Framework Convention on
Climate Change

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

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2022 annual submission of 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 10 to 15 October 2022 in Bonn.

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

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Contents

Abbreviations and acronyms

$\Delta C_{WW_{peatB}}$	carbon dioxide and carbon emissions from changes in carbon stock in biomass due to vegetation clearing
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"
BOD	biochemical oxygen demand
C	carbon
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"
CORINE	Coordination of Information on the Environment
CPR	commitment period reserve
CRF	common reporting format
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU ETS	European Union Emissions Trading System
Eurostat	statistical office of the European Union
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 reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
Kyoto Protocol Supplement	*2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*
LULUCF	land use, land-use change and forestry
MCF	methane correction factor
MSW	municipal solid waste
N	nitrogen

N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NF_3	nitrogen trifluoride
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
SOC	soil organic carbon
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 2022 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 10 to 15 October 2022 in Bonn and was coordinated by Sohel Pasha, Claudia do Valle and Nalin Srivastava (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	Mark Hunstone	Australia
	Mayra Rocha	Brazil
Energy	Maya Fukuda	Japan
	Haakon Marold	Australia
	Victoria Novikova	Belarus
	David O'Toole	Australia
IPPU	Valentina Idrissova	Canada
	Thapelo Clifford Mohale Letete	South Africa
	Takuji Terakawa	Japan
Agriculture	Michael Anderl	Austria
	Britta Maria Hoem	Norway
	Giovanna Lunkmoss de Christo	Brazil
LULUCF and KP-LULUCF	Andrea Brandon	New Zealand
	Oksana Butrym	Ukraine
	Iordanis Tzamtzis	Greece
Waste	Takefumi Oda	Japan
	Sirinthornthep Towprayoon	Thailand
Lead reviewers	Mark Hunstone	
	Mayra Rocha	

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

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

4.   A draft version of this report was communicated to the Government of Hungary, which provided no comments.

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

5. Annex I presents the annual GHG emissions of 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 2022 annual submission

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

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

Assessment			Issue/problem ID#(s) in table 3 or 5[a]
Date(s) of submission	Original submission: NIR, 15 April 2022; CRF tables (version 2), 15 April 2022; SEF tables, 15 April 2022		
	Revised submissions: NIR, 27 May 2022; CRF tables (version 3), 27 May 2022		
	Unless otherwise specified, values from the most recent submission are included in this report		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	E.3, L.5, L.6, L.19
	(c) Development and selection of EFs?	No	
	(d) Collection and selection of AD?	Yes	L.18, KL.10
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	Yes	E.1, E.4, I.2, I.3, L.4, L.11
	(g) Reporting of uncertainties, including methodologies?	Yes	G.5, L.2
	(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?	The Party did not report any insignificant categories as "NE"	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:		
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	
	(b) Performance of the national system functions?	No	

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	KL.3
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	No	
	(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 22 February 2022,[3] and had not been resolved by the time of publication of the report on the review of the Party's 2021 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

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

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
General			
G.1	AD (G.7, 2021) Transparency	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.	Addressing. The Party provided in its NIR (p.19) further information on its data collection, processing and storage, and on the data sources used. The Party referenced decree 278/2014 as the formal basis for the collection of data for the inventory. Annex 1 to this decree lists public entities, while annex 2 lists GHG emission sources subject to data supply and reporting obligations. The ERT noted that there is a formal agreement in place for sourcing additional inventory data. For example, paragraph 5 of decree 278/2014 states that, in addition to the formalized regular schedule of data collection, inventory experts are entitled to request additional data to supplement or refine available information. During the review, the Party clarified that inventory experts can contact a dedicated contact person within the Hungarian Central Statistical Office for additional data that are not covered by decree 278/2014. The ERT considers that, for this recommendation to be fully addressed, the Party must provide in the NIR the lists of the public entities and GHG emission sources subject to data supply and reporting obligations as set out in annexes 1 and 2 to decree 278/2014.
G.2	Key category analysis (G.9, 2021) KP reporting adherence	Improve consistency between the CRF tables and the NIR by providing consistent information in the NIR and the CRF tables.	Resolved. The Party reported in CRF table NIR-3 that all three KP-LULUCF categories (A.1 afforestation and reforestation, A.2 deforestation and B.1 forest management) are considered key categories. This is consistent with the information provided in the NIR (p.23).
G.3	KP-LULUCF supplementary information (G.5, 2021) Transparency	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.	Resolved. The Party reported in its NIR (section 6.5.4.2.4, p.393) that it applies equations 2.8.1 and 2.8.2 from the Kyoto Protocol Supplement to estimate the annual feedstocks for HWP (industrial roundwood, wood pulp). The ERT notes that the application of these equations enables the estimation of the annual fraction of feedstock for HWP commodities production from the domestic forest harvest.

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[3] FCCC/ARR/2021/HUN.

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
G.4	QA/QC and verification (G.8, 2021) Convention reporting adherence	Improve consistency between the CRF tables and the NIR by addressing the areas for improvement identified (see ID#s I.10, I.11, L.16, W.6, KL.8, KL.10 and KL.12 from FCCC/ARR/2021/HUN) and enhance the QA/QC procedures and describe any changes made thereto in the NIR.	Addressing. Inconsistencies between the NIR and the CRF tables are mostly addressed. The ERT considers that the recommendation has not yet been fully addressed because the Party did not describe in its NIR (section 1.7, p.23) whether it enhanced the QA/QC procedures and some inconsistencies still remain between the NIR and the CRF tables. For example, the uncertainty tables in annex 2 to the NIR still include emission data from the 2021 submission; however, according to the Party, the underlying calculations correctly reference 2020 emission data (see ID# L.8 below).

Energy

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
E.1	1.A.2.g Other (manufacturing industries and construction) – all fuels – CO_2, CH_4 and N_2O (E.3, 2021) (E.2, 2020) (E.3, 2019) (E.8, 2017) Consistency	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, p.68, and annex 6, p.A102) that emissions from 'auto producer' plants (undertakings which generate electricity or heat, wholly or partly for their own use, as an activity that supports their primary activity) have been reallocated to the extent possible from category 1.A.2.g to the economic sectors where these plants operated and generated emissions for 1998–2020, with the remaining share of emissions allocated to category 1.A.2.g.iii other stationary combustion. These changes resulted in a decrease in emissions of 13.4 kt CO_2 eq in 2019 and 0 kt CO_2 eq in the base year. The ERT noted that the 2006 IPCC Guidelines (vol. 2, chap. 2.2) state that emissions from 'auto producers' should be assigned to the sector where they were generated. During the review, the Party clarified that energy consumption and emissions for all 'auto producers' are allocated to the relevant end-use category for 1998–2020, and to the extent possible also for earlier years. The Party further clarified that the category 1.A.2.g.iii other stationary combustion contains all emissions from industrial sources not considered separately in categories 1.A.2.a to 1.A.2.f (e.g. transport equipment, machinery, textiles, wood and wood products). Moreover, emissions from fuel consumption reported as "Industry not elsewhere specified" in the energy statistics submitted to IEA and Eurostat are included in this category. Therefore, the Party considers that emissions from the remaining 'auto producers' whose end-use sector is unknown could be allocated here. The current allocation of the emissions from 'auto producers' for 1998–2020 is acceptable to the ERT given the circumstances explained by the Party above. However the ERT noted that there is a time series consistency issue for the period prior to 1998 as, for years before 1998, the Party must allocate the emissions under the sector where they were generated.
E.2	1.A.3.e.i Pipeline transport – gaseous fuels – CO_2, CH_4 and N_2O (E.6, 2021) Transparency	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.	Addressing. The Party reported in its NIR (p.77) that different sources of AD have been used across the time series. For 2010–2015, fuel consumption data contained in the IEA annual gas questionnaire were used as AD. For 2005–2009, fuel consumption data from the EU ETS database were used. For the years before 2005, the sum of natural gas production and imports was used as a proxy. However, detailed information on the new extrapolation method for AD has not been provided. During the review, the Party clarified that when IEA data were compared with EU ETS data reported by FGSZ Natural Gas Transmission Ltd (Hungary's transmission system operator), Hungary detected an underestimation in the IEA data for 2010, which was corrected on the basis

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
			of the EU ETS data. For earlier years in the time series, backward interpolation was carried out as follows: for 2005–2009, fuel consumption data were taken from the EU ETS database; and for the years before 2005, the sum of natural gas production and import was used as proxy information.
E.3	1.A.4.b Residential – liquid fuels – CO_2, CH_4 and N_2O (E.4, 2021) (E.9, 2020) (E.11, 2019) Comparability	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 reported in its NIR (p.84) that the constant number of households in Hungary that have gardens or backyards (56 per cent of households, which corresponds to 2.2 million households) and the constant number of 6 kt gasoline was assumed to be consumed by all households that have gardens across the entire time series. This resulted in constant CO_2 and CH_4 emissions for category 1.A.4.b.ii off-road vehicles and other machinery. In its NIR (p.84) and CRF table 1.A(a)(sheet 4), the Party provided estimates of emissions from off-road vehicles and other machinery (19 kt CO_2). The Party also reported in its NIR (p.84) that AD were reallocated from category 1.A.3.b road transportation to category 1.A.4.b.ii off-road vehicles and other machinery.
			During the review, the Party clarified that CO_2 emissions from the category 1.A.4.b.ii are calculated by applying a tier 2 methodology (applying a country-specific EF for gasoline) and that it does not plan to change the approach of using constant AD in the time series. Hungary stated that since the AD used are based on an order of magnitude estimate, it considers that introducing a trend would not increase the accuracy of the calculated emissions. In addition, the approach was used as a rough estimate in the absence of any other reliable information that would justify the introduction of a trend into the time series. The Party also reiterated information provided in the NIR (p.84) that (1) all gasoline consumption in the energy statistics from the annual IEA/Eurostat questionnaires is accounted for in the inventory, and therefore it is merely an issue of allocation; and (2) emissions amount to 19 kt CO_2, which is below the threshold of significance. As mentioned in the previous review report, the current 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 (i.e. 31.41 kt CO_2 eq for 2020). The ERT also noted that 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. The ERT considers that this issue is not an accuracy issue, but rather an issue of allocation of emissions between category 1.A.3.b and category 1.A.4.b.ii. The ERT also considers that the recommendation has not yet been fully addressed because the Party has not yet revised its estimates or the assumption based on which the emissions are estimated to be constant. The Party has not yet provided the result of the key category analysis for this subcategory that can justify the proposed approach, as according to the key category analysis reported in the NIR (annex 1, p.A3) category 1.A.4.b.ii belongs to category 1.A.4 other sectors – liquid fuels (CO_2), which is a key category and requires the application of a higher-tier methodology in accordance with the 2006 IPCC Guidelines.

