



Report on the individual review of the annual submission of Italy 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 Italy, 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 26 September to 1 October 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.



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Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
2019 Refinement to the 2006 IPCC Guidelines	<i>2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
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”
B _{BEFORE}	biomass carbon stock on land immediately before conversion
C	carbon
CER	certified emission reduction
CH ₄	methane
CM	cropland management
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
COD	chemical oxygen demand
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”
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
d.m.	dry matter content
DOC _f	fraction of degradable organic carbon that decomposes
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
Eurostat	statistical office of the European Union
FM	forest management
FMRL	forest management reference level
FMRL _{corr}	forest management reference level technical correction
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
Kyoto Protocol Supplement	<i>2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol</i>
LULUCF	land use, land-use change and forestry
MMS	manure management system(s)
N	nitrogen

N ₂ O	nitrous oxide
NA	not applicable
NE	not estimated
NF ₃	nitrogen trifluoride
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
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
SOC	soil organic carbon
SWDS	solid waste disposal site(s)
TOW	total organic load in wastewater
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	<i>2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands</i>
Y _m	methane conversion rate

I. Introduction

1. This report covers the review of the 2022 annual submission of Italy, 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 26 September to 1 October 2022 in Bonn and was coordinated by Jongikhaya Witi and Tomoyuki Aizawa (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Italy.

Table 1

Composition of the expert review team that conducted the review for Italy

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Hlobisile Patricia Sikhosana	Eswatini
	Sorin Deaconu	Romania
Energy	Ana Carolina Avzaradel Szklo	Brazil
	Lawrence Kotoe	Ghana
	John David Watterson	United Kingdom
	Songli Zhu	China
IPPU	Jet Chong	Australia
	Kristina Gonchar	Belarus
	Ingrid Person Rocha e Pinho	Brazil
Agriculture	Kingsley Kwako Amoako	Ghana
	Hongmin Dong	China
LULUCF and KP-LULUCF	Thiago de Araújo Mendes	Brazil
	Helen Karu	Estonia
	Admore Mureva	Zimbabwe
	Atsushi Sato	Japan
Waste	Richard Claxton	United Kingdom
	Igor Ristovski	North Macedonia
Lead reviewers	Thiago de Araújo Mendes	
	John David Watterson	

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 Italy resolve identified findings, including issues¹ designated as problems.² Other findings, and, if applicable, the encouragements of the ERT to Italy to resolve related issues, are also included in this report.

4. A draft version of this report was communicated to the Government of Italy, 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 Italy, including totals excluding and including LULUCF, indirect CO₂ 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 Italy

Assessment		Issue/problem ID#(s) in table 3 or 5 ^a	
Date(s) of submission	Original submission: NIR, 12 April 2022; CRF tables (version 1), 8 April 2022; SEF tables, 8 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?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	L.7, W.6, W.8
	(c) Development and selection of EFs?	No	
	(d) Collection and selection of AD?	Yes	E.1, W.10
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	Yes	KL.1, KL.8
	(g) Reporting of uncertainties, including methodologies?	No	
	(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	E.5
	(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?	Yes	
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?		
	(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.1
(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.10
(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?		NA	Italy did not apply the provision to exclude emissions and subsequent removals associated with natural disturbances from the accounting
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	Italy 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 March 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 Italy

<i>ID#</i>	<i>Issue/problem classification^a</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
General			
G.1	Article 3.14 (G.1, 2021) (G.12, 2019) KP reporting adherence	Report any changes in the information provided under Article 3, paragraph 14, of the Kyoto Protocol in accordance with decision 15/CMP.1 in conjunction with decision 3/CMP.11. If there have been no changes, highlight this in the NIR.	Resolved. The Party reported in its NIR (p.369) information on the changes in information provided under Article 3, paragraph 14, of the Kyoto Protocol in accordance with decisions 15/CMP. 1 and 3/CMP.11. The information is further provided in tables 14.2–14.3 of the NIR (pp.372–373).
Energy			
E.1	Comparison with international data – refinery feedstocks (E.4, 2021) Accuracy	Check the value reported in CRF table 1.A(b) for the stock change of refinery feedstock and report in the NIR on any further analysis comparing the data reported in the CRF table and those reported to IEA.	Not resolved. The Party reported for 2020 in CRF table 1.A(b) –41,974.93 TJ for refinery feedstock stock change but reported a figure of 32,098.76 TJ to IEA. The Party stated in its NIR that some differences in data communicated to the various international organizations have been observed, are under investigation and are mainly caused by the use of default instead of country-specific energy conversion factors and different classification criteria of fuels. The Party stated in its NIR (annex 5 and p.72) that data submitted by the Ministry of Economic Development for the joint questionnaire of IEA, the Organisation for Economic Co-operation and Development and Eurostat have been used for solid, liquid and gaseous fuel consumption for 2016–2020 and that at the time it was not possible to reconstruct the entire time series at the category level. Therefore, data from the national energy balance have also been used, but the Party plans only to use energy data provided by the Ministry of Economic Development for the joint questionnaire in the future (NIR p.70). During the review, the Party reiterated its commitment to reconstruct the entire time series AD for refinery feedstock at the category level.

³ FCCC/ARR/2021/ITA.

<i>ID#</i>	<i>Issue/problem classification^a</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
E.2	1.A.1.a Public electricity and heat production – waste – CO ₂ , CH ₄ and N ₂ O (E.5, 2021) Accuracy	Undertake a review of the amount of waste used in the energy sector and account for waste used not only for electricity production but also for heat production and make any appropriate amendments to the CRF tables.	Resolved. The Party reported in CRF table 1.A(b) a non-biomass fraction of waste production of 51.630 TJ for 2019. This is 4 per cent higher than figures reported by IEA and 16 per cent higher than the figure reported in Italy's 2021 submission. According to the NIR (section 3.1, p.63) energy produced in incinerators or landfills, as well as energy produced by biogas collection from manure and agriculture residue, is mainly used for heating and electricity for private building or animal recoveries and very little of the energy produced is supplied to the electrical grid. Therefore, emissions from waste incineration facilities with energy recovery are reported under category 1.A.4.a (other sectors – commercial/institutional) for the fossil and biomass fraction of waste incinerated in the other fuel and biomass subcategories respectively. Energy recovered by these plants is mainly used for district heating of commercial buildings or is auto-consumed within the plant. For 2020, 99 per cent of the total amount of waste incinerated was treated in plants with an energy recovery system.
E.3	1.A.3.b Road transportation – biomass – CO ₂ , CH ₄ and N ₂ O (E.6, 2021) Transparency	Specify in the NIR that emission estimates have also been compiled for biogasoline consumption.	Resolved. The Party reported in its NIR (section 3.5.3.2.1.1, p.94) that biodiesel, biogasoline and biogas are used in road transportation in Italy and that the respective emissions have been estimated in the Party's submission. The ERT considers that the recommendation has been fully addressed.
IPPU			
I.1	2.B.1 Ammonia production – CO ₂ (I.4, 2021) (I.8, 2019) Transparency	Investigate the reasons for the difference between apparent consumption and the amount of urea used in the inventory and include the results of this investigation in the NIR.	Resolved. The Party reported in its NIR (p.146) that it is continuing to investigate the final uses of urea in Italy and the amount of urea used in the inventory against apparent consumption. The ERT notes that information about final markets of urea in Italy is updated and emissions sources (selective catalyst reduction engines; nitrogen oxides abatement systems and fertilizers) are clearly described in the NIR (p.140). One conclusion of the investigation is that the emissions sources provided by Italy's sole ammonia operator since 2019 confirm the completeness of the inventory. During the review, the ERT asked the Party to clarify whether the ammonia operator provided the CO ₂ streams separately, so that CO ₂ could be allocated correctly (CO ₂ for fertilizers in agriculture and CO ₂ recovered for technical gases in IPPU). The Party explained that it reported the amount of recovered CO ₂ from ammonia production under urea production in CRF table 2 (I).A-Hs1 (2020).
I.2	2.D.3 Other (non-energy products from fuels and solvent use) – CO ₂ (I.5, 2021) (I.10, 2019) Convention reporting adherence	Present national totals with and without indirect CO ₂ emissions in CRF table summary 2.	Addressing. The Party continued to report total national emissions including indirect CO ₂ in the CRF tables (e.g. CRF table summary 2 and CRF table 10) in the row intended for total national emissions excluding indirect CO ₂ , while reporting "NA" for the total national emissions including indirect CO ₂ rather than providing numerical values to reflect the reporting of indirect CO ₂ emissions from solvents. Italy explained in its NIR (section 2.5, p.61) that the indirect CO ₂ emissions are reported in the relevant categories of solvent use. During the review, Italy provided an Excel spreadsheet which shows total national GHG

