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Report on the individual review of the annual submission of Hungary submitted in 2020*

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 2020 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 26 to 31 October 2020 remotely.

* In the symbol for this document, 2020 refers to the year in which the inventory was submitted, not to the year of publication.

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Abbreviations and acronyms

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"
C	carbon
CER	certified emission reduction
CH_4	methane
CKD	cement kiln dust
CM	cropland management
Convention reporting adherence	adherence to the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
COPERT	software tool for calculating road transport emissions
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
DM	dry matter
DOM	dead organic matter
EF	emission factor
EFISCEN	European Forest Information Scenario (model)
ERT	expert review team
ERU	emission reduction unit
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
FM	forest management
FMRL	forest management reference level
$FMRL_{corr}$	forest management reference level technical correction
F_{SOM}	amount of nitrogen mineralized from loss of soil organic carbon in mineral soils through land-use change or management practices
GHG	greenhouse gas
GM	grazing land management
G4M	Global Forest Model
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
Kyoto Protocol Supplement	*2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*
LULUCF	land use, land-use change and forestry

MMS	manure management system(s)
N	nitrogen
NA	not applicable
NE	not estimated
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
N_2O	nitrous oxide
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SF_6	sulfur hexafluoride
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*
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*

I. Introduction

1. This report covers the review of the 2020 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 26 to 31 October 2020 remotely[1] and was coordinated by Lisa Hanle, Claudia do Valle, Javier Hanna and Karen Ortega (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	Tomas Gustafsson	Sweden
	David Kuntze	Germany
Energy	Giorgi Machavariani	Georgia
	Yves Marenne	Belgium
	Takashi Morimoto	Japan
IPPU	Kristina Gonchar	Belarus
	Valentina Idrissova	Kazakhstan
	Kakhaberi Mdivani	Georgia
Agriculture	Shaidatul Azdawiyah Abdul Talib	Malaysia
	Braulio Pikman	Brazil
	Janka Szemesova	Slovakia
LULUCF and KP-LULUCF	Markus Didion	Switzerland
	Eray Özdemir	Turkey
	Iordanis Tzamtzis	Greece
	Marina Vitullo	Italy
Waste	Fatma Betül Demirok	Turkey
	Erick Wamalwa Masafu	Kenya
	Hans Oonk	Netherlands
Lead reviewers	Fatma Betül Demirok	
	David Kuntze	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2020 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

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

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

[1] Owing to the circumstances related to the coronavirus disease 2019, the review had to be conducted remotely.

[2] Issues are defined in decision 13/CP.20, annex, para. 81.

[3] Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

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 2020 annual submission

7. Table 2 provides the assessment by the ERT of the Party's 2020 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 2020 annual submission of Hungary

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
Dates of submission	Original submission: NIR, 15 April 2020; CRF tables (version 3), 15 April 2020; standard electronic format tables, 15 April 2020		
	Revised submission: CRF tables (version 5), 15 December 2020		
	Unless otherwise specified, values from the most recent submission are included in this report		
Review format	Centralized review conducted remotely		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	I.6, L.4, L.7, L.14, L.15, L.19, W.13
	(c) Development and selection of EFs?	Yes	E.11, L.3, L.13
	(d) Collection and selection of AD?	Yes	E.9, A.11
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	Yes	E.1, E.13, I.3, L.8
	(g) Reporting of uncertainties, including methodologies?	Yes	L.16
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness?[b]	No	
	(j) Application of corrections to the inventory?	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	Yes	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:		
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
	(b) Performance of the national system functions?	No	
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	No	
	(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 standard independent assessment report?	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.7, KL.8
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	Yes	KL.5, KL.6
	(c) Reporting requirements of decision 6/CMP.9?	No	
	(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	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	
Question 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 14 February 2020,[4] and had not been resolved by the time of publication of the review report of the Party's 2019 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

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

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
		The previous ERT did not identify any issues that remained unresolved at the time of publication of the 2019 review report.	
Energy			
E.1	1.A.1 Energy industries – gaseous fuels – CO_2 (E.2, 2019) (E.7, 2017) Consistency	Provide in future NIRs the country-specific CO_2 EFs used to calculate emissions from natural gas consumption for the entire time series with a description of how time-series consistency is ensured.	Addressing. Hungary did not provide any further information on the country-specific CO_2 EFs used in the NIR. During the review, it reported that progress had been made since the 2019 annual submission, indicating that it had started to analyse a database containing EU ETS data recently received from the authority in charge of these data, with the results set to be included in the 2021 annual submission.
E.2	1.A.2.g Other (manufacturing industries and construction) – all fuels – CO_2, CH_4 and N_2O (E.3, 2019) (E.8, 2017) Comparability	Use the results of the information gathered from 'auto producers', including the information on the proportion of fuel consumed by 'auto producers', and allocate the emissions from 'auto producers' under the sector where they were generated, in accordance with the methods in the 2006 IPCC Guidelines.	Not resolved. According to the NIR (p.51), CO_2, CH_4 and N_2O emissions from 'auto producers' are still predominantly accounted for under subcategory 1.A.2.g.viii other (other stationary combustion) (except for emissions from the iron, steel, and pulp, paper and print industries), which is not in line with the 2006 IPCC Guidelines (vol. 2, chap. 2, section 2.2). During the review, Hungary explained that more detailed information was made available by the energy statistics provider a few years ago, initially only for 2013, but since then also for 2014–2019. However, it believes that it will be difficult to obtain this information for the years prior to 2013. The ERT considers that the Party has the data available to resolve this issue for 2013 onward and suggests that the Party investigate whether it could reconstruct the data for the years prior to 2013 using the gap-filling methodologies (e.g. overlap techniques) from the 2006 IPCC Guidelines (vol. 1, chap. 5, section 5.3.3).
E.3	1.A.3.b.ii Light-duty trucks – liquid fuels – N_2O	Review the reasons for the inter-annual changes in the IEF for 1997–1999 and revise the	Resolved. The large inter-annual changes in the N_2O IEF observed in the 2019 annual submission were reduced, reported in the 2020 annual submission as +16.6 per cent from 1996 to 1997, +6.4 per cent from 1997 to 1998 and +2.4 per cent from 1998 to 1999. Hungary explained in the NIR (p.81) that the recalculations

[4] FCCC/ARR/2019/HUN.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	(E.7, 2019) Consistency	estimates, if appropriate, or provide a justification for the trend in the IEF in the NIR.	were made using the latest version of the COPERT model (5.3.0). During the review, it also explained that AD (stock, vehicle type, mileage) were revised and outliers removed. The ERT considers the new trends presented to be reasonable on the basis of the revisions to the AD described.
E.4	1.A.3.b.iii Heavy-duty trucks and buses – diesel – N_2O (E.8, 2019) Consistency	Explain the inter-annual changes in the IEF for 2000–2017 or revise the estimates, if appropriate, or provide a justification for the trend in the IEF in the NIR.	Resolved. Hungary reported a similar trend in the N_2O IEF for diesel as that observed by the ERT during the review of the 2019 annual submission. The N_2O IEF was relatively stable prior to 1999 (2.65–2.80 kg/TJ), before decreasing by 47.0 per cent to 1.40 kg/TJ from 2000 to 2009, and then increasing by 83.5 per cent from 2010 to 2016 (to 3.07 kg/TJ). As noted in the NIR (p.81) and confirmed during the review, the Party used the latest version of the COPERT model, which includes the most up-to-date EFs. It also looked at similar countries in the region and observed a common downward trend in N_2O IEFs when the early Euro categories of vehicles began to replace conventional technologies, followed by an upward trend connected with the appearance of higher Euro categories of vehicles. The ERT agreed with the Party's assessment, noting that the same development, which saw the N_2O IEF increase significantly as of 2005 following the introduction of more stringent EU standards for motors, was also observed in other EU countries.
E.5	1.A.3.c Railways – solid and liquid fuels – CO_2, CH_4 and N_2O (E.5, 2019) (E.9, 2017) Transparency	Report in the NIR the EFs used to estimate the emissions from railways.	Resolved. The Party reported a country-specific CO_2 EF for diesel consumption in railway transport based on carbon content in the NIR (p.79). The ERT reviewed the CO_2 EF for solid fuels for prior to 2006 (emissions from solid fuels have been reported as "NO" since 2006) and confirmed that the information provided in the NIR is sufficient. For CH_4 and N_2O emissions from solid and liquid fuels, Hungary used (NIR p.80) the IPCC default EFs from the 2006 IPCC Guidelines (vol. 2, chap. 3, table 3.4.1).
E.6	1.A.3.c Railways – solid and liquid fuels – CO_2 (E.6, 2019) (E.10, 2017) Accuracy	Develop country-specific EFs for all fuels to estimate CO_2 emissions from this category.	Resolved. The Party developed and applied country-specific CO_2 EFs, based on carbon content, for oil consumption in railway transport (NIR p.79). During the review, it explained that it had also developed a country-specific EF for lignite consumption in railways, but that no country-specific EF was used for consumption of other solid fuels (coals) in railways, emissions from which have been reported as "NO" since 2006.
E.7	1.A.4.b Residential – biomass – CO_2, CH_4 and N_2O (E.9, 2019) Transparency	Include an explanation in CRF table 9 and in the NIR of where emissions from off-road vehicles and other machinery (1.A.4.b.ii) are included.	Resolved. Biomass emissions for subcategory 1.A.4.b.ii (off-road vehicles and other machinery) continued to be reported as "IE". Hungary explained in CRF table 9 that emissions from biomass (biogasoline) from off-road vehicles and other machinery are reported under road transportation (subcategory 1.A.3.b), and provided information on the reporting of biogasoline in the NIR (p.85).
E.8	1.A.4.b Residential – gaseous fuels and biomass – CO_2, CH_4 and	Provide further information on the reasons for the trends in natural gas and biomass used in the NIR, including regarding the impacts of the	Resolved. In the NIR (p.84), the Party clarified that trends in natural gas and biomass consumption are influenced by several factors, including the number of

