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Report on the individual review of the annual submission of Hungary submitted in 2021*

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 2021 annual submission of Hungary, 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 6 to 11 September 2021 remotely.

* In the symbol for this document, 2021 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"
CCF	carbon content factor
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"
CP	commitment period
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU	European Union
EU ETS	European Union Emissions Trading System
Eurostat	statistical office of the European Union
F-gas	fluorinated gas
FM	forest management
FMRL	forest management reference level
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-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, 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
MMS	manure management system(s)
MSW	municipal solid waste
N	nitrogen

N_2O	nitrous oxide
NA	not applicable
NE	not estimated
Nex	nitrogen excretion
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
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*

I. Introduction

1. This report covers the review of the 2021 annual submission of Hungary, 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 6 to 11 September 2021 remotely[1] and was coordinated by Nashib Kafle, Karen Ortega and Roman Payo (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Hungary.

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

Area of expertise	*Name*	*Party*
Generalist	Phindile Mangwana	South Africa
	Harry Vreuls	Netherlands
Energy	André Amaro	Portugal
	Vincent Camobreco	United States
	Maya Fukuda	Japan
IPPU	Laura Dawidowski	Argentina
	Emma Salisbury	United Kingdom
	Alexander Valencia	Colombia
Agriculture	Abdulkadir Bektas	Turkey
	Paulo Cornejo	Chile
	Mahmoud Medany	Egypt
LULUCF and KP-LULUCF	Atsuko Hayashi	Japan
	Agustin Inthamoussu	Uruguay
	Doru Leonard Irimie	Romania
Waste	Richard Claxton	United Kingdom
	Violeta Hristova	Bulgaria
	Hiroyuki Ueda	Japan
Lead reviewers	Laura Dawidowski	
	Harry Vreuls	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2021 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

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

[1] Owing to the circumstances related to the coronavirus disease 2019, the review had to be conducted remotely.
[2] Issues are defined in decision 13/CP.20, annex, para. 81.
[3] Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

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

5. Annex I presents the annual GHG emissions of Hungary, 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 2021 annual submission

7. Table 2 provides the assessment by the ERT of the Party's 2021 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 2021 annual submission of Hungary

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
Date of submission	Original submission: NIR, 15 April 2021; CRF tables (version 2), 15 April 2021; SEF tables (SEF-CP1-2020 and SEF-CP2-2020), 15 April 2021		
Review format	Centralized review conducted remotely		
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	G.9
	(b) Selection and use of methodologies and assumptions?	Yes	I.11, L.5, L.6, L.7, L.12, L.13
	(c) Development and selection of EFs?	Yes	L.1, L.11
	(d) Collection and selection of AD?	Yes	E.4, A.4, KL.13
	(e) Reporting of recalculations?	Yes	W.7
	(f) Reporting of a consistent time series?	Yes	E.5, I.3, I.8, L.17
	(g) Reporting of uncertainties, including methodologies?	Yes	L.3
	(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]	No	
	(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?	No	
	(b) Performance of the national system functions?	No	

Assessment			*Issue/problem ID#(s) in table 3 or 5[a]*
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	No	
	(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	G.5, KL.5, KL.6, KL.7, KL.9, KL.14
	(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.8, KL.12
	(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	
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	Hungary 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 16 April 2021,[4] and had not been resolved by the time of publication of the report on the review of the Party's 2020 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 Hungary

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	Key category analysis (G.1, 2020) Transparency	Enhance the transparency of the NIR by replacing "the same changes" in NIR section 1.6 with an exact description of the changes made as a result of the key category analysis for each category.	Resolved. The Party reported in its NIR (section 1.6) information on its key categories and stated during the review that it has enhanced its reporting in that section. The ERT noted that the words "the same changes" have been removed. However, the ERT also noted that there is no clear mandate to compare the key category analyses between annual submissions.
G.2	Key category analysis (G.3, 2020) Transparency	Enhance the transparency of the NIR by presenting the results of the approach 1 level and trend key category analysis including and excluding LULUCF.	Resolved. The Party reported in its NIR (pp.A8–A35) the results of the approach 1 level and trend key category analysis including and excluding LULUCF.
G.3	Key category analysis (G.4, 2020) Transparency	Enhance the transparency of the NIR by including the results of the approach 1 key category analysis for the base year, with and without LULUCF, in annex 1.	Resolved. Hungary reported in its NIR (pp.A27–A35) the results of the approach 1 key category analysis for the base year, with and without LULUCF.
G.4	Key category analysis (G.5, 2020) KP reporting adherence	Include the results of the KP-LULUCF key category analysis in the NIR (section 1.6).	Resolved. The Party reported in its NIR (section 1.6) the results of the KP-LULUCF key category analysis, including that the smallest key category under the Convention is category 2.A.4 other process uses of carbonates, with CO_2 emissions of 249 kt in 2019. It noted that, as all KP-LULUCF resulted in higher net CO_2 eq emissions and removals than those of the smallest key category, all three KP-LULUCF categories (categories A.1 afforestation and reforestation, A.2 deforestation and B.1 forest management) can be considered key.
Energy			
E.1	1.A.1 Energy industries – gaseous fuels – CO_2 (E.1, 2020) (E.2, 2019) (E.7, 2017) Consistency	Provide in future NIRs the country-specific CO_2 EFs used to calculate emissions from natural gas consumption for the entire time series with a description of how time-series consistency is ensured.	Resolved. The Party reported in its NIR (p.55) that new country-specific CO_2 EFs for natural gas were developed using EU ETS data to obtain weighted average EFs for each year in 2008–2019, which were then used to recalculate emissions from natural gas consumption for the years before 2008 on the basis of the average value for 2008–2012.

[4] FCCC/ARR/2020/HUN.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
E.2	1.A.2 Manufacturing industries and construction – liquid, solid, gaseous and other fossil fuels – CO_2 (E.11, 2020) Accuracy	Investigate the possibility of using country-specific CO_2 EFs for subcategories under category 1.A.2 other than non-metallic minerals, and pulp and paper.	Resolved. Hungary developed and applied country-specific CO_2 EFs for natural gas for all subcategories under category 1.A.2. Since CO_2 emissions from natural gas combustion accounted for 61 per cent of the total CO_2 emissions under category 1.A.2 for 2019, the country-specific CO_2 EF (55.80 t/TJ) for natural gas significantly reduced the share of CO_2 emissions calculated using default CO_2 EFs (56.10 t/TJ) under category 1.A.2, as reported in the NIR (p.69). During the review, the Party clarified that default CO_2 EFs are used for liquefied petroleum gas (accounting for 1.6 per cent of total energy use in category 1.A.2), fuel oil (accounting for 0.0 per cent) and imported solid fuels generally used outside of the EU ETS (accounting for around 2 per cent). It also clarified that it does not plan to use further country-specific EFs in the short term, since country-specific EFs are already used for all significant subcategories under category 1.A.2.
E.3	1.A.2.g Other (manufacturing industries and construction) – all fuels – CO_2, CH_4 and N_2O (E.2, 2020) (E.3, 2019) (E.8, 2017) Comparability	Use the results of the information gathered from 'auto producers', including the information on the proportion of fuel consumed by 'auto producers', and allocate the emissions from 'auto producers' under the sector where they were generated, in accordance with the methods in the 2006 IPCC Guidelines.	Addressing. The Party reported in its NIR (section 3.2.6.5) that emissions from all 'auto producer' plants were reallocated from category 1.A.2.g to the economic sector under which these plants operate for 2013–2019. However, emissions from 'auto producer' plants prior to 2013 were still reported under category 1.A.2.g. During the review, Hungary clarified that it is considering using information on the outputs (i.e. produced electricity and heat) of 'auto producer' plants, obtained from annual IEA/Eurostat questionnaires, to reallocate emissions prior to 2013. It plans to discuss this matter with experts from the Hungarian Energy and Public Utility Regulatory Authority, which is responsible for domestic energy statistics.
E.4	1.A.4.b Residential – liquid fuels – CO_2, CH_4 and N_2O (E.9, 2020) (E.11, 2019) Accuracy	Review the assumption that the number of households in Hungary is constant across the time series. If this assumption cannot be justified, either revise the estimates or the assumption based on which the emissions are estimated to be constant, and provide the result of the key category analysis for this subcategory that can justify the proposed approach.	Not resolved. The Party indicated in the NIR (pp.85 and A103) that this issue has not been addressed. It did not justify its use of the assumption that was applied or make any methodological changes in the NIR. During the review, the ERT noted that there is an increasing trend in the number of households in Hungary according to the Hungarian Central Statistical Office (see https://www.ksh.hu/stadat_files/jov/en/jov0002.html). However, the Party reported that it did not believe that these statistics would improve the accuracy of its estimates as they do not include information on how many households have gardens, unlike the survey used by the Party. As also noted previously, the ERT noted that any errors caused by assuming a constant number of households in Hungary would not lead to emissions being underestimated to an extent that exceeds the significance threshold for Hungary (e.g. 32.19 kt CO_2 eq for 2019). The ERT also noted the Party intends to continue to use this assumption for this reason, and that all gasoline consumption in the energy statistics from the annual IEA/Eurostat questionnaires is accounted for in the inventory, but considers that the recommendation has not been addressed because the Party has not yet justified its use of the assumption in its NIR.
E.5	1.B.2 Oil, natural gas and other emissions from	Identify the most appropriate method for ensuring a smooth transition in the time series between the	Addressing. The Party continued to use default EFs from the 2006 IPCC Guidelines (vol. 2, chap. 4.2.2.3) for developing and developed countries across

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	energy production – liquid and gaseous fuels – CO_2 and CH_4 (E.13, 2020) Consistency	default EFs in the 2006 IPCC Guidelines (vol. 2, chap. 4.2.2.3) for developing countries and economies in transition applied in the early 1990s and the IPCC default EFs for developed countries applied from 1995 onward (e.g. by taking into account the splicing techniques from the 2006 IPCC Guidelines (vol. 1, chap. 5.3.3)).	the time series for most of the subcategories under category 1.B.2. However, Hungary reported in its NIR (section 3.3.2.5) that it recalculated CH_4 emissions from natural gas transmission and storage (subcategory 1.B.2.b.4) and natural gas distribution (subcategory 1.B.2.b.5) using a country-specific method instead of applying default CH_4 EFs from the 2006 IPCC Guidelines. For 2016–2019 it used data on fugitive natural gas losses from transmission, storage and distribution from the Hungarian Energy and Public Utility Regulatory Authority; for 1985–1993 it applied default CH_4 EFs from the 2019 Refinement to the 2006 IPCC Guidelines (vol. 2, chap. 4.2.2.3) on the basis of an analysis of the aforementioned data on fugitive natural gas losses that justifies the use of the 2019 Refinement as the IEFs for 2016–2019 for subcategories 1.B.2.b.4 and 1.B.2.b.5 fall within the range of default CH_4 EFs (as explained in NIR section 3.3.2.5). CH_4 emissions were then estimated by applying interpolation techniques for the intermediate years (1994–2015) to ensure a smooth transition in the time series. During the review, the Party clarified that it is considering applying the 2019 Refinement to the 2006 IPCC Guidelines for the whole category, a process it expects to span multiple years. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet addressed the significant inter-annual changes in the CO_2 and CH_4 IEFs for oil production, or the CO_2 IEF for natural gas transmission and storage.
IPPU			
I.1	2.A.1 Cement production – CO_2 (I.11, 2020) Transparency	Include information on the type of carbonate inputs at the aggregated level in the NIR.	Addressing. The Party reported in its NIR (section 4.3.1.2) that, according to the EU ETS directive (directive 2003/87/EC), factories are responsible for reporting their CO_2 emissions, which are calculated on the basis of the amount and CO_2 content of all used raw materials, excluding recycled cement kiln dust filtered by dust collectors, as follows: CO_2 content of raw flour multiplied by the amount of raw flour minus the CO_2 content of filtered dust multiplied by the amount of filtered dust. The CO_2 content is analysed by a certified laboratory. Detailed data on carbonate composition are not needed for this method. The NIR does not specify which carbonate inputs are used in the process, besides mentioning magnesium carbonate (p.115). During the review, the ERT noted that the NIR does not provide sufficient information on carbonate inputs to explain the consistently low IEF for category 2.A.1. The Party clarified that this is due to the high calcium carbonate content of limestone mined in Hungary. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included complete information on the type of carbonate inputs in the NIR.
I.2	2.A.2 Lime production – CO_2 (I.12, 2020) Transparency	Specify in the NIR that the tier 3 method was applied for 2005 onward.	Resolved. The Party reported in its NIR (p.117) that the amount of CO_2 generated by this subsector was reported using plant-specific (EU ETS) emission data of companies for after 2005 and using a country-specific IEF for extrapolation for the