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
E.4	1.B.2 Oil, natural gas and other emissions from energy production – liquid and gaseous fuels – CO_2 and CH_4 (E.5, 2021) (E.13, 2020) Consistency	Identify the most appropriate method for ensuring a smooth transition in the time series between the 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)).	Addressing. The Party continued to use default EFs from the 2006 IPCC Guidelines (vol. 2, chap. 4.2.2.3) for developing countries and economies in transition for 1985–1994 and IPCC default EFs for developed countries from 1995 onward for several of the subcategories under category 1.B.2. The Party reported in its NIR (annex 6, p.A102) that it plans to identify the most appropriate method for ensuring a smooth transition in the time series between the default EFs in the 2006 IPCC Guidelines for developing countries and economies in transition applied in the early 1990s and the IPCC default EFs for developed countries applied from 1995 onward, together with the application of the 2019 Refinement to the 2006 IPCC Guidelines. While in CRF table 1.B.2 categories 1.B.2.b.4 natural gas transmission and storage and 1.B.2.b.5 natural gas distribution show revised CH_4 and CO_2 IEFs, category 1.B.2.a.2 oil production still shows the CH_4 IEF for oil production, which demonstrates significant inter-annual changes where the CH_4 IEF declined by 40 per cent from 3,000.08 kg/1,000 m^3 in 1994 to 1,800.75 kg/1,000 m^3 in 1995. Similarly, the CO_2 IEF for oil production declined by 94 per cent from 2,150.66 kg/1,000 m^3 in 1994 to 130.06 kg/1,000 m^3 in 1995. During the review, the Party clarified that no major steps were taken for the 2022 submission but it plans to address this issue for the next annual submission together with the full application of the 2019 Refinement to the 2006 IPCC Guidelines.
E.5	1.B.2.c Venting and flaring – CH_4 (E.7, 2021) Transparency	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.	Resolved. In the report on the review of the Party's 2021 submission, the ERT noted that 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 2020 submission. In the 2021 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. During the review, it clarified that CH_4 emissions from venting of natural gas were included under category 1.B.2.b.4 in the 2021 submission owing to the recalculation of CH_4 emissions for this category (see ID# E.4 above). In the 2022 submission, the Party reported (NIR p.480, and annex 6, p.A109) that emissions for category 1.B.2.c.1.ii were allocated by mistake in the 2021 submission and have been reported in the 2022 submission in accordance with table 4A.2.7 of the 2019 Refinement to the 2006 IPCC Guidelines. CRF table 1.B.2 no longer reports "IE" for category 1.B.2.c.1.ii but rather values for the entire time series ranging from 16.99 kt CH_4 in the base year to 6.46 kt CH_4 in 2020.
IPPU			
I.1	2.A.1 Cement production – CO_2 (I.1, 2021) (I.11, 2020) Transparency	Include information on the type of carbonate inputs at the aggregated level in the NIR.	Addressing. In its NIR (section 4.3.1.4, p.113), the Party explained that it needed more time to collect the data on carbonate inputs. During the review, Hungary indicated that it will provide information on carbonate inputs to explain the consistently low IEF for category 2.A.1 in the 2023 submission.

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
I.2	2.A.4 Other process uses of carbonates – CO_2 (I.3, 2021) (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. No changes were reported on AD for manufacturers of bricks and ceramics in the 2022 submission. During the review, Hungary indicated that it plans to address the recommendation for the next annual submission.
I.3	2.A.4 Other process uses of carbonates – CO_2 (I.8, 2021) Consistency	Assess the time-series consistency of CO_2 IEFs for category 2.A.4.a ceramics and revise the estimates for prior to 2005.	Addressing. The Party explained in its NIR (section 4.1, p.104) that depending on the trend, either the IEF of the last year in the time series or the average IEF of 2005–2020 was applied. On the basis of the IEF trend for 2005–2020 (from 0.1 to 0.05 t CO_2/t), the ERT considers that the application of an IEF of 0.07 t CO_2/t for the pre-2005 period is justified. However, during the review, Hungary indicated that it plans to consider the time-series consistency of CO_2 IEFs for this category for the next annual submission.
I.4	2.B.1 Ammonia production – CO_2 (I.9, 2021) Transparency	Include in the NIR a description of the method for calculating the country-specific carbon content factor applied for 1985–2006.	Resolved. In its NIR (section 4.4.1.2, p.132), Hungary reported that the country-specific carbon content factor for 1985–2006 was calculated by taking the average of the plant-specific carbon content factors for 2007–2019 reported by the producers because there was no significant trend in the carbon content factor for these years.
I.5	2.F.1 Refrigeration and air conditioning – HFCs (I.10, 2021) Convention reporting adherence	Correct the lifetime for subcategory 2.F.1.c to 20 years in the NIR.	Resolved. In NIR table 4.9.5 (p.169), the Party reported a lifetime of 20 years for HFCs and PFCs in industrial refrigeration.
I.6	2.F.1 Refrigeration and air conditioning – HFC-32 (I.11, 2021) Accuracy	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.	Resolved. In its NIR (section 4.9.2.4, p.177), the Party explained that according to one of Hungary's biggest manufacturers, the typical refrigerant charge in 2005 was 0.7 kg, but as at 2020 it was 0.4 kg, resulting in an average refrigerant charge of 0.55. The ERT considers the approach justified and accurate. The methodology used and the correct estimation of emissions for mobile air conditioning on trams were provided in the NIR and CRF table 2(II)B-H (sheet 2).
I.7	2.F.1 Refrigeration and air conditioning – HFCs (I.12, 2021) Transparency	Explain in the NIR the methodology used to calculate recovery efficiencies across the time series.	Resolved. In its NIR (section 4.9.2.2), the Party reported recovery efficiencies (table 4.9.7) and an explanation (p.174) of how they were estimated. Recovery efficiencies were assumed negligible for the pre-2010 period with an increase over the past few years. The average of 2017–2019 was applied to calculate the linear trend for 2010–2017.
I.8	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.13, 2021) Transparency	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.	Resolved. In its NIR (section 4.9.2.2, pp.169–170), the Party explained that data were collected from manufacturers and expert judgment was used, which was well documented and sufficiently justified.
I.9	2.F.1 Refrigeration and air conditioning – HFCs	Provide in the NIR further information on the methodology used for calculating the	Resolved. In its NIR (section 4.9.2.4, pp.176–179) the Party included additional details on data collection from manufacturers and the methods used for calculating refrigerant

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
(I.14, 2021) Transparency	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.	charge of mobile air-conditioning units for all modes of transport. The Party provided a transparent description of the recalculations that occurred in the 2022 submission (p.177).

Agriculture

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
A.1	3. General (agriculture) – CH_4 and N_2O (A.1, 2021) (A.10, 2020) Convention reporting adherence	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 (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.	Resolved. The Party corrected in the 2021 submission 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. The remaining editorial issues and unit errors listed were corrected for the 2022 submission.
A.2	3.B Manure management – CH_4 and N_2O (A.3, 2021) (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.	Resolved. The Party reported in its NIR (p.243) that the first biogas plant utilizing animal manure was established in 2004, so the inventory takes into account the amount of manure treated in the biogas plants from 2004 onward and reports "NO" for earlier years. New data on agricultural wastes used in biogas plants in Hungary have become available and were reported in the NIR (section 5.3.2.2.1, p.243) and CRF table 3.B(a)s2.
A.3	3.B Manure management – CH_4 and N_2O (A.4, 2021) (A.11, 2020) Accuracy	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.	Resolved. The Party reported CH_4 and N_2O emissions from manure used in anaerobic digesters in CRF tables 3.B(a)(sheet 2) and 3B(b) for 2004–2020. For the period before 2004 Hungary reported "NO", as there were no biogas plants using animal manure in the country in that period. Annual statistics on agricultural wastes treated in biogas plants were provided by the Hungarian Energy and Public Utility Regulatory Office for 2017–2020. For 2004–2016, the amount of manure used in biogas plants was estimated on the basis of existing feedstock statistics and the amount of biogas produced. The Party provided in its NIR (section 5.3.2, p.241) a description of the methodology used in accordance with the 2006 IPCC Guidelines. The methane conversion factors for manure treated in anaerobic digesters were determined based on the 2019 Refinement to the 2006 IPCC Guidelines tier 2 methodology using the equations provided in annex 10A.4.
A.4	3.B.3 Swine – CH_4 and N_2O (A.7, 2021) Transparency	Explain why the CH_4 IEF for swine for 1985–2000 is lower than the lowest value in the IPCC default range.	Resolved. The Party provided a satisfactory explanation of the low CH_4 IEF for swine for 1985–2000 in its NIR (section 5.3.4, p.267). There is a high proportion of solid manure in Hungary, and anaerobic lagoons are not used. This leads to a lower value than the IPCC default EF value for Eastern Europe.