ID#	Issue/problem classification ^a	Recommendation from previous review report	ERT assessment and rationale
I.3	2.D.3 Other (non-energy products from fuels and solvent use) – CO ₂ (I.6, 2021) (I.10, 2019) Convention reporting adherence	Report indirect CO ₂ emissions in CRF table 6 as “IE” instead of “NO”.	emissions with and without indirect CO ₂ . The ERT considers that, if Italy reports those emissions in CRF table 6, this issue will be resolved. Resolved. The Party reported indirect CO ₂ emissions in CRF table 6 as “IE” instead of “NO”.
Agriculture			
A.1	3.A.1 Cattle – CH ₄ (A.16, 2021) Accuracy	Conduct further verification of country-specific Y _m values, as indicated by Italy during the review, and include in the NIR the results of the verification to demonstrate that country-specific values better represent Italy’s national circumstances, in addition to a justification.	Resolved. The Party revised its Y _m values for dairy cattle for 2004–2019 and reported in its NIR (p.208) country-specific Y _m values used for CH ₄ estimation for cattle and the results of their verification (p.212). Adequate justification for Italy’s values based on national circumstances has also been provided in the NIR (p.208). Detailed information on parameters used to determine the Y _m values was also provided (section 5.2.2, pp.205–212, section 5.2.6, p.213, and annex 7, section A7.1, p.495).
A.2	3.A.2 Sheep – CH ₄ (A.1, 2021) (A.4, 2019) Transparency	Improve the transparency of reporting on the enteric fermentation of sheep by providing information on the assumptions used to adjust the feed digestibility percentage values for mature ewes and other mature sheep.	Resolved. The Party reported in its NIR (section 5.2.2, pp.210–211, and section 5.2.6, p.213) the assumptions underlying the adjustment to the feed digestibility percentage values for mature ewes and other sheep. Italy however stated in its NIR (section 5.2.6, p.213) that it plans to collect additional data and information to improve the estimation of CH ₄ emissions from sheep, in particular the feed digestibility parameter for mature ewes and other mature sheep.
A.3	3.B Manure management – CH ₄ (A.17, 2021) Transparency	Provide in the NIR the values used for conversions from volume to mass unit for slurry and solid manure when estimating CH ₄ emissions from cattle and buffalo manure management.	Resolved. The Party reported in its NIR (section 5.3.2, p.215) the values used for conversions from volume to mass unit as multiplying the slurry and solid manure values which were converted from volume to weight by 1 t/m ³ and 0.75 t/m ³ to obtain the values in mass by factors proposed in the study by Husted (1994).
A.4	3.B Manure management – CH ₄ (A.18, 2021) Accuracy	Revise the CH ₄ EFs used to estimate emissions from pasture, paddock and range for cattle (dairy and non-dairy) and buffalo by correcting the allocation of the methane conversion factor and manure handled by climate zone, in line with equation 10.23 of the 2006 IPCC Guidelines (vol. 4, chap. 10), and recalculate CH ₄ emissions for this subcategory.	Resolved. The Party recalculated the CH ₄ EFs for cattle and buffalo for the entire time series and reported in its NIR (section 5.3.2, pp.214–226) the recalculated CH ₄ EFs used to estimate emissions from pasture, paddock and range for cattle and buffalo. Italy also corrected the EFs for the temperate and cool regions in line with equation 10.23 of the 2006 IPCC Guidelines (vol. 4, chap. 10) and recalculated CH ₄ emissions using the EFs for the respective climate zones. Additional information on implied EFs was provided in NIR table A.7.16 (p.510).
A.5	3.C Rice cultivation – CH ₄	Provide an explanation in the NIR of the increase in the share of rice cultivation area	Resolved. The Party explained the increase in the share of rice cultivation area with single aeration from 1.0 per cent in 1990 to 58.6 per cent in 2020 in its NIR (section

<i>ID#</i>	<i>Issue/problem classification^a</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
	(A.19, 2021) Transparency	with single aeration, which is one of the key drivers for the decrease in CH ₄ emissions from rice cultivation.	5.4.3, p.232).
A.6	3.B.4 Other livestock – N ₂ O (A.20, 2021) Consistency	(a) Ensure that emissions from ostrich manure management are consistently reported between CRF tables 3.B(a) and 3.B(b), including the reporting of estimates or the appropriate notation key, together with a justification for excluding N ₂ O emissions from ostrich manure management as an insignificant source in line with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party reported the inclusion of N ₂ O emissions from ostrich manure management in its NIR (section 5.5.2, pp.237) reported under agricultural soils. Italy also reported consistent data in CRF tables 3.B(a) and 3.B(b) and corrected the notation key in CRF tables 3.B(a)s1 and 3.B(a)s2.
A.7	3.B.4 Other livestock – N ₂ O (A.20, 2021) Consistency	Correct the MMS reported for ostriches in CRF table 3.B(a)s2.	Resolved. The Party has corrected the MMS in CRF table 3.B(a)s2 to pasture, range and paddock.
A.8	3.D.a.1 Inorganic N fertilizers – N ₂ O (A.21, 2021) Transparency	Provide an explanation in the NIR (e.g. as a footnote to table 5.38) of the amount of fertilizer distributed (t/year), N content (%) and amount of N (t N/year) in the fertilizer for other nitrogenous fertilizers.	Resolved. The Party provided footnotes to table 5.38 in its NIR (p.235) explaining the fertilizer distributed and the composition of the various types of fertilizer distributed in 2020.
LULUCF			
L.1	4. General (LULUCF) – (L.1, 2021) (L.1, 2019) (L.8, 2018) Transparency	Report more detailed explanatory information and a justification for recalculations in the NIR in line with paragraph 44 of the UNFCCC Annex I inventory reporting guidelines (e.g. providing information on the updated AD and/or on errors corrected in the models used).	Resolved. Italy has provided additional explanatory information on recalculations in its NIR (pp.267–268, 275, 285, 291 and 297).
L.2	4. General (LULUCF) – (L.15, 2021) Convention reporting adherence	Ensure that the key category analysis is reported in a consistent manner in chapter 6 and in the rest of the NIR.	Resolved. In the NIR, the key categories included in table 1.6 (p.39) for LULUCF correspond to the key categories in table 6.2 (p.253). HWP are no longer identified as a key category.
L.3	4. General (LULUCF) – CO ₂ (L.16, 2021)	With specific reference to cropland and settlements remaining settlements, use the notation key “NA” in all circumstances	Resolved. The Party uses the notation key “NA” with a comment in CRF tables 4.A–4.C and 4.E when applying a tier 1 assumption of carbon stocks in equilibrium. These include CSCs in mineral soils in forest land remaining forest land and grassland