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			years before 2005. The method reported for the category in the NIR (p.116) and in CRF Reporter is tier 2 until 2004 and tier 3 for 2005–2019.
I.3	2.A.4 Other process uses of carbonates – CO_2 (I.3, 2020) (I.12, 2019) Consistency	Resolve the time-series inconsistency related to AD for manufacturers of bricks and ceramics not included in the EU ETS using appropriate methods as described in the 2006 IPCC Guidelines.	Not resolved. The ERT noted that there were no revisions of the AD for the category in the 2021 submission. The Party reported in its NIR (p.A104) and during the review that this recommendation has not yet been addressed.
I.4	2.A.4 Other process uses of carbonates – CO_2 (I.13, 2020) Transparency	Report on the carbonates contained in the raw materials used for brick and ceramics production.	Resolved. The Party reported in its NIR (p.123) that companies producing brick and ceramics (of which there were 22 in 2018) use different types of clay and refractory mass as raw materials. Under the EU ETS, companies report the carbon and CO_2 content of their raw materials, supported by measurement results from certified analytical testing laboratories. CO_2 emissions from the organic carbon and carbonate content of raw materials, reported under the EU ETS, are estimated on the basis of these analytical results. During the review, the Party provided the ERT with its submissions made as per article 10 of the EU monitoring mechanism regulation (regulation 749/2014), which showed that its GHG inventory estimates are consistent with its EU ETS reporting.
I.5	2.B.8 Petrochemical and carbon black production – CO_2 (I.15, 2020) Transparency	Describe in the NIR the production processes for ethylene, ethylene dichloride and vinyl chloride monomer, and carbon black, as well as the method, including EF development, for calculating CO_2 emissions.	Resolved. The Party reported in its NIR (section 4.4.3.2) the production processes and methods used to calculate CO_2 emissions.
I.6	2.E.1 Integrated circuit or semiconductor – HFCs, PFCs, SF_6 and NF_3 (I.4, 2020) (I.13, 2019) Transparency	Include an explanation as to how it is determined that there were no other companies in this category with relevant F-gas emissions in the NIR, referring, for example, to the 2006 IPCC Guidelines (vol. 3, chaps. 6.2.3–6.2.4), to justify that completeness had been ensured.	Resolved. Hungary reported in its NIR (section 4.8) the investigations it conducted to ensure completeness. The Party identified eight companies that manufacture electronic equipment, which do not use F-gases, and one company that uses NF_3 during cleaning but has a closed system with no ambient emissions and follow-up neutralization of the reacted NF_3 gas.
I.7	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.6, 2020) (I.7, 2019) (I.12, 2017) Accuracy	Implement a tier 2 method to estimate the emissions of F-gases from refrigeration and air conditioning.	Resolved. The Party reported in its NIR (table 4.9.3) that a tier 2 method is used to estimate emissions of F-gases from refrigeration and air conditioning. The methodology is described in more detail in NIR section 4.9.2.2.
Agriculture			
A.1	3. General (agriculture) – CH_4 and N_2O (A.10, 2020)	Correct the editorial issues and errors in measurement units in section 5.1 (reference to category 3.E), figures 5.1.3–5.1.4 (colour coding), figure 5.2.2 (unit of measurement for milk production) and tables 5.2.1	Addressing. The Party corrected in the NIR the editorial issues and errors in figures 5.1.3, 5.1.4 and 5.2.2 and tables 5.2.1 and 5.3.16, but did not resolve the issues relating to tables 5.3.17–5.3.18 or section 5.1.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	Convention reporting adherence	(unit of measurement for population) and 5.3.16–5.3.18 (unit of measurement for volatile solids (kg dry matter/head/day) of the NIR.	During the review, it clarified that the measurement unit error in tables 5.3.17–5.3.18 will be corrected in the next annual submission as these tables need to be changed from horizontal to vertical format in order for the correction to be made.
A.2	3.A.1 Cattle – CH_4 (A.2, 2020) (A.6, 2019) Convention reporting adherence	Correct the error identified in the NIR regarding the number of equations used to estimate the net energy for activity when estimating gross energy intake for dairy cattle.	Resolved. The Party corrected in the NIR (p.227 and table 5.2.4) the error identified regarding the number of equations used, clarifying that equation 10.4 from the 2006 IPCC Guidelines (vol. 4, chap. 10) is used to estimate net energy for activity when estimating gross energy intake for dairy cattle.
A.3	3.B Manure management – CH_4 and N_2O (A.6, 2020) (A.10, 2019) Transparency	Explain in the NIR the reason for reporting "NO" for some years of the time series for cattle, poultry and swine manure allocated to anaerobic digesters.	Addressing. Hungary reported in its NIR (pp.247–248) that the corrected data on biogas plants will be available for the 2022 submission. Moreover, the Ministry of Agriculture has initiated a project to develop country-specific methane conversion factors for animal manure used in anaerobic digesters, which will also be available for the 2022 submission. During the review, the Party reported that it corrected in its NIR (p.247) the two incorrect references to CRF table 3.B(s)s2 instead of CRF table 3.B(a)s2. The ERT considers that the recommendation has not yet been fully addressed because the Party did not specify the year in which the first biogas plant was established, thus explaining the historical reporting of "NO".
A.4	3.B Manure management – CH_4 and N_2O (A.11, 2020) Accuracy	(a) Finalize a procedure for reporting manure processed in anaerobic digesters, estimate the corresponding CH_4 and N_2O emissions using the most appropriate methods from the 2006 IPCC Guidelines (vol. 4, chap. 10) (if necessary applying the splicing techniques set out in vol. 1, chap. 5, to ensure time-series consistency) and replace "IE" in CRF tables 3.B(a)s2 and 3.B(b) with the appropriate figures when data on biodigesters become available; (b) If this is not possible for the next annual submission, use the documentation boxes in CRF tables 3.B(a)s1 and 3.B(b) to explain that "IE" in the column for digesters refers to the allocation of the corresponding amounts under other MMS (liquid and solid) owing to lack of information on the amount of manure diverted to digesters.	(a) Addressing. The Party continued to report anaerobic digested manure under on-farm storage (liquid and solid MMS). The Party reported in its NIR (pp.247–248) that the corrected allocation and estimates will be available for the 2022 submission. Further, the Ministry of Agriculture has initiated a project to develop country-specific methane conversion factors for animal manure used in anaerobic digesters, which will also be available for the 2022 submission. During the review, the Party clarified that it is in the process of collecting AD on the amount of animal manure used in anaerobic digesters and the background information required to derive country-specific methane conversion factors for each animal category, on the basis of which it will report emissions from anaerobic digesters. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet updated the methodology and reporting on the amount of manure processed in anaerobic digesters to ensure consistency between the agriculture, waste and energy sectors, and has not yet reported consistent values for the amount of manure diverted to biodigesters and the use of biogas as a fuel for heat and power production. (b) Resolved. Information explaining the use of "IE" was provided in the documentation boxes to CRF tables 3.B(a)s1 and 3.B(b) and in the NIR (p.248).
A.5	3.B.4 Other livestock – N_2O (A.12, 2020) Transparency	Include in the NIR appropriate references for equations 5.4–5.7, which are used to estimate the Nex rate for broilers, laying hens and sows.	Resolved. The Party reported in its NIR (pp.253, 255 and 256) appropriate references for equations 5.4–5.7.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
LULUCF			
L.1	4. General (LULUCF) – CO_2 (L.3, 2020) (L.11, 2019) Accuracy	Review the calculation which results in zero emissions/removals for CSC in mineral soils for grassland remaining grassland and flooded land remaining flooded land in 2017, and, if appropriate, revise and report a proper value or notation key in CRF tables 4.C and 4.D.	Not resolved. In CRF tables 4.C and 4.D, for CSC in mineral soils for grassland remaining grassland for 2017 and 2019, the Party continued to report zero emissions and removals and did not use notation keys; and for flooded land remaining flooded land, it reported "IE" for the entire time series. During the review, the Party clarified that it will address the issue for the next annual submission.
L.2	4. General (LULUCF) – CO_2 (L.4, 2020) (L.18, 2019) Accuracy	Recalculate the figures for the area of forest land converted to other lands by using transition periods of 20 years, rather than the area accumulated since 1985, in CRF tables 4.B, 4.C and 4.E, and then recalculate all the related emissions and removals accordingly.	Resolved. Hungary reported the following cumulative areas of forest land converted to other land: 9,570 ha forest land converted to cropland in CRF table 4.B; 8,060 ha forest land converted to grassland in CRF table 4.C; and 18,360 ha forest land converted to settlements in CRF table 4.E, resulting in 35,990 ha in total. These figures are identical in the 2020 and 2021 submissions. The ERT noted that NIR table 6.5.2 provides different annual figures and asked the Party for further information regarding the use of a 20-year transition period. During the review, the Party provided detailed Excel files containing information on the conversion of annual figures in the NIR to cumulative 20-year figures in the CRF tables, including formulas used, as well as further clarifications regarding the correspondence between the two sets of figures.
L.3	4. General (LULUCF) (L.16, 2020) Convention reporting adherence	Conduct a quantitative assessment of the emissions and removals for each LULUCF category for at least the base year and the latest inventory year and a trend uncertainty assessment between these two years using at least approach 1, and report the results within the uncertainties discussion for each land-use category in the NIR as well as in NIR table A2-2.	Not resolved. The Party reported in the NIR (section 6.11) that uncertainties were previously calculated using a Monte Carlo simulation (approach 2) for the forest land category and using a tier 1 method for the other LULUCF categories. The ERT noted that the NIR does not include an updated, comprehensive quantitative or qualitative assessment of uncertainties related to individual land-use categories, pools or gases. During the review, the Party clarified that it plans to improve its uncertainty assessment for the next annual submission.
L.4	Land representation – CO_2, CH_4 and N_2O (L.18, 2020) Convention reporting adherence	Correct the data to ensure that the total areas reported in CRF tables 4.A, 4.B, 4.C, 4.D and 4.E match those reported in CRF table 4.1, performing QA/QC checks to ensure correctness of the reported data.	Addressing. The Party reported in CRF table 4.1 different AD for land-use categories 4.A–4.D than those reported in CRF tables 4.A–4.E, although these differences are minor. During the review, the Party clarified that it has identified the source of these differences and will correct the figures for the next annual submission.
L.5	Land representation – CO_2, CH_4 and N_2O (L.19, 2020) Accuracy	Develop a consistent time series for all IPCC land-use categories for 1966 onward, on the basis of available national data and following the 2006 IPCC Guidelines to ensure time-series consistency; adopt a 20-year transition period, as per the 2006 IPCC Guidelines, for all IPCC categories; and report GHG emissions and removals on the basis of the recalculated time series of land-use category areas.	Addressing. Hungary reported in its NIR (table 6.3.6) the annual land-use change matrix for 1985–2019 but did not include the representation of land-use categories for prior to 1985 in compliance with the 2006 IPCC Guidelines (vol. 4, chap. 2, p.13), which state that "the length of time that land remains in a conversion category after a change in land use is by default 20 years". During the review, the Party clarified that, while extrapolation backwards is theoretically possible (at least at the computation level), it would lead to assumptions far remote from the reality of land-use changes pre-1985, which remain largely unknown. Thus, Hungary considers that not generating pre-1985 data, which in practice equates to zero CSC