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	N_2O (E.10, 2019) Transparency	relative prices of these fuels on their consumption.	heating degree days (figure 3.2.8.4), prices and availability of natural gas (e.g. length of pipelines).
E.9	1.A.4.b Residential – liquid fuels – CO_2, CH_4 and N_2O (E.11, 2019) Accuracy	Review the assumption that the number of households in Hungary is constant across the time series. If this assumption cannot be justified, either revise the estimates or the assumption based on which the emissions are estimated to be constant, and provide the result of the key category analysis for this subcategory that can justify the proposed approach.	Not resolved. The Party indicated in the NIR (p.A97) that this issue has not been addressed. No methodological changes were made and a key category assessment was not provided for this subcategory. For 2018, Hungary reported emissions from off-road vehicles and other machinery of 18.82 kt CO_2, 0.05 kt CH_4 and 0.0002 kt N_2O. During the review, it explained that, owing to the estimated CO_2 emissions of less than 19 kt CO_2, this is not a key category. The ERT noted that the Party's assumption that a constant household number leads to constant CO_2 emissions from off-road vehicles and other machinery (subcategory 1.A.4.b.ii) implies that this source will never be classified as a key category on the basis of the trend analysis and this does not justify maintaining the current assumptions. The ERT analysed the situation in Hungary and found that the population declined between 1990 (10,596,487) and 2018 (9,775,564) (see https://data.worldbank.org/indicator/SP.POP.TOTL?locations=HU). Given the rate of population decline and the current CO_2, CH_4 and N_2O emissions for this category, the ERT is of the view that any errors caused by the assumption of a constant number of households in Hungary would not lead to emissions being underestimated to an extent that exceeds the significance threshold for Hungary (31.61 kt CO_2 eq for 2018), above which issues are to be included in the list of potential problems and further questions raised by the ERT.
IPPU			
I.1	2. General (IPPU) – CO_2, CH_4 and N_2O (I.11, 2019) Convention reporting adherence	Ensure consistency between the methods reported in CRF table Summary 3 and in the NIR.	Resolved. The Party reported updated information in its NIR (pp.108–111) that the tier 3 method was applied for the entire reporting period. This information is consistent with the data reported in CRF table Summary 3.
I.2	2.A.1 Cement production – CO_2 (I.1, 2019) (I.3, 2017) (I.9, 2016) (I.9, 2015) Transparency	Include transparent information in the NIR on the estimation methodology for filling data gaps in the time series of the CO_2 IEF before 2005.	Resolved. The Party reported in its NIR (pp.108–111) that the tier 3 method from the 2006 IPCC Guidelines (vol. 3, chap. 2, section 2.2.1.1) was applied for the entire reporting period. For the years prior to 2005, the Party calculated CO_2 emissions by applying the average CO_2 content from the raw meal and CKD amounts reported by companies annually for 2005–2018, calculated in line with the EU ETS directive (directive 2003/87/EC). Under this directive, factories report CO_2 emissions on the basis of production data, analysis of raw flour, and CKD (which contains CO_2 generated from all carbonates, including magnesium carbonate and other).
I.3	2.A.4 Other process uses of carbonates – CO_2	Resolve the time-series inconsistency related to AD for manufacturers of bricks and ceramics	Not resolved. The Party indicated in its NIR (p.A98) and confirmed during the review that this issue identified for the years prior to 2003 has not been resolved.

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(I.12, 2019) Consistency	not included in the EU ETS using appropriate methods as described in the 2006 IPCC Guidelines.	The ERT considers that the recommendation has not yet been addressed because Hungary has not yet reported a mathematical method showing that time-series consistency has been ensured for the entire reporting period.
I.4	2.E.1 Integrated circuit or semiconductor – HFCs, PFCs, SF_6 and NF_3 (I.13, 2019) Transparency	Include an explanation as to how it is determined that there were no other companies in this category with relevant F-gas emissions in the NIR, referring, for example, to the 2006 IPCC Guidelines (vol. 3, sections 6.2.3 and 6.2.4), to justify that completeness had been ensured.	Addressing. The Party reported in its NIR (section 4.8) information on emissions sources of F-gases in the electronics industry, which showed that a single company used SF_6 between 2001 and 2005. It also indicated its plans to restart its research into new potential emissions sources for the electronics industry (category 2.E) for the next submission. During the review, in response to questions regarding the completeness of reporting for category 2.E and subcategory 2.E.1 in particular, Hungary reported that eight companies in the country manufacture several types of electrical equipment, all of which were contacted during the review. These companies confirmed that they do not use HFCs, PFCs, SF_6 or NF_3 during manufacturing because they only assemble accessories. The aforementioned company for which emissions were reported between 2001 and 2005, a semiconductor manufacturer, stopped using SF_6 after 2005 and introduced new substances for cleaning panels (TOPKLEAN EL 20A and NOVEC 71IPA). The same company also confirmed that it does not use PFCs. The ERT considers that the recommendation has not yet been addressed because Hungary has not yet demonstrated in the NIR that its reporting is complete (e.g. the Party did not indicate the number of companies manufacturing semiconductors and the evolution of their F-gas consumption over time).
I.5	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.5, 2019) (I.7, 2017) (I.8, 2016) (I.8, 2015) (42, 2014) (62, 2013) Accuracy	Make efforts to collect relevant data from companies and develop a country-specific value for recovery efficiency for refrigeration and air-conditioning equipment and include all the information related to the estimation of disposal emissions in the NIR.	Resolved. The Party took into account refrigerant recovery in its estimates for the first time, using information from the F-gas database maintained by the National Climate Protection Authority. It reported information on recovery efficiency for relevant gases for applications under category 2.F.1 in its NIR (p.168). The recalculations are described in the NIR (p.175) and reported in CRF table 8.
I.6	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.7,2019) (I.12, 2017) Accuracy	Implement a tier 2 method to estimate the emissions of F-gases from refrigeration and air conditioning.	Not resolved. Hungary continued to apply tier 1 methods for commercial refrigeration (subcategory 2.F.1.a), industrial refrigeration (subcategory 2.F.1.c), transport refrigeration (subcategory 2.F.1.d) and stationary air-conditioning (subcategory 2.F.1.f) (NIR pp.166–170) and the ERT did not note any further progress made in this regard since the 2019 annual submission. Hungary noted in the NIR (p.176) that it continues to make efforts to collect more data and develop a tier 2 method for all subapplications.
I.7	2.F.1 Refrigeration and air conditioning – HFCs (I.14, 2019) Transparency	Report in the NIR the outcome of the planned study on the success of an exchange programme for domestic refrigerators and implement a	Resolved. The Party developed, applied and reported a disposal loss factor for all years between 2005 (95.0 per cent) and 2018 (58.0 per cent) in CRF table 2(II).B-H, with information on estimation methods reported in its NIR (pp.170–171).