LULUCF

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
L.1	4. General (LULUCF) – CO_2	Review the calculation which results in zero emissions/removals for carbon stock change	Resolved. The Party revised its calculations for carbon stock change in mineral soils for grassland remaining grassland and flooded land remaining flooded land in 2017,

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	(L.1, 2021) (L.3, 2020) (L.11, 2019) Accuracy	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.	reporting –1.58 kt C in mineral soils in grassland remaining grassland in 2017 in CRF table 4.C and "IE" in mineral soils in flooded land remaining flooded land in 2017 in CRF table 4.D.
L.2	4. General (LULUCF) (L.3, 2021) (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.	Addressing. The Party provided in its NIR (section 6.11, p.444) an updated quantitative assessment of the uncertainty associated with the input data (i.e. AD and EFs) together with the uncertainty analysis results for emissions and removals following approach 2 (Monte Carlo simulation) of the 2006 IPCC Guidelines. However:
			(a) The update in the uncertainty analysis pertains to the non-forest categories (categories other than forest land remaining forest land, land converted to forest land, forest land converted to other land uses), while for the forest-related categories, the uncertainty analysis reported in the NIR is the same as that of the 2021 GHG inventory submission (NIR section 6.5.7, p.408);
			(b) The uncertainty analysis for the forest-related categories does not cover all carbon pools for which emissions/removals are reported, such as litter, deadwood and soils pools in land converted to forest land (NIR table 11.15, p.524);
			(c) The uncertainty analysis was performed for 2005 and the latest inventory year (i.e. 2020) and the trend between these two years (NIR section 6.11, p.444), instead of the base year and the latest year of the GHG inventory;
			(d) The results of the uncertainty analysis for the LULUCF sector have not been incorporated in the uncertainty analysis of the total inventory, thus relevant information has not been included in the relevant tables in annex 2 to the NIR (p.A35).
			During the review, the Party informed the ERT that the development of the uncertainty analysis for the forestry sector is in progress and provided it with additional information including a summary description of an updated uncertainty analysis calculated by applying both the error propagation approach and the Monte Carlo simulation, although the results are not yet definitive. The Party informed the ERT that the updated analysis covers all carbon pools in the forest-related categories. Because the uncertainty analysis is incomplete for the LULUCF sector the results will be incorporated in the relevant tables in annex 2 to the NIR as soon as data become available.
L.3	Land representation – CO_2, CH_4 and N_2O (L.4, 2021) (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.	Resolved. The Party reported corrected total areas in CRF tables 4.A, 4.B, 4.C, 4.D and 4.E that match the total areas reported in CRF table 4.1 for the whole time series.
L.4	Land representation – CO_2, CH_4 and N_2O	Develop a consistent time series for all IPCC land-use categories for 1966 onward, on the basis of available national data and following	Addressing. The Party adopted a 20-year transition period, as per the 2006 IPCC Guidelines, for all IPCC categories (NIR section 6.3.2, p.350). However, it continued to report in its NIR (section 6.1.1, p.340) that the land-use changes before 1985 have not

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	(L.5, 2021) (L.19, 2020) Accuracy	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.	been taken into account for developing the land-transition matrix because of the lack of data on the nature or the direction of trends of land-use conversion areas before 1985. The Party stated that this led to the assumption of zero carbon stock changes due to land-use changes before 1985 and that the trend of reported emissions and removals in the land-use conversion categories before 2005 may involve data artefacts resulting from this assumption. The effects on the reported emissions and removals are also reflected in NIR figures 6.1.1 (p.341), 6.1.2 (p.342) and 6.3.3 (p.351), in which shaded boxes indicate the emissions and removals affected by the data artefacts.
			In response to a question raised during the review, the Party informed the ERT that it considers the issue to be of minor importance as what matters is the trend of the latest years, and that the time series from 2004 provides a good enough basis for trend analysis. Hungary also emphasized the lack of country-specific maps and databases, as well as international remote-sensing data sources for years before 1985, noting that it prefers to allocate resources for improving the current system for the future. Furthermore, Hungary informed the ERT about its ongoing plans to improve the land-transition matrix with spatially identifiable data (albeit without considering land-use changes before 1985), such as data sources to be utilized, approaches to be used and organizations involved, with implementation expected by 2024–2025. The ERT notes that Hungary did not consider land-use changes that occurred in the 20 years back from the first year of the time series (i.e. from 1966), following the 20-year IPCC default transition period, and thus a consistent time series from Hungary's base year (i.e. average 1985–1987) until 2004 has not been ensured (i.e. the period in which emissions and removals are affected by land-use changes from 1966–1985). The ERT further notes that Hungary has not recalculated the emissions and removals for the land-use categories for the years of the time series affected by the above-mentioned data artefacts (i.e. 1985–2004) on the basis of land-use change data from 1966 onward.
L.5	4.A Forest land – CO_2 (L.6, 2021) (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. The Party continued to report in its NIR (p.374) that, while the origin of "found forest" is usually unknown with an average age above 20 years, it is partly the result of conversion but the vast majority is the result of natural expansion, reclassification of land or geodesic remeasurement (NIR p.376). The Party also provided updated information on the approach followed to estimate the origin type of "found forest" (NIR p.377) together with information on the share of the different types of origin of such forest from 2008 to 2020 (NIR table 6.5.2.2, p.379). However, the Party did not provide information on the recalculated area of "found forest" for the entire time series separately for the portion established by conversion and the portion established by natural expansion or by geodesic remeasurements, or on how "found forest" has been treated for the entire time series, including the period before 2008.
			During the review, the Party provided the ERT with a corrected version of NIR table 6.5.2.2, owing to some identified errors in the proportions of the different "found forest" origin types, together with a table showing the annual areas of such forest by origin type for 2008–2020. The Party explained that recalculations of the areas were not carried out

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			because it cannot be proved whether or not the conversions were really human induced. Moreover, spatially explicit monitoring of forest conversions (including "found forest"), which provides the information on the origin of "found forest" is available from 2008 onward only; before 2008 only the aggregated area of "found forest" is available from information on the annual change of the total forest subcompartments, the land conversions to forest land and forest land conversions to other land uses.
			The ERT considers that the recommendation has not been resolved because the Party has not recalculated the area of "found forest" for the entire time series separately for the portion established by conversion and the portion established by natural expansion or by geodesic remeasurements, or explained clearly in the NIR why such recalculation is not possible.
L.6	4.A Forest land – CO$_2$ (L.7, 2021) (L.8, 2020) (L.14, 2019) Accuracy	Recalculate, for the entire time series, carbon stock change in all pools under forest land remaining forest land (4.A.1) and land converted to forest land (4.A.2).	Not resolved. Carbon stock change in all pools under forest land remaining forest land (4.A.1) and land converted to forest land (4.A.2) has not been recalculated because the associated areas have not been recalculated (see ID# L.5 above).
L.7	4.A.1 Forest land remaining forest land – CO$_2$ (L.15, 2021) Transparency	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.	Addressing. Hungary added a new section 6.5.1.1 in its NIR (p.374) providing information on the databases available in the country and used for estimating carbon stock changes in forest land. The National Forestry Database, which contains data on forest and other subcompartments for several variables (e.g. species, age class, origin), is used for estimating carbon stock changes in all carbon pools in forest land except deadwood; carbon stock changes from the deadwood pool are estimated from another available database, the NFI. In the same section, additional generic information was provided on the NFI (e.g. sample grid, the sampling plots' characteristics, variables estimated and the frequency of implementation). Furthermore, the Party listed the reasons for using the National Forestry Database as the main data source for the GHG inventory instead of the NFI, together with the disadvantages associated with this database. However, Hungary did not include in the NIR all additional information requested from the previous ERT related to the application of the stock-difference method for forest land, such as the duration of the National Forestry Database surveys (10-year cycle); the annual proportion of the forest area surveyed (10 per cent of the total forest area); the approach for the annual update of the National Forestry Database (i.e. the estimation for the annual 10 per cent proportion is based on field measurements by forest planners, while the remaining 90 per cent is based on yield tables by adding the modelled increment and subtracting the wood removed from forests to the previous growing stock; the annual coverage of the National Forestry Database in the country (15 out of 150 forest districts per year); and the temporal 'step' followed in the application of the stock-difference method from the 2006 IPCC Guidelines (vol. 4, chap. 2, equation 2.8) for estimating carbon stock change in biomass (1 year).
			During the review, the Party indicated that because the data sources and processing of the National Forestry Database are complex it preferred to describe the database in a