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			for 1966–1985 and which has implicitly been its practice so far, is the preferred option (including for future annual submissions) to generating data without a scientific basis. Furthermore, the Party explained that, given the 20-year transition period, the representation of land-use categories pre-1985 will not have an impact on reporting under the Kyoto Protocol, and as such it considers this a lower priority than other necessary improvements. The Party applied a 20-year transition period and, notwithstanding ID# L.2 above, is implementing it in the inventory for 1986 onward. However, the ERT considers that the recommendation has not been fully addressed because the Party has not yet provided a land-use change matrix and associated estimates for 1966–1985 and has not reported emissions and removals on this basis. It suggests that the Party either implement the previous ERT recommendation to develop a 1966–1985 time series (e.g. using retrospective extrapolation, international databases or other methods), or, in the absence of reliable data, assume zero land-use changes for 1966–1985, which equates to zero CSC, and provide information on this approach in the next annual submission.
L.6	4.A Forest land – CO_2 (L.7, 2020) (L.14, 2019) Accuracy	Recalculate the area of forest land for the entire time series for the portion of "found forest" established by conversion, and for the portion of "found forest" established by natural expansion or by geodesic remeasurements, separately.	Addressing. Hungary reported in its NIR (p.370) that, while the origin of "found forest" is usually unknown, it is the result of conversion, natural expansion or remeasurement for management planning purposes, and has an average value above 20 years. The Party also reported in its NIR (p.380) that the calculation method used ensures that stocks of new "found forest" are excluded from net removals, although net removals from all "found forest" are included in net removals from forest land remaining forest land. During the review, the Party clarified that it will report the required estimates in the next annual submission. Hungary agreed with the ERT that, to avoid overestimating net sinks under forest land remaining forest land, the carbon stock of "found forest" needs to be excluded from estimates of CSC because it does not constitute an actual increase in carbon stock (i.e. it is not a sink for the year in which such forests are first included in the GHG inventory). The ERT considers that the Party has yet to report separately the areas of "found forest" resulting from conversion, natural expansion or remeasurement.
L.7	4.A Forest land – CO_2 (L.8, 2020) (L.14, 2019) Accuracy	Recalculate, for the entire time series, CSC in all pools under forest land remaining forest land (4.A.1) and land converted to forest land (4.A.2).	Not resolved. The Party reported in its NIR (p.370) that, given the largely unknown origin of "found forest", it decided not to estimate CSC for these areas. The ERT noted that resolving this issue is dependent on resolving ID# L.6 above. During the review, the Party clarified that it will provide recalculated estimates in the next annual submission.
L.8	4.A.1 Forest land remaining forest land – CO_2 (L.9, 2020) (L.15, 2019)	Change the notation key from "NO" to "NE" for the dead organic matter and mineral soils pools for forest land remaining forest land in CRF table 4.A.	Not resolved. The Party reported "NO" in its 2020 submission and "NO, NA" in its 2021 submission in CRF table 4.A for forest land remaining forest land for both the litter and mineral soils pools, despite the recommended use of "NE". During the review, Hungary clarified that this was one of the technical problems that it encountered when importing data into the CRF tables but noted that it will correct

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	Convention reporting adherence		its use of notation keys and take steps to enhance its QA system for its next annual submission.
L.9	4.A.2 Land converted to forest land – CO_2 (L.10, 2020) (L.17, 2019) Convention reporting adherence	Correct the figures for land converted to forest land in NIR tables 6.5.3 and 6.5.11 so that the figures are consistent in tables 6.5.3 and 6.5.11 and CRF table 4.A for category 4.A.2 and address the problem that occurred in the underlying database for inventory year 2017 (i.e. which resulted in some figures for 2017 in NIR table 6.5.11 showing a slight increase from the figures in the previous year).	Not resolved. The following AD for land converted to forest land were reported for 2018 and 2019, respectively: 124,226 and 117,589 ha (NIR table 6.5.3); 122,464 and 116,144 ha (NIR table 6.5.11); and 122,230 and 117,590 ha (CRF table 4.A). During the review, the Party clarified that it consults several sources of information on afforestation, which sometimes provide slightly different data owing to their focus on different issues. Attempts to harmonize these data sources and the resulting differences have already been made, but these differences, albeit small, are still present. The Party plans to eliminate these small inconsistencies for the next annual submission.
L.10	4.C.1 Grassland remaining grassland – CO_2 (L.20, 2020) Transparency	Explain in the NIR how the distribution of the area of various grassland subcategories is assessed and used as a basis to determine changes in management practices.	Addressing. Hungary reported in CRF table 4.C estimated values for CSC in mineral soils for grassland remaining grassland, which were given as "0" for several years of the time series, and provided in its NIR (section 6.7.2) information regarding the methodology used. During the review, it clarified that "0" was reported for some years of the time series because 2013 is the last year for which data on grassland treated with chemical fertilizers are available, after which linear extrapolation (no change) was assumed. The Party provided during the review a complete time series for the proportion of non-degraded (i.e. non-fertilized) grassland, illustrating that the assumption of "0" was applicable for some years, and mentioned its plan to revise its historical values to take into account information obtained from the next census. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included detailed information on the AD and assumptions used to estimate CSC in mineral soils.
L.11	4.D.1 Wetlands remaining wetlands – CO_2 (L.13, 2020) (L.5, 2019) (L.9, 2017) Accuracy	If the country-specific CSC are estimated for lands for which the standard land-use categories based on the 2006 IPCC Guidelines (e.g. peat extraction and flooded land remaining flooded land) are not applicable, for instance the mineral soil CSC under wetlands remaining wetlands with grass vegetation, examine the ways to report CSC in such lands under "other wetlands" with a notification in the documentation box or in the comment box in the CRF tables, together with a clear explanation in the relevant section of the NIR of where in the CRF tables the emissions from those lands are reported.	Not resolved. Hungary continued to report "NO" for net CSC in mineral and organic soils for peat extraction remaining peat extraction and "IE" for net CSC in mineral soils in flooded land remaining flooded land. During the review, the Party clarified that it will look into the issue for the next annual submission.
L.12	4(II) Emissions/removals from drainage and rewetting and other	Correct the reporting of CO_2 emissions from peat extraction in CRF table 4(II) and provide the correct value or a notation key.	Not resolved. The Party reported in its NIR (pp.437–438) the same value as was reported previously (0.8 t/m^3) for converting wet peat to air-dry peat, which led to the relatively high estimates for this subcategory. During the review, the Party

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	management of organic/mineral soils – CO_2 (L.14, 2020) (L.7, 2019) (L.13, 2017) Accuracy		clarified that this was the largest value obtained from samples taken at various extraction sites, which produced a relatively large range of values; the largest value was used in order to not underestimate emissions. The Party also clarified that the value reported in the NIR will be reviewed subject to available resources.
L.13	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO_2 (L.15, 2020) (L.16, 2019) Accuracy	Provide justification for the high value used to convert from wet peat to air-dry peat (0.8 t/m^3) and, if the value cannot be justified, try to obtain a more accurate value and recalculate the emissions from off-site emissions from managed peatlands accordingly.	Addressing. The Party reported in its NIR (pp.437–438) the same value as was reported previously (0.8 t/m^3) for converting wet peat to air-dry peat. During the review, the Party clarified that this was the largest value obtained from samples taken at various extraction sites, which produced a relatively large range of values; the largest value was used in order to not underestimate emissions. The Party also clarified that this value will be reviewed subject to the availability of resources.
L.14	4(IV) Indirect N_2O emissions from managed soils – CO_2 and CH_4 (L.21, 2020) Transparency	Provide the relevant AD (i.e. amount of N mineralized from losses in SOC in mineral soils due to land-use changes or management practices, in kg N/year (known as F_{SOM})) in CRF table 4(IV) in the next annual submission.	Resolved. The Party reported in CRF table 4(IV) AD on the amount of N mineralized from losses in SOC in mineral soils due to land-use changes or management practices, and provided information on the calculation of N_2O emissions in the NIR (section 6.4.2).
Waste			
W.1	5.A Solid waste disposal on land – CH_4 (W.13, 2020) Transparency	Improve the description of assumptions about landfill covers for managed landfills D1 in the NIR, explaining that these landfills are covered but not necessarily immediately after the waste is deposited.	Resolved. The Party improved the description in its NIR (p.459) of assumptions about landfill covers for D1 landfills, explaining that these landfills are covered but not necessarily immediately after the waste is deposited, and in some cases the application of a soil cover oxidation might be delayed owing to modernization efforts or post-closure management.
W.2	5.A Solid waste disposal on land – CH_4 (W.13, 2020) Accuracy	Improve the time series of covers and CH_4 oxidation for 2007–2016 to take into account the conclusions of the 2009 report on the implementation of the EU landfill directive that from 2007 onward all managed landfills met the requirements of the EU landfill directive and were therefore covered.	Resolved. The time series (2004–2016) was recalculated for the 2021 submission, as explained in the NIR (p.461). The Party reported in its NIR (p.459) that the conclusions of the 2009 report on the implementation of the EU landfill directive indicate that for 2007–2009 all managed landfills met the requirements of the EU landfill directive and were therefore covered. On the basis of this report, for 2009 onward an oxidation value of 0.1 was assumed. Hungary also improved its time series of covers and CH_4 oxidation.
W.3	5.C.2 Open burning of waste – CO_2, CH_4 and N_2O (W.7, 2020) (W.15, 2019) Transparency	Include additional information to justify the reporting of emissions from open burning using "NO" in the NIR.	Resolved. The Party reported in its NIR (p.465) information on legislation prohibiting the open burning of waste, namely decree 21/1986 on the protection of air quality, under which waste incineration of any kind requires authorization; decree 21/2001 (II.14) prohibiting the open burning of waste, including in household furnaces; and decree 306/2010 (XII.23) on air protection.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
W.4	5.D Wastewater treatment and discharge – CH_4 (W.8, 2020) (W.16, 2019) Transparency	Include in the NIR the tables that indicate the main AD and parameters used in the calculations for CH_4 emissions from both domestic and industrial wastewater treatment.	Addressing. The Party reported in its NIR (pp.470–473) on AD and other parameters, including information on the proportion of the population connected to different sewerage systems for 1990 and 2019, but did not specify the assumptions or data sources used to determine municipal and industrial wastewater treatment. During the review, it clarified that annual data on the number of dwellings connected to public sewerage systems are provided by the Hungarian Central Statistical Office for 1990–2019. Data on the proportion of the population connected thereto are available for 2011 onward, prior to which the proportion is calculated on the basis of the number of dwellings connected. The ERT considers that the recommendation has not yet been fully addressed because the assumptions and data sources used were not clearly explained in the NIR.
W.5	5.D.2 Industrial wastewater – CH_4 (W.12, 2020) (W.18, 2019) Transparency	Provide an explanation of the EFs for industrial wastewater treatment, including a reason for adopting the methane correction factors applied, in the NIR.	Not resolved. Hungary reported in its NIR (p.472) the methane correction factors applied for the aerobic treatment of industrial wastewater for the entire time series but did not justify its selection of or the trends in these factors. During the review, it clarified that it applied the general assumptions that industrial wastewater is treated aerobically and that, in the case of anaerobic treatment, CH_4 generated is recovered as sewage sludge gas with an assumed leakage rate of 5 per cent. The Party noted that it is considering recalculating emissions for category 5.D for its next annual submission.
KP-LULUCF			
KL.1	General (KP-LULUCF) (KL.2, 2020) Transparency	Correct the value reported in NIR table 11.8 for "Land under AR" and enhance the transparency of the NIR by clearly explaining the transition period applied for KP-LULUCF.	Resolved. The Party included information regarding the 20-year transition period in the documentation box in CRF table 4(KP-I)A.2 and throughout NIR section 11. The ERT noted that the value reported for removals in NIR table 11.7 for "emissions and removals from AR since 1990" is consistent with the value reported in CRF table 4(KP-I)A.1.
KL.2	Deforestation – CO_2, CH_4 and N_2O (KL.3, 2020) Transparency	Revise the methodological description in the NIR to reflect how the Party determined the appropriate areas of deforestation for forest subcompartments and other subcompartments, and ensure consistency between the areas and the emissions and removals reported in the NIR and in CRF table 4(KP-I)A.2.	Resolved. The Party reported in the NIR (section 11.1.3.2) on the methodology used to determine the areas of deforestation and ensured consistency between the cumulative deforestation values in NIR table 11.3 and CRF table 4(KP-I)A.2 for the entire time series.
KL.3	FM – CO_2, CH_4 and N_2O (KL.4, 2020) Transparency	Correct the values for the FM areas reported in NIR table 6.5.1 for 2008–2018, and enhance the transparency of the NIR by including a detailed section on "found forest" as applied to KP-LULUCF reporting, reporting a time series of the areas, as well as the parameters and carbon factors used in the estimation process.	Addressing. Hungary reported the following FM areas for 2019: 1,878,365 ha (NIR table 6.5.1); 1,762,627 ha (NIR table 11.6); and 1,895,650 ha (CRF table 4(KP-I)B.1). It reported the following areas of new "found forest" for 2017: 1,683 ha (NIR table 6.5.3) and 1,664 ha (NIR table 11.5(c)). During the review, the Party clarified that the correct value for the FM area is that in NIR table 6.5.1, and that the Excel sheet used for the CRF table data contains an incorrect formula, which will be corrected for the next annual submission. It also clarified that the difference between the areas reported in NIR tables 6.5.1 and 11.6 is equal to the