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
		country-specific disposal factor in the inventory, if appropriate.	
I.8	2.F.1 Refrigeration and air conditioning – HFCs (I.15, 2019) Transparency	Include information on the methodology, AD sources and assumptions for calculating mobile air-conditioning emissions from buses and trains in the NIR.	Resolved. The Party reported information on the methodology, AD sources and assumptions used for estimating emissions from mobile air-conditioning sources for buses and trains in its NIR (p.173).
I.9	2.F.4 Aerosols – HFCs (I.16, 2019) Comparability	Review the use of the notation key "NE" for the amount filled into new manufactured products for the category other, HFC-134a and HFC-152a (2.F.4.b) and for metered dose inhalers of HFC-134a (2.F.4.a) for 1992–2017 and update the notation keys to "NO".	Resolved. The Party reported "NO" in CRF table 2(II).B-Hs2 for the amount filled into new manufactured products for other aerosols of HFC-134a and HFC-152a (subcategory 2.F.4.b) and for metered dose inhalers of HFC-134a (subcategory 2.F.4.a) for the entire time series.
I.10	2.G.2 SF_6 and PFCs from other product use – SF_6 (I.10, 2019) (I.15, 2017) Accuracy	Obtain data on existing stocks of soundproof windows and estimate and report the SF_6 emissions from soundproof windows separately under this category.	Resolved. The Party estimated SF_6 emissions from soundproof windows separately as reported in CRF table 2(II).B-H (0.06 t SF_6 from stock and 0.16 t SF_6 from disposal in 2018) and reported on the methodology in its NIR (pp.189–190).
Agriculture			
A.1	3.A Enteric fermentation – CH_4 (A.5, 2019) Accuracy	Ensure consistency between table 5.2.1 in the NIR and CRF table 3.As1 when reporting livestock populations.	Resolved. The Party reported the same values in NIR table 5.2.1 and CRF table 3.A for the various years, correcting the errors for 2016 and 2017 identified in the previous review report. It also referred to a new cross-check procedure in its NIR (p.214) aimed at ensuring consistency between the NIR and CRF tables.
A.2	3.A.1 Cattle – CH_4 (A.6, 2019) Convention reporting adherence	Correct the error identified in the NIR regarding the number of equations used to estimate the net energy for activity when estimating gross energy intake for dairy cattle.	Addressing. Hungary updated the reference in NIR table 5.2.4 to equation 10.4. However, the ERT considers that the recommendation has not been fully addressed because the Party has not yet updated the corresponding explanation provided in its NIR (p.218), which still refers to equation 10.5 of the 2006 IPCC Guidelines (vol. 4, chap. 10) for net energy requirements for dairy cows and pregnancy. Equation 10.5 is based on the live weight of sheep, while equation 10.4 is based on net energy for maintenance of cattle.
A.3	3.A.1 Cattle – CH_4 (A.7, 2019) Transparency	Provide in the NIR the assumptions underlying the uncertainty value of ±20 per cent associated with the country-specific CH_4 EF for dairy cattle.	Resolved. The Party reported in its NIR (p.227) that the uncertainty of the country-specific EF was assumed to be ±20 per cent in line with the 2006 IPCC Guidelines (vol. 4, chap. 10, section 10.3.4).
A.4	3.B Manure management – CH_4 (A.9, 2019) Transparency	Provide clear information in the NIR and in CRF table 9 on where the emissions from manure treated in anaerobic digesters are included and justify in the NIR why they are	Resolved. Hungary reported in the NIR (p.240) why manure treated in anaerobic digesters is allocated to on-farm storage (liquid and solid MMS). It also reported that it is not possible to include the corresponding explanation in CRF table 9. The ERT acknowledged that information on the quantity of manure allocated to various

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		reported according to the on-farm storage system.	MMS, included as additional information in CRF table 3.B(a)s2, cannot be reflected in CRF table 9.
A.5	3.B Manure management – N_2O (A.8, 2019) Transparency	Improve the transparency of the NIR by referencing the N_2O EFs reported in table 5.3.15 accurately and by explaining any differences between those figures and the N_2O EF for manure management from the 2006 IPCC Guidelines, for example by explaining that the values in NIR table 5.3.15 are IEFs based on the weighted averages of IPCC default EFs (table 10.21 of the 2006 IPCC Guidelines) for liquid manure "with natural crust cover" and liquid manure "without natural crust cover".	Resolved. The Party provided detailed references and clarified the use of the weighted average values of IPCC default EFs from table 10.21 of the 2006 IPCC Guidelines (vol. 4, chap. 10) for liquid manure with and without natural crust cover in NIR table 5.3.21 (equivalent to table 5.3.15 in the 2019 NIR).
A.6	3.B Manure management – CH_4 and N_2O (A.10, 2019) Transparency	Explain in the NIR the reason for reporting "NO" for some years of the time series for cattle, poultry and swine manure allocated to anaerobic digesters.	Addressing. In CRF table 3.B(a) Hungary reported the amount of cattle manure allocated to biogas plants as "NO" for prior to 2004 and as "IE" for thereafter; the amount of swine manure allocated to biogas plants as "NO" for prior to 2006 and as "IE" for thereafter; and poultry manure allocated to biogas plants as "NO" or "IE". It explained in the NIR (p.240) that "IE" was reported for those years and animals when provisional data indicated that some manure was used in digesters and "NO" for other cases. However, the Party did not clearly specify the year in which a biogas plant was first set up to explain the historical reporting of "NO". The ERT also noted that CRF table 3.B(a)s2 is incorrectly referred to twice on that NIR page as table 3.B(s)s2 instead of 3.B(a)s2.
A.7	3.D.a.2 Organic N fertilizers – N_2O (A.12, 2019) Transparency	Reference accurately the IPCC default parameters used to calculate the N content of the composted municipal waste and composted sewage sludge in the NIR by indicating that these data are taken from table 4.1, volume 5 (waste), in the 2006 IPCC Guidelines.	Resolved. The Party provided complete information in its NIR (p.274), specifying that the N content of composted municipal waste and composted sewage sludge was calculated using the IPCC default parameters from the 2006 IPCC Guidelines (vol. 5, chap. 4, table 4.1).
A.8	3.D.a.2.b Sewage sludge applied to soils – N_2O (A.13, 2019) Accuracy	Use an appropriate N content for sewage sludge that reflects national circumstances when estimating N_2O emissions from sewage sludge applied to soils and provide a justification for this choice in the NIR.	Resolved. Hungary applied a country-specific N content for sewage sludge of 4.2 per cent in its calculations. This value was based on measured data provided by the National Food Chain Safety Office. Data on applied organic fertilizers were determined in coordination with the expert for the waste sector, with justification provided in the NIR (p.274).
A.9	3.D.a.5 Mineralization/immobilization associated with loss/gain of soil organic matter – N_2O	Provide the source of the AD for N mineralization associated with loss of soil organic matter and the tier of the methodology used in the NIR.	Resolved. The Party reported that a tier 2 methodology was adopted to calculate N losses due to mineralization in its NIR (p.278) and that the AD applied were the carbon losses from management changes for mineral soils under cropland remaining cropland (category 4.B.1). These carbon losses are calculated under the LULUCF sector on the basis of the detailed land-use matrix.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	(A.3, 2019) (A.15, 2017) Transparency		
LULUCF			
L.1	4. General (LULUCF) – CO_2, CH_4 and N_2O (L1, 2019) (L.5, 2017) Transparency	Correct the description of how the biomass before conversion value used for the biomass carbon stock change estimate for land converted to settlements was derived.	Resolved. The methodological description of how the biomass before conversion value used for the biomass carbon stock change estimate for land converted to settlements was derived was included in the NIR (sections 6.9.3.1, 6.9.3.2.1, 6.9.3.3.1 and 6.9.3.4.1, pp.434–436).
L.2	4. General (LULUCF) – CO_2 (L.10, 2019) Comparability	Correct the notation key used to report emissions from organic soils under forest land converted to other land uses in NIR tables 6.5.12 and 11.4 to "NO".	Resolved. The Party reported emissions from organic soils under forest land converted to other land uses as "NO" in NIR tables 6.5.12 and 11.4.
L.3	4. General (LULUCF) – CO_2 (L.11, 2019) Accuracy	Review the calculation which results in zero emissions/removals for carbon stock changes 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.	Addressing. Although Hungary reported carbon stock changes in mineral soils for grassland remaining grassland in CRF table 4.C for 1990–2016 (ranging from –41.70 to 4.06 kt C) and 2018 (–0.17 kt C), it continued to report zero for 2017. Carbon stock changes in mineral soils in flooded land remaining flooded land were reported as "IE" in CRF table 4.D for the entire time series together with an appropriate explanation for this reporting. During the review, the Party clarified that the relevant information was provided in the NIR (sections 6.7.6 and 6.8.5); however, the ERT noted that this information did not include a rationale for the reporting of a zero value for 2017 for carbon stock changes in mineral soils for grassland remaining grassland.
L.4	4. General (LULUCF) – CO_2 (L.18, 2019) Accuracy	Recalculate the figures for the area of forest land converted to other lands by using transition periods of 20 years, rather than the area accumulated since 1985, in CRF tables 4.B, 4.C and 4.E, and then recalculate all the related emissions and removals accordingly.	Not resolved. Hungary reported the figures for forest land converted to other land in CRF tables 4.B, 4.C and 4.E, providing relevant information in the NIR (section 6.5.1). However, the ERT found inconsistencies between the data provided in NIR table 6.5.2 and the data reported in CRF table 4(KP-I)A.2; for example, for 2018 a deforested area of 18,700.35 ha was reported in CRF table 4(KP-I)A.2, but Hungary reported forest land areas converted to other land-use categories of 2,218 ha (forest subcompartments) and 3,378 ha (forest and other subcompartments) in NIR table 6.5.2. During the review, the Party clarified that the areas reported in the NIR are annual values, whereas CRF table 4(KP-I)A.2 contains cumulative values (of forest subcompartments since 1990), and indicated that it plans to revise all figures for the next annual submission. During the review, the Party clarified that CRF tables 4.B, 4.C and 4.E specify the cumulative area of forest land converted to other land uses based on a transition period of 20 years, starting from 1985. The ERT considers that the recommendation has not yet been addressed because the Party has not yet adopted a 20-year transition period since the base year or