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
			supplementary document linked from NIR section 6.5.1.1. The ERT notes that the additional information requested by the previous recommendation closely relates to and helps to better understand the methodological approach used by Hungary in applying the stock-difference method. The ERT considers that the recommendation has not been resolved because the Party did not provide in the NIR all the required additional information related to the application of the stock-difference method on forest land.
L.8	4.A.1 Forest land remaining forest land – CO_2 (L.16, 2021) Convention reporting adherence	Correct the figures in NIR table 6.5.5 and ensure consistency between the NIR and CRF table 4.A.	Not resolved. The Party reported in its NIR (table 6.1.1, p.339) that the area values for forest land remaining forest land in table 6.5.5 (p.385) have been corrected and match the respective values in CRF table 4.A. However, the ERT noted that the Party continued to report inconsistent area values in its NIR (table 6.5.5, p.385) and CRF table 4.A for the entire time series. For example, 1,946,190 ha was reported in NIR table 6.5.5 for 2020, whereas 1,883,577 ha was reported in CRF table 4.A for the same year. During the review, Hungary clarified that before the previous annual submission the entire time series was recalculated in the calculation working files; however, in error, NIR table 6.5.5 was not updated accordingly. The Party also clarified that the figures reported in CRF table 4.A are correct and provided the ERT with the updated table 6.5.5 with the correct values.
L.9	4.A.1 Forest land remaining forest land – CO_2 (L.8, 2021) (L.9, 2020) (L.15, 2019) Convention reporting adherence	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.	Resolved. The Party reported carbon stock changes from forest land remaining forest land applying two strata, namely forest subcompartments and other. In stratum forest subcompartments carbon stock changes in the deadwood pool were reported for the entire time series while "NE" was reported for the litter and mineral soils pools assuming the pools are in equilibrium. In stratum other "NE" was reported for the deadwood, litter and mineral soils pools for the entire time series assuming the pools are in equilibrium. The ERT notes in relation to this issue that the appropriate notation key to be used in the CRF tables for the tier 1 assumption provided in the 2006 IPCC Guidelines for carbon stocks being in equilibrium in reporting on the LULUCF sector is "NA".
L.10	4.A.2 Land converted to forest land – CO_2 (L.9, 2021) (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).	Addressing. The Party reported in its NIR (p.339) that NIR tables 6.5.3 and 6.5.11 and CRF table 4.A for category 4.A.2 are consistent with each other and addressed the issue regarding the underlying database for the inventory year 2017 by eliminating the small increases in some of the figures for 2017 in NIR table 6.5.11 compared with the figures in 2016. However, the ERT identified that the new area reported in NIR table 6.5.3 (p.380) for land converted to forest land equals 2,431 ha in 2020 whereas the respective area reported in NIR table 6.5.11 (p.398) equals 2,428 ha; the total areas of land converted to forest land match between NIR tables 6.5.3 (column t2) and 6.5.11 (last column) for all years in 2008–2020, but the total areas reported in CRF table 4.A are different from the total areas reported in the two NIR tables for all the years in 2008–2020; and there are differences in the values reported in NIR table 6.5.11 in the row for 2017 as compared with the previous year (diagonal). During the review, the Party acknowledged the discrepancy between NIR tables 6.5.3 and 6.5.11 in 2020, explaining that this was due to the subtraction of deforested land from land under conversion to

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			forest land from an incorrect age group; this problem will be resolved in the next annual submission. Regarding the differences between the total areas of land converted to forest land in NIR tables 6.5.3 and 6.5.11 and the areas reported in CRF table 4.A.2, the Party clarified that the latter contains the areas of other subcompartments whereas the former does not.
			The ERT, comparing the values in NIR tables 6.5.3 and 6.5.11 with the total land converted to forest land in CRF table 4.A excluding other subcompartments, notes that the explanation provided by the Party is justified. With regard to the differences in the row for 2017, the ERT accepts the explanation provided by the Party during the review that in diagonal the areas reported in one year may differ from the respective areas in the previous year (as being decreased) in cases of deforestation of previous afforested areas. The ERT considers that the recommendation has not yet been fully addressed because the Party did not report consistent figures in NIR table 6.5.3 for land converted to forest land in 2020 compared with the area reported in NIR table 6.5.11 for the same year.
L.11	4.B.1 Cropland remaining cropland – CO_2 (L.17, 2021) Consistency	(a) Continue to estimate carbon stock changes in mineral soils for category 4.B.1 and include information on progress in the next annual submission. (b) Since the method used for estimating carbon stock changes in mineral pools may have greater applicability across the LULUCF sector, report the revised estimates in CRF tables 4.A–4.E and describe the methodological improvements in the respective sections in the NIR.	Addressing. (a) The Party continued to report carbon stock changes in mineral soils in cropland remaining cropland and provided relevant information in NIR sections 6.4.1 (p.361) and 6.6.2.3 (p.417). The Party updated section 6.4.1 by including additional information on the management subcategories identified in the cropland remaining cropland category, namely non-set-aside and set-aside and the effects of management changes between these two subcategories in the carbon stock change estimates. Furthermore, the Party reported that the most recent data on the share of the different management practices on soils are from 2016. In NIR section 6.6.7 (p.421) Hungary reported that new soils carbon stock change factors are being developed as part of the category-specific planned improvements. However, it did not provide information on the progress made in this methodological improvement. During the review, the Party confirmed that the revision of the SOC values and the associated SOC change values due to land-use change is currently being undertaken, and the results are planned to be implemented in the next annual submission; this improvement has been delayed owing to other commitments. The Party also provided the ERT with a draft document on the carbon stock change factors in mineral soils. The ERT considers that part (a) of the recommendation has not been fully addressed because the Party has not included information in the NIR about the progress made on revising the SOC and SOC change values. (b) The ERT noted that Hungary has recalculated the time series for carbon stock changes in mineral soils in several land-use categories, such as cropland remaining cropland and grassland remaining grassland, and provided related information in NIR sections 6.6.6 (p.420) and 6.7.6 (p.430). However, these recalculations were the results of the revision of the land-transition matrix and the correction of calculation errors rather than due to methodological improvements, which is closely related to the revision of SOC and SOC change values described in point (a) above. During the review, Hungary

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
			confirmed this, explaining that the recalculations are planned once the updated stock change factors become available. The ERT considers that part (b) of the recommendation has not been resolved because the Party has not revised the estimates in CRF tables 4.A–4.E as a result of the methodological improvements or described the methodological improvements in the respective sections of the NIR.
L.12	4.C.1 Grassland remaining grassland – CO_2 (L.10, 2021) (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. The Party reported in its NIR (section 6.7.2.3, p.424) that for determining the two broad management subcategories in grassland remaining grassland (i.e. nominal managed grasslands and improved grasslands) two sources of information were utilized, namely the number of grazing animals and the level of management costs for each soil type and climate region for 1985–2002 and the annual grassland areas receiving chemical fertilization from 2003 onward (NIR table 6.7.2, p.424). The distribution of grasslands by management subcategory annually was estimated (NIR table 6.7.3, p.426) on the basis of expert judgment using information from the above-mentioned sources, which will be updated once data from other sources become available.
			The ERT noted, however, that no explanation was provided in the NIR about how the exact share of each of the management subcategories was determined using the above-mentioned sources of information on the basis of expert judgment, given that these shares vary annually, and how these shares were used to estimate associated carbon stock changes. During the review, Hungary informed the ERT that the current land identification system allows for the application of approach 1 for cropland and grassland, and for the estimation of the 'gross' areas of management changes (from non-set-aside to set-aside and vice versa), in which CORINE land cover data (https://land.copernicus.eu/pan-european/corine-land-cover) are used, thus formulation B (approaches 2 and 3 for AD collection in the 2006 IPCC Guidelines (vol. 4, chap. 2, box 2.1, p.2.34)) has been applied. The ERT considers that the recommendation has not been fully addressed because the Party has not explained in the NIR how, on the basis of expert judgment, the distribution of the area of grassland subcategories has been assessed from the two main sources of information. Moreover, the Party has not reported in the NIR the information provided during the review on how the changes in management practices were determined.
L.13	4.D.1 Wetlands remaining wetlands – CO_2 (L.11, 2021) (L.13, 2020) (L.5, 2019) (L.9, 2017) Transparency	If the country-specific carbon stock changes 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 carbon stock changes under wetlands remaining wetlands with grass vegetation, examine the ways to report carbon stock changes in such lands under "other wetlands" with a notification in the documentation box	Addressing. The Party corrected the notation key from "IE" to "NO" for the area of mineral soils under peat extraction remaining peat extraction in CRF table 4.D. Furthermore, the Party corrected CRF table 4.D for the carbon stock changes for organic soils under flooded land remaining flooded land by using the notation key "NO" instead of reporting numerical values. The Party reported carbon stock changes from wetlands remaining wetlands on mineral soils under category 4.D.1.3 other wetlands remaining other wetlands and reported "IE" for the areas and carbon stock changes in mineral soils under category 4.D.1.2 flooded land remaining flooded land. The ERT considers that the recommendation has not been fully addressed because the Party did not provide a comment in the documentation box of CRF table 4.D regarding the use of notation key "IE" in flooded land remaining flooded land and did not update the NIR (section 6.8.2,