<i>ID#</i>	<i>Issue/problem classification^a</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
	Comparability	where a tier 1 assumption of carbon stocks being in equilibrium (i.e. gains equal losses) is used (see also ID# KL.8 below).	remaining grassland (other wooded lands), CSCs in living biomass (excluding for perennial woody crops) and dead organic matter in cropland remaining cropland, and all CSCs in settlements remaining settlements.
L.4	4.A Forest land – CO ₂ (L.4, 2021) (L.3, 2019) (L.2, 2018) (L.5, 2016) (L.5, 2015) (56, 2014) Transparency	Document the For-est Model validations in the NIR.	Addressing. In previous review reports, the ERTs noted that fully resolving this recommendation will require data from the third NFI to validate the For-est Model. The Party reported in its NIR (pp.267 and 598–599) and confirmed during the review that the complete set of data from the third NFI will be available in late 2022 and therefore the For-est Model validation against the latest NFI data is due to be implemented for the next submission.
L.5	4.G HWP – AD (L.19, 2021) Transparency	Include in CRF table 4.Gs2 the full series of HWP AD from 1961 onward used for the estimation of emissions.	Not resolved. The Party has not provided the full series of HWP AD in CRF table 4.Gs2. During the review, Italy stated that the link to the forest product statistics of the Food and Agriculture Organization of the United Nations, where the requested information is available, is provided in the NIR (p.296). The ERT considers that the recommendation has not yet been addressed because CRF table 4.Gs2 should include AD from the first year for which they were available.
L.6	4.G HWP – CO ₂ (L.12, 2021) (L.16, 2019) Transparency	Document in the NIR the methodology used for estimating CO ₂ emissions from SWDS reported in CRF table 4.Gs1 and the rationale for the reported half-life value of 3.89 years.	Not resolved. The Party has not documented in the HWP section of its NIR (section 6.12, pp.296–297) the methodology used for estimating CO ₂ emissions from HWP in SWDS. During the review, the Party clarified that it applies the default half-lives of 35 years for sawnwood, 25 years for wood panels and 2 years for paper provided in the 2019 Refinement to the 2006 IPCC Guidelines, table 12.3, which are equivalent to those provided in table 2.8.2 of the Kyoto Protocol Supplement, and that the methodology for estimating CO ₂ emissions from HWP in SWDS is described in the NIR (section 7.2.6, p.314). However, when comparing the current and previous submissions, the ERT noted that the Party has updated the methodology for estimating annual change in total long-term carbon storage in HWP waste reported as a memo item in CRF table 5, whereas the methodology for estimating CO ₂ net emissions from HWP in SWDS reported in CRF table 4.Gs1 has not been changed and is therefore not the same as that described in section 7.2.6 of the NIR. In addition, Italy has not provided an explanation for reporting “NO” for gains in HWP in SWDS together with positive annual stock change in CRF table 4.Gs1.
L.7	4.G HWP – CO ₂ (L.20, 2021) Accuracy	Estimate HWP in SWDS using methods consistent with the 2006 IPCC Guidelines for the waste sector and report the estimates under the information item in CRF table 4.Gs1 and under the memo item in CRF table 5, and also include HWP in SWDS in the HWP estimates if they meet the significance criteria of a key category, in	Addressing. The Party reported in its NIR (p.314) that CO ₂ emissions from HWP in SWDS are under investigation. During the review, the Party clarified that the HWP sheet in the first-order decay model from the 2006 IPCC Guidelines was implemented to estimate the long-term storage of carbon in waste disposal sites and the annual change in total long-term carbon storage in HWP waste. The information has been reported in section 7.2.6 of the NIR. The ERT considers that the recommendation has not yet been fully addressed, as the

<i>ID#</i>	<i>Issue/problem classification^a</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
		accordance with guidance provided in the 2006 IPCC Guidelines (vol. 4, chap. 12, pp.12.8–12.9, and figure 12.1).	information regarding HWP in SWDS reported in CRF table 4.Gs1 is not consistent with CRF table 5 (see ID# L.6 above).
L.8	4.G HWP – CO ₂ (L.21, 2021) Transparency	Report in the NIR information which identifies deforestation-sourced HWP as negligible in Italy as justification for not estimating additional deforestation-sourced HWP emissions or sequestrations under the Convention compared with those estimated under the Kyoto Protocol, and explain why using the assumption of instantaneous oxidation for deforestation-sourced HWP is a valid choice for producing its estimates, given its national circumstances, consistent with the 2006 IPCC Guidelines.	Not resolved. The Party has not included any additional information in NIR section 6.12.2 concerning the methodology for estimating emissions from HWP (pp.296–297). During the review, the Party clarified that the relevant information is provided in NIR section 9.4.5 (pp.358–359), stating that all wood originating from deforestation is assigned to fuelwood and that there are no HWP originating from deforestation. However, the ERT could not identify any documentation or references which justify this assumption.
Waste			
W.1	5. General (waste) – CO ₂ (W.9, 2021) Accuracy	Revise estimates of the annual change in total long-term carbon storage in HWP waste in CRF table 5, ensuring that the corresponding CO ₂ emissions are greater than, or equal to, zero.	Resolved. The Party revised the reporting on the memo item in CRF table 5 across the time series, with the annual change in total long-term carbon storage in HWP waste reaching more than 100 per cent in some years. Most of the reported values are positive, particularly for the beginning of the time series, while negative values are reported since 2009. The Party reported in its NIR (p.602) and CRF table 5 that HWP have been estimated using the first-order decay waste method from the 2006 IPCC Guidelines (vol. 5, chap. 3, pp.3.10–3.12) and the CRF tables have been updated accordingly. During the review, Italy submitted the first-order decay waste model, and the ERT could confirm that the Party has correctly inserted the annual change in total long-term carbon storage in HWP waste.
W.2	5.C.1 Waste incineration – CO ₂ (W.7, 2021) (W.12, 2019) Transparency	Improve the transparency of reporting on waste incineration by including the values of carbon content for the whole time series and the reason for the changes in carbon content, fossil carbon fraction and oxidation factor in order to facilitate the replication of the estimation.	Resolved. The Party reported in its NIR (table 7.24, p.319) the values of carbon content for the whole time series and the reason for the changes in carbon content, fossil carbon fraction and oxidation factor (p.317). During the review, the Party provided a file with all the information included in the estimation of emissions from waste incineration and clarified that the oxidation factor used is 100 per cent. .
W.3	5.D.1 Domestic wastewater – CH ₄ (W.10, 2021) Accuracy	Provide a justification in the NIR for using the value 1.25 as the correction factor for all additional industrial biochemical oxygen demand discharged into sewers or revise its current practice and apply the default value of 1.00 for uncollected wastewater,	Resolved. The Party reported in its NIR (p.325) that a correction factor of 1.25 has been applied to both collected and uncollected wastewater in order to account for illegal wastewater spills from industry or craft activities that are not taken into account in official statistics or other industries and establishments (e.g. restaurants, butchers or grocery stores) that can be co-discharged with domestic wastewater. The ERT agreed with the justification.

<i>ID#</i>	<i>Issue/problem classification^a</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
		especially in the case of rural populations using latrines.	
W.4	5.D.1 Domestic wastewater – CH ₄ (W.11, 2021) Accuracy	Estimate CH ₄ emissions from leakage from anaerobic digestion of sewage sludge by using either country-specific information on the leakage rate or, if no country-specific information is available, the default value of 5 per cent from the 2006 IPCC Guidelines (vol. 5, chap. 4, p.4.4).	Resolved. The Party reported in its NIR (p.326 and table 7.24, p.319) that CH ₄ emissions from sludge have been subtracted from the total amount of CH ₄ produced because emissions from sludge from wastewater treatment are considered under landfills, agricultural soils and incineration. In addition, Italy has distinguished between CH ₄ recovery from flaring and for energy generation, the latter being reported under the energy sector.
W.5	5.D.1 Domestic wastewater – CH ₄ (W.13, 2021) Transparency	Include information on the approach used to estimate TOW in sludge in the NIR.	Resolved. The Party reported in its NIR (p.326, including table 7.35) that TOW in sludge has been estimated as half of standard TOW, on the basis of international literature (Metcalf and Eddy, 1991), which states that the typical reduction in volatile solids achieved in anaerobic digestion for mixed sludge (primary plus secondary) varies between 45 and 60 per cent.
KP-LULUCF			
KL.1	General (KP-LULUCF) – (KL.8, 2021) KP reporting adherence	Ensure that time-series consistency is maintained in the publishing of CRF table NIR-2 by ensuring that, for all categories in all reported years, the area total at the end of the previous year aligns with the previous year's total at the end of the current year and that a consistent total national area is reported in all years.	Addressing. The Party has corrected most of the inconsistencies in CRF table NIR-2 identified by the previous ERT. However, the current ERT found that, for FM and other land, the areas reported under “total area at the end of the current inventory year” in CRF table NIR-2 for 2018 and those reported under “total area at the end of the previous inventory year” in CRF table NIR-2 for 2019 were not consistent. During the review, the Party clarified that there were errors in CRF table NIR-2 for 2018 but that these had no impact on the reported emissions. The correct areas for FM that were used for estimating CSCs were reported in CRF table 4(KP-I)B.1.
KL.2	General (KP-LULUCF) – CO ₂ , CH ₄ and N ₂ O (KL.9, 2021) Transparency	Report transparent and detailed information in the NIR on how the method used for applying the natural disturbances provision in FM and AR avoids the expectation of net credits and net debits (see ID# KL.4 below).	Resolved. The issue is no longer relevant, as Italy did not apply the natural disturbances provision.
KL.3	General (KP-LULUCF) – CO ₂ , CH ₄ and N ₂ O (KL.10, 2021) KP reporting adherence	Clearly report a final decision with regard to applying the natural disturbances provision. If the decision is to apply the provision, include all information on areas and emissions from activities relevant to natural disturbances in CRF tables 4(KP-I)A.1.1 and 4(KP-I)B.1.3, enabling the accounting of emissions and removals and the effect of natural disturbances for FM, and also make proper use of these tables to subsequently	Resolved. The Party reported in its NIR (pp.358 and 361) that it did not apply the natural disturbances provision.

