	NA	NA	NA		–144.04	
1990	254 106.69	290 103.67	NA	NA				
1995	295 434.41	330 044.53	NA	NA				
2000	348 537.54	388 091.26	NA	NA				
2010	321 431.93	358 156.64	NA	NA				
2011	321 187.92	357 852.04	NA	NA				
2012	315 953.18	350 635.37	NA	NA				
2013	290 251.74	323 830.86	NA	NA		–7 565.92	1 610.60	–27 310.30
2014	290 354.23	325 894.01	NA	NA		–7 262.29	83.55	–28 150.78
2015	299 448.05	337 416.38	NA	NA		–6 640.52	–2 292.31	–28 938.44
2016	287 778.91	325 627.60	NA	NA		–6 169.79	–2 754.18	–28 943.67
2017	300 752.91	338 844.75	NA	NA		–5 487.48	–3 175.59	–29 547.31
2018	295 102.95	333 251.40	NA	NA		–5 047.89	–3 265.81	–30 056.12
2019	276 723.20	313 828.49	NA	NA		–4 680.15	–3 296.90	–29 455.24
2020	239 194.10	274 742.89	NA	NA		–4 163.16	–3 145.92	–28 680.12

Note: Emissions and removals reported for the sector other (sector 6) are not included in the total GHG emissions.

[a] The Party did not report indirect CO_2 emissions in CRF table 6.

[b] The value reported in this column relates to GHG emissions from conversion of forests (deforestation) in 1990 as contained in the report on the review of the Party's report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol.

[c] Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

[d] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O and 1995 for HFCs, PFCs, SF_6 and NF_3. The base year for CM under Article 3, para. 4, of the Kyoto Protocol is 1990. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

Table I.2
Greenhouse gas emissions and removals by gas for Spain, excluding land use, land-use change and forestry, 1990–2020
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	231 328.44	36 641.89	17 865.06	3 039.92	1 164.38	NO, NA	63.99	NO, NA
1995	267 577.47	37 571.08	17 873.32	5 867.64	1 055.21	NO, NA	99.81	NO, NA
2000	311 674.62	42 203.64	21 189.14	12 342.79	494.73	NO, NA	186.33	NO, NA
2010	284 282.68	39 409.57	17 702.57	16 421.80	105.12	NO, NA	234.89	NO, NE, NA
2011	285 132.26	39 782.20	16 761.84	15 719.26	89.97	127.36	239.15	NO, NE, NA
2012	279 384.96	38 679.41	16 090.13	15 707.10	54.36	499.42	220.00	NO, NE, NA
2013	253 102.71	37 470.36	16 706.85	15 598.98	67.17	670.93	213.86	NO, NA
2014	255 459.10	36 816.55	17 358.44	15 462.87	63.42	523.65	209.99	NO, NA
2015	272 164.66	38 218.84	17 556.41	8 666.91	93.04	495.17	221.35	NO, NA
2016	261 227.66	37 795.63	17 291.54	8 420.45	90.80	571.90	229.62	NO, NA
2017	275 053.21	38 115.00	17 939.71	6 503.66	128.05	879.72	225.40	NO, NA
2018	270 052.27	38 331.85	18 165.84	4 722.80	130.74	1 621.03	226.88	NO, NA
2019	251 825.15	37 828.27	17 920.09	4 532.51	52.88	1 441.61	227.97	NO, NA
2020	213 339.72	37 738.77	18 233.67	3 727.19	31.96	1 440.94	230.64	NO, NA
Percentage change 1990–2020	**–7.8**	**3.0**	**2.1**	**22.6**	**–97.3**	**NA**	**260.4**	**NA**

Note: Emissions and removals reported for the sector other (sector 6) are not included in this table.

[a] Spain did not report indirect CO_2 emissions in CRF table 6.