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		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.	p.432) to provide a clear explanation of where in the CRF tables the emissions from wetlands remaining wetlands were reported. During the review, the Party indicated that improvements with regard to this issue will be implemented in the next annual submission.
L.14	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO_2 (L.12, 2021) (L.14, 2020) (L.7, 2019) (L.13, 2017) Accuracy	Correct the reporting of CO_2 emissions from peat extraction in CRF table 4(II) and provide the correct value or a notation key.	Resolved. The Party recalculated the entire time series for CO_2 emissions from peat extraction in CRF table 4(II), which resulted in a significant decrease in the reported emissions (e.g. a decrease of 76.9 per cent from 182.21 kt CO_2 in the 2021 submission to 42.02 kt CO_2 in the 2022 submission for 2019). The recalculation was made using an updated density value (0.2 t air-dry peat/m^3 from Hahn, 1984) compared with the density value (0.8 t air-dry peat/m^3) used in the previous annual submissions. However, the reported CO_2 emissions from peat extraction remain high for the entire time series. The ERT noted that Hungary's IEF for CO_2 emissions from peat extraction is the highest of all Parties included in Annex I to the Convention in 1990–1997 (e.g. Hungary's IEF is 1,164,242.36 kg CO_2/ha in 1990 versus 57,121.35 kg CO_2/ha, that of the second highest IEF in the same year) and the highest of all Parties included in Annex I to the Convention for several years from 1998 onward. During the review, Hungary indicated that the area-related IEF is not an appropriate indicator, since peat extraction is linked to actual demand, depth and quality of peat rather than the area. The ERT accepts the explanation provided by the Party.
L.15	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO_2 (L.13, 2021) (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.	Resolved. The Party recalculated the entire time series for CO_2 emissions from peat extraction in CRF table 4(II), which resulted in a significant decrease in the reported emissions (see ID# L.14 above). Hungary used a revised density value (0.2 t air-dry peat/m^3 from Hahn, 1984) to convert from wet peat to air-dry peat (NIR p.435) compared with the value used in the previous annual submissions (0.8 t air-dry peat/m^3). However, as noted in ID# L.14 above, CO_2 emissions from peat extraction reported in CRF table 4(II) remain disproportionately high per area and the Party has not provided a justification for this. During the review, the Party explained that since the IEF for CO_2 emissions is calculated based on the area under peat extraction its variation may be large; however, peat extraction is linked more to the actual demand, depth and quality of peat. The ERT accepts the explanation provided by the Party.
L.16	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO_2 (L.18, 2021) Transparency	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 available in support of its high CO_2 IEF per area of drained organic soils.	Resolved. The Party reported in its NIR (section 6.8.2.1, p.435) that the variation in the amount of peat extracted annually is due to the high variation in the demand of peat and listed in NIR table 6.8.3 (p.435) the annual amounts of peat extracted.

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L.17	4(V) Biomass burning – CO_2, N_2O and CH_4 (L.19, 2021) Transparency	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 available in support of the assumptions made when extrapolating emissions from wildfires for prior to 1997.	Resolved. The Party included information in the NIR (section 6.4.3, p.367) on the reporting of AD and emissions from wildfires from all land uses including from forest land, cropland and grassland remaining in the same categories. It explained that AD for wildfires have been collected since 1998 and in 2007 a methodological change occurred, and the AD for 1998–2007 were adjusted to ensure consistency in the time series. For the period before 1997, the annual average emissions for 1998–2020 were used to report emissions from wildfires. The Party explained also that it did not extrapolate the AD back from 1997, but reported "NE" for the AD instead in order to be more transparent regarding the gap in the AD time series prior to 1997.

Waste

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
W.1	5.A Solid waste disposal on land – CH_4 (W.6, 2021) Convention reporting adherence	Correct the information regarding categorization number W091 in the NIR.	Resolved. The Party correctly reported food waste in its NIR (p.458) as categorization numbers W091, W092 and W093 on the basis of the European Waste Classification for Statistics.
W.2	5.A Solid waste disposal on land – CH_4 (W.7, 2021) Transparency	Transparently provide in the NIR information on the recalculations performed and the reasons for them.	Resolved. The Party clearly reported in its NIR (section 7.2.5, p.463) that it did not perform any recalculation in the category solid waste disposal on land in the 2022 submission.
W.3	5.A.1.a Anaerobic – CH_4 (W.8, 2021) Transparency	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.	Resolved. The Party changed the notation key for the amount of CH_4 flared for category 5.A.1.a prior to 2001 to "NO", and provided in its NIR (p.462) the reason for the change: it is possible that flaring activity did not occur before 2001 as landfill gas production started only in 2005. The ERT considers that this assumption provided by the Party seems reasonable since flaring is connected to biogas production and the first biogas plant was built in 2004 (see ID# A.2 above).
W.4	5.B.1 Composting – CH_4 (W.9, 2021) Comparability	Report "NO" for the amount of CH_4 flared if no flaring activity occurs, or, if "NE" continues to be used, provide a clear explanation for this in the NIR and CRF table 9.	Resolved. The Party changed the notation key for the amount of CH_4 flared for category 5.B.1 to "NO", as there is no flaring activity for categories 5.B.1.a and 5.B.1.b. During the review, the Party explained that the two dominant composting technologies in Hungary are open windrow composting and windrow composting under a semipermeable membrane with an aeration system; composting is generally considered as an aerobic process with a very small amount of CH_4 generation and therefore no biogas collection and no flaring occur at composting plants. The ERT concludes that the Party's explanations are reasonable.
W.5	5.B.2 Anaerobic digestion at biogas facilities – CH_4 (W.10, 2021) Transparency	Report "NO" for the amount of CH_4 flared if no flaring activity occurs, or, if "NE" continues to be used, provide a clear	Addressing. The Party clearly explained in CRF table 9 that it reported "NE" for the amount of CH_4 flared because there is no information on flaring activity for category 5.B.2.b. However, the Party did not report the reason in the NIR. During the review, the Party indicated that it will provide the explanation in the next annual submission.

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
		explanation for this in the NIR and CRF table 9.	
W.6	5.D Wastewater treatment and discharge – CH$_4$ (W.4, 2021) (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 (p.472) additional information regarding annual data on the population connected to public sewerage systems, which is a parameter to estimate AD for the category domestic wastewater treatment. During the review, the Party confirmed the information provided in the NIR. The ERT considers that this issue is resolved for the category domestic wastewater treatment. However, the ERT notes that the Party did not mention a table of AD for industrial wastewater in the NIR and in the response to the related question during the review, although the Party provided in NIR table 7.5.1 (p.471) BOD (kg BOD/m^3) for each industrial subsector as a parameter to estimate AD. The ERT also notes that the Party reported in the NIR (p.478) that it plans to carry out analyses of the industrial wastewater treatment facilities in order to confirm or modify the AD reported in tabular format. The ERT considers that the Party has not fully addressed this issue with respect to industrial wastewater.
W.7	5.D.1 Domestic wastewater – CH$_4$ (W.11, 2021) Comparability	Report "NO" for the amount of CH$_4$ flared for 1990–2000 and explain the use of "NE" for 2001–2003 in the NIR and CRF table 9.	Resolved. The Party reported "NO" for the amount of CH$_4$ flared for 1990–2000 in CRF table 5.D. The Party also reported "NE" for 2001–2003 in CRF table 5.D and explained in its NIR (p.473) and CRF table 9 that it used "NE" for 2001–2003 because there is no information on flaring activity for category 5.D.1 for those years.
W.8	5.D.2 Industrial wastewater – CH$_4$ (W.5, 2021) (W.12, 2020) (W.18, 2019) Transparency	Provide an explanation of the EFs for industrial wastewater treatment, including a reason for adopting the MCFs applied, in the NIR.	Resolved. The Party reported in its NIR (p.472) the reason for adopting the MCFs applied for industrial wastewater treatment. Assuming that industrial wastewater is treated aerobically, the Party applied an MCF of 0.05 (i.e. the middle of the range for aerobic treatment from table 6.8 in the 2006 IPCC Guidelines) from 2000, and the highest value of the range (MCF = 0.1) for the beginning of the time series (until 1995), and interpolated the values between 1995 and 2000.
W.9	5.D.2 Industrial wastewater – CH$_4$ and N$_2$O (W.12, 2021) Comparability	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$_2$O emissions in the NIR and CRF table 9.	Addressing. The Party reported the amount of CH$_4$ for energy recovery as "IE" and provided an explanation for the use of "IE" in its NIR (p.472) and CRF table 9. The Party also provided an explanation for the use of "NE" for sludge removed, N in effluent and the amount of CH$_4$ flared in CRF tables 5.D and 9; however, it did not provide this explanation in its NIR. During the review, the Party did not mention this matter in the response to the related questions. Moreover, the Party did not provide any explanation for reporting N$_2$O emissions for this category as "NE" in CRF table 9. During the review, the Party clarified that N$_2$O emissions from industrial wastewater have not yet been estimated owing to lack of guidance in the 2006 IPCC Guidelines. The Party also stated that these emissions will be estimated in accordance with the 2019 Refinement to the 2006 IPCC Guidelines and will be reported in future submissions.

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale

KP-LULUCF

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
KL.1	AR – CO_2 (KL.7, 2021) KP reporting adherence	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.	Resolved. In NIR section 11.3.1.2 (p.516) the Party referred to section 6.5.5.2.2 (p.400) for information about demonstrating that the litter pool in AR is not a net source. In section 6.5.5.2.2, the Party provided information on the litter carbon stocks in non-forest land uses (i.e. zero) and on litter equilibrium carbon stock levels in forest land after the conversion (i.e. 8.78 t C/ha from Heil et al., 2012). During the review, Hungary clarified that the above average value for litter stocks in the country was calculated using information from the above-mentioned reference and provided the ERT with an Excel file showing the calculation. The Party also explained that since litter carbon stocks on each ha of AR land are zero then a steady increase in litter carbon occurs until the new equilibrium is achieved, after which litter carbon remains stable.
KL.2	FM – CO_2, CH_4 and N_2O (KL.3, 2021) (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. The Party corrected NIR table 6.5.1 (p.371), which presents areas under FM under the Kyoto Protocol since 1990 (forest and other subcompartments) that match the areas reported in CRF table 4(KP-I)B.1 for 2013–2020. However, such a comparison could not be done for 2008–2012 because the respective CRF tables 4(KP-I)B.1 for these years were not filled in (i.e. the second commitment period of the Kyoto Protocol does not cover these years). Nevertheless, the ERT notes that provision of information in the CRF tables for KP-LULUCF is not required for years outside of the second commitment period of the Kyoto Protocol, thus the lack of such information does not affect the Party's commitments in this respect. Hungary updated its NIR (section 6.5.2, p.376) by providing additional information on the reasons for the increase in the areas of "found forest" (e.g. natural expansion, reclassification of lands, geodesic remeasurements) and by including the procedural framework for the assignment of the origin of "found forest" (p.377). Furthermore, the Party reported in NIR tables 6.5.3 (p.380) and 11.5(c) (p.501) the annual areas of new "found forest" from 2008 onward. However, Hungary did not provide information about the parameters and carbon factors used in the estimation process for the KP-LULUCF reporting specifically for "found forest".
			During the review, the Party provided additional information with regard to the approach applied for "found forest". More specifically, the Party explained that the treatment of "found forest" for estimating carbon stock changes under the Kyoto Protocol was the same as under the Convention (as described in NIR section 6.5.3, p.380). Carbon stock changes in the biomass pool in "found forest" under FM were estimated separately from the rest of the FM area, and by excluding the total carbon stocks of "found forest" when first identified. All types of "found forest" were included in FM reporting (as well as in the FMRL technical correction), and there has been no differentiation in the estimation method with respect to the origin of "found forest". Hungary also provided the annual time series of CO_2 emissions from "found forest" from 2009 until 2020. Although information provided by the Party during the review was sufficient, it has not been included in the NIR and the ERT considers that the recommendation has not yet been fully addressed. The ERT concluded that this potential problem of a mandatory nature