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
			area of other subcompartments, which is included in the latter but not the former. Furthermore, the Party explained that the "found forest" area in NIR table 6.5.3 includes only the forest subcompartment, whereas NIR table 11.5(c) also includes other subcompartments. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet ensured full consistency between the NIR and the CRF tables concerning areas subject to FM, or included a detailed section on "found forest" as applied to KP-LULUCF reporting.
KL.4	FM – CO_2, CH_4 and N_2O (KL.5, 2020) KP reporting adherence	Explain in the NIR all factors leading to the technical correction and the updated FMRL technical correction (e.g. following the checklist in table 2.7.1 of the Kyoto Protocol Supplement), including the rationale for calculating the technical correction, the methods used for the calculation and the results, as well as a discussion of the differences between the FMRL technical correction and the original FMRL.	Resolved. The ERT noted Hungary's exchange on this matter with the previous ERT, which accepted the Party's recalculations for the technical correction of the FMRL. Hungary reported in its NIR (section 11.5.2.3) detailed information on the assumptions and methods used for the technical correction, as requested by the previous ERT.
KL.5	FM – CO_2 (KL.7, 2020) KP reporting adherence	Enhance the transparency of the NIR by including transparent and verifiable information demonstrating that the litter pool is not a source, following the guidance provided in the Kyoto Protocol Supplement (section 2.3.1).	Not resolved. The Party reported in its NIR (sections 6.5.4.2.2 and 11.3.1.2) the same information as provided in the previous NIR: mainly qualitative information, including comparisons with other countries, demonstrating that the deadwood, litter and soil carbon pools are not a source. During the review, the Party clarified that it will improve its reporting on this matter in the next annual submission.
KL.6	FM – CO_2 (KL.8, 2020) KP reporting adherence	Enhance the transparency of the NIR by including transparent and verifiable information demonstrating that the soils pool is not a net source on the basis of the ongoing analysis of the Hungarian Soil Protection and Monitoring System measurements.	Not resolved. The Party reported in its NIR (sections 6.5.4.2.3 and 11.3.1.2) information demonstrating that the soils pool is not a source, but this information was largely identical to that provided in the previous submission. During the review, the Party clarified that it will review this issue for the next annual submission.

[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.

[b] The report on the review of the 2018 annual submission of Hungary was not available at the time of this review. Therefore, 2018 is excluded from the list of review years in which issues could have been identified.

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 2021 annual submission of Hungary, 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 Hungary

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
General	No issues identified.	
Energy		
E.3	Use the results of the information gathered from 'auto producers', including the information on the proportion of fuel consumed by 'auto producers', and allocate the emissions from 'auto producers' under the sector where they were generated, in accordance with the methods in the 2006 IPCC Guidelines.	4 (2017–2021)
E.4	Review the assumption that the number of households in Hungary is constant across the time series. If this assumption cannot be justified, either revise the estimates or the assumption based on which the emissions are estimated to be constant, and provide the result of the key category analysis for this subcategory that can justify the proposed approach.	3 (2019–2021)
IPPU		
I.3	Resolve the time-series inconsistency related to AD for manufacturers of bricks and ceramics not included in the EU ETS using appropriate methods as described in the 2006 IPCC Guidelines.	3 (2019–2021)
Agriculture		
A.3	Explain in the NIR the reason for reporting "NO" for some years of the time series for cattle, poultry and swine manure allocated to anaerobic digesters.	3 (2019–2021)
LULUCF		
L.1	Review the calculation which results in zero emissions/removals for CSC in mineral soils for grassland remaining grassland and flooded land remaining flooded land in 2017, and, if appropriate, revise and report a proper value or notation key in CRF tables 4.C and 4.D.	3 (2019–2021)
L.6	Recalculate the area of forest land for the entire time series for the portion of "found forest" established by conversion, and for the portion of "found forest" established by natural expansion or by geodesic remeasurements, separately.	3 (2019–2021)
L.7	Recalculate, for the entire time series, CSC in all pools under forest land remaining forest land (4.A.1) and land converted to forest land (4.A.2).	3 (2019–2021)
L.8	Change the notation key from "NO" to "NE" for the dead organic matter and mineral soils pools for forest land remaining forest land in CRF table 4.A.	3 (2019–2021)

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
L.9	Correct the figures for land converted to forest land in NIR tables 6.5.3 and 6.5.11 so that the figures are consistent in tables 6.5.3 and 6.5.11 and CRF table 4.A for category 4.A.2 and address the problem that occurred in the underlying database for inventory year 2017 (i.e. which resulted in some figures for 2017 in NIR table 6.5.11 showing a slight increase from the figures in the previous year).	3 (2019–2021)
L.11	If the country-specific CSC are estimated for lands for which the standard land-use categories based on the 2006 IPCC Guidelines (e.g. peat extraction and flooded land remaining flooded land) are not applicable, for instance the mineral soils CSC under wetlands remaining wetlands with grass vegetation, examine the ways to report CSC in such lands under "other wetlands" with a notification in the documentation box or in the comment box in the CRF tables, together with a clear explanation in the relevant section of the NIR of where in the CRF tables the emissions from those lands are reported.	4 (2017–2021)
L.12	Correct the reporting of CO_2 emissions from peat extraction in CRF table 4(II) and provide the correct value or a notation key.	4 (2017–2021)
L.13	Provide justification for the high value used to convert from wet peat to air-dry peat (0.8 t/m^3) and, if the value cannot be justified, try to obtain a more accurate value and recalculate the emissions from off-site emissions from managed peatlands accordingly.	3 (2019–2021)
Waste		
W.4	Include in the NIR the tables that indicate the main AD and parameters used in the calculations for CH_4 emissions from both domestic and industrial wastewater treatment.	3 (2019–2021)
W.5	Provide an explanation of the EFs for industrial wastewater treatment, including a reason for adopting the methane correction factors applied, in the NIR.	3 (2019–2021)
KP-LULUCF	No issues identified.	

[a] The report on the review of the 2018 annual submission of Hungary has not yet been published. Therefore, 2018 was 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 2021 annual submission

10. Table 5 presents findings made by the ERT during the individual review of the 2021 annual submission of Hungary that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2021 annual submission of Hungary

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General			
G.5	KP-LULUCF supplementary information	The Party reported in its NIR (section 6.5.4.2.4) information on HWP but did not include an adequate description of how emissions and removals resulting from changes in the HWP pool accounted for do not include imported HWP in accordance with paragraph 2(g)(vii) of annex II to decision 2/CMP.8. During the review, Hungary clarified that, as reported in its NIR, it uses equation 2.8.1 from the Kyoto Protocol Supplement to estimate the domestically utilized fraction of the total amount of HWP. The ERT recommends that the Party include information in NIR section 6.5.4.2.4 showing how emissions and removals resulting from changes in the HWP pool accounted for do not include imported HWP.	Yes. Transparency
G.6	Inventory management	Hungary reported in its NIR (section 10) recalculations and planned improvements. However, the ERT noted that this section did not include any planned improvements for a number of key categories. During the review, the Party indicated that it did not include a national inventory improvement plan in its current and recent annual submissions and that information on improvements is documented only in the sectoral chapters of the NIR. In addition, it discussed in the NIR how the results of the key category and uncertainty analyses are used to prioritize inventory improvements. The ERT encourages the Party to compile a national inventory improvement plan and report information on the status of planned improvements and the timeline for their expected implementation, to the extent possible, as part of its inventory management.	Not an issue/problem
G.7	AD	Hungary reported in its NIR (section 1.4) information on data collection, processing and storage, and the various data sources used. The ERT noted that it was not clear which data were sourced within the scope of the reporting obligation under government decree 278/2014 and which were sourced through other non-mandatory mechanisms, or whether there are any formal agreements in place for sourcing additional inventory data. During the review, the Party clarified that government decree 278/2014 establishes most of the country's data reporting requirements and provides for mechanisms for collecting data from government ministries and companies. It also clarified that institutions responsible for compiling the inventory are entitled to request additional data to supplement or refine the available information or make any corrections requested during reviews. The ERT recommends that the Party enhance the transparency of the NIR by including information in section 1.4 on key data sources and the existing data collection mechanisms used, and documenting how additional data not covered by any formal data-sourcing agreements are sourced.	Yes. Transparency
G.8	QA/QC and verification	The Party reported in its NIR (section 1.7) information on its QA/QC procedures, with the full QA/QC plan provided in annex 5. The ERT noted areas for improvement with regard to QA/QC procedures and inconsistencies between the NIR	Yes. Convention reporting adherence