Table I.3
Greenhouse gas emissions and removals by sector for Spain, 1990–2020
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	213 038.23	29 659.24	35 066.32	–35 996.98	12 339.89	NA
1995	250 693.27	31 896.34	34 301.31	–34 610.11	13 153.60	NA
2000	290 097.87	41 977.07	41 814.58	–39 553.71	14 201.73	NA
2010	266 385.46	40 524.49	36 168.80	–36 724.72	15 077.90	NA

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2011	269 080.84	37 607.91	35 435.28	–36 664.12	15 728.01	NA
2012	265 067.64	35 969.02	34 272.26	–34 682.19	15 326.45	NA
2013	239 662.76	34 824.44	34 333.10	–33 579.12	15 010.56	NA
2014	239 552.68	36 625.48	35 936.76	–35 539.78	13 779.08	NA
2015	254 993.39	31 053.80	36 644.31	–37 968.33	14 724.89	NA
2016	244 027.58	30 587.66	36 720.52	–37 848.69	14 291.85	NA
2017	258 814.09	28 330.13	37 750.33	–38 091.84	13 950.20	NA
2018	253 574.20	27 885.95	37 786.10	–38 148.44	14 005.15	NA
2019	236 768.33	26 123.05	37 643.82	–37 105.29	13 293.28	NA
2020	199 319.27	23 709.13	38 481.37	–35 548.79	13 233.12	NA
Percentage change 1990–2020	**–6.4**	**–20.1**	**9.7**	**–1.2**	**7.2**	**NA**

Note: Spain did not report indirect CO_2 emissions in CRF table 6.

Table I.4

Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, base year–2020, for Spain

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[a]	*Activities under Article 3.3 of the Kyoto Protocol*		*FM and elected activities under Article 3.4 of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				–23 100.00				
Technical correction				–4 261.00				
Base year[b]	NA				–144.04	NA	NA	NA
2013		–8 205.03	639.12	–27 310.30	1 610.60	NA	NA	NA
2014		–7 898.61	636.32	–28 150.78	83.55	NA	NA	NA
2015		–7 273.13	632.60	–28 938.44	–2 292.31	NA	NA	NA
2016		–6 801.05	631.25	–28 943.67	–2 754.18	NA	NA	NA
2017		–6 117.97	630.49	–29 547.31	–3 175.59	NA	NA	NA
2018		–5 677.52	629.62	–30 056.12	–3 265.81	NA	NA	NA
2019		–5 309.52	629.37	–29 455.24	–3 296.90	NA	NA	NA
2020		–4 792.64	629.48	–28 680.12	–3 145.92	NA	NA	NA
Percentage change base year–2020					**2 084.1**	**NA**	**NA**	**NA**

Note: Values in this table include emissions from land subject to natural disturbances, if applicable.

[a] The value reported in this column relates to 1990.

[b] The base year for CM under Article 3, para. 4, of the Kyoto Protocol is 1990. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

2. Table I.5 provides information on the Party's accounting quantities for reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5
Accounting quantities for activities under Article 3, paragraph 3, and forest management and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol for Spain
(kt CO_2 eq)

		Net emissions/removals										
GHG source/ sink activity	*Base year*[b]	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Total*[c]	*Accounting parameters*	*Accounting quantities*[a]
A.1. AR		–8 205.034	–7 898.612	–7 273.127	–6 801.047	–6 117.966	–5 677.516	–5 309.522	–4 792.644	–52 075.468		–52 075.467
Excluded emissions from natural disturbances[d]		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
A.2. Deforestation		639.117	636.323	632.604	631.252	630.486	629.625	629.367	629.483	5 058.257		5 058.257
B.1. FM										–231 081.985		–12 193.985
Net emissions/ removals		–27 310.302	–28 150.784	–28 938.445	–28 943.666	–29 547.306	–30 056.123	–29 455.239	–28 680.121	–231 081.985		
Excluded emissions from natural disturbances[d]			NA	NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances			NA	NA	NA	NA	NA	NA	NA	NA		NA
Any debits from newly established forest			NA	NA	NA	NA	NA	NA	NA	NA		NA