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
			does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.
KL.3	FM – CO_2 (KL.5, 2021) (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).	Addressing. The Party reported in its NIR (sections 6.5.4.2.2 and 11.3.1.2) the same information it provided in the previous NIR. More specifically, it reported qualitative information to demonstrate that the litter pool is not a net source on the basis of providing reasoning based on the system response (i.e. litter pool) and indicated that currently there is no monitoring system that could provide accurate estimates of the amount of carbon stock changes in litter under FM. The Party supported the assumption that the litter pool is not a net source by reporting that Hungarian forests are managed under the sustainable management principle, clear-cuts have been restricted during recent decades and one third of the forests are still in the intensive growing phase. Furthermore, no major disturbances have occurred that could negatively affect litter carbon stocks. Hungary also reconciled the litter carbon stocks with the deadwood stocks, providing quantitative information that they are not a source, and included information on the high uncertainties associated with estimating carbon stock changes in litter in other countries (e.g. Austria, Netherlands).
			During the review, the Party informed the ERT that it does not plan to develop a reliable monitoring system for litter in the near future, stating that significant change does not occur in the country's forest types and management regimes; this is supported by a number of national available statistics (e.g. Global Forest Resources Assessments 2020 country report). The Party also indicated that there has been a move towards 'close to nature' forestry practice in the last three or four decades. This is a slow process, with only about 60–70 per cent of the current annual increment harvested each year, which provides adequate evidence that more carbon is accumulated than lost in forests.
			The ERT noted that the litter pool is not included in Hungary's FMRL inscribed in the appendix to decision 2/CMP.7 or in the FMRL technical correction. The ERT concluded that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.
KL.4	FM – CO_2 (KL.6, 2021) (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.	Resolved. The Party reported net removals for organic soils in CRF table 4 (KP-1)B.1 and provided information in its NIR (section 11.3.1.2, p.509) demonstrating that the mineral soil pool under FM is not a net source. More specifically, the information provided was based on literature, related projects conducted within the country, field measurements, the 2006 IPCC Guidelines and reasoning based on knowledge of likely system responses. In this context, Hungary demonstrated that mineral soils under total FM are not a net source by examining three FM strata separately. For the first stratum (FM areas with final cutting and artificial regeneration) a net EF of 5 t C/ha was applied on the basis of information from a recent project (Somogyi et al, 2011), data from the

2006 IPCC Guidelines (e.g. amount of carbon change from forest land to cropland to simulate the final cutting effect in SOC) and knowledge of the systems process under consideration. For the second stratum (FM areas with harvesting and natural regeneration) zero carbon stock change was assumed on the basis of expert judgment and information from a research project (Somogyi et al, 2013) according to which carbon increased in two case studies and decreased in one case study, and in general the carbon stocks were much higher than that of a comparable stand after artificial regeneration. For the third stratum (all other land under FM), which is the biggest one in area of the total FM area, as at 2020 a modified removal factor (0.357 t C/ha) from an as yet unpublished analysis of soil carbon stock estimates from 186 plots under the Hungarian Soil Protection and Monitoring System measurements for 1992–2016 was applied. In NIR tables 11.11 (p.514) and 11.12 (p.515) the Party presented quantitative information indicating that in total the mineral soils in FM are not a net source of emissions.

| KL.5 | FM – CO_2 (KL.8, 2021) KP reporting adherence | 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. | Resolved. The Party updated its NIR (section 11.5.2.3, p.532) by providing information on the main factors responsible for the higher sink during the commitment period, as compared with the FMRL. The Party reported that the main factor explaining the difference in net removals between the reporting of FM during the second commitment period of the Kyoto Protocol and the FMRL is the decrease in actual harvestings compared with the harvesting rate projected in the FMRL. More specifically, for the development of the FMRL the harvesting rate embedded in the modelling was an increase of 10.1 per cent between 2013 and 2020, from 7,904,000 m^3 in 2013 to 8,702,000 m^3 in 2020, whereas the actual harvestings were 7,875,000 m^3 in 2013 and 6,580,000 m^3 in 2020. For the second commitment period of the Kyoto Protocol, the total harvest was lower by 11.0 per cent than that projected through the FMRL, namely the projected amount of 66,423,000 m^3 versus the actual amount 59,323,000 m^3 (NIR table 11.20, p.537). This could explain the difference between the net removals reported under FM and the projected FMRL, considering also that the FMRL estimate was highly sensitive to the assumed harvesting rate, as also noted in the "Report of the technical assessment of the forest management reference level submission of Hungary submitted in 2011" (FCCC/TAR/2011/HUN, para. 19). Other factors resulting in higher net removals reported under FM compared with the FMRL include the reduction in illegal logging partly due to the implementation during the second commitment period of the Kyoto Protocol of European Union regulation 995/2010; the low level of natural disturbance occurrences in the country; and potentially the effects of climate change (warmer years) and the fertilization effect (increased growth rate of trees); however, neither of the last two factors were embedded in the modelling of the FMRL. |
| KL.6 | FM – CO_2 (KL.9, 2021) KP reporting adherence | Report "NE" for net carbon stock changes 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, | Resolved. The Party reported "NE" for the carbon stock changes in mineral soils under FM in CRF table 4(KP-I).B.1 for all the years of the second commitment period of the Kyoto Protocol. The Party reported country-based information in its NIR (section 11.3.1.2, p.509) demonstrating that the mineral soil pool under FM is not a net source (see ID# KL.4 above). |

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
		p.514, referring to an unpublished study), or alternatively provide estimates.	
KL.7	FM – CO_2 (KL.10, 2021) Transparency	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.	Resolved. The Party corrected the figures reported in NIR table 11.6 (p.502) so that they are consistent with the AD reported in CRF table 4(KP-I)B.1 for FM for 2013–2020. More specifically, NIR table 11.6 has been modified to comprise two tables, (a) and (b), with the former presenting the annual areas of the forest subcompartments and the latter presenting the annual areas of the other subcompartments under FM. In this context, the figures for the areas of the forest subcompartments in NIR table 11.6(a) (last column) equal the sum of the areas of the forest subcompartments for southern Hungary and northern Hungary in CRF table 4(KP-I)B.1. Similarly, the figures for the areas of the other subcompartments in table 11.6(b) (last column) equal the sum of the areas of the other subcompartments for southern Hungary and northern Hungary in CRF table 4(KP-I)B.1.
KL.8	FM – CO_2 (KL.11, 2021) Transparency	Provide in the NIR (section 6.1.4) detailed information regarding the new calculation system put in place by Hungary since the 2020 submission.	Resolved. The Party reported in its NIR (section 6.1.4, p.343) detailed information regarding the new calculation system put in place since the 2020 submission. In particular, Hungary explained that with this new system the entire time series is recalculated in each inventory year (using Excel) versus the process followed before 2020, according to which the data and estimations were assessed for the last inventory year only and for the rest of the time series data were copied manually from previous inventories, which led to several errors (e.g. copying errors, malfunctional formulas). Furthermore, with the new system in place, the CRF tables are generated automatically (through the use of Excel Visual Basic for Applications) ensuring that copy and paste errors are avoided. During the review, the Party provided examples of how the previous calculation system was refined. Finally, Hungary explained that for the forest land category (CRF tables 4.A.1, 4.A.2, 4.B.1, etc.) the reporting is done separately for two strata, namely for forest subcompartments and other (i.e. other subcompartments), an approach that is also followed in FM under the Kyoto Protocol (CRF table 4(KP-I)B.1).
KL.9	FM – CO_2 (KL.12, 2021) KP reporting adherence	Depending on the solution implemented in respect of ID# L.6 in table 3 of FCCC/ARR/2021/HUN, ensure full consistency in the treatment of carbon stock in "found forest" between Convention reporting, KP-LULUCF reporting and accounting based on projected FMRL.	Resolved. The Party ensured consistency in the treatment of carbon stock in "found forest" between Convention reporting, KP-LULUCF reporting and accounting based on the projected FMRL. Relevant information about the technical correction of the FMRL was reported in the NIR (section 11.5.2.3, p.532) and provided during the review (see IDs# L.5 and KL.2 above).
KL.10	HWP – CO_2 (KL.13, 2021) KP reporting adherence	Correct the figures on carbon stock changes in the HWP pool in the NIR and ensure full consistency between NIR table 6.5.17 and CRF table 4(KP-I)C.	Addressing. The ERT noted that (1) it is not clear whether NIR table 6.5.17 represents information related to the HWP contribution under Convention reporting (CRF table 4.Gs1) or KP-LULUCF reporting (CRF table 4(KP-I)C); (2) all cells of NIR table 6.5.17 except for 2019 contain zero values; (3) most of the units in the table are incorrect (e.g. carbon stock gains/losses are presented in kha); and (4) it is not clear what the last four rows (from "-3, Gains" and below) represent.