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
		and CRF tables (see ID#s I.10, I.11, L.16, W.6, KL.8, KL.10 and KL.12 below). During the review, the Party acknowledged these areas and reported that it will address them for the next annual submission and take steps to develop its QA system. The ERT recommends that Hungary improve consistency between the CRF tables and the NIR by addressing the areas for improvement identified and enhance its QA/QC procedures and describe any changes made thereto in the NIR.	
G.9	Key category analysis	Hungary reported in its NIR (section 1.6) that, as all KP-LULUCF resulted in higher net CO_2 eq emissions and removals than those of the smallest key category, all three KP-LULUCF categories (categories A.1 afforestation and reforestation, A.2 deforestation and B.1 forest management) can be considered key. However, in CRF table NIR 3, A.2 deforestation is indicated not to be a key category. The ERT recommends that Hungary improve consistency between the CRF tables and the NIR by providing consistent information in the NIR and the CRF tables.	Yes. KP reporting adherence
Energy			
E.6	1.A.3.e.i Pipeline transport – gaseous fuels – CO_2, CH_4 and N_2O	The ERT noted a significant increase in CO_2 emissions from pipeline transport between 1990 and 2010 (rising from 28.0 to 73.8 per cent). According to the NIR (section 3.2.7.5), a new extrapolation method was used for pipeline transport, but no detailed information was provided on how the Party recalculated emissions from pipeline transport. During the review, the Party clarified that this was because (1) the energy statistics (annual IEA/Eurostat questionnaires on natural gas) used as AD did not contain information on the fuels allocated to pipeline transport prior to 2010, meaning that the AD were extrapolated for those years and (2) the value in the energy statistics for 2010 (1,278 TJ on a gross calorific value basis) was lower than that reported by FGSZ Natural Gas Transmission Ltd (Hungary's transmission system operator) under the EU ETS. This issue was first detected when compiling the 2021 submission. Hungary amended the fuel consumption data for 2010 on the basis of the EU ETS data, and then changed the extrapolation method as follows: for 2005–2009, it used data from the EU ETS database, and for earlier years it extrapolated the AD using data on production and importation of natural gas, instead of total consumption, as in the previous annual submissions. It explained that, while there was not a significant difference between the two values extrapolated (i.e. using data on production and importation on the one hand and total consumption on the other), it opted for the higher value. The ERT recommends that the Party provide information on the sources of AD used across the times series, including the detailed information on the new extrapolation method for AD and an explanation for the significant increase in emissions from pipeline transport between 1990 and 2010.	Yes. Transparency
E.7	1.B.2.c Venting and flaring – CH_4	The ERT noted that the CH_4 emissions for category 1.B.2.c.1.ii venting (gas) were reported as "IE" in CRF table 1.B.2 for the base year–2019, whereas values ranging from 4.62 kt for the base year to 1.56 kt for 2015 were reported in the previous annual submission. The Party reported in CRF table 9 that CH_4 emissions for category 1.B.2.c.1.ii are allocated under category 1.B.2.b.4 natural gas – transmission and storage but did not explain why. During the review, Hungary clarified that CH_4 emissions from venting of natural gas are now included under category 1.B.2.b.4 owing to the recalculation of CH_4 emissions for this category in response to a previous recommendation (see ID# E.5 in table 3). The ERT noted that the NIR does not clearly explain why and how the recalculation affected the allocation of emissions reported as "IE" for category 1.B.2.c.1.ii and where they are allocated.	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 the reason for reporting emissions for category 1.B.2.c.1.ii as "IE" in CRF table 1.B.2 and explain where these emissions are allocated.	
IPPU			
I.8	2.A.4 Other process uses of carbonates – CO_2	Hungary reported in its NIR (section 4.3.4.2) that for category 2.A.4.a ceramics plant-specific data were reported for 2005–2016 and a country-specific IEF was generated for extrapolating emissions before 2005, adding that the trend in the IEF meant that the 2005 IEF was the most appropriate value for the earlier years. However, the ERT noted that the Party reported in CRF table 2(I).A-Hs1 an IEF of 0.10 t CO_2/t for 2005 and an IEF of 0.07 t CO_2/t for all years prior to 2005. During the review, Hungary clarified that in January 2018 it recalculated its AD for category 2.A.4.a to improve its estimates, reviewing the assumption underlying the addition of 10 per cent to the data reported under the EU ETS for 2005 onward. The resulting changes in AD reflected not only the addition of emissions not under the EU ETS but also the exclusion of types of brick and ceramics that are not sources of CO_2 emissions. The time-series consistency of IEFs for prior to 2005 compared with IEFs for 2005 onward was not reviewed; however, Hungary reported that a recalculation of CO_2 emissions for category 2.A.4.a for prior to 2005 will be performed for the next annual submission. The ERT recommends that the Party assess the time-series consistency of CO_2 IEFs for category 2.A.4.a ceramics and revise the estimates for prior to 2005.	Yes. Consistency
I.9	2.B.1 Ammonia production – CO_2	The Party reported in its NIR (p.134) that the default CCF was replaced by a newly calculated country-specific CCF for 1985–2006, with plant-specific CCF values reported by producers used for 2007 onward. However, it was not clarified in the NIR how the country-specific CCF was derived. During the review, the Party clarified that the country-specific CCF for 1985–2006 was calculated by taking the average of the CCFs for 2007–2019 because there was no significant trend in the CCF for these years. The ERT recommends that the Party include in its NIR a description of the method for calculating the country-specific CCF applied for 1985–2006.	Yes. Transparency
I.10	2.F.1 Refrigeration and air conditioning – HFCs	Hungary reported in its NIR (table 4.9.5) a lifetime of 25 years for subcategory 2.F.1.c industrial refrigeration. However, the ERT noted that disposal emissions from industrial refrigeration were first reported 20 years after HFCs were first introduced to market under this subcategory. During the review, the Party clarified that this was due to a clerical error in the NIR, which will be corrected for the next annual submission, noting that the lifetime for products under subcategory 2.F.1.c is 20 years. The ERT recommends that the Party correct the lifetime for subcategory 2.F.1.c to 20 years in its NIR.	Yes. Convention reporting adherence
I.11	2.F.1 Refrigeration and air conditioning – HFC-32	The Party reported in CRF table 2(II)B-Hs2 emissions of HFC-32 for subcategory 2.F.1.e mobile air conditioning. In the previous annual submission, HFC-32 emissions were reported as "NO". During the review, the Party clarified that emissions from air-conditioning equipment on trams were included in the annual submission for the first time. Trams use R-407C and R-410A, both of which contain HFC-32. The ERT noted that this information is not included in the NIR, section 4.9.2.4 of which contains information on only the methodology used and the estimated emissions from air-conditioning systems in road vehicles and trains. The ERT also noted that HFC-32 emissions from stock under subcategory 2.F.1.e mobile air conditioning were greater for 2017 (0.11 t) than for 2016 and 2018 (0.01 t in both cases). During the review, the Party clarified that there were errors in the compilation file for 2008–2019 and provided corrected	Yes. Accuracy

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		estimates that showed that the overestimation of emissions from stocks (2.27–0.38 t CO_2 eq) was significantly below the threshold of significance in accordance with the UNFCCC Annex I inventory reporting guidelines. The ERT recommends that the Party include information in the NIR on the method for calculating emissions from mobile air conditioning on trams and correct the emission estimates for 2008–2019.	
I.12	2.F.1 Refrigeration and air conditioning – HFCs	Hungary reported in its NIR (table 4.9.7) recovery efficiencies by gas for 2010–2019 and noted (p.174) that these efficiencies were calculated using data from the national F-gas database, which was created in 2010. According to national experts, recovery efficiencies have been increasing over the past few years. As Hungary has no further information about the efficiency of the disposal of refrigerants prior to 2010, recovery was assumed to be negligible prior to this time. During the review, the Party clarified that, for 2017–2019, it used the average of these three years to estimate recovery efficiencies and, assuming negligible recovery prior to 2010, calculated a linear trend between 2010 and 2017. The ERT recommends that the Party explain in its NIR the methodology used to calculate recovery efficiencies across the time series.	Yes. Transparency
I.13	2.F.1 Refrigeration and air conditioning – HFCs and PFCs	The Party reported in its NIR (table 4.9.5) information on the country-specific parameters used in the tier 2 model. However, the ERT noted that some of these parameters are not within the range of IPCC default parameters. For example, the lifetime for products under subcategory 2.F.1.d is given as 15 years, whereas the default range given in the 2006 IPCC Guidelines (vol. 3, p.7.52) is 6–9 years; the EF for assembly losses under subcategory 2.F.1.e is given as 1 per cent, whereas the IPCC default range is 0.2–0.5 per cent (vol. 3, p.7.52); and the annual emission rate for subcategory 2.F.1.f is given as 15 per cent, whereas the IPCC default range is 1–10 per cent (vol. 3, p.7.52). During the review, the Party clarified that the source of the country-specific EFs is national air-conditioning and refrigeration experts. The ERT recommends that the Party explain in the NIR the source of its country-specific parameters, particularly those that fall outside the IPCC default ranges, for example documented expert judgment.	Yes. Transparency
I.14	2.F.1 Refrigeration and air conditioning – HFCs	The Party reported in CRF table 2(II)B-Hs2 recalculated emissions for subcategory 2.F.1.e mobile air conditioning for 1992 onward. Aggregated F-gas emissions for 2018 were recalculated from 563.8 kt CO_2 eq in the previous annual submission to 365.6 kt CO_2 eq in the current annual submission. However, the Party reported in the NIR (p.481) that only minor recalculations were made to this subcategory because of the change from the balance to the EF method. During the review, the Party clarified that these recalculations were due to a change in the refrigerant charge in cars, which was updated from 0.7 kg previously for the whole time series to 0.55 kg for 2004–2019 owing to new information received that the typical charge 15 years ago was 0.7 kg but as of 2020 was 0.4 kg, resulting in an average refrigerant charge of 0.55 kg for the intermediate period of 2004–2019. The ERT noted that, while it is indicated in the NIR (p.179) that the average refrigerant charge is between 0.4 and 0.7 kg (with more refrigerant being required for mobile air conditioners in cars in the earlier years), it is not explained how this information was used for the estimates and that it affected the recalculations made for the annual submission. The Party clarified that relevant information will be included in the next annual submission. The ERT recommends that the Party provide in its NIR further information on the methodology used for calculating the refrigerant charge of mobile air-conditioning units in cars and include a transparent presentation of recalculations including all changes made, in line with paragraphs 43–45 of the UNFCCC Annex I inventory reporting guidelines.	Yes. Transparency