GHG source/ sink activity	*Net emissions/removals*										*Accounting parameters*	*Accounting quantities*[a]
	Base year[b]	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Total*[c]		
FMRL[e]											–23 100.00	
Technical corrections to FMRL											–4 261.00	
FM cap											79 341.28	-12 193.985
B.2. CM (if elected)	–144.038	1 610.598	83.552	–2 292.306	–2 754.180	–3 175.586	–3 265.807	–3 296.904	–3 145.922	–1 6236.556		–15 084.248
B.3. GM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.4. RV (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.5. WDR (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

[a] The accounting quantity is the total quantity of units to be issued or cancelled for a particular activity.

[b] Net emissions and removals from CM, GM, RV and/or WDR, if elected, in the Party's base year as established in decision 9/CP.2.

[c] Cumulative net emissions and removals for all years of the commitment period reported in the annual submission under review.

[d] The Party indicated that it is excluding emissions from natural disturbances at the end of the commitment period.

[e] As inscribed in the appendix to the annex to decision 2/CMP.7 in kt CO_2 eq per year.

3. Table I.6 provides an overview of key data from Spain's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.6
Key data for Spain under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2022 annual submission

Parameter	*Data*
Periodicity of accounting	(a) AR: commitment period accounting (b) Deforestation: commitment period accounting (c) FM: commitment period accounting (d) CM: commitment period accounting (e) GM: not elected (f) RV: not elected (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	CM
Election of application of provisions for natural disturbances	Yes, for AR and FM[a]
3.5% of total base-year GHG emissions, excluding LULUCF	9 917.659 kt CO_2 eq (79 341.275 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	Issue 52 075 467 RMUs
2. Deforestation	Cancel 5 058 257 units
3. FM	Issue 12 193 985 RMUs
4. CM	Issue 15 084 248 RMUs

Note: Values in this table reflect the accounting quantities for activities under Article 3, para. 3, and FM and any elected activities under Article 3, para. 4, of the Kyoto Protocol as reported in table I.5.

[a] The Party decided not to exclude emissions and subsequent removals from natural disturbances in its accounting for the 2022 annual submission.

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.8 include the information to be included in the compilation and accounting database for Spain. Data shown are from the Party's annual submission, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table II.1
Information to be included in the compilation and accounting database for 2020, including on the commitment period reserve, for Spain
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
CPR	**1 590 189 509**	**–**	**–**	**1 590 189 509**
Annex A emissions				
CO_2	213 339 721	–	–	213 339 721
CH_4	37 738 775	–	–	37 738 775
N_2O	18 233 673	–	–	18 233 673
HFCs	3 727 186	–	–	3 727 186
PFCs	31 958	–	–	31 958
Unspecified mix of HFCs and PFCs	1 440 943	–	–	1 440 943
SF_6	230 640	–	–	230 640
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**274 742 895**	**–**	**–**	**274 742 895**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–4 792 644	–	–	–4 792 644
Deforestation	629 483	–	–	629 483
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–28 680 121	–	–	–28 680 121
CM	–3 145 922	–	–	–3 145 922
CM for the base year	–144 038	–	–	–144 038

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.2
Information to be included in the compilation and accounting database for 2019 for Spain
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	251 825 149	–	–	251 825 149
CH_4	37 828 273	–	–	37 828 273
N_2O	17 920 085	–	–	17 920 085
HFCs	4 532 512	–	–	4 532 512
PFCs	52 885	–	–	52 885
Unspecified mix of HFCs and PFCs	1 441 614	–	–	1 441 614
SF_6	227 972	–	–	227 972
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**313 828 490**	**–**	**–**	**313 828 490**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–5 309 522	–	–	–5 309 522

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Deforestation	629 367	–	–	629 367
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–29 455 239	–	–	–29 455 239
CM	–3 296 904	–	–	–3 296 904
CM for the base year	–144 038	–	–	–144 038