<i>ID#</i>	<i>Issue/problem classification^a</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
		exclude emissions from accounting in the CRF accounting table.	
KL.4	AR – CO ₂ , CH ₄ and N ₂ O (KL.11, 2021) Accuracy	Use methods for estimating the natural disturbance background level and margin that ensure that there is no expectation of net credits or debits, in addition to ensuring that methods used for estimating natural disturbances are consistent between AR and FM in accordance with decision 2/CMP.7, annex, paragraph 33(b) and footnote 9.	Resolved. The issue is no longer relevant, as Italy did not apply the natural disturbances provision.
KL.5	AR – CO ₂ , CH ₄ and N ₂ O (KL.12, 2021) Transparency	(a) Provide transparent information in the NIR regarding the areas of wildfire in AR from 1990 onward and justify the methods used for the estimation of emissions from biomass burning in AR; (b) Explain in detail in the NIR how the estimates for biomass burning are used in the construction of the natural disturbances background level and margin.	Resolved. The issue is no longer relevant, as Italy did not apply the natural disturbances provision.
KL.6	FM – CO ₂ , CH ₄ and N ₂ O (KL.13, 2021) Transparency	Provide comprehensive and transparent information in the NIR as to how the FMRL _{corr} is calculated, demonstrating that the policy assumptions used in the construction of the FMRL _{corr} are the same as for the FMRL, including how the harvesting rate assumptions used for FMRL are maintained in the FMRL _{corr} and how wildfire emissions have been updated in the FMRL _{corr} in a manner consistent with the calculation of the natural disturbance background level for FM.	Not resolved. The ERT considers that the recommendation has not yet been addressed, as the Party has not provided the information on underlying factors and assumptions used in the FMRL _{corr} calculation in its NIR. During the review, the Party clarified that the policy assumptions applied to calculate the FMRL _{corr} are the same as those used in the construction of the FMRL, since the same historical data have been applied and no new policies related to the forestry sector have been adopted since 2009. The Party has not applied the same projected harvest rates, area under FM or forest characteristics as described in the initial submission of information on FMRL; instead, the actual values of these parameters have been used for the FMRL _{corr} and it was assumed that the same FM practices and level of disturbances will continue until the end of the second commitment period. On the basis of the information provided during the review, the ERT concluded that the lack of transparency in the NIR does not impact the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore the issue was not included in the list of potential problems and further questions raised by the ERT.
KL.7	CM – (KL.14, 2021) Transparency	Provide additional information in the NIR regarding the consequences of excluding land areas which are reported under CM and GM only in the base year.	Addressing. The Party reported in its NIR (p.362) information on the land areas that were subject to CM activities in 1990, but have not been reported under CM or any other KP-LULUCF elected activity during the second commitment period of the Kyoto Protocol. Total emissions and removals from these areas have been provided for 1990–

ID#	Issue/problem classification ^a	Recommendation from previous review report	ERT assessment and rationale
KL.8	CM – CO ₂ (KL.15, 2021) Comparability	With specific reference to CM and GM, use the notation key “NA” in all circumstances where a tier 1 assumption of carbon stocks being in equilibrium (i.e. gains equal losses) is applied.	<p>2012, but not for the commitment period.</p> <p>The ERT noted that the Party did not include in its NIR similar information for GM, although the area under GM decreased between 1990 and 2013 (table 2.23, p.362). During the review, the Party clarified that 172 kha land was reported under GM only in the base year. Most of this area (163 kha) was converted to forest land before the second commitment period and has been reported under AR. The rest of the area was converted to cropland, wetlands and settlements. On the basis of the information provided in the NIR (pp.342–343), GM converted to cropland areas have not been excluded from the KP-LULUCF reporting. The ERT also noted that carbon stock losses from the land conversions to wetlands and settlements are assumed to occur in the year of conversion (pp.283 and 285), thus the exclusion of these areas from the KP-LULUCF reporting has had no consequences on reported emissions and removals in any of the years in the second commitment period.</p> <p>On the basis of the information provided during the review, the ERT concluded that the lack of transparency in the NIR does not impact the Party’s ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore the issue was not included in the list of potential problems and further questions raised by the ERT.</p>
KL.9	GM – N ₂ O (KL.16, 2021) Completeness	Estimate and report N ₂ O emissions from N mineralization or immobilization where CSCs are negative and report the areas and CSCs in mineral soils (including where N ₂ O emissions are not occurring owing to increasing carbon stocks and negative mineralized N from loss of SOC stocks in mineral soils) in CRF table 4(KP-II)3, and ensure that the reporting under the Convention is consistent with this.	Resolved. The Party reported land areas and CSCs in mineral soils in CRF table 4(KP-II)3, although the plus and minus signs were wrongly used for CSC estimates under column C (i.e. increases in the mineral soil carbon stocks were reported as a negative number and decreases as a positive number). Italy also estimated N ₂ O emissions from N mineralization where carbon stocks in mineral soils decreased. The reporting was consistent with the reporting under the Convention.

^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 Italy, and had not been addressed by the Party at 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 Italy

<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed^a</i>
General	No issues identified.	
Energy	No issues identified.	
IPPU		
I.1	Investigate the reasons for the difference between apparent consumption and the amount of urea used in the inventory and include the results of this investigation in the NIR.	3 (2019–2022)
I.2	Present national totals with and without indirect CO ₂ emissions in CRF table summary 2.	3 (2019–2022)
Agriculture	No issues identified.	
LULUCF		
L.1	Report more detailed explanatory information and a justification for recalculations in the NIR in line with paragraph 44 of the UNFCCC Annex I inventory reporting guidelines (e.g. providing information on the updated AD and/or on errors corrected in the models used).	4 (2018–2022)
L.4	Document the For-est Model validations in the NIR.	6 (2014–2022)
L.6	Document in the NIR the methodology used for estimating CO ₂ emissions from SWDS reported in CRF table 4.Gs1 and the rationale for the reported half-life value of 3.89 years.	3 (2019–2022)
Waste	No issues identified.	
KP-LULUCF	No issues identified.	

^a Reports on the reviews of the 2017 and 2020 annual submissions of Italy have not yet been published. Therefore, 2017 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 Italy that are additional to those identified in table 3.