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Agriculture			
A.6	3. General (agriculture)	The ERT noted a number of typographical errors in the NIR: (a) "Repectively" (p.261), which should be written as "respectively"; (b) "Fallowing" (pp.247, 248 and 269), which should be written as "following"; (c) "Timeseries" (pp.219, 231, 232, etc.), which should be written as "time series"; (d) "Trancparency" (p.267), which should be written as "transparency"; (e) "Calculeted" (p.282), which should be written as "calculated"; (f) "Evapotranspiring" (p.300), which should be written as "evapotranspiration"; (g) "Distinghuised" (p.305), which should be written as "distinguished"; (h) "Allowded" and "deseases" (p.309), which should be written as "allowed" and "diseases", respectively. During the review, the Party acknowledged these typographical errors and reported that it plans to correct them for the next annual submission. The ERT encourages the Party to address these typographical errors within the NIR.	Not an issue/problem
A.7	3.B.3 Swine – CH_4 and N_2O	The Party reported in CRF table 3.B(a)s1 that the CH_4 IEF for swine for 1985–2000 is in the range of 2.27–2.91 kg/head/year. However, the ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 10, tables 10A-7–10A-8), which specify IPCC default values of 3–45 kg/head/year. During the review, the Party clarified that this is due to the higher proportion of solid manure in Hungary than accounted for in the IPCC default value for Eastern Europe. For 1985–2000, the proportion of solid manure ranged from 59.1 to 45.7 per cent, while tables 10A-7–10A-8 of the 2006 IPCC Guidelines assume a proportion of 42 per cent for Eastern Europe. Additionally, the IPCC default MMS usage assumes 3 per cent anaerobic lagoon with methane correction factors of 66 and 68 per cent, but anaerobic lagoons do not exist in Hungary. The extremely high methane correction factors for anaerobic lagoons significantly increase the IPCC default EF. The ERT recommends that the Party explain why the CH_4 IEF for swine for 1985–2000 is lower than the lowest value in the IPCC default range.	Yes. Transparency
LULUCF			
L.15	4.A.1 Forest land remaining forest land – CO_2	The Party reported in the NIR (section 6.5.1) that its forest area and volume estimates are based on data from the national forestry database (available at www.nfk.gov.hu/Supplementary_Information_news_547), which in turn is based on annual surveys of one of 10 forest parcels (with each parcel accounting for 10 per cent of the total forest area) and is updated on the basis of yield tables. To estimate stock changes, Hungary uses equation 2.8 from the 2006 IPCC Guidelines (vol. 4, chap. 2) with time t_1 and t_2 in the denominator denoting two consecutive years (implying the denominator is 1) and not two more distant points in time (t_2–t_1>1), as suggested by equation 2.8. During the review, the Party confirmed that the national forestry database is primarily used as its 10-year FM planning instrument and is updated on a yearly basis, using yield tables for each parcel, for use in aggregated national statistics and LULUCF estimates. Each year, one of the 10 forest parcels is surveyed on the basis of field measurements provided by forest planners, while the other nine parcels are updated by adding the annual increment (modelled by yield tables) to the previous volume and subtracting the volume of	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
		trees reported as removed by forest managers; 10-year FM plans are developed at the level of each of the country's 150 forest districts (such that around 15 forest districts are surveyed each year). The Party clarified that it also has a systematic sample-based forest inventory, known as the Growth Monitoring System and Forest Monitoring and Observation System, which is also described in the forestry-related databases document (available at the link provided above). Following the publication of this document, the name of the system was changed to the NFI. The Party mentioned during the review that it is currently considering whether and, if so, how it should use the NFI (which has a longer survey cycle) instead of the national forestry database for its GHG inventory calculations. The ERT recommends that Hungary include in the NIR (section 6.5.2) the additional information provided during the review on the application of a stock change method for forest land. The ERT encourages Hungary to use NFI data with longer survey cycles, which may be more reliable than those resulting from annual updates via yield tables.	
L.16	4.A.1 Forest land remaining forest land – CO_2	Hungary reported different areas for forest land remaining forest land (i.e. under forest and other subcompartments) in NIR table 6.5.5 and CRF table 4.A (e.g. 1,814,949 ha versus 1,931,010 ha, respectively, for 2018, and 1,820,955 ha versus 1,936,690 ha, respectively, for 2019). During the review, the Party acknowledged these differences and noted that the correct figures were those provided in CRF table 4.A. It provided the correct figures for NIR table 6.5.5 and clarified that it will provide these in the next NIR. The ERT recommends that the Party correct the figures in NIR table 6.5.5 and ensure consistency between the NIR and CRF table 4.A.	Yes. Convention reporting adherence
L.17	4.B.1 Cropland remaining cropland – CO_2	The Party reported significant inter-annual changes in implied CSC factors for mineral soils (e.g. –7.54 per cent for 2011/2012, –9.40 per cent for 2012/2013, –10.84 per cent for 2013/2014, –12.10 per cent for 2014/2015 and –13.66 per cent for 2017/2018) for cropland remaining cropland. It also reported in the NIR (section 6.4.1) the methodology and EFs used to assess CSC for different land uses, including cropland. Furthermore, it reported (in section 6.6.2.3) the following factors causing changes to the mineral soils pool, all of which were included in the calculation of CSC: changes in management, changes in input, and conversions of cropland from non-set-aside to set-aside and back again. During the review, the Party explained that category 4.B.1 cropland remaining cropland is broken down into non-set-aside and set-aside cropland, for which different carbon stocks are assumed. In each case where land is converted from one subcategory to the other, the SOC changes over a 20-year period (i.e. the IPCC default transition period). The large areas converted to the set-aside subcategory in several years of the time series are reflected in the IEFs for category 4.B. The Party clarified that conversion may not be possible for all subcategories and soil types. In practice, this means that the number of subcategories into which a land-use category is broken down depends on which areas are subject to which land-use changes (e.g. areas of forest land converted to cropland, areas of forest land converted to grassland), resulting in different mean SOC contents. The Party acknowledged that it was only possible to differentiate between some of the subcategories and reported that it is working on revising the relevant SOC and SOC change values. The ERT recommends that Hungary continue to estimate CSC in mineral soils for category 4.B.1 and include information on its progress in the next annual submission. Furthermore, since the method used by the Party for estimating CSC in mineral pools may have greater applicability across the LULUCF sector, the ERT also recommends that Hungary report the revised estimates in CRF tables 4.A–4.E and describe the methodological improvements in the respective chapters in NIR.	Yes. Consistency
L.18	4(II) Emissions/remov	The Party reported in CRF table 4(II)D.1 for 2019 a CO_2 IEF per area of drained organic soils of 235,357.96 kg CO_2/ha, which is the highest of all the IEFs reported by the Parties (ranging from 1,102.10 to 235,357.96 kg CO_2/ha) and more	Yes. Transparency

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	als from drainage and rewetting and other management of organic/mineral soils – CO_2	than four times higher than the second-highest value (47,622.75 kg CO_2/ha). Furthermore, the ERT noted the following significant inter-annual changes: –37.96 per cent for 1990/1991, –33.37 per cent for 1991/1992, 76.27 per cent for 1992/1993, –40.68 per cent for 1993/1994, –55.00 per cent for 1995/1996 and –80.35 per cent for 1997/1998. During the review, Hungary clarified that this category includes emissions due to peat extraction in specific mines, called "peat extraction sites", referred in the NIR (p.434), and that the inter-annual fluctuations are due to market demand rather that atypical land-use practices. The ERT noted that the fluctuations in market demand explained by the Party are reflected in the figures in NIR table 6.8.3 and accepted the Party's reasoning. The ERT recommends that the Party include in the next annual submission the explanation provided during the review for the fluctuation of the CO_2 IEF per area of drained organic soils, as well as any other evidence it may have in support of its high CO_2 IEF per area of drained organic soils.	
L.19	4(V) Biomass burning – CO_2, N_2O and CH_4	The Party reported "NE" in CRF table 4(V) for AD on wildfires on forest land, cropland and grassland remaining in the same categories for prior to 1997; however, the Party reported CH_4 and N_2O emissions for these categories. The ERT noted that the extrapolated emissions for 1985–1997 are based on the average emissions for 1998–2021. Against this background, the ERT asked Hungary during the review to provide its reasoning for this approach (i.e. why the average for 1998–2021 could not be used to derive AD as well), or, if applicable, to provide AD estimates for 1985–1997. During the review, the Party acknowledged that one way of estimating gaps in a time series is indeed to extrapolate AD and then estimate emissions on the basis thereof. However, it explained that, if the EFs do not change over time, this method would yield the same result as the one already applied, which is also in line with the 2006 IPCC Guidelines (vol. 1, chap. 5.3). Furthermore, the Party indicated it prefers its current method because, by reporting "NE", it can be more transparent and indicate the fact that there is actually a gap in the AD time series. The ERT recommends that the Party include in the next annual submission the information provided during the review on the reporting of AD and emissions from wildfires on forest land, cropland and grassland remaining in the same categories for prior to 1997, as well as any other evidence it may have in support of the assumptions made when extrapolating emissions from wildfires for prior to 1997.	Yes. Transparency
Waste			
W.6	5.A Solid waste disposal on land – CH_4	The Party reported in its NIR (p.456) the waste categories used in the IPCC waste model. The ERT noted that categorization number W091 is indicated twice under food waste: "Food = degradable organic waste in mixed ordinary waste + separately collected animal and vegetal wastes (i.e. W091, W091, W093)". During the review, the Party clarified that W091 was indicated twice by mistake and the sentence should read as follows: "Food = degradable organic waste in mixed ordinary waste + separately collected animal and vegetal wastes (i.e. W091 animal and mixed food waste, W092 vegetal waste, and W093 animal faeces, urine and manure)". The ERT recommends that Hungary correct the information regarding categorization number W091 in its NIR.	Yes. Convention reporting adherence
W.7	5.A Solid waste disposal on land – CH_4	The Party reported in its NIR (section 7.2.5) that the amount of MSW deposited for 1970–1975 was revised and CH_4 emissions recalculated. The ERT noted that the reasons for revising the amount of MSW deposited were not clearly stated in the NIR. During the review, Hungary clarified that this revision was due to an interpolation error for 1970–1975. The ERT recommends that the Party transparently provide in its NIR information on the recalculations performed and the reasons for them.	Yes. Transparency