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.3
Information to be included in the compilation and accounting database for 2018 for Spain
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	270 052 271	–	–	270 052 271
CH_4	38 331 851	–	–	38 331 851
N_2O	18 165 836	–	–	18 165 836
HFCs	4 722 796	–	–	4 722 796
PFCs	130 740	–	–	130 740
Unspecified mix of HFCs and PFCs	1 621 027	–	–	1 621 027
SF_6	226 875	–	–	226 875
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**333 251 398**	**–**	**–**	**333 251 398**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–5 677 516	–	–	–5 677 516
Deforestation	629 625	–	–	629 625
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–30 056 123	–	–	–30 056 123
CM	–3 265 807	–	–	–3 265 807
CM for the base year	–144 038	–	–	–144 038

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.4
Information to be included in the compilation and accounting database for 2017 for Spain
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	275 053 205	–	–	275 053 205
CH_4	38 114 999	–	–	38 114 999
N_2O	17 939 711	–	–	17 939 711
HFCs	6 503 662	–	–	6 503 662
PFCs	128 052	–	–	128 052
Unspecified mix of HFCs and PFCs	879 722	–	–	879 722
SF_6	225 399	–	–	225 399
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**338 844 751**	**–**	**–**	**338 844 751**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–6 117 966	–	–	–6 117 966
Deforestation	630 486	–	–	630 486
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–29 547 306	–	–	–29 547 306
CM	–3 175 586	–	–	–3 175 586

	Original submission	*Revised submission*	*Adjustment*	*Final value*
CM for the base year	–144 038	–	–	–144 038

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.5
Information to be included in the compilation and accounting database for 2016 for Spain
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	261 227 657	–	–	261 227 657
CH_4	37 795 634	–	–	37 795 634
N_2O	17 291 537	–	–	17 291 537
HFCs	8 420 447	–	–	8 420 447
PFCs	90 802	–	–	90 802
Unspecified mix of HFCs and PFCs	571 903	–	–	571 903
SF_6	229 620	–	–	229 620
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**325 627 601**	**–**	**–**	**325 627 601**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–6 801 047	–	–	–6 801 047
Deforestation	631 252	–	–	631 252
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–28 943 666	–	–	–28 943 666
CM	–2 754 180	–	–	–2 754 180
CM for the base year	–144 038	–	–	–144 038

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.6
Information to be included in the compilation and accounting database for 2015 for Spain
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	272 164 660	–	–	272 164 660
CH_4	38 218 842	–	–	38 218 842
N_2O	17 556 415	–	–	17 556 415
HFCs	8 666 908	–	–	8 666 908
PFCs	93 037	–	–	93 037
Unspecified mix of HFCs and PFCs	495 170	–	–	495 170
SF_6	221 352	–	–	221 352
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**337 416 384**	**–**	**–**	**337 416 384**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–7 273 127	–	–	–7 273 127
Deforestation	632 604	–	–	632 604
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–28 938 445	–	–	–28 938 445
CM	–2 292 306	–	–	–2 292 306
CM for the base year	–144 038	–	–	–144 038

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.7
Information to be included in the compilation and accounting database for 2014 for Spain
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	255 459 100	–	–	255 459 100
CH_4	36 816 547	–	–	36 816 547
N_2O	17 358 439	–	–	17 358 439
HFCs	15 462 871	–	–	15 462 871
PFCs	63 420	–	–	63 420
Unspecified mix of HFCs and PFCs	523 647	–	–	523 647
SF_6	209 988	–	–	209 988
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**325 894 012**	**–**	**–**	**325 894 012**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–7 898 612	–	–	–7 898 612
Deforestation	636 323	–	–	636 323
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–28 150 784	–	–	–28 150 784
CM	83 552	–	–	83 552
CM for the base year	–144 038	–	–	–144 038