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			period that takes into account areas converted before 1985 (see ID# L.19 in table 5).
L.5	4.A Forest land – CO_2 (L.12, 2019) Convention reporting adherence	Correct the erroneous figures for the area of forest subcompartments and calculated area covered by trees in 2017.	Resolved. The Party reported a time series of forest areas, by forest subcompartment, that are included under the Convention and subject to FM activity under the Kyoto Protocol, in the NIR (table 6.5.1). The erroneous figures identified for 2017 in the 2019 annual submission were corrected.
L.6	4.A Forest land – CO_2 (L.13, 2019) Transparency	Update the description of trends in deforestation and afforestation to include the current situation and include the information on the change in data collection for these areas.	Resolved. The Party reported in the NIR (section 6.5.1) an updated description of trends in deforestation and afforestation and the methodology and data sources used in the estimation process.
L.7	4.A Forest land – CO_2 (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.	Not resolved. Hungary reported in the NIR (p.A.101) that relevant information was provided in NIR sections 6.1.4 and 6.5.9 (p.401). However, the ERT noted that section 6.1.4 does not exist, and that the information provided in section 6.5.9 is not sufficient to understand if and how the Party addressed the recommendation. Hungary also stated in the NIR (section 6.5.3, p.370) that the biomass carbon stock change, obtained by applying the stock difference method (2006 IPCC Guidelines, vol. 4, chap. 2, equation 2.5), was corrected to exclude the stock of newly "found forest". During the review, the Party clarified that a last-minute change in the heading numbering in the NIR submitted resulted in the error regarding section 6.1.4 (which appeared as 6.2.3 (p.328) in the submitted version), clarifying that this will be corrected for the next annual submission. It also stated that it reported the area of "found forest" under forest land remaining forest land and accounted for emissions and removals for this category in CRF table 4.A.1. According to the Party, the full annual area needs to be reported in the land-use change matrix, which contains both annual land converted to forest land and the annual "found forest" area, in order to account for the total national area. It also reported that the term "found forest" is an error term in its forest inventory, noting that forests located a distance from other forest blocks are not necessarily the result of afforestation (i.e. converted from cropland or grassland). Although it understands the theoretical need to report converted areas as such (noting that it reports areas for which sufficient conversion information is available), it reported that in cases in which it is not known how a particular forest was established it cannot be reported separately as "direct conversion" or "natural expansion" (as recommended by the previous ERT). Therefore, in Hungary's view, making such a distinction would not enhance the accuracy of its inventory. The ERT considers that the carbon stock of "found forest" needs to be excluded from estimates of carbon stock change because this stock does not constitute an actual increase in carbon stock (i.e. it is not a sink in the year in which these forests are first included in the GHG inventory, as described in NIR section 6.5.2). Such exclusion is necessary to prevent net sinks under forest land remaining forest land

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			from being overestimated. Hungary indicated that, under category 4.A.2 (land converted to forest land), it reported only the portion of land converted to forest land part of the annual area mentioned above and the emissions and removals accounted for. The ERT considers that the recommendation has not yet been addressed because the Party has not yet recalculated 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. The ERT is of the view that implementation of the above-mentioned recommendation is important to achieve a consistent land representation, by correcting the forest land category misclassification.
L.8	4.A Forest land – CO_2 (L.14, 2019) Consistency	Recalculate, for the entire time series, carbon stock changes in all pools under forest land remaining forest land (4.A.1) and land converted to forest land (4.A.2).	Not resolved. See ID# L.7 above.
L.9	4.A.1 Forest land remaining forest land – CO_2 (L.15, 2019) Convention reporting adherence	Change the notation key from "NO" to "NE" for the DOM and mineral soils pools for forest land remaining forest land in CRF table 4.A.	Addressing. Hungary reported carbon stock changes in the deadwood pool (e.g. 42.33 kt C for 2018), but continued to report "NO" for the litter and mineral soils pools in CRF table 4.A. During the review, it clarified that the relevant information for DOM (i.e. the deadwood and litter pools) is provided in NIR section 6.5.4.3.1. The Party explained that the mineral soils pool is assumed not to be a source, on the basis of the same assumptions applied for FM (NIR sections 7.3.1.2.2 and 11.3.1.2), and reported that it will include comments explaining this in CRF table 4.A in the next annual submission. The ERT noted that, although "NO" was reported for the litter pool in CRF table 4.A, the NIR (p.379) points to the assumption that carbon stock in the litter pool increases. During the review, the Party clarified that a new data set had recently become available and was used to derive a new estimate for the deadwood pool under forest land remaining forest land, which shows that biomass in this pool is still increasing. Hungary reported that it does not have sufficient data to derive a similar appropriate estimate for the litter pool, but that, assuming that forests are in a growing phase, it can be assumed that the litter pool is not a source. The ERT noted that the "not a source" principle is applicable only to KP-LULUCF, in accordance with decision 2/CMP.8, annex II, paragraph 2(e), and that Hungary should use "NA" in the CRF tables for the tier 1 assumption provided in the 2006 IPCC Guidelines for carbon stocks in equilibrium in the LULUCF sector. The ERT considers that the recommendation has not been fully addressed because, while quantitative information on the deadwood carbon stock was reported in the NIR (figure 6.5.4) and in CRF table 4.A, the Party did not report carbon stock changes in the litter pool.

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
L.10	4.A.2 Land converted to forest land – CO_2 (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 figures for land converted to forest land in NIR tables 6.5.3 and 6.5.11. During the review, it stated that the information requested was included in NIR section 6.5.1. However, the ERT noted that, while the figures for new land converted to forest land in NIR table 6.5.3 match the data reported in the first column of NIR table 6.5.11 (1,341 ha in 2018), the figures for forest land remaining forest land in those tables do not match. Further, the total area of land converted to forest land in NIR table 6.5.3 (124,226 ha) matches the area reported in CRF table 4.A, but does not match the total area given in NIR table 6.5.11 (122,464 ha). The fact that there are still issues identified in the tables suggests that the problem in the underlying database has not been fully resolved. The ERT therefore considers that the recommendation has not yet been addressed because there are still inconsistencies in the data reported in NIR tables 6.5.3 and 6.5.11.
L.11	4.C.1 Grassland remaining grassland – CO_2 (L.4, 2019) (L.8, 2017) Convention reporting adherence	Modify the notation key of living biomass pool to "NA".	Resolved. The Party reported carbon stock changes in biomass in grassland remaining grassland as "NA" for the entire time series.
L.12	4.C.2.1 Forest land converted to grassland – CO_2 (L.18, 2019) Accuracy	Correct the data entry errors in the reported carbon stock changes in biomass and DOM in CRF table 4.C.	Resolved. No errors were identified in the reported carbon stock changes in biomass and DOM in CRF table 4.C.
L.13	4.D.1 Wetlands remaining wetlands – CO_2 (L.5, 2019) (L.9, 2017) Accuracy	If Hungary estimates the country-specific carbon stock changes for its lands for which the standard land-use categories based on the 2006 IPCC Guidelines (e.g. peat extraction and flooded land remaining flooded land) are not applicable, for instance the mineral soils 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 or in the comment box in the CRF tables, together with a clear explanation in the relevant section of the NIR of where in the CRF tables the emissions from those lands are reported.	Not resolved. Hungary reported "NO" for net carbon stock changes in mineral and organic soils for peat extraction remaining peat extraction. For net carbon stock changes in mineral soils in flooded land remaining flooded land, it reported "IE", with a comment that net carbon stock changes in mineral soils are reported together with all other non-peatland wetlands in category 4.D.1.3 (other wetlands remaining other wetlands). It reported a net loss in carbon stocks in mineral soils in other wetlands remaining other wetlands. During the review, it confirmed that the carbon stock changes in the CRF tables are reported under other wetlands remaining other wetlands (category 4.D.1.3), clarifying that a methodological description was included in the NIR table 6.8.1. However, the ERT noted that this table relates to land converted annually to peat extraction. For peat extraction remaining peat extraction, the area of organic soils subject to peat extraction was reported in row 12 of CRF table 4.D (0.78 kha for 2018), but soil carbon stock changes were reported as "NO". During the review, the Party stated that an error had occurred when uploading data to CRF Reporter, resulting in erroneous data being reported in CRF table 4.D, but stated that the correct values will be reported in the next annual submission. The ERT considers that the recommendation has not yet been