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W.8	5.A.1.a Anaerobic – CH_4	The Party reported in CRF table 5.A the amount of CH_4 flared for subcategory 5.A.1.a anaerobic as "NE" for 1990–2000, but did not explain its use of "NE" in either the NIR or CRF table 9. During the review, Hungary clarified that the earliest available data on the amount of CH_4 flared are from 2001, and that it is possible that flaring did not occur before then. The ERT recommends that Hungary explain in the NIR and CRF table 9 why "NE" is reported for the amount of CH_4 flared for subcategory 5.A.1.a and confirm the assumption that CH_4 flaring did not occur before 2001, for example by contacting the relevant national data providers or stakeholders.	Yes. Transparency
W.9	5.B.1 Composting – CH_4	Hungary reported in CRF table 5.B the amount of CH_4 flared for subcategories 5.B.1.a MSW and 5.B.1.b other sludge reported as "NE" for 1990–2019, but did not explain its use of "NE" in either the NIR or CRF table 9. During the review, the Party explained that there is no information on flaring activity for subcategories 5.B.1.a and 5.B.1.b. The ERT recommends that the Party report "NO" for the amount of CH_4 flared if no flaring activity occurs, or, if it continues to use "NE", provide a clear explanation for this in the NIR and CRF table 9.	Yes. Comparability
W.10	5.B.2 Anaerobic digestion at biogas facilities – CH_4	The Party reported in CRF table 5.B the amount of CH_4 flared for subcategory 5.B.2.b other biogases from anaerobic fermentation as "NE" for 2000–2019, but did not explain its use of "NE" in either the NIR or CRF table 9. During the review, it explained that there is no information on flaring activity for subcategory 5.B.2.b. The ERT recommends that the Party report "NO" for the amount of CH_4 flared if no flaring activity occurs, or, if it continues to use "NE", provide a clear explanation for this in the NIR and CRF table 9.	Yes. Comparability
W.11	5.D.1 Domestic wastewater – CH_4	Hungary reported in CRF table 5.D the amount of CH_4 flared as "NE" for 1990–2003, but did not explain its use of "NE" in either the NIR or CRF table 9. The NIR (p.472) states that, according to energy statistics, sewage sludge gas utilization started in 2001. During the review, the Party clarified that since no official database on wastewater treatment is available, individual wastewater treatment plants were contacted, with the earliest collected information on flaring being for 2004. The ERT recommends that the Party report "NO" for the amount of CH_4 flared for 1990–2000 and explain its use of "NE" for 2001–2003 in its NIR and CRF table 9.	Yes. Comparability
W.12	5.D.2 Industrial wastewater – CH_4 and N_2O	Hungary reported in CRF table 5.D sludge removed, N in effluent, the amount of CH_4 flared and the amount of CH_4 used for energy recovery and N_2O emissions as "NE" for 1990–2019, but did not explain its use of "NE" in either the NIR or CRF table 9. During the review, the Party clarified that amount of CH_4 for energy recovery is reported under category 5.D.1 domestic wastewater, as this value is calculated on the basis of energy statistics and the data available include sewage sludge gas from both municipal and industrial wastewater plants. It also clarified that it does not have the necessary information to estimate sludge removed and amount of CH_4 flared, and that there is no methodology in the 2006 IPCC Guidelines for estimating N in effluent, which is why it reported "NE". The ERT recommends that the Party report the amount of CH_4 for energy recovery as "IE" instead of "NE" and provide an explanation for the use of "IE" for the amount of CH_4 for energy recovery and "NE" for sludge removed, N in effluent and the amount of CH_4 flared and N_2O emissions in the NIR and CRF table 9.	Yes. Comparability
KP-LULUCF			
KL.7	AR – CO_2	The Party reported net CSC in litter as "NE" for "northern Hungary" and "southern Hungary" for 2013–2019 in CRF table 4(KP-I)A.1. The ERT noted that this is not in accordance with decision 2/CMP.7, annex, paragraph 26, or the Kyoto Protocol Supplement, according to which the Party needs to either estimate emissions and removals or provide transparent,	Yes. KP reporting adherence

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		verifiable information that the pool is not a source. During the review, the Party clarified that it will provide the correct notation key and additional information in the documentation box in the relevant CRF tables in the next annual submission. The ERT recommends that the Party either continue to report "NE" and provide more specific, country-based evidence supporting the assumption that the pool is not a source, as referred to in the NIR (sections 6.5.4.2.2 and 11.3.1.2), or alternatively provide estimates.	
KL.8	FM – CO_2	The ERT noted that Hungary did not report information on the main factors responsible for the higher net sink during the commitment period reported in the relevant CRF accounting table for 2013–2019 compared with the FMRL. The Party did not include in its NIR information on the main factors generating the accounting quantity (i.e. the difference in net emissions between the reporting of FM during the second commitment period and the FMRL) or explain whether the accounting quantity is consistent with those factors, with a view to demonstrating that the accounting quantity can be explained as deviations in actual policies compared with historical policies included in the FMRL, rather than as differences between the methodological elements, factors and parameters used in the FMRL and those used for estimating GHG emissions and removals. The ERT noted that this is not in accordance with the Kyoto Protocol Supplement (p.2.97), according to which it is good practice for Parties to the Kyoto Protocol to provide this information. During the review, the Party clarified that it reported in its NIR (p.382) that forest land remaining forest land is a net sink owing to annual increments, which are larger than the harvests. Moreover, it explained that FM areas, besides some differences explained in section 11.2 (which will be addressed through the technical correction), largely overlap with the areas of forest land reported under the Convention, meaning that the drivers are similar. Differences between FMRL modelling (which is necessary for the projection) and estimating historical events are assumed to be addressed by the ex-post calibration of the FMRL. Finally, the accounting quantity can partly be explained by the differences in the harvest rate assumed in the 2011 FMRL submission and the actual harvest rate reported in NIR figure 6.5.3. According to document FCCC/TAR/2011/HUN, paragraph 19, the projections from the FMRL model are "highly sensitive to the assumed harvesting rate because an increase or a decrease of only 10 per cent in the assumed harvest value can result in significantly different results and direction (from sink to source and vice versa)". Thus, differences between assumed and actual harvests have resulted in some differences in the projected and estimated historical FM sinks. Hungary also noted in NIR table 11.19 that, owing to lack of capacity, it has not conducted any analysis or modelling of the effect of climate change on tree growth or natural disturbances for its FM estimates or FMRL; therefore, the effect of these processes on the accounting quantity cannot be estimated. The ERT recommends that the Party provide information on the main factors responsible for a higher sink during the commitment period, as compared with the FMRL, in accordance with the good practice outlined in the Kyoto Protocol Supplement and include in the next annual submission detailed information, following the points expressed during the review, on the main factors generating the accounting quantity to show whether the accounting quantity is consistent with those factors.	Yes. KP reporting adherence
KL.9	FM – CO_2	Hungary reported net CSC in mineral soils as "NA, NO" for 2013–2018 in CRF table 4(KP-I).B.1. The ERT noted that this differs from the previous submission, in which "NE" was reported. The ERT also noted that this is not in accordance with decision 2/CMP.7, annex, paragraph 26, or the Kyoto Protocol Supplement, according to which the Party needs to either estimate emissions and removals or provide transparent, verifiable information that the pool is not a source. During	Yes. KP reporting adherence

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		the review, the Party clarified that it reported "NA, NO" incorrectly and will use the correct notation key in the next annual submission. The ERT recommends that the Party report "NE" for net CSC in mineral soils and provide additional country-based evidence that the pool is not a source, as referred to in the NIR (section 11.3.1.2, p.514, referring to an unpublished study), or alternatively provide estimates.	
KL.10	FM – CO_2	Hungary reported different AD in NIR table 11.6 and CRF table 4(KP-I)B.1 (e.g. 1,762,627 and 1,895,650 ha, respectively, for 2019). During the review, it clarified that these differences are due to the fact that the NIR table does not include other subcompartments under FM, which will be corrected for the next annual submission. The ERT recommends that the Party correct the figures in NIR table 11.6 and ensure consistency between the NIR and CRF table 4(KP-I)B.1 regarding AD on FM across the time series.	Yes. Transparency
KL.11	FM – CO_2	The 2020 and 2021 submissions differ significantly in terms of both AD and removals for several years in the two commitment periods. For example, for 2018, AD on the FM area increased between the two submissions, from 1,764.62 to 1,848.91 kha for 2020 and 2021, respectively, while FM removals decreased from –3,211.19 to –2,799.72 kt CO_2 for 2020 and 2021, respectively. During the review, the Party clarified that, after resubmitting its estimates reported under the Kyoto Protocol in 2020, it found minor mistakes in several formulas, which were corrected for the 2021 submission. Furthermore, it explained that new estimates concerning other subcompartments under FM resulted in the increase in the FM area. In addition, it reported that the "calculation system" and all forest-related data were revised on the basis of work started in 2020. The Party also referred to NIR section 6.1.4 for further information regarding recalculations for KP-LULUCF categories covering the complete time series, as well to NIR section 11.3.1.4 for a full list of differences between the 2020 and 2021 submissions. The ERT found the explanations provided by the Party to be plausible, but only found limited information on changes to the calculation system referred to above, preventing it from reconstructing these recalculations. The ERT recommends that the Party provide in the NIR (section 6.1.4) detailed information regarding the new calculation system put in place by Hungary since the 2020 submission.	Yes. Transparency
KL.12	FM – CO_2	The Party reported in the NIR (section 11.5.2.3) a technical correction to the FMRL (169 kt CO_2 eq) due to (1) the use of a different method for GHG reporting than those used to develop the original FMRL and its assessment; (2) a change in the area under FM over time due to the inclusion of "found forest" in the FM category; and (3) changes in the estimates of various components of the total FM emissions (see ID# KL.4 in table 3). Furthermore, the Party reported in NIR table 11.19 an average annual increase in sink from biomass pools for the second commitment period (282 kt CO_2 eq), attributable to "found forest" and translated directly into the FMRL technical correction value. The ERT noted that, in ID# L.6 in table 3, it is recommended that the carbon stock of "found forest" should be excluded from estimates of CSC, as it does not constitute an actual increase in carbon stock (i.e. it is not a sink for the year in which these forests are first included in the GHG inventory), to prevent net sinks under forest land remaining forest land from being overestimated. The ERT recommends that, depending on the solution implemented in respect of ID# L.6 in table 3, the Party ensure full consistency in the treatment of carbon stock in "found forest" between Convention reporting, KP-LULUCF reporting and accounting based on projected FMRL.	Yes. KP reporting adherence

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
KL.13	HWP – CO_2	The Party reported the following figures in CRF table 4(KP-I)C for 2018 in its 2020 and 2021 submissions, respectively: initial stock: 9,148.31 and 8,667.31 kt carbon; gains: 319.68 and 320.43 kt carbon; losses: –232.00 and –217.22 kt carbon; net change: 87.68 and 103.20 kt carbon; and net CO_2 emissions and removals: –321.48 and –378.41 kt CO_2 eq. The ERT noted that these figures differ from those provided in NIR table 6.5.17 and asked for further information. During the review, the Party clarified that it will provide the correct figures in the next NIR. The ERT recommends that the Party correct the figures on CSC in the HWP pool in the NIR and ensure full consistency between NIR table 6.5.1.7 and CRF table 4(KP-I)C.	Yes. KP reporting adherence
KL.14	N_2O emissions from N mineralization/ immobilization due to carbon loss/gain associated with land-use conversion and management change in mineral soils – N_2O	In CRF table 4(KP-II)3, the Party reported "NE" under FM for CSC resulting from N_2O emissions from N mineralization/immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils for 2013–2019, but did not provide adequate justification that such CSC is not a net source of emissions. During the review, the Party clarified that it will use the correct notation key in its next NIR, following the approach described in NIR section 11.3.1.2, demonstrating that the soils pool is not a source for this category. The ERT recommends that Hungary report "NO" for CSC resulting from N_2O emissions from N mineralization/immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils, and provide additional evidence that the soils pool is not a source, complementing the information in NIR section 11.3.1.2, or alternatively provide estimates.	Yes. Comparability

[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 2021 annual submission of Hungary.