Table 5

Additional findings made during the individual review of the 2022 annual submission of Italy

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?^a</i>
General		No general findings additional to those included in table 3 were made by the ERT during the review.	
Energy			
E.4	1.B.2.a Oil – liquid fuels – CH ₄	<p>During the review, the ERT noted a significant inter-annual change between 2015 and 2016 of –60.13 per cent for CH₄ emissions from oil production (CRF table 1.B.2.a) due to recalculation of the emissions. The Party clarified that, in 2016, updated data were acquired by the national oil and gas operator which allowed for an update of the EFs for the oil and gas activities, with a significant reduction in fugitive emissions from production and processing.</p> <p>During the review, the ERT asked the Party whether the updated EFs should have been applied to the whole time series in order to ensure consistency. The Party clarified that, since 2016, the national oil and gas operator has implemented new standards to drastically reduce the fugitive emissions from its oil production sites. Updating the whole time series would, therefore, not reflect the actual state of emissions prior to 2016 and would introduce an underestimation of emissions for those years. In order to better understand the origin of the reduction in the EFs, the ERT asked the Party whether there had been any changes to the composition of natural gas that might affect the value of the CH₄ EF. In response, the Party stated that natural gas composition has remained the same (which is always about 6 per cent below the national mix average) and therefore has not resulted in changes to the CH₄ EF for natural gas produced in Italy.</p> <p>The ERT welcomes the Party's detailed explanation and recommends that the Party include in its NIR the information provided during the review that explains why updating CH₄ EFs for oil production would not reflect the actual state of emissions prior to 2016.</p>	Yes. Transparency
E.5	1.B.2.a Oil – natural gas liquids – CH ₄ 1.A(a) – natural gas liquids – CH ₄	<p>During the review, the ERT noted that for 2020, IEA reported natural gas liquid consumption of about 412 TJ, while CRF tables 1.A(b) and 1.A(d) report no apparent consumption for this fuel, leading to a 100 per cent difference between the two data sets. The Party informed the ERT that low levels of production of natural gas liquids have restarted in the country, after a gap of 20 years, and that this will be considered in the next submission. Italy explained further that the issue is under investigation and the figure will be included in CRF tables 1.A(b) and 1.A(d), if relevant, and in CRF tables 1.A(a) and 1.B.2. The 2006 IPCC Guidelines provide a method for this category in table 4.2.4 (vol. 2, chap. 4). According to the Party, the questionnaires that it sends to Eurostat, IEA and the United Nations Economic Commission for Europe show low-level production for 2020 (9,839 Mg = 412 TJ) used entirely for refinery operations and related emissions leading to around 26,000 t CO₂, which, according to the calculations of the ERT, is about 0.01 per cent of total national GHG emissions, without LULUCF, and therefore below the threshold referred to in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. The ERT agrees with the estimate produced by the Party and notes that the resulting emissions are below the threshold</p>	Yes. Completeness

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
		<p>for the application of an adjustment, even if emissions from production of natural gas liquids are factored in the calculations as they are likely to be below 1 kt CO₂ eq, in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11 (26 kt CO₂ eq in 2020) and therefore not included in the list of potential problems and further questions raised by the ERT.</p> <p>The ERT recommends that the Party investigate production and use of natural gas liquids in Italy and if the activity does occur, report AD and emissions, both for fugitive and for combustion emissions, with respect to refinery operations.</p>	
IPPU		No findings for the IPPU sector additional to those included in table 3 were made by the ERT during the review.	
Agriculture		No findings for the agriculture sector additional to those included in table 3 were made by the ERT during the review.	
LULUCF			
L.9	4.B.1 Cropland remaining cropland – CO ₂	The ERT noted that the description provided in the NIR regarding the estimation of CSCs in mineral soils for cropland remaining cropland (pp.270–273) and grassland remaining grassland (grazing land) (pp.276–278) is not transparent enough to check if the applied approach is consistent with the 2006 IPCC Guidelines (vol. 4, chap. 5).	Yes. Transparency
	4.C.1 Grassland remaining grassland – CO ₂	<p>During the review, the Party clarified that formulation B of equation 2.25 from the 2006 IPCC Guidelines (vol. 4, chap. 2, box 2.1) is applied, considering both the number of years over a single inventory as well as the dependency of stock change parameters equal to 20. Changes in carbon stocks are estimated at the regional level and the following steps are applied: (1) data are collected from areas with different management practices, as reported in table 6.18 of the NIR (p.271); (2) the annual changes between the areas with management practices are calculated, on the basis of probable conversion patterns; (3) the annual SOC stock change is estimated on the basis of the SOC stocks in each region and by management practice; (4) annual SOC stock changes are estimated for all land areas that have been under changes in management practices during the last 20 years. The annual national SOC stock change is estimated using the total of the SOC stock changes for all the administrative regions.</p> <p>The ERT recommends that the Party include in the NIR more transparent information regarding the estimation of CSCs in mineral soils for cropland remaining cropland and grassland remaining grassland (grazing land), such as trends in land areas under different management practices since 1970.</p>	
L.10	4.C.2 Land converted to grassland – CO ₂	<p>The Party reported in its NIR (p.280) that it applies a tier 1 methodology to estimate CSCs in land converted to grassland, assuming that carbon stocks in biomass immediately after the conversion are equal to 0 t C ha⁻¹. However, the ERT noted that losses in the biomass carbon pool were reported in CRF table 4.C for land converted to grassland as “NO”.</p> <p>During the review, the Party clarified that three types of conversions to grassland occur in Italy, namely (1) annual crops converted to managed grazing land, where B_{BEFORE} equals 10 t d.m. ha⁻¹; (2) annual crops converted to natural (unmanaged) grazing land, where B_{BEFORE} equals 0 t d.m. ha⁻¹; and (3) woody crops converted to other wooded land, where B_{BEFORE} equals 0 t d.m. ha⁻¹.</p> <p>The latter two conversions result in biomass growth of 6.1 t d.m. ha⁻¹, which does not correspond to the explanation in the NIR that for the annual crops converted to natural (unmanaged) grazing land and for woody crops converted to other wooded land, it was assumed that an abrupt transition has not occurred (p.280). During the review, the</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
L.11	4.D Wetlands – CO ₂ , CH ₄ and N ₂ O	<p>Party provided evidence that biomass increment indeed occurs after agricultural abandonment.</p> <p>The ERT recommends that the Party provide transparent information on B_{BEFORE} values for each type of land conversion, as well as justification for the parameter values used to estimate CSCs in biomass for annual crops converted to natural grazing land and woody crops converted to other wooded land.</p> <p>The Party stated in section 6.4.3 of its NIR (p.283) that reservoirs or water bodies regulated by human activity have not been considered in the land-use definitions of wetlands (flooded land) in the NIR. The ERT noted that there was therefore a risk that the area of wetlands has been underestimated. The ERT notes that emissions for these flooded lands were not estimated for reasons justifiable under the 2006 IPCC Guidelines, including the lack of tier 1 methodologies and EFs (vol. 4, chap. 7). As a result, any underrepresentation of the area owing to the exclusion of reservoirs and other constructed water bodies would not affect emissions based the 2006 IPCC Guidelines and the Wetlands Supplement.</p> <p>During the review, the Party clarified that it will consider the monitoring of reservoirs or water bodies regulated by human activity and the potential inclusion of these areas in future submissions.</p> <p>The ERT encourages the Party to extend its land-monitoring systems to identify and estimate areas of reservoirs and other constructed water bodies.</p>	Not an issue/problem
L.12	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CH ₄	<p>The Party reported CO₂ emissions from organic soils for cropland and grassland categories (CRF tables 4.B–4.C) and N₂O emissions from cultivated organic soils (CRF table 3.D) but reported CH₄ emissions from drained organic cropland and grassland soils as “NO” in CRF table 4(II).</p> <p>During the review, Italy stated that CH₄ emissions are assumed to be negligible from all drained organic soils according to section 2.2 of the Wetlands Supplement. The ERT noted that CH₄ emissions from drained organic soils encompass both land and ditch emissions (equation 2.6 of the Wetlands Supplement). Default factors for estimating CH₄ emissions are presented in tables 2.3 and 2.4 of the Wetlands Supplement.</p> <p>The ERT encourages Italy to use the Wetlands Supplement in preparing its inventory for estimating GHG emissions from drained organic soils.</p>	Not an issue/problem
Waste	5.A Solid waste disposal on land – CH ₄	<p>The Party reported in its NIR (section 7.2.2, p.306) and CRF table 5.A a DOC_f value of 0.5 (50 per cent), which is the default value in the 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.13), despite having indicated that it applies a tier 2 method for the category. The ERT notes that this is an insignificant change to the emissions from this sector (<0.1 per cent). The 2006 IPCC Guidelines (vol. 5, chap. 3.2.3) state that values from similar countries can be used for degradable organic carbon but they should be based on well-documented research, and so the Party should try to begin research and data-collection. During the review, the Party clarified that the default value 0.5 for the fraction of degradable organic carbon that is ultimately degraded and released from landfill is also reported in national short-term studies (Andreottola and Cossu, 1998; Poletini and Muntoni, 2002) and is deemed the most appropriate value for national conditions.</p> <p>The ERT recommends that the Party plan and begin research in order to verify that the parameters presented in the national short term studies are still relevant to the national conditions of Italy in order to improve the estimates by using a higher-tier methodology (tier 2 or 3) that use separate country-specific DOC_f values defined for specific</p>	Yes. Accuracy