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.8
Information to be included in the compilation and accounting database for 2013 for Spain
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	253 102 713	–	–	253 102 713
CH_4	37 470 362	–	–	37 470 362
N_2O	16 706 850	–	–	16 706 850
HFCs	15 598 979	–	–	15 598 979
PFCs	67 168	–	–	67 168
Unspecified mix of HFCs and PFCs	670 933	–	–	670 933
SF_6	213 858	–	–	213 858
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**323 830 863**	**–**	**–**	**323 830 863**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–8 205 034	–	–	–8 205 034
Deforestation	639 117	–	–	639 117
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–27 310 302	–	–	–27 310 302
CM	1 610 598	–	–	1 610 598
CM for the base year	–144 038	–	–	–144 038

[a] The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

The only category for which an estimation method is included in the 2006 IPCC Guidelines that was reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of the reporting in the Party's inventory is 4.C.1 grassland remaining grassland – soil pool (CO_2) (see ID# L.4 in table 3).

Annex IV

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

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

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2013, 2014, 2015, 2016, 2017, 2019 and 2021 annual submissions of Spain, contained in documents FCCC/ARR/2013/ESP, FCCC/ARR/2014/ESP, FCCC/ARR/2015/ESP, FCCC/ARR/2016/ESP, FCCC/ARR/2017/ESP, FCCC/ARR/2019/ESP and FCCC/ARR/2021/ESP, respectively.

Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at https://unfccc.int/documents/510888.

Annual status report for Spain for 2022. Available at https://unfccc.int/sites/default/files/resource/asr2022_ESP.pdf.

C. Other documents used during the review

Responses to questions during the review were received from María José Alonso Moya (Ministry for the Ecological Transition and the Demographic Challenge of Spain), including additional material on the methodology and assumptions used. The following references may not conform to UNFCCC editorial style as some have been reproduced as received:

EEA. 2019. *EMEP/EEA air pollutant emission inventory guidebook 2019: Technical guidance to prepare national emission inventories*. Luxembourg: Publications Office of the European Union. Available at https://www.eea.europa.eu/publications/emep-eea-guidebook-2019.

EU Effort Sharing decision: https://climate.ec.europa.eu/document/download/ac4ed936-c5de-4f9d-9f27-396311f97dcf_en.

G. Jaurena, J.M.Cantet, J.I.Arroquy, R.A.Palladino, M.Wawrzkiewicz and D. Colombatto 2015. Prediction of the Y_m factor for livestock from on-farm accessible data. Livestock Science, 177, 52–62.

MITECO_SEI (Ministry for the Ecological Transition and the Demographic Challenge). Available at https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/default.aspx.

MITECO_SEI (Ministry for the Ecological Transition and the Demographic Challenge). Tratamiento de aguas residuales. Available at: https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/091001-trat-ag-res-industr_tcm30-429867.pdf.

MITECO_SEI (Ministry for the Ecological Transition and the Demographic Challenge). Uso de HFCs en los equipos de aire acondicionado de vehículos. Available at: https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/060502_2f1_coches_tcm30-445438.pdf.

Ministerio de Agricultura, Pesca y Alimentación. Bases Zootécnicas para el Cálculo del Balance Alimentario de N y P en Bovino. Available at: https://www.mapa.gob.es/es/ganaderia/temas/ganaderia-y-medio-ambiente/balance-de-nitrogeno-e-inventario-de-emisiones-de-gases/default.aspx).

Ministerio de Agricultura, Pesca y Alimentación. Bases Zootécnicas para el Cálculo del Balance Alimentario de N y P en Caprino. Available at: https://www.mapa.gob.es/es/ganaderia/temas/ganaderia-y-medio-ambiente/balance-de-nitrogeno-e-inventario-de-emisiones-de-gases/default.aspx).

Ministerio de Agricultura, Pesca y Alimentación. Encuesta de sacrificio de ganado. Available at: https://www.mapa.gob.es/es/estadistica/temas/estadisticas-agrarias/ganaderia/encuestas-sacrificio-ganado.