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 Hungary 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 2021 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 Hungary in its 2021 annual submission

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

Table I.1
Total greenhouse gas emissions and removals for Hungary, base year–2019
(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								–1 000.00
Base year[d]	108 516.66	110 408.85	NA	NA	NA		NA	
1990	92 111.18	94 786.97	NA	NA				
1995	71 095.44	77 193.25	NA	NA				
2000	73 859.34	74 916.73	NA	NA				
2010	61 503.53	66 056.58	NA	NA				
2011	60 107.45	64 354.14	NA	NA				
2012	55 883.87	60 957.51	NA	NA				
2013	54 038.21	58 068.18	NA	NA		–1 111.29	NA	–1 457.09
2014	53 037.44	58 407.72	NA	NA		–944.55	NA	–3 029.36
2015	55 643.94	61 516.67	NA	NA		–957.66	NA	–3 622.70
2016	57 603.34	62 258.59	NA	NA		–883.75	NA	–2 769.43
2017	59 336.75	64 716.42	NA	NA		–938.38	NA	–3 316.26
2018	60 076.12	64 735.40	NA	NA		–816.80	NA	–2 787.05
2019	58 864.84	64 433.17	NA	NA		–682.31	NA	–3 517.41

Note: Emissions and removals reported in 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 1985–1987 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs, SF_6 and NF_3. Hungary has not elected any activities under Article 3, para. 4, of the Kyoto Protocol. 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 Hungary, excluding land use, land-use change and forestry, average for 1985–1987 to 2019
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
Average for 1985–1987	85 418.12	13 539.67	11 141.25	NO	371.08	NO	7.29	NO
1990	73 225.50	12 789.30	8 384.06	0.0024	375.72	NO	12.39	NO
1995	61 391.28	10 736.82	4 755.34	36.05	222.72	NO	51.05	NO
2000	58 365.11	10 572.28	5 411.40	203.86	282.49	NO	81.59	NO
2010	52 068.80	8 912.53	3 730.43	1 249.52	3.74	NO	91.55	NO
2011	50 191.34	8 771.30	3 922.55	1 387.33	4.03	NO	77.59	NO
2012	46 757.51	8 800.15	3 860.05	1 458.61	4.14	NO	77.05	NO
2013	43 590.21	8 624.59	4 198.89	1 552.03	4.61	NO	97.85	NO
2014	43 678.12	8 381.11	4 430.68	1 829.36	4.31	NO	84.14	NO
2015	46 614.82	8 425.07	4 532.96	1 821.31	4.17	NO	118.34	NO
2016	47 072.01	8 365.29	4 800.68	1 887.89	4.28	NO	128.45	NO
2017	49 452.26	8 394.80	4 802.00	1 951.54	1.98	NO	113.84	NO
2018	49 407.95	8 323.65	4 871.65	2 033.05	2.53	NO	96.56	NO
2019	49 079.71	8 238.10	4 877.64	2 133.83	2.75	NO	101.14	NO
Percentage change average for 1985–1987 to 2019	**–42.5**	**–39.2**	**–56.2**	**NA**	**–99.3**	**NA**	**1 287.0**	**NA**

Note: Emissions and removals reported in the sector other (sector 6) are not included in this table.
[a] Hungary did not report indirect CO_2 emissions in CRF table 6.

Table I.3
Greenhouse gas emissions and removals by sector for Hungary, average for 1985–1987 to 2019
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
Average for 1985–1987	80 157.98	15 076.21	12 018.02	–1 892.19	3 225.20	NO
1990	69 363.24	11 750.20	9 983.17	–2 675.79	3 690.36	NO
1995	59 036.01	8 227.79	6 000.83	–6 097.81	3 928.62	NO
2000	56 439.97	8 183.19	6 136.36	–1 057.39	4 157.22	NO

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2010	49 882.12	6 394.80	5 674.03	–4 553.05	4 105.63	NO
2011	47 961.12	6 559.28	5 889.63	–4 246.69	3 944.12	NO
2012	44 784.96	6 266.10	5 925.22	–5 073.64	3 981.23	NO
2013	42 273.93	5 670.48	6 326.21	–4 029.97	3 797.56	NO
2014	41 658.84	6 487.53	6 572.25	–5 370.28	3 689.10	NO
2015	44 230.85	6 936.54	6 787.64	–5 872.73	3 561.64	NO
2016	45 075.01	6 647.43	7 095.35	–4 655.25	3 440.80	NO
2017	46 723.79	7 423.03	7 105.93	–5 379.67	3 463.68	NO
2018	46 445.03	7 708.80	7 146.32	–4 659.28	3 435.26	NO
2019	46 197.95	7 665.81	7 132.74	–5 568.33	3 436.67	NO
Percentage change average for 1985–1987 to 2019	**–42.4**	**–49.2**	**–40.6**	**194.3**	**6.6**	**NA**

Notes: (1) Hungary did not report emissions or removals in the sector other (sector 6); (2) Hungary 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–2019, for Hungary

(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				–1 000.00				
Technical correction				–168.75				
Base year[b]	NA				NA	NA	NA	NA
2013		–1 275.55	164.25	–1 457.09	NA	NA	NA	NA
2014		–1 142.10	197.55	–3 029.36	NA	NA	NA	NA
2015		–1 218.76	261.10	–3 622.70	NA	NA	NA	NA
2016		–1 212.81	329.06	–2 769.43	NA	NA	NA	NA
2017		–1 302.10	363.72	–3 316.26	NA	NA	NA	NA
2018		–1 241.58	424.77	–2 787.05	NA	NA	NA	NA
2019		–1 108.06	425.75	–3 517.41	NA	NA	NA	NA
Percentage change base year–2019					**NA**	**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] Hungary has not elected to report on any activities under Article 3, para. 4, of the Kyoto Protocol. 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 Hungary
(kt CO_2 eq)

		Net emissions/removals									
GHG source/sink activity	*Base year*[a]	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*Total*[b]	*Accounting parameters*	*Accounting quantity*[c]
A.1. AR		–1 275.549	–1 142.104	–1 218.763	–1 212.806	–1 302.104	–1 241.577	–1 108.062	–8 500.965		–8 500.965
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
A.2. Deforestation		164.254	197.553	261.100	329.057	363.719	424.775	425.748	2 166.207		2 166.207
B.1. FM									–20 499.293		–12 318.025
Net emissions/ removals		–1 457.088	–3 029.360	–3 622.697	–2 769.430	–3 316.257	–2 787.055	–3 517.407	–20 499.293		
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		NO	NO	NO	NO	NO	NO	NO	NO		NO
FMRL[e]										–1 000.000	
Technical corrections to FMRL										–168.753	
FM cap										30 680.949	–12 318.025
B.2. CM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

GHG source/sink activity	*Net emissions/removals*									*Accounting parameters*	*Accounting quantity*[c]
	Base year[a]	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*Total*[b]		
B.3. GM (if elected)	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
B.5. WDR (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

[a] 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.
[b] The accounting quantity is the total quantity of units to be issued or cancelled for a particular activity.
[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 does not intend to exclude emissions from natural disturbances.
[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 relevant data from Hungary's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.6
Key relevant data for Hungary under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2021 annual submission

Parameter	*Data values*
Periodicity of accounting	(a) AR: annual accounting (b) Deforestation: annual accounting (c) FM: annual accounting (d) CM: not elected (e) GM: not elected (f) RV: not elected (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	None
Election of application of provisions for natural disturbances	No
3.5% of total base-period GHG emissions, excluding LULUCF	3 835.119 kt CO_2 eq (30 680.949 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 1 216 263 RMUs
2. Deforestation	Cancel 396 041 units
3. FM	Issue 1 157 986 RMUs

Note: Values in this table reflect the difference in 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 between this report and the previously published review report for the Party.

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.7 include the information to be included in the compilation and accounting database for Hungary. 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 2019, including on the commitment period reserve, for Hungary
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
CPR	**391 037 652**	–	–	**391 037 652**
Annex A emissions				
CO_2	49 079 712	–	–	49 079 712
CH_4	8 238 101	–	–	8 238 101
N_2O	4 877 636	–	–	4 877 636
HFCs	2 133 833	–	–	2 133 833
PFCs	2 747	–	–	2 747
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	101 138	–	–	101 138
NF_3	NO	–	–	NO
Total Annex A sources	**64 433 168**	–	–	**64 433 168**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 108 062	–	–	–1 108 062
Deforestation	425 748	–	–	425 748
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 517 407	–	–	–3 517 407

Table II.2
Information to be included in the compilation and accounting database for 2018 for Hungary
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	49 407 953	–	–	49 407 953
CH_4	8 323 652	–	–	8 323 652
N_2O	4 871 648	–	–	4 871 648
HFCs	2 033 052	–	–	2 033 052
PFCs	2 532	–	–	2 532
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	96 563	–	–	96 563
NF_3	NO	–	–	NO
Total Annex A sources	**64 735 401**	–	–	**64 735 401**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 241 577	–	–	–1 241 577
Deforestation	424 775	–	–	424 775
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–2 787 055	–	–	–2 787 055

Table II.3
Information to be included in the compilation and accounting database for 2017 for Hungary
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	49 452 258	–	–	49 452 258
CH_4	8 394 801	–	–	8 394 801
N_2O	4 801 996	–	–	4 801 996
HFCs	1 951 543	–	–	1 951 543
PFCs	1 977	–	–	1 977
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	113 842	–	–	113 842
NF_3	NO	–	–	NO
Total Annex A sources	**64 716 416**			**64 716 416**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 302 104	–	–	–1 302 104
Deforestation	363 719	–	–	363 719
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 316 257	–	–	–3 316 257

Table II.4
Information to be included in the compilation and accounting database for 2016 for Hungary
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	47 072 006	–	–	47 072 006
CH_4	8 365 294	–	–	8 365 294
N_2O	4 800 677	–	–	4 800 677
HFCs	1 887 887	–	–	1 887 887
PFCs	4 276	–	–	4 276
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	128 450	–	–	128 450
NF_3	NO	–	–	NO
Total Annex A sources	**62 258 590**	–	–	**62 258 590**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 212 806	–	–	–1 212 806
Deforestation	329 057	–	–	329 057
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–2 769 430	–	–	–2 769 430

Table II.5
Information to be included in the compilation and accounting database for 2015 for Hungary
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	46 614 820	–	–	46 614 820
CH_4	8 425 074	–	–	8 425 074
N_2O	4 532 956	–	–	4 532 956
HFCs	1 821 308	–	–	1 821 308
PFCs	4 169	–	–	4 169
Unspecified mix of HFCs and PFCs	NO	–	–	NO

	Original submission	*Revised submission*	*Adjustment*	*Final value*
SF_6	118 342	–	–	118 342
NF_3	NO	–	–	NO
Total Annex A sources	**61 516 670**	–	–	**61 516 670**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 218 763	–	–	–1 218 763
Deforestation	261 100	–	–	261 100
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 622 697	–	–	–3 622 697

Table II.6
Information to be included in the compilation and accounting database for 2014 for Hungary
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	43 678 123	–	–	43 678 123
CH_4	8 381 108	–	–	8 381 108
N_2O	4 430 678	–	–	4 430 678
HFCs	1 829 360	–	–	1 829 360
PFCs	4 314	–	–	4 314
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	84 139	–	–	84 139
NF_3	NO	–	–	NO
Total Annex A sources	**58 407 722**	–	–	**58 407 722**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 142 104	–	–	–1 142 104
Deforestation	197 553	–	–	197 553
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 029 360	–	–	–3 029 360

Table II.7
Information to be included in the compilation and accounting database for 2013 for Hungary
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	43 590 214	–	–	43 590 214
CH_4	8 624 594	–	–	8 624 594
N_2O	4 198 889	–	–	4 198 889
HFCs	1 552 027	–	–	1 552 027
PFCs	4 606	–	–	4 606
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	97 850	–	–	97 850
NF_3	NO	–	–	NO
Total Annex A sources	**58 068 181**	–	–	**58 068 181**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 275 549	–	–	–1 275 549
Deforestation	164 254	–	–	164 254
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–1 457 088	–	–	–1 457 088

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

No mandatory categories from the 2006 IPCC Guidelines were identified as missing.

Annex IV

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

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B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2017, 2019 and 2020 annual submissions of Hungary, contained in documents FCCC/ARR/2017/HUN, FCCC/ARR/2019/HUN and FCCC/ARR/2020/HUN, 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/sites/default/files/resource/AGI_2021_Final%20Version.pdf.

Annual status report for Hungary for 2021. Available at https://unfccc.int/sites/default/files/resource/asr2021_HUN.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Gábor Kis-Kovács (Hungarian Meteorological Service), including additional material on the methodology and assumptions used.