ID#	Issue/problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			addressed because the Party reported the area of organic soils subject to peat extraction (in row 12 of CRF table 4.D), while the relevant carbon stock changes were reported as "NO".
L.14	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO_2 (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.	Not resolved. Hungary continued to report a disproportionately high estimate for CO_2 emissions from peat extraction compared to area; it reported an area of 0.78 kha in CRF table 4.D for 2018 and CO_2 emissions from peat extraction of 177.32 kt CO_2 in CRF table 4(II). During the review, it clarified that it needs to collect additional data to address this recommendation, but that this issue will be resolved for the next annual submission. The ERT considers that the recommendation has not yet been addressed because the Party has not yet explained the disproportionately high values of CO_2 emissions from peat extraction reported in CRF table 4(II).
L.15	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO_2 (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.	Not resolved. The Party continued to report a density value of 0.8 t/m^3 without providing adequate justification. During the review, it explained that it needs to collect additional data to address the issue and clarified that, as reported in the NIR (p.428), it adopted a conservative approach (i.e. applying the largest density value measured in samples obtained from various sites, namely 0.8 t/m^3) for converting volume extracted to biomass extracted. The ERT considers that the recommendation has not yet been addressed because the Party has not yet adequately justified the high value used to convert wet peat to air-dry peat.
Waste			
W.1	5.A Solid waste disposal on land – CH_4 (W.9, 2019) Transparency	Include in the NIR information to justify the appropriateness of the chosen default CH_4 generation rate constants for Hungary's specific national circumstances.	Resolved. The Party provided relevant climatological information in its NIR (pp.448–449) and reported the generation rate constants in NIR table 7.2.2. The values used are consistent with the default values for dry temperate regions specified in the 2006 IPCC Guidelines (vol. 5, chap. 3, table 3.3).
W.2	5.A Solid waste disposal on land – CH_4 (W.10, 2019) Transparency	Include further detailed information regarding waste criteria and data sources, especially for sludge, in the NIR.	Resolved. The NIR includes relevant information regarding waste criteria and data sources used for this category. Regarding sludge, the Party clarified in the NIR (p.446) that it used sludge data that had been reported directly by wastewater treatment plants to the General Directorate of Water Management. According to NIR table 7.7.2, the assumed degradable organic carbon content of sludge is based on DM; the Party's approach to calculating emissions from co-disposal of sludge in landfills combines AD on DM with a degradable organic carbon content for DM.
W.3	5.A.2 Unmanaged waste disposal sites – CH_4 (W.11, 2019) Comparability	Disaggregate the estimates and report CH_4 emissions from managed and unmanaged disposal sites separately and explain this recalculation in the NIR.	Resolved. Hungary reported in CRF table 5.A both the amount of waste disposed of and CH_4 emissions from managed and unmanaged disposal sites, allowing it to take into account CH_4 oxidation for managed landfills. The resulting emissions were recalculated accordingly, as described in the NIR (section 7.2.5).

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
W.4	5.B.1 Composting – CH_4 and N_2O (W.12, 2019) Transparency	Include specific values for EFs and an explanation for the moisture content applied to composting in the NIR.	Resolved. The Party reported the CH_4 and N_2O EFs applied on a dry weight basis and included a reference for the moisture content used in its NIR (p.456).
W.5	5.C.1 Waste incineration – CO_2 (W.13, 2019) Transparency	Include an explanation of the assumption for DM content and fossil carbon fraction for industrial sludge in the NIR.	Resolved. The Party reported in the NIR (p.459) that the classification of incinerated waste had changed. The amount of sludge incinerated is no longer registered separately, but merged under hazardous waste or other, depending on the type of industrial sludge. Emissions from incineration of sludge are no longer quantified separately, rendering the previous recommendation irrelevant.
W.6	5.C.1 Waste incineration – CO_2 (W.14, 2019) Transparency	Include in the NIR all specific values and relevant information regarding the fossil carbon content that is used in the CO_2 emission estimates for clinical, hazardous (non-liquid) and industrial solid waste.	Resolved. The Party reported the fossil carbon contents and provided references in its NIR (table 7.4.1) (under carbon EFs).
W.7	5.C.2 Open burning of waste – CO_2, CH_4 and N_2O (W.15, 2019) Transparency	Include additional information to justify the reporting of emissions from open burning using the notation key "NO" in the NIR.	Addressing. The NIR (p.457) refers to legislation prohibiting the open burning of waste of a non-biogenic origin, but does not specify which legislation is meant. During the review, Hungary explained that, in 1986, a decree on the protection of air quality came into force, under which waste incineration (of any kind) required authorization. In 2001, decree 21/2001 (II.14) came into force explicitly prohibiting the open burning of waste, including in household furnaces. The same prohibition was included in the current decree on air protection (306/2010 (XII. 23.)). The ERT considers that this issue would be resolved by Hungary providing information on this legislation in the NIR (e.g. title, year of implementation and a brief summary as provided during the review).
W.8	5.D Wastewater treatment and discharge – CH_4 (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 restructured NIR section 7.5.2 to enhance transparency by including tables with most of the main AD and parameters used in the calculations, but did not specify the fraction of the population connected to sewers.
W.9	5.D Wastewater treatment and discharge – CH_4 (W.5, 2019) (W.3, 2017) (W.7, 2016) (W.7, 2015) Transparency	Improve the transparency of the description of the calculation for CH_4 recovery in the NIR by including an explanation on the amount of CH_4 flared and by adding a new column for CH_4 recovery from biogas production.	Resolved. The Party reported data on CH_4 recovery and the amount of CH_4 flared in its NIR (pp.464–465).
W.10	5.D Wastewater treatment and discharge – CH_4 and N_2O	Demonstrate in the NIR that the application of two different methods for the share of the volume of water treated in different ways results	Resolved. Hungary reported in its NIR (figure 7.5.1) that data on the share of different treatment systems utilized for 1990–2018 were derived from a single source: the Hungarian Central Statistics Office. During the review, it confirmed

ID#	*Issue/problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
	(W.7, 2019) (W.7, 2017) Consistency	in a consistent time series and, if this is not possible, update the method to ensure a consistent time series, considering the methods contained in the 2006 IPCC Guidelines (vol. 1, chap. 5).	that it used this single data source consistently for 1990 onward. For the years prior to 1990, similarly detailed data were not available; therefore, it took available data on secondary treatment from the statistical yearbook for 1985, carrying out interpolation for between 1985 and 1990. The ERT noted that the Party has ensured time-series consistency in line with the methods contained in the 2006 IPCC Guidelines (vol. 1, chap. 5).
W.11	5.D.1 Domestic wastewater – N_2O (W.17, 2019) Transparency	Include in the NIR a description of how the Party obtained total N included in table 7.5.3, an explanation of the EF for N_2O emissions from effluent and the methodology used to estimate N_2O emissions from advanced treatment plants.	Resolved. The Party provided relevant information in its NIR (p.467) on the AD, EF and methodology used. The ERT was able to reproduce the N_2O emissions on the basis of this information.
W.12	5.D.2 Industrial wastewater – CH_4 (W.18, 2019) Transparency	Provide an explanation of the EFs for industrial wastewater treatment, including a reason for adopting the CH_4 correction factors applied, in the NIR.	Not resolved. The Party reported in its NIR (p.464) the CH_4 correction factors applied in quantifying CH_4 emissions from aerobic treatment of industrial wastewater for the entire time series, but did not justify its selection of or the trends in these factors.
KP-LULUCF			
KL.1	HWP – CO_2 (KL.1, 2019) (KL.5, 2017) Transparency	Improve the explanation of the methods for estimating and accounting HWP, considering the following points: (a) Provide accurate information on the treatment of emissions from HWP originating from forests prior to the start of the second commitment period and describe how these emissions are included in the accounting (see decision 2/CMP.8, annex II, para. 2(g)(iii)); (b) Provide further methodological information on how the emissions from HWP already accounted for during the first commitment period based on instantaneous oxidation were excluded. The emissions estimated based on the first-order decay method occurred from wood harvested in previous years and so explaining that emissions occurred only in the second commitment period does not prove the exclusion of emissions that are already accounted as instantaneous oxidation during the first commitment period (see decision 2/CMP.8, annex II, para. 2(g)(iv)).	Resolved. (a) The Party reported the requested information in its NIR (section 11.5.2.5). Hungary's FMRL is based on a projection and the contribution of HWP to the FMRL was assessed on the basis of the Kyoto Protocol Supplement (box 2.8.2, section 2.8.5); (b) The Party reported in its NIR (section 11.5.2.5) that it chose not to account for emissions from HWP originating from forests prior to the start of the second commitment period. The ERT notes that this is in accordance with decision 2/CMP.7, annex, paragraph 16.

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

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

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

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2020 annual submission of Hungary, and had not been addressed by the Party at the time of publication of this review report.