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
W.7	5.C.2 Open burning of waste – CO ₂	<p>waste types. The ERT notes that it is good practice to use disaggregated DOC_f values specific to waste types only when waste composition data are based on representative sampling and analysis over a longer period.</p> <p>The Party reported in its NIR (p.321) values for the fraction of the population burning waste of 9–9.4 and the fraction of the waste amount that is burned relative to the total amount of waste treated of 0.4 to calculate emissions of CO₂ from open burning of waste. The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 5, section 5.3.2). The ERT considers that the NIR is not transparent enough in its explanation of the choice of these values.</p> <p>During the review, the Party clarified that random sampling measurements done in recent years show that the most significant fires involved 1,800 Mg per year of open burning waste in Corteolona in 2018 and 8,400 Mg per year of open burning waste in Pomezia in 2017, which are negligible quantities; however, this was not considered to be proper research.</p> <p>The ERT recommends that the Party update the values for the fraction of the population burning waste and the fraction of the waste amount that is burned relative to the total amount of waste treated using best available research data or expert judgment.</p>	Yes. Transparency
W.8	5.D.1 Domestic wastewater – CH ₄	<p>The ERT compared the indigenous sewage sludge gas production reported by the Party to Eurostat (2,137 TJ in 2019) with the amounts of CH₄ for energy recovery reported in CRF table 5.D (21.56 kt in 2019, which is approximately 1,087 TJ) and found a difference of about 50 per cent.</p> <p>During the review, the Party explained that its estimation was based on the volume of biogas with an assumption of 50 per cent fraction of CH₄ in the biogas. Italy also explained that the volume of biogas was provided by Terna (the national independent system operator that provides data used in submissions to Eurostat) and included details of the volume of biogas used for the production of electricity and heat which, in 2019, amounted to 1,415 TJ. The ERT noted that, on the basis of the data provided by the Party, the fraction of CH₄ in the biogas would be about 65 per cent.</p> <p>The ERT recommends that the Party reconsider its assumption of a 50 per cent share of CH₄ in biogas and provide the value and its documentation in the NIR. The ERT also recommends that Italy investigate possible reasons for the remaining difference between the amount of indigenous sewage sludge gas production reported to Eurostat (2,137 TJ in 2019) and the amount it estimated on the basis of the volume of biogas provided by Terna (1,415 TJ in 2019), which may include other uses of biogas (e.g. blending with natural gas, own use in wastewater treatment plants) in addition to the use of biogas for the production of electricity and heat, or consider estimating CH₄ recovery for energy on the basis of total indigenous biogas production.</p>	Yes. Accuracy
W.9	5.D.1 Domestic wastewater – CH ₄	<p>The ERT noted that the Party reported by far the highest amount of CH₄ flared among reporting Parties, with most developed country Parties reporting “NO” or “NE” for the amount of CH₄ flared. In its calculations, Italy assumed that all TOW of sludge in wastewater treatment plants undergoes anaerobic treatment. During the review, the Party explained that it assumed that the biogas which is not recovered for energy is automatically flared for safety reasons and noted that flaring is mandatory in wastewater treatment plants. It also explained that anaerobic digestion of sludge is common practice in wastewater treatment plants, and that it is investigating a different methodology for estimating the production of biogas in wastewater treatment plants.</p> <p>The ERT encourages the Party to pursue its investigation into a different methodology for estimating total biogas</p>	Not an issue/problem

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
W.10	5.D.2 Industrial wastewater – CH ₄	<p>production and revise the amount of CH₄ flared accordingly.</p> <p>The Party reported in table 7.36 of its NIR (p.328) the wastewater generation (m³/t) from several industries and associated COD (g/l) values used in the estimates. The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 6, table 6.12) because that suggests a range for beer and malt of 5–6 m³/t for the wastewater generation value, and the Party uses a value of 4.2 m³/t. For fish processing, the value range is 2–8 m³/t but the Party uses 13 m³/t. COD (g/l) values are mostly default sourced from the 2006 IPCC Guidelines (vol. 5, chap. 6, table 6.9). The ERT notes that the Party needs to use either the default values or only country-specific values rather than a mixture of both.</p> <p>During the review, the Party clarified that the data are derived from the annual report of Assobirra, the beer industry association, which states that 420 litres of water are used for each hectolitre of beer. The annual wastewater generation is therefore calculated by multiplying 420 litres by 15.83 million hectolitres. In table 7.36 of the NIR, the Party does not state that the unit value is different for beer and malt. In its next submission, the Party will insert a footnote giving the different unit value and will revise the values in NIR table 7.36.</p> <p>The ERT recommends that the Party conduct an investigation into COD values and wastewater generation for the most significant industries and report the findings in the next submission.</p>	Yes. Accuracy
KP-LULUCF			
KL.10	FM – CO ₂ , CH ₄ and N ₂ O	<p>The ERT noted that the Party does not provide in its NIR a clear explanation of the factors generating the accounting quantity. This is not in accordance with the Kyoto Protocol Supplement (p.2.97).</p> <p>During the review, the Party clarified that the main factors generating the accounting quantity are differences in the actual and assumed harvesting volumes and fire intensities. The area affected by forest fires has been significantly smaller in the most recent years of the commitment period, compared with the historical burned area that was used to calculate the FMRL_{corr}.</p> <p>On the basis of the information provided during the review, the ERT concluded that the lack of transparency in the NIR does not impact the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore the issue was not included in the list of potential problems and further questions raised by the ERT.</p>	Yes. Transparency

^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 Italy.

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 Italy 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 Italy in its 2022 annual submission

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

Table I.1
Total greenhouse gas emissions and removals for Italy, base year–2020
 (kt CO₂ eq)

	<i>Total GHG emissions excluding indirect CO₂ emissions</i>		<i>Total GHG emissions and removals including indirect CO₂ emissions^a</i>		<i>Land-use change (Article 3.7 bis as contained in the Doha Amendment)^b</i>	<i>KP-LULUCF (Article 3.3 of the Kyoto Protocol)^c</i>	<i>KP-LULUCF (Article 3.4 of the Kyoto Protocol)</i>	
	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>			<i>CM, GM, RV, WDR</i>	<i>FM</i>
FMRL								–22 166.00
Base year ^d	516 336.76	519 984.51	NA	NA	NA		1 507.09	
1990	516 260.19	519 907.94	NA	NA				
1995	509 920.43	533 876.45	NA	NA				
2000	536 177.49	557 290.63	NA	NA				
2010	476 268.25	517 804.06	NA	NA				
2011	471 621.16	505 141.14	NA	NA				
2012	461 385.79	485 879.74	NA	NA				
2013	410 809.33	450 434.41	NA	NA		–4 314.66	–3 052.50	–30 100.15
2014	388 805.50	429 340.84	NA	NA		–6 212.62	–3 761.83	–31 097.40
2015	398 666.49	441 759.07	NA	NA		–6 606.32	–4 348.63	–32 248.17
2016	399 039.49	439 274.37	NA	NA		–7 062.39	–6 606.82	–29 064.14
2017	413 600.02	433 482.10	NA	NA		–6 324.47	–6 123.58	–13 117.29
2018	394 101.81	429 624.38	NA	NA		–3 501.85	–5 891.91	–24 274.59
2019	377 672.46	418 352.22	NA	NA		–5 993.63	–6 057.00	–30 218.27
2020	348 846.95	381 247.96	NA	NA		–7 141.56	–4 624.12	–23 179.07

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 CO₂ 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 all gases except NF₃, for which the base year is 1995. The base year for CM and GM 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 Italy, excluding land use, land-use change and forestry, 1990–2020

(kt CO₂ eq)