ID#	Issue/problem classification[a]	Recommendation from previous review report	ERT assessment and rationale
			During the review, the Party explained that NIR table 6.5.17 shows the effect of the recalculations implemented for the HWP pool under the Convention, and the zero values are presented for the years when no recalculation occurred. The Party clarified that the recalculations implemented for 2019 were due to an error in estimating carbon stock changes. Finally, the Party provided the ERT with the corrected units of the table and indicated that the last four rows should be disregarded because they were mistakenly copied in the NIR. The ERT notes the correct values reported in the table and their consistency with the information reported in CRF table 4.G. Although information provided by the Party during the review was sufficient it has not been included in the NIR, and the ERT considers that the recommendation has not yet been fully addressed. The ERT concluded that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.
KL.11	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 (KL.14, 2021) Comparability	Report "NO" for carbon stock changes 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.	Resolved. The Party reported "NO" for carbon stock changes 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 in FM in CRF table 4(KP-II)3 for all the years of 2013–2020. The ERT notes that N_2O emissions from N mineralization associated with land-use conversions and management change in mineral soils in FM are associated with the corresponding carbon losses. The Party provided the necessary transparent and verifiable information demonstrating that the soils pool is not a net source (see ID# KL.4 above), that is, loss of carbon, demonstrating at the same time that soils are not a source of N_2O emissions from N mineralization/immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils.

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

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

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

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

ID#	Previous recommendation for issue	Number of successive reviews issue not addressed[a]
General	No issues identified.	
Energy		
E.1	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 described in the 2006 IPCC Guidelines.	5 (2017–2022)
E.3	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.	4 (2019–2022)
E.4	Identify the most appropriate method for ensuring a smooth transition in the time series between the 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)).	3 (2020–2022)
IPPU		
I.1	Include information on the type of carbonate inputs at the aggregated level in the NIR.	3 (2020–2022)
I.2	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.	4 (2019–2022)
Agriculture	No issues identified.	
LULUCF		
L.2	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.	3 (2020–2022)
L.4	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.	3 (2020–2022)
L.5	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.	4 (2019–2022)
L.6	Recalculate, for the entire time series, carbon stock change in all pools under forest land remaining forest land (4.A.1) and land converted to forest land (4.A.2).	4 (2019–2022)

ID#	Previous recommendation for issue	Number of successive reviews issue not addressed[a]
L.10	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).	4 (2019–2022)
L.12	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.	3 (2020–2022)
L.13	If the country-specific carbon stock changes 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 carbon stock change under wetlands remaining wetlands with grass vegetation, examine the ways to report carbon stock changes 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.	5 (2017–2022)
Waste		
W.6	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.	4 (2019–2022)
KP-LULUCF		
KL.2	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.	3 (2020–2022)
KL.3	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).	3 (2020–2022)

[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.

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

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

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

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
General			
G.5	Uncertainty analysis	The Party reported an uncertainty assessment in its NIR (annex 2, p.A35). However, the ERT identified that the emission data reported in NIR table A2-1 had not been updated from the 2021 submission. During the review, the Party clarified that while the emission data and uncertainty calculations for individual categories were not correct, the overall emissions uncertainty calculation was correctly based on 2020 emission data.	Yes. Convention reporting adherence
		The ERT recommends that the Party ensure that uncertainty calculations are based on the latest data inputs and reported accurately in the submission.	
Energy			
E.6	1.A.3.e.i Pipeline transport – gaseous fuels – CO_2, CH_4 and N_2O	The Party reported an increase in emissions from pipeline transport from 67.59 kt CO_2 in 2015 to 172.15 kt CO_2 in 2019, followed by a decrease to 125.10 kt CO_2 in 2020. However, no information on the sources of AD for 2016–2020 were provided in the NIR. During the review, the Party clarified that IEA data were used for estimating emissions from pipeline transport.	Yes. Transparency
		The ERT recommends that the Party provide in the NIR information on the sources of AD used over the 2016–2020 time series.	
IPPU		No findings for the IPPU sector additional to those included in table 3 were made by the ERT during the review.	
Agriculture		No findings for the agriculture sector additional to those included in table 3 were made by the ERT during the review.	
LULUCF			
L.18	4.B.1 Cropland remaining cropland – CO_2	Hungary reported carbon stock changes in mineral soils resulting from the conversion between the two strata applied in the inventory, namely set-aside and non-set-aside (NIR section 6.6.2.3, p.417, and table 6.4.2, p.365). During the review, the ERT asked the Party for more information regarding whether conversions between perennial and annual crops occur in the country. Hungary responded that the total area of perennial croplands is rather low relative to annual croplands and there is very little conversion from one to the other and vice versa, if any, and that it is not practicable to attempt to estimate carbon stock changes due to such conversions. The ERT notes that according to CORINE land cover data, which Hungary uses in the inventory (NIR table 6.3.1, p.345), conversions between perennial and annual crops do occur in the country.	Yes. Accuracy
		The ERT recommends that the Party collect the necessary information, namely area data and carbon stock change factors with regard to the conversions between perennial and annual cropland, and report associated carbon stock changes in mineral soils in cropland remaining cropland.	
L.19	4.D.1.1 Peat extraction remaining peat extraction – CO_2	The Party reported CO_2 emissions from peat extraction (68.51 kt CO_2) in CRF table 4(II) for 2020. During the review and in the context of the interaction with the ERT about the issue in ID#s L.14 and L.15 in table 3, the Party provided the ERT with an Excel file containing information on how CO_2 emissions from peat extraction were estimated. The ERT identified that (1) Hungary included in the total CO_2 emissions from peat extraction reported in CRF table 4(II) CO_2 emissions resulted from the carbon stock changes in biomass due to vegetation clearing, indicated as $\Delta C_{WWpeatB}$ in	Yes. Accuracy

		equation 7.4 of the 2006 IPCC Guidelines (vol. 4, chap. 7), although in CRF table 4(II) emissions/removals associated with management of organic (and mineral) soils should be reported; and (2) the inclusion of carbon stock changes from biomass clearing in total CO_2 emissions was erroneously implemented because they have been algebraically added (i.e. as a negative value since they refer to carbon losses) to the rest of the CO_2–C emissions from peat extraction (on-site and off-site provided as positive values) before being converted to CO_2 emissions, resulting in an underestimation of total CO_2 emissions from peat extraction. During the review, Hungary acknowledged the above-mentioned errors and indicated that it will correct them in the next annual submission.	
		The ERT recommends that the Party correct the entire time series for CO_2 emissions from peat extraction in CRF table 4(II) by reporting only emissions from peat extraction on the organic soil pool in this table for the entire time series. The ERT also recommends that the Party report carbon stock changes in biomass due to vegetation clearing ($\Delta C_{WWpeatB}$ in equation 7.4 of the 2006 IPCC Guidelines (vol. 4, chap. 7, p.7.11)) in CRF table 4.D for the entire time series.	
Waste		No findings for the waste sector additional to those included in table 3 were made by the ERT during the review.	
KP-LULUCF		No findings for KP-LULUCF additional to those included in table 3 were made by the ERT during the review.	

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

VI. Application of adjustments

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

Annex I

Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Hungary in its 2022 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–2020

(kt CO_2 eq)

| | Total GHG emissions excluding indirect CO_2 emissions | | Total GHG emissions and removals including indirect CO_2 emissions[a] | | Land-use change (Article 3.7 bis as contained in the Doha Amendment)[b] | KP-LULUCF (Article 3.3 of the Kyoto Protocol)[c] | KP-LULUCF (Article 3.4 of the Kyoto Protocol) | |
	Total including LULUCF	Total excluding LULUCF	Total including LULUCF	Total excluding LULUCF			CM, GM, RV, WDR	FM
FMRL								−1 000.00
Base year[d]	108 091.32	110 452.15	NA	NA	NA		NA	
1990	91 721.57	94 820.92	NA	NA				
1995	71 160.02	77 194.41	NA	NA				
2000	74 079.69	74 928.81	NA	NA				
2010	61 605.07	66 021.08	NA	NA				
2011	60 235.71	64 309.22	NA	NA				
2012	56 324.07	60 915.40	NA	NA				
2013	54 184.60	58 033.04	NA	NA		−1 094.14	NA	−1 517.63
2014	53 516.42	58 401.35	NA	NA		−863.31	NA	−2 923.80
2015	55 839.47	61 495.83	NA	NA		−955.17	NA	−3 766.91
2016	57 759.89	62 256.34	NA	NA		−882.35	NA	−2 987.58
2017	59 610.07	64 728.75	NA	NA		−915.06	NA	−3 548.87
2018	60 334.00	64 756.35	NA	NA		−807.14	NA	−3 140.56
2019	59 674.23	64 580.97	NA	NA		−668.23	NA	−3 936.99
2020	55 997.24	62 818.39	NA	NA		−861.81	NA	−5 309.01