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

ID#	*Previous recommendation for the issue*	*Number of successive reviews issue not addressed*[a]
General	No issues identified.	
Energy		
E.1	Provide in future NIRs the country-specific CO_2 EFs used to calculate emissions from natural gas consumption for the entire time series with a description of how time-series consistency is ensured.	3 (2017–2020)
E.2	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.	3 (2017–2020)
IPPU		
I.6	Implement a tier 2 method to estimate the emissions of F-gases from refrigeration and air conditioning.	3 (2017–2020)
Agriculture	No issues identified.	
LULUCF		
L.13	If Hungary estimates the country-specific carbon stock changes for its lands for which the standard land-use categories based on the 2006 IPCC Guidelines (e.g. peat extraction and flooded land remaining flooded land) are not applicable, for instance the mineral soils carbon stock changes under wetlands remaining wetlands with grass vegetation, examine ways to report the 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.	3 (2017–2020)
L.14	Correct the reporting of CO_2 emissions from peat extraction in CRF table 4(II) and provide the correct value or a notation key.	3 (2017–2020)

ID#	*Previous recommendation for the issue*	*Number of successive reviews issue not addressed*[a]
Waste	No issues identified.	
KP-LULUCF	No issues identified.	

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

V. Additional findings made during the individual review of the Party's 2020 annual submission

10. Table 5 presents findings made by the ERT during the individual review of the 2020 annual submission of Hungary that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2020 annual submission of Hungary

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General			
G.1	Key category analysis	The Party reported in the NIR (section 1.6) the results of the approach 1 key category analysis. It included the sentence "In Trend assessment: Including and excluding LULUCF (the same changes)", but did not explain what was meant by "the same changes". Similar information was reported for the level assessment. During the review, Hungary explained that "In Trend assessment: Including and excluding LULUCF (the same changes)" means that category changes occurred for both the trend assessment including LULUCF and the trend assessment excluding LULUCF. These changes involved categories that were not listed as key categories in the previous NIR according to the trend assessment being identified as key categories in the 2020 annual submission, and categories that were listed as key categories in the previous NIR being removed from the key category list in the 2020 annual submission. Hungary also reported in the NIR that other fossil fuels consumed in manufacturing industries and construction (category 1.A.2), which was identified as a key category using a trend assessment in the previous submission, was also identified as a key category using a level assessment including and excluding LULUCF in the 2020 annual submission, and that this is what is meant by "In Level assessment: Including and excluding LULUCF (the same changes)". Manufacturing industries and construction – other fossil fuels is thus a key category for all four types of analyses (trend assessment including LULUCF, trend assessment excluding LULUCF, level assessment including LULUCF and level assessment excluding LULUCF). The ERT recommends that Hungary enhance the transparency of the NIR by replacing "the same changes" with an exact description of the changes made as a result of the key category analysis for each category.	Yes. Transparency
G.2	Key category analysis	Hungary applied only approach 1 to the key category analysis, meaning it did not use approach 2 or qualitative criteria. During the review, Hungary explained that it will investigate the possibility of performing an approach 2 key category analysis including LULUCF on the basis of available information and report its results in future submissions.	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT encourages the Party to use approach 2 and qualitative criteria for the key category analysis and report the results in future submissions.	
G.3	Key category analysis	The Party reported in the NIR (annex 1, pp.A3–A18) the results of the approach 1 key category analysis, specifically the level and trend assessment including LULUCF, but did not provide the results of the analysis excluding LULUCF. The latter results were provided to the ERT during the review.	Yes. Transparency
		The ERT recommends that Hungary enhance the transparency of its NIR by presenting the results of the approach 1 level and trend key category analysis including and excluding LULUCF.	
G.4	Key category analysis	In its NIR (annex 1, pp.A3–A18) Hungary documented the approach 1 level assessment for 2018 only. The 2006 IPCC Guidelines (vol. 1, chap. 4.3.1, p.4.14) indicate that the level assessment should be performed for the inventory base year and the latest inventory year, with the base year analysis updated if estimates for the base year change or are recalculated. During the review, the Party provided the ERT with the key category analysis for the base year with and without LULUCF.	Yes. Transparency
		The ERT recommends that Hungary enhance the transparency of its NIR by including the results of the approach 1 key category analysis for the base year, with and without LULUCF, in annex 1.	
G.5	Key category analysis	The Party did not report in the NIR (section 1.6) the results of the KP-LULUCF key category analysis. During the review, it provided these results and stated that it will report them in the next annual submission.	Yes. KP reporting adherence
		The ERT recommends that Hungary include the results of the KP-LULUCF key category analysis in the NIR (section 1.6).	
G.6	Uncertainty analysis	In its uncertainty analysis reported in the NIR (annex A2.1), Hungary stated that the uncertainty calculation for each GHG without LULUCF is presented in table A2-2, reporting that calculating the uncertainty with LULUCF is a planned improvement. During the review, the Party informed the ERT that this is still a planned improvement. For a further discussion of the state of the uncertainty analysis with LULUCF, and the recommendation from the ERT thereon, see ID# L.16 below.	Yes. Convention reporting adherence
Energy			
E.10	Comparison with international data – solid fuels – CO_2	The ERT noted discrepancies in the amount of lignite production and apparent consumption between the data reported to IEA and the data reported in the CRF tables. For example, for 2018 the amounts of lignite produced and imported shown in CRF table 1.A(b) were 3,850 TJ and 2,211 TJ lower, respectively, than the figures reported to IEA. During the review, Hungary explained that separate calorific values are reported to IEA for lignite produced and imported, these values varying significantly in some cases, while a single net calorific value is used in CRF table 1.A(b). For 2018, the Party reported to IEA a net calorific value for produced lignite of 6.05 TJ/kt and a net calorific value for imported lignite of 14.94 TJ/kt, while the single net calorific value reported in CRF table 1.A(b) for 2018 was 6.25 TJ/kt. During the review, the Party explained that it is considering using energy units instead of physical units to report amounts of lignite produced, imported and exported and apparent consumption in CRF table 1.A(b) in future submissions.	Not an issue/problem
		The ERT welcomes the Party's suggestion of using energy units for lignite figures and encourages it to consider the most appropriate units for reporting lignite in CRF table 1.A(b).	