	CO ₂ ^a	CH ₄	N ₂ O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF ₆	NF ₃
1990	439 549.84	49.389.98	27 208.91	444.00	2 906.86	NO,NA	408.35	NA,NO
1995	449 826.11	51.417.07	29 433.04	926.65	1 492.31	24.97	679.72	76.57
2000	470 487.19	51.913.39	30 270.07	2 488.94	1 488.50	24.97	604.31	13.26
2010	436 117.44	47.340.84	20 331.05	12 055.42	1 520.39	24.97	393.79	20.17
2011	424 256.27	45.911.77	19 846.33	12 971.38	1 661.28	24.97	441.36	27.78
2012	403 696.91	46.466.49	20 123.67	13 597.95	1 499.21	24.97	445.61	24.93
2013	369 679.72	45.008.77	19 297.43	14 270.54	1 705.41	24.97	421.88	25.70
2014	349 390.36	44.050.81	19 004.49	14 918.54	1 564.34	24.97	359.16	28.17
2015	361 163.18	44.112.22	18 866.63	15 403.09	1 688.33	24.97	472.25	28.42
2016	358 182.54	43.681.28	19 308.42	16 030.03	1 613.73	24.97	399.42	33.98
2017	352 735.39	43.672.28	19 059.33	16 235.46	1 313.68	24.97	417.49	23.50
2018	349 005.04	42.981.95	18 987.32	16 495.79	1 657.27	23.15	451.73	22.13
2019	339 233.21	41.982.45	18 756.73	16 870.73	1 027.55	23.54	440.17	17.84
2020	302 278.60	42 780.07	19 471.13	15 876.24	538.62	22.86	264.14	16.31
Percentage change 1990– 2020	–31.2	–13.4	–28.4	3 475.7	81.5	NA	–35.3	NA

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

^a Italy did not report indirect CO₂ emissions in CRF table 6.

Table I.3

Greenhouse gas emissions and removals by sector for Italy, 1990–2020

(kt CO₂ eq)

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
1990	425 298.00	40 421.81	36 899.54	–3 647.75	17 288.59	NO
1995	437 937.84	38 315.54	37 648.70	–23 956.02	19 974.37	NO
2000	459 631.20	39 123.39	36 682.43	–21 113.14	21 853.62	NO
2010	428 903.22	36 964.06	31 555.19	–41 535.82	20 381.59	NO

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
2011	416 018.15	37 298.54	32 032.38	-33 519.99	19 792.07	NO
2012	399 105.28	34 546.03	32 333.67	-24 493.95	19 894.75	NO
2013	366 695.06	33 583.83	31 514.86	-39 625.08	18 640.66	NO
2014	346 450.28	33 186.27	31 267.88	-40 535.34	18 436.42	NO
2015	358 776.32	33 232.52	31 206.67	-43 092.59	18 543.57	NO
2016	355 381.05	33 497.93	32 140.80	-40 234.88	18 254.59	NO
2017	349 941.86	33 695.55	31 683.77	-19 882.07	18 160.92	NO
2018	345 416.08	34 603.67	31 459.98	-35 522.57	18 144.65	NO
2019	335 080.92	33 985.41	31 353.65	-40 679.76	17 932.24	NO
2020	298 900.44	31 049.05	32 684.53	-32 401.01	18 613.95	NO
Percentage change 1990–2020	-29.7	-23.2	-11.4	788.2	7.7	NA

Notes: (1) Italy did not report emissions or removals for the sector other (sector 6); the corresponding cells in the CRF tables were left blank; (2) Italy did not report indirect CO₂ 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 Italy(kt CO₂ eq)

	<i>Article 3.7 bis as contained in the Doha Amendment^a</i>	<i>Activities under Article 3.3 of the Kyoto Protocol</i>		<i>FM and elected activities under Article 3.4 of the Kyoto Protocol</i>				
	<i>Land-use change</i>	<i>AR</i>	<i>Deforestation</i>	<i>FM</i>	<i>CM</i>	<i>GM</i>	<i>RV</i>	<i>WDR</i>
FMRL				-22 166.00				
Technical correction				-1 680.06				
Base year ^b	NA				1 381.46	125.62	NA	NA
2013		-6 257.04	1 942.37	-30 100.15	-2 283.25	-769.26	NA	NA
2014		-8 165.72	1 953.11	-31 097.40	-2 578.34	-1 183.49	NA	NA
2015		-8 569.89	1 963.57	-32 248.17	-3 503.61	-845.01	NA	NA
2016		-9 035.85	1 973.45	-29 064.14	-5 673.70	-933.11	NA	NA
2017		-8 299.86	1 975.39	-13 117.29	-5 581.17	-542.41	NA	NA
2018		-5 485.32	1 983.47	-24 274.59	-5 318.02	-573.89	NA	NA
2019		-7 986.88	1 993.25	-30 218.27	-5 417.10	-639.91	NA	NA
2020		-9 141.59	2 000.03	-23 179.07	-4 011.22	-612.90	NA	NA
Percentage change base year–2020					-390.4	-587.9	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 and GM 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 Italy

(kt CO₂ eq)

GHG source/sink activity	Net emissions/removals										Accounting parameters	Accounting quantity ^a
	Base year ^b	2013	2014	2015	2016	2017	2018	2019	2020	Total ^c		
A.1. AR		-6 257.036	-8 165.723	-8 569.892	-9 035.847	-8 299.865	-5 485.319	-7 986.877	-9 141.588	-62 942.147		-62 942.146
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		NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
A.2. Deforestation		1 942.373	1 953.107	1 963.574	1 973.453	1 975.391	1 983.473	1 993.251	2 000.030	15 784.654		15 784.655
B.1. FM										-213 299.076		-22 530.590
Net emissions/removals		-30 100.149	-31 097.399	-32 248.173	-29 064.138	-13 117.292	-24 274.589	-30 218.268	-23 179.067	-21 3299.076		
Excluded emissions from natural disturbances ^d		NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Any debits		NO	NO	NO	NO	NO	NO	NO	NO	NO		NO

GHG source/sink activity	Net emissions/removals										Accounting parameters	Accounting quantity ^a	
	Base year ^b	2013	2014	2015	2016	2017	2018	2019	2020	Total ^c			
from newly established forest													
FMRL ^e												-22 166.000	
Technical corrections to FMRL												-1 680.061	
FM cap												146 137.768	-22 530.590
B.2. CM (if elected)	1 381.462	-2 283.245	-2 578.339	-3 503.613	-5 673.702	-5 581.167	-5 318.019	-5 417.096	-4 011.222	-34 366.403			-45 418.098
B.3. GM (if elected)	125.625	-769.256	-1 183.494	-845.013	-933.114	-542.412	-573.891	-639.907	-612.901	-6 099.989			-7 104.986
B.4. RV (if elected)	NA	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		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 in its report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol its intention to apply the provisions from natural disturbances to its accounting of AR and FM at the end of the commitment period. The Party decided not to exclude emissions and subsequent removals from natural disturbances in its accounting for the 2022 annual submission.

^e As inscribed in the appendix to the annex to decision 2/CMP.7 in kt CO₂ eq per year.