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

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

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

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

[d] "Base year" refers to the base year under the Kyoto Protocol, which is 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 2020
(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	85 418.15	13 589.67	11 134.51	NO	371.08	NO	7.29	NO
1990	73 225.54	12 829.78	8 377.49	0.0024	375.72	NO	12.39	NO
1995	61 391.31	10 743.74	4 749.54	36.05	222.72	NO	51.05	NO
2000	58 365.15	10 591.05	5 404.67	203.86	282.49	NO	81.59	NO
2010	52 068.73	8 893.61	3 713.93	1 249.52	3.74	NO	91.55	NO
2011	50 191.33	8 741.93	3 907.01	1 387.33	4.03	NO	77.59	NO
2012	46 757.48	8 777.03	3 841.08	1 458.61	4.14	NO	77.05	NO
2013	43 611.55	8 582.59	4 184.41	1 552.03	4.61	NO	97.85	NO
2014	43 729.84	8 339.73	4 413.96	1 829.36	4.31	NO	84.14	NO
2015	46 653.47	8 384.19	4 515.06	1 820.59	4.17	NO	118.34	NO
2016	47 113.09	8 333.87	4 781.19	1 895.46	4.28	NO	128.45	NO
2017	49 515.23	8 353.33	4 780.86	1 963.52	1.98	NO	113.84	NO
2018	49 463.32	8 291.91	4 847.50	2 054.52	2.53	NO	96.56	NO
2019	49 234.65	8 233.72	4 849.90	2 158.82	2.75	NO	101.14	NO
2020	47 284.50	8 219.73	5 012.73	2 188.75	3.26	NO	109.43	NO
Percentage change average for 1985–1987 to 2020	**−44.6**	**−39.5**	**−55.0**	**NA**	**−99.1**	**NA**	**1 400.6**	**NA**

Note: Emissions and removals reported for 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 2020
(kt CO_2 eq)

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
Average for 1985–1987	80 188.92	15 076.21	12 030.38	−2 360.84	3 225.20	NO
1990	69 385.91	11 750.20	9 994.45	−3 099.35	3 690.36	NO
1995	59 032.09	8 227.79	6 005.91	−6 034.39	3 928.62	NO

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
2000	56 447.91	8 183.19	6 140.53	−849.13	4 157.18	NO
2010	49 871.20	6 394.82	5 655.29	−4 416.01	4 099.77	NO
2011	47 950.79	6 559.29	5 863.75	−4 073.51	3 935.40	NO
2012	44 774.58	6 266.11	5 900.69	−4 591.33	3 974.01	NO
2013	42 284.70	5 670.49	6 293.62	−3 848.44	3 784.23	NO
2014	41 700.04	6 487.54	6 537.83	−4 884.93	3 675.94	NO
2015	44 258.64	6 935.84	6 752.47	−5 656.36	3 548.88	NO
2016	45 105.41	6 655.02	7 067.93	−4 496.44	3 427.97	NO
2017	46 774.10	7 435.02	7 070.95	−5 118.69	3 448.69	NO
2018	46 485.31	7 730.29	7 119.37	−4 422.35	3 421.37	NO
2019	46 347.69	7 695.59	7 112.99	−4 906.75	3 424.71	NO
2020	44 386.46	7 733.36	7 297.01	−6 821.14	3 401.55	NO
Percentage change average for 1985–1987 to 2020	**−44.6**	**−48.7**	**−39.3**	**188.9**	**5.5**	**NA**

Notes: (1) Hungary did not report emissions or removals for the sector other (sector 6); the corresponding cells in the CRF tables were left blank; (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–2020, 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				−333.71				
Base year[b]	NA				NA	NA	NA	NA
2013		−1 270.52	176.39	−1 517.63	NA	NA	NA	NA
2014		−1 136.23	272.92	−2 923.80	NA	NA	NA	NA
2015		−1 228.93	273.76	−3 766.91	NA	NA	NA	NA
2016		−1 227.49	345.14	−2 987.58	NA	NA	NA	NA
2017		−1 314.41	399.35	−3 548.87	NA	NA	NA	NA
2018		−1 249.94	442.80	−3 140.56	NA	NA	NA	NA
2019		−1 121.78	453.55	−3 936.99	NA	NA	NA	NA
2020		−1 171.83	310.02	−5 309.01	NA	NA	NA	NA

	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
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)

GHG source/sink activity	Base year[b]	Net emissions/removals									Accounting parameters	Accounting quantity[a]
		2013	2014	2015	2016	2017	2018	2019	2020	Total[c]		
A.1. AR		–1 270.523	–1 136.229	–1 228.931	–1 227.492	–1 314.411	–1 249.937	–1 121.780	–1 171.832	–9 721.134		–9 721.133
Excluded emissions from natural disturbances[d]		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
A.2. Deforestation		176.387	272.918	273.756	345.144	399.348	442.798	453.554	310.024	2 673.928		2 673.928
B.1. FM										–27 131.349		–16 461.699
Net emissions/ removals		–1 517.629	–2 923.799	–3 766.914	–2 987.580	–3 548.868	–3 140.558	–3 936.988	–5 309.013	–27 131.349		
Excluded emissions from natural disturbances		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

GHG source/sink activity	Base year[b]	2013	2014	2015	2016	2017	2018	2019	2020	Total[c]	Accounting parameters	Accounting quantity[a]
Net emissions/removals												
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Any debits from newly established forest		NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
FMRL[e]											−1 000.000	
Technical corrections to FMRL											−333.706	
FM cap											30 680.949	−16 461.699
B.2. CM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.3. GM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.4. RV (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.5. WDR (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

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

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

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

[d] The Party indicated that it 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 data from Hungary's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.6
Key data for Hungary under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2022 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 1 220 168 RMUs
2. Deforestation	Cancel 507 722 units
3. FM	Issue 4 143 674 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 (FCCC/ARR/2021/HUN).

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.8 include the information to be included in the compilation and accounting database for 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 2020, 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	47 284 497	–	–	47 284 497
CH_4	8 219 728	–	–	8 219 728
N_2O	5 012 727	–	–	5 012 727
HFCs	2 188 748	–	–	2 188 748
PFCs	3 260	–	–	3 260
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	109 426	–	–	109 426
NF_3	NO	–	–	NO
Total Annex A sources[a]	**62 818 386**	–	–	**62 818 386**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 171 832	–	–	–1 171 832
Deforestation	310 024	–	–	310 024
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–5 309 013	–	–	–5 309 013

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

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

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	49 234 646	–	–	49 234 646
CH_4	8 233 717	–	–	8 233 717
N_2O	4 849 903	–	–	4 849 903
HFCs	2 158 823	–	–	2 158 823
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[a]	**64 580 975**	–	–	**64 580 975**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 121 780	–	–	–1 121 780
Deforestation	453 554	–	–	453 554
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				

	Original submission	Revised submission	Adjustment	Final value
FM	–3 936 988	–	–	–3 936 988

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

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

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	49 463 319	–	–	49 463 319
CH_4	8 291 909	–	–	8 291 909
N_2O	4 847 501	–	–	4 847 501
HFCs	2 054 524	–	–	2 054 524
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[a]	**64 756 349**	–	–	**64 756 349**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 249 937	–	–	–1 249 937
Deforestation	442 798	–	–	442 798
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 140 558	–	–	–3 140 558

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

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

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	49 515 229	–	–	49 515 229
CH_4	8 353 330	–	–	8 353 330
N_2O	4 780 858	–	–	4 780 858
HFCs	1 963 518	–	–	1 963 518
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[a]	**64 728 755**	–	–	**64 728 755**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 314 411	–	–	–1 314 411
Deforestation	399 348	–	–	399 348
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 548 868	–	–	–3 548 868

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

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

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				

	Original submission	Revised submission	Adjustment	Final value
CO_2	47 113 086	–	–	47 113 086
CH_4	8 333 866	–	–	8 333 866
N_2O	4 781 195	–	–	4 781 195
HFCs	1 895 464	–	–	1 895 464
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[a]	**62 256 337**	**–**	**–**	**62 256 337**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 227 492	–	–	–1 227 492
Deforestation	345 144	–	–	345 144
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–2 987 580	–	–	–2 987 580

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

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

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	46 653 470	–	–	46 653 470
CH_4	8 384 193	–	–	8 384 193
N_2O	4 515 065	–	–	4 515 065
HFCs	1 820 592	–	–	1 820 592
PFCs	4 169	–	–	4 169
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	118 342	–	–	118 342
NF_3	NO	–	–	NO
Total Annex A sources[a]	**61 495 832**	**–**	**–**	**61 495 832**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 228 931	–	–	–1 228 931
Deforestation	273 756	–	–	273 756
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 766 914	–	–	–3 766 914

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

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

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions				
CO_2	43 729 844	–	–	43 729 844
CH_4	8 339 734	–	–	8 339 734
N_2O	4 413 961	–	–	4 413 961
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

	Original submission	Revised submission	Adjustment	Final value
Total Annex A sources[a]	**58 401 353**	–	–	**58 401 353**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 136 229	–	–	–1 136 229
Deforestation	272 918	–	–	272 918
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–2 923 799	–	–	–2 923 799

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

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

	Original submission	Revised submission	Adjustment	Final value
Annex A emissions		–	–	
CO_2	43 611 553	–	–	43 611 553
CH_4	8 582 594	–	–	8 582 594
N_2O	4 184 407	–	–	4 184 407
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[a]	**58 033 038**	–	–	**58 033 038**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 270 523	–	–	–1 270 523
Deforestation	176 387	–	–	176 387
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–1 517 629	–	–	–1 517 629

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

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

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

Annex III

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 2013, 2014, 2015, 2016, 2017, 2019, 2020 and 2021 annual submissions of Hungary, contained in documents FCCC/ARR/2013/HUN, FCCC/ARR/2014/HUN, FCCC/ARR/2015/HUN, FCCC/ARR/2016/HUN, FCCC/ARR/2017/HUN, FCCC/ARR/2019/HUN, FCCC/ARR/2020/HUN and FCCC/ARR/2021/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_2022_Final.pdf.

Annual status report for Hungary for 2022. Available at https://unfccc.int/sites/default/files/resource/asr2022_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.

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