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
E.11	1.A.2 Manufacturing industries and construction – liquid, solid, gaseous and other fossil fuels – CO_2	The Party reported in the NIR (p.70) that it predominantly uses default CO_2 EFs for subcategories under category 1.A.2, with some exceptions, such as non-metallic minerals. During the review, the ERT asked whether the Party plans to apply country-specific CO_2 EFs for further subcategories under category 1.A.2, in line with the decision tree in the 2006 IPCC Guidelines (vol. 2, chap. 2, figure 2.1). Hungary explained that it already uses a country-specific EF (tier 3 method) for the pulp and paper subcategory and is examining the possibility of using more facility-level information for other industries. The ERT welcomes the Party's efforts. The ERT recommends that Hungary further investigate the possibility of using country-specific CO_2 EFs for subcategories under category 1.A.2 other than non-metallic minerals, and pulp and paper.	Yes. Accuracy
E.12	1.A.4.b Residential – gaseous fuels – CO_2, CH_4 and N_2O	In the NIR (p.51), Hungary explained that only one third of CH_4 losses reported in statistical publications are considered as real losses (i.e. fugitive CH_4 emissions), with the remaining two thirds the result of accounting and assumed to be burned. The basis for this assumption was not clear to the ERT. During the review, the Party explained that, to calculate emissions for this category, it adds the original natural gas consumption for the residential category in the IEA questionnaire to two thirds of what is reported as distribution losses in the same questionnaire. It then applies the default EFs from the 2006 IPCC Guidelines (i.e. 56.1 t CO_2/TJ and 5 kg CH_4/TJ (vol. 2, chap. 2, table 2.5)) to these modified AD reflecting the sum of these two quantities. The Party confirmed that these distribution losses are not included in the official sales statistics but are still consumed in the residential category. The Party is in contact with the Hungarian Energy and Public Utility Regulatory Authority in the hope of obtaining new information on different loss types (e.g. technological losses, measurement losses and losses due to illegal consumption) that have occurred in recent years. However, Hungary emphasized that these losses are insignificant. In 2018, for example, the original gas consumption of 119 PJ was increased by 2 PJ to account for this additional assumed consumption of natural gas. The ERT encourages Hungary to hold further discussions with the Hungarian Energy and Public Utility Regulatory Authority with a view to improving the accuracy of the AD used.	Not an issue/problem
E.13	1.B.2 Oil, natural gas and other emissions from energy production – liquid and gaseous fuels – CO_2 and CH_4	The ERT identified significant inter-annual changes in the CO_2 and CH_4 IEFs for oil production, natural gas transmission and natural gas distribution between 1994 and 1995. For example, the CH_4 IEF for oil production declined from 3,000.08 kg/1,000 m^3 in 1994 to 1,800.75 kg/1,000 m^3 in 1995, which equates to a decrease of 40.0 per cent. Similarly, for natural gas transmission, the CH_4 IEF declined from 674.50 kg/million m^3 in 1994 to 298.00 kg/million m^3 in 1995, representing a decrease of 55.8 per cent. For natural gas distribution, the corresponding decrease amounted to 38.9 per cent. Similar trends, or even more significant ones in the case of oil production, were observed for CO_2 (in the case of oil production, the corresponding decline in the CO_2 IEF was 94.0 per cent). In the NIR (section 3.3.2.6), the Party reported that, as part of an informal review organized by the EU in 2015, it was recommended to identify a method for ensuring a smooth transition between the two types of IPCC default EFs for fugitive CO_2 and CH_4 emissions from oil and natural gas activities, namely the default EFs for developed countries, which have been used since 1995, and the default EFs for developing countries and countries with economies in transition, which were used prior to 1995. During the review, Hungary indicated that it had recently initiated contact with the Hungarian Energy and Public Utility Regulatory Authority, which is responsible for regulating prices and preparing tariffs and fees in the field of natural gas, to try to obtain information on officially accepted levels of technological losses, from which it could derive country-specific EFs. However, sufficient information is not yet	Yes. Consistency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		available and additionally the Party is not aware whether any data it does obtain will date back far enough. Hungary also noted that it is analysing the 2019 Refinement to the 2006 IPCC Guidelines for further guidance on this matter. The ERT recommends that the Party 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, section 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)).	
IPPU			
I.11	2.A.1 Cement production – CO_2	NIR table 4.3.1 includes data on the amount of raw flour used to produce cement, but does not specify which carbonates are consumed and assumed for the CO_2 emission estimates. During the review, the Party clarified that under the EU ETS directive (directive 2003/87/EC) cement-producing factories are required to report CO_2 emissions for 2005 onward, calculated on the basis of the amount and CO_2 content of all raw materials used and the amount of non-recycled CKD filtered by dust collectors. In this calculation, the CO_2 content of raw flour is multiplied by the amount of raw flour minus the CO_2 content of filtered dust multiplied by the amount of filtered dust. The CO_2 content is analysed by a certified laboratory. The Party commented, and the ERT acknowledged, that detailed data on the carbonate composition are not necessary for this method. The ERT recommends that the Party include information on the type of carbonate inputs at the aggregated level in its NIR.	Yes. Transparency
I.12	2.A.2 Lime production – CO_2	The Party reported in its NIR (p.114) that a tier 2 method was used to estimate emissions for this category for 1985–2004 and a tier 3 method for 2015–2016, but did not specify which methods were applied for 2005–2014, 2017 or 2018. The ERT noted that this is not in accordance with the UNFCCC Annex I inventory reporting guidelines, which require information on methods applied for the whole reporting period. During the review, Hungary clarified that the tier 3 method was used for 2005 onward and stated that it will provide the relevant information in the next annual submission. The ERT recommends that the Party specify in the NIR that the tier 3 method was applied for 2005 onward.	Yes. Transparency
I.13	2.A.4 Other process uses of carbonates – CO_2	The Party reported in its NIR (p.120) that it applied a tier 3 method for estimating emissions for this category for 2005 onward and used plant-specific data, but did not report the type of plant-specific data used. The ERT noted that this is not in accordance with the UNFCCC Annex I inventory reporting guidelines because the carbonates contained in the raw materials used were not described in the NIR. During the review, the Party clarified that the companies in the country that produce brick and ceramics (22 companies in 2018) use different types of clay and refractory mass as raw materials. Under the EU ETS, companies are required to report the carbon and CO_2 content of their raw materials, supported by measurement results from certified analytical testing laboratories. CO_2 emissions from the organic carbon and carbonate content of raw materials, reported under the EU ETS, are calculated on the basis of these analytical results. Given that the Party uses a tier 3 method for reporting emissions from brick and ceramics production, the ERT recommends that it report on the carbonates contained in the raw materials used.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
I.14	2.B.1 Ammonia production – CO_2	The Party reported that a tier 3 method was applied for estimating emissions from ammonia production, explaining in the NIR (p.134) that information on fuel requirements is provided by producers and a default carbon content factor (56.1 kg CO_2/GJ) applied. The ERT noted that use of a default carbon content factor is not in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 3, p.3.13), which consider it good practice to provide information on the carbon content factor from producers or use country-specific energy sector information when applying a tier 3 method. During the review, the Party clarified that, on the basis of the EU ETS reports, it will examine the possibility of applying a country-specific carbon content factor for future submissions. The ERT encourages the Party to continue examining the possibility of applying a country-specific carbon content factor.	Not an issue/problem
I.15	2.B.8 Petrochemical and carbon black production – CO_2	The Party reported in its NIR (p.142) and CRF table 2(I).A-Hs1 that ethylene and dichloroethylene are considered as intermediate products in the production of further petrochemical products such as toluene diisocyanate and methylene diphenyl diisocyanate and that carbon black is also produced in the country. However, no information is provided in the NIR regarding the production process for these chemicals and plant-specific EF development. During the review, the Party explained that only one company produces ethylene in Hungary. According to its annual EU ETS emission report, the company uses three different gaseous fuels during the production process and the CO_2 emissions reported are calculated using the standard methodology set out in EU regulation 601/2012, supported by monthly laboratory measurements of the carbon content in fuels. The Party also clarified that only one company produces ethylene dichloride and vinyl chloride monomer and that only one company produces carbon black using quench oil, natural gas and a negligible amount of other materials. The CO_2 emissions reported by these two companies are calculated in the same way as described above. The ERT recommends that the Party describe in its NIR the production processes for ethylene, ethylene dichloride and vinyl chloride monomer, and carbon black, as well as the method, including EF development, for calculating CO_2 emissions.	Yes. Transparency
Agriculture			
A.10	3. General (agriculture) – CH_4 and N_2O	The Party reported the following incomplete information on measurement units and incorrect references to tables in its NIR. (1) Section 5.1 reports that category 3.E (prescribed burning of savannas) is not relevant to Hungary and therefore the Party reported all associated emissions as "NO" in the CRF tables. However, the same section also mentions that, in response to a previous recommendation, a section on category 4.E (settlements) was included in the NIR. The linkage between the references to category 3.E and category 4.E was not clear to the ERT. (2) Figure 5.1.3 presents CH_4 emissions from agriculture split into four categories, but the same colours appear to have been chosen to denote both enteric fermentation and field burning of agricultural residues. There is a table note stating that emissions from field burning of agricultural residues are zero for all other years except the base year, but it is impossible to identify the non-zero value in the figure. In figure 5.1.4 on N_2O emissions from agriculture, different colours are used, but the non-zero value for the base year (assuming the rest of the period is zero) is not visible. (3) Table 5.2.1 does not contain the unit of measurement for population. (4) Figure 5.2.2 presents cattle population and milk production, but there is no unit of measurement for milk production. (5) In tables 5.3.16–5.3.18, the unit of measurement for volatile solids is kg DM/day. However, according to CRF table 3.B(a)s1, the correct unit is kg/DM/head/day, which should be used to ensure consistency in the dimensional analysis.	Yes. Convention reporting adherence