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

Table I.6

Key data for Italy under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2022 annual submission

<i>Parameter</i>	<i>Data</i>
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: commitment period accounting (f) RV: not elected (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	CM, GM
Election of application of provisions for natural disturbances	Yes, for AR and FM ^a
3.5% of total base-year GHG emissions, excluding LULUCF	18 267.221 kt CO ₂ eq (146 137.768 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 62 942 146 RMUs
2. Deforestation	Cancel 15 784 655 units
3. FM	Issue 22 530 590 RMUs
4. CM	Issue 45 418 098 RMUs
5. GM	Issue 7 104 986 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 Italy. 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 Italy (t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
CPR	2 169 262 279	–	–	2 169 262 279
Annex A emissions				
CO ₂	302 278 600	–	–	302 278 600
CH ₄	42 780 066	–	–	42 780 066
N ₂ O	19 471 128	–	–	19 471 128
HFCs	15 876 243	–	–	15 876 243
PFCs	538 616	–	–	538 616
Unspecified mix of HFCs and PFCs	22 862	–	–	22 862
SF ₆	264 141	–	–	264 141
NF ₃	16 306	–	–	16 306
Total Annex A sources^a	381 247 963	–	–	381 247 963
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–9 141 588	–	–	–9 141 588
Deforestation	2 000 030	–	–	2 000 030
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–23 179 067	–	–	–23 179 067
CM	–4 011 222	–	–	–4 011 222
CM for the base year	1 381 462	–	–	1 381 462
GM	–612 901	–	–	–612 901
GM for the base year	125 625	–	–	125 625

^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 Italy (t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	339 233 207	–	–	339 233 207
CH ₄	41 982 451	–	–	41 982 451
N ₂ O	18 756 730	–	–	18 756 730
HFCs	16 870 731	–	–	16 870 731
PFCs	1 027 554	–	–	1 027 554
Unspecified mix of HFCs and PFCs	23 540	–	–	23 540
SF ₆	440 167	–	–	440 167
NF ₃	17 838	–	–	17 838
Total Annex A sources^a	418 352 220	–	–	418 352 220
Activities under Article 3, paragraph 3, of the Kyoto Protocol				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
AR	-7 986 877	–	–	-7 986 877
Deforestation	1 993 251	–	–	1 993 251
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-30 218 268	–	–	-30 218 268
CM	-5 417 096	–	–	-5 417 096
CM for the base year	1 381 462	–	–	1 381 462
GM	-639 907	–	–	-639 907
GM for the base year	125 625	–	–	125 625

^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 Italy(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	349 005 042	–	–	349 005 042
CH ₄	42 981 946	–	–	42 981 946
N ₂ O	18 987 322	–	–	18 987 322
HFCs	16 495 795	–	–	16 495 795
PFCs	1 657 269	–	–	1 657 269
Unspecified mix of HFCs and PFCs	23 151	–	–	23 151
SF ₆	451 725	–	–	451 725
NF ₃	22 132	–	–	22 132
Total Annex A sources^a	429 624 382	–	–	429 624 382
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-5 485 319	–	–	-5 485 319
Deforestation	1 983 473	–	–	1 983 473
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-24 274 589	–	–	-24 274 589
CM	-5 318 019	–	–	-5 318 019
CM for the base year	1 381 462	–	–	1 381 462
GM	-573 891	–	–	-573 891
GM for the base year	125 625	–	–	125 625

^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 Italy(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	352 735 387	–	–	352 735 387
CH ₄	43 672 277	–	–	43 672 277
N ₂ O	19 059 334	–	–	19 059 334
HFCs	16 235 461	–	–	16 235 461
PFCs	1 313 677	–	–	1 313 677
Unspecified mix of HFCs and PFCs	24 968	–	–	24 968
SF ₆	417 494	–	–	417 494
NF ₃	23 500	–	–	23 500
Total Annex A sources^a	433 482 097	–	–	433 482 097
Activities under Article 3, paragraph 3, of the Kyoto Protocol				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
AR	-8 299 865	-	-	-8 299 865
Deforestation	1 975 391	-	-	1 975 391
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-13 117 292	-	-	-13 117 292
CM	-5 581 167	-	-	-5 581 167
CM for the base year	1 381 462	-	-	1 381 462
GM	-542 412	-	-	-542 412
GM for the base year	125 625	-	-	125 625

^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 Italy(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	358 182 542	-	-	358 182 542
CH ₄	43 681 282	-	-	43 681 282
N ₂ O	19 308 425	-	-	19 308 425
HFCs	16 030 033	-	-	16 030 033
PFCs	1 613 725	-	-	1 613 725
Unspecified mix of HFCs and PFCs	24 968	-	-	24 968
SF ₆	399 415	-	-	399 415
NF ₃	33 979	-	-	33 979
Total Annex A sources^a	439 274 370	-	-	439 274 370
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-9 035 847	-	-	-9 035 847
Deforestation	1 973 453	-	-	1 973 453
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-29 064 138	-	-	-29 064 138
CM	-5 673 702	-	-	-5 673 702
CM for the base year	1 381 462	-	-	1 381 462
GM	-933 114	-	-	-933 114
GM for the base year	125 625	-	-	125 625

^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 Italy(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	361 163 177	-	-	361 163 177
CH ₄	44 112 222	-	-	44 112 222
N ₂ O	18 866 625	-	-	18 866 625
HFCs	15 403 094	-	-	15 403 094
PFCs	1 688 326	-	-	1 688 326
Unspecified mix of HFCs and PFCs	24 968	-	-	24 968
SF ₆	472 245	-	-	472 245
NF ₃	28 417	-	-	28 417
Total Annex A sources^a	441 759 074	-	-	441 759 074
Activities under Article 3, paragraph 3, of the Kyoto Protocol				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
AR	-8 569 892	-	-	-8 569 892
Deforestation	1 963 574	-	-	1 963 574
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-32 248 173	-	-	-32 248 173
CM	-3 503 613	-	-	-3 503 613
CM for the base year	1 381 462	-	-	1 381 462
GM	-845 013	-	-	-845 013
GM for the base year	125 625	-	-	125 625

^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 Italy(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	349 390 357	-	-	349 390 357
CH ₄	44 050 812	-	-	44 050 812
N ₂ O	19 004 486	-	-	19 004 486
HFCs	14 918 543	-	-	14 918 543
PFCs	1 564 344	-	-	1 564 344
Unspecified mix of HFCs and PFCs	24 968	-	-	24 968
SF ₆	359 158	-	-	359 158
NF ₃	28 175	-	-	28 175
Total Annex A sources^a	429 340 843	-	-	429 340 843
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-8 165 723	-	-	-8 165 723
Deforestation	1 953 107	-	-	1 953 107
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-31 097 399	-	-	-31 097 399
CM	-2 578 339	-	-	-2 578 339
CM for the base year	1 381 462	-	-	1 381 462
GM	-1 183 494	-	-	-1 183 494
GM for the base year	125 625	-	-	125 625

^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 Italy(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	369 679 720	-	-	369 679 720
CH ₄	45 008 766	-	-	45 008 766
N ₂ O	19 297 428	-	-	19 297 428
HFCs	14 270 536	-	-	14 270 536
PFCs	1 705 414	-	-	1 705 414
Unspecified mix of HFCs and PFCs	24 968	-	-	24 968
SF ₆	421 884	-	-	421 884
NF ₃	25 696	-	-	25 696
Total Annex A sources^a	450 434 412	-	-	450 434 412
Activities under Article 3, paragraph 3, of the Kyoto Protocol				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
AR	-6 257 036	–	–	-6 257 036
Deforestation	1 942 373	–	–	1 942 373
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-30 100 149	–	–	-30 100 149
CM	-2 283 245	–	–	-2 283 245
CM for the base year	1 381 462	–	–	1 381 462
GM	-769 256	–	–	-769 256
GM for the base year	125 625	–	–	125 625

^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 1.B.2.a oil – natural gas liquids (CH₄) (see ID# E.6 in table 5).

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 2014, 2015, 2016, 2018, 2019 and 2021 annual submissions of Italy, contained in documents FCCC/ARR/2014/ITA, FCCC/ARR/2015/ITA, FCCC/ARR/2016/ITA, FCCC/ARR/2018/ITA, FCCC/ARR/2019/ITA and FCCC/ARR/2021/ITA 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 Italy for 2022. Available at https://unfccc.int/sites/default/files/resource/asr2022_ITA.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Daniela Romano and Riccardo de Lauretis (Italian Institute for Environmental Protection and Research), 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:

Andreottola G., Cossu R., 1988. 'Modello matematico di produzione del biogas in uno scarico controllato. RS – Rifiuti Solidi vol. II n. 6, pp. 473-483.

ENEA-federAmbiente, 2012. Rapporto sul recupero energetico da rifiuti urbani in Italia. 3° ed.

Husted S., 1994. *Seasonal variation in methane emissions from stored slurry and solid manures*, J. Env. Qual. 23, pp. 585-592.

Metcalf and Eddy, 1991. *Wastewater engineering: treatment, disposal and reuse*. McGraw Hill, third edition.

Muntoni A., Poletti A., 2002. 'Modelli di produzione del biogas- limiti di applicazione e sensitività'.

Vitullo, M., Federici, S., 2019 National Forest Accounting Plan (NFAP). Institute for Environmental Protection and Research (ISPRA).