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		During the review, the Party clarified that the reference to category 4.E in section 5.1 is outdated and should read category 3.E; the correct unit of measurement for table 5.2.1 is 1,000 head; the measurement unit for milk production in figure 5.2.2 should be kg milk/head/day; and the correct unit of measurement for tables 5.3.16–5.3.18 is kg DM/head/day. Further, it clarified that it plans to make some editorial changes to the NIR with a view to addressing missing or incorrect information and that the CRF tables are correctly presented and the problems identified are specific to the NIR. The ERT recommends that the Party 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 DM/head/day)) of the NIR.	
A.11	3.B Manure management – CH_4 and N_2O	Hungary reported in the NIR (p.240) that anaerobic digested manure is allocated to on-farm storage (liquid and solid MMS). During the review, it clarified that it plans to separately include anaerobic digesters in the next annual submission, explaining that data collection on the amount of agricultural waste used in anaerobic digesters is regulated by the government order on the National Statistical Data Collection Programme, issued in accordance with the 2016 Act on Official Statistics (see https://www.ksh.hu/official_statistical_service). The Party noted that, according to provisional data, dairy cattle manure accounts for most of the feedstock used in biogas facilities. In 2018, around 5 per cent of dairy cattle manure (of which 25 per cent solid and 75 per cent liquid), 2.5 per cent of swine manure (of which 5 per cent solid and 95 per cent liquid) and significantly less than 1 per cent of poultry manure (mainly chicken) was treated in anaerobic digesters. Owing to the low proportion of digesters in MMS and considering that not only liquid but also solid manure is used as feedstock, Hungary expects its CH_4 emissions to decrease by no more than 1 kt CH_4 if anaerobic digesters are taken into account according to provisional estimates, which were based on a CH_4 conversion factor of 2 per cent, considered to be the most conservative assumption. The ERT recommends that the Party 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. If this is not possible for the next annual submission, the ERT recommends that Hungary use the documentation boxes in CRF tables 3.B(a)s1 and 3.B(b) to explain that "IE" in the column for digesters refers to the allocation of the corresponding amounts under other MMS (liquid and solid) owing to lack of information on the amount of manure diverted to digesters. Lastly, the ERT encourages Hungary, as it updates its methodology and reporting on the amount of manure processed in anaerobic digesters, to ensure consistency between the different sectors (agriculture, waste and energy) and report consistent values (manure to biodigesters and use of biogas as a fuel for heat and power production).	Yes. Accuracy
A.12	3.B.4 Other livestock – N_2O	Hungary reported new equations for estimating the Nex rate for broilers, laying hens and sows in its NIR (equations 5.4–5.7), but did not provide any references for these equations. During the review, it clarified that equations 5.4 and 5.5 correspond to equations 10.33A and 10.33B from the 2019 Refinement to the 2006 IPCC Guidelines, respectively, noting that the 2006 IPCC Guidelines do not provide a country-specific methodology for the calculation of the N retention rate of sows. Moreover, the default value provided in table 10.20 of the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.60) refers to swine and is not differentiated into the subcategories of mature and	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		growing animals. As a result, the Party decided to apply the method and default EFs from the 2019 Refinement to the 2006 IPCC Guidelines. The Party clarified that it did not compare the Nex rate for sows with default values from the 2006 IPCC Guidelines owing to the lack of comparable livestock categories. Table 10.19 of the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.59) shows a combined default value for breeding animals (breeding boars and sows), which results in a value of 30.22 kg N ((0.46 kg N (1,000 kg animal mass)$^{-1}$day^{-1})*365(days)*180 kg/1,000) as calculated by the ERT and using the IPCC default weight for Eastern European sows. In the NIR (table 5.3.13), the Nex rates for the sow subcategories ranged from 12.6 to 38.1 kg N/head/year for 2018. The value derived using the 2006 IPCC Guidelines thus falls within this range. Regarding equations 5.6 and 5.7, Hungary clarified that the cited equations correspond to equations 10.33D and 10.33E from the 2019 Refinement to the 2006 IPCC Guidelines, noting that the 2006 IPCC Guidelines do not provide a country-specific methodology for the calculation of the N retention rate of laying hens and that the default value provided in table 10.20 of the 2006 IPCC Guidelines refers to poultry and is not differentiated into subcategories such as laying hens and broilers. As a result, the Party decided to apply the method and default EFs from the 2019 Refinement to the 2006 IPCC Guidelines. For equations 5.6 and 5.7, the Party reported that it compared its country-specific values with the default values provided in the 2006 IPCC Guidelines, details of which can also be found in the NIR (section 5.3.4 and table 5.3.25). The ERT recommends that the Party include in its NIR appropriate references for equations 5.4–5.7, which are used to estimate the Nex rate for broilers, laying hens and sows.	
LULUCF			
L.16	4. General (LULUCF)	The Party reported in its NIR (section 6.11) that uncertainties for the forest land category have been calculated using an approach 2 Monte Carlo simulation and uncertainties for the other LULUCF categories using approach 1. An uncertainty analysis for the LULUCF sector was carried out in 2012 using approach 1 from the 2006 IPCC Guidelines, resulting in an overall uncertainty level of –46/+42 per cent, which it considers to be relevant for the 2020 annual submission. However, it also reported that it intends to repeat the uncertainty analysis in the future and will consider additionally applying approach 2 (Monte Carlo) for the entire sector, in addition to an approach 1 estimation. However, the ERT noted that the NIR did not include a quantitative or qualitative assessment of uncertainties related to individual land-use categories, pools or gases. In all cases, references were provided to uncertainty analyses in previous submissions. During the review, the Party clarified that each year in its NIR it reports on a quantitative uncertainty analysis for forest-related categories and activities (under the Convention and the Kyoto Protocol) conducted using approach 2. For non-forest-related categories, a quantitative uncertainty analysis using approach 1 was last conducted in 2014 (2014 NIR, pp.267, 277, 285, 294, 300 and 301). Hungary noted that the uncertainty analysis for the LULUCF sector (1) includes all components of the overall emission and removal estimates that could not be estimated (all of which involving negligible or small emissions or removals) for completeness; (2) does not include estimates where there is a risk of overestimating sinks or underestimating emissions, or applies a conservative approach; (3) reports all instances where a tier 1 quantification methodology or default factor is used; and (4) analyses possible non-quantifiable elements of uncertainty. The ERT noted that this is not in accordance with the UNFCCC Annex I inventory reporting guidelines, which require the Party to assess and estimate the quantitative uncertainty of the data used for all source and sink categories using at least approach 1 from the 2006	Yes. Convention reporting adherence

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		IPCC Guidelines, as well as the uncertainties for at least the base year and the latest inventory year and the trend uncertainty between these two years. The ERT recommends that the Party 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.	
L.17	4. General (LULUCF) – CO_2	The Party reported the estimation process for soil carbon stock changes in the NIR (section 6.4.1), but did not describe the SOC used to estimate these changes for the different land-use transition categories. During the review, it provided a table containing this information, clarifying that a paper by Zsembeli et al. (2013) was used as the data source for forest SOC, and reported that SOC for other land-use categories was assessed on the basis of expert judgment, considering potential land-use conversions and the site characteristics. The ERT encourages the Party to include in the NIR the SOC table for the different land-use transition categories and to detail the assumptions on which the SOC assessment was based.	Not an issue/problem
L.18	Land representation – CO_2, CH_4 and N_2O	The Party reported initial and final land-use category areas in CRF table 4.1. However, the final areas reported in the table are not always consistent with the land-use areas reported in the CRF background tables (i.e. column C in CRF tables 4.A, 4.B, 4.C, 4.D and 4.E). For example, for 2018, final cropland area in CRF table 4.1 was reported as 5,201.23 ha, whereas in CRF table 4.B the total area reported was 5,201.63 kha. For grassland, the corresponding values in CRF tables 4.1 and 4.C were 1,196.73 and 1,196.93 kha, and for settlements these values were 584.06 and 584.30 kha. During the review, the Party clarified that an error had occurred when filling in the data. The ERT recommends that Hungary 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 that reported in CRF table 4.1, performing QA/QC checks to ensure correctness of the reported data.	Yes. Convention reporting adherence
L.19	Land representation – CO_2, CH_4 and N_2O	The Party stated in its NIR (p.325) that the reported area of non-forest land-use conversion categories, which is key for estimating emissions and removals and should include areas under conversion for the (default) 20-year period, excludes areas that were converted before 1985 because no area estimates are available for these years. The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 3) since this approach essentially results in different transition periods being applied (i.e. before and after 1985). The ERT also noted that land-use category areas are available in the statistical database of the Food and Agriculture Organization of the United Nations as well as on the Hungarian Central Statistical Office website, which was also noted in the NIR (section 6.3.2). NIR figures 6.3.3–6.3.4 highlight the effects of excluding areas that were converted before 1985 (potential overestimation of soil carbon stock changes until 2004 owing to application of different transition periods). During the review, the Party clarified that its land-use change estimates exclude areas that were converted before 1985 owing to lack of data. It reported that this approach does not result in different transition periods being applied because all calculations related to land under the land-use change categories apply a 20-year transition period, noting that any possible bias results from lack of data prior to 1985 and not to different transition periods being used. For example, areas classified under conversion categories in 1985 remained classified as such for 20 years before being moved to a land remaining land category in 2005. The Party acknowledged the data sources mentioned by the ERT, but noted that these only contain land-use areas and not land-use change areas, and the latter cannot be inferred from	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		land-use information only, which is the only information the Party has. In a previous project, Hungary demonstrated that applying assumptions to pre-1985 conversions could lead to large uncertainties rendering the application of assumptions in itself meaningless. With regard to NIR figures 6.3.3–6.3.4, the Party confirmed that soil carbon stock changes may be over- or underestimated, but only for 1985–2004, after which time the number of years for which meaningful data are available increases. The Party suggested that the current share of data available with unbiased estimates is already more than sufficient to present a good basis for mitigation policies and measures (the main area in which emission and removal data are needed), and that the costs of developing conversion data for the years prior to 1985 – if it is even possible to develop meaningful, sufficiently accurate data – are disproportionate to the potential improvement in accuracy needed to modify its current mitigation policies and measures for the future. Hungary therefore concluded that no recalculation is possible or necessary. The ERT agreed with Hungary's explanation that any possibly biased emissions for the conversion categories result only from the fact that land-use change estimates exclude areas converted prior to 1985, affecting estimates of carbon stock changes in all carbon pools. However, it noted that, as Hungary's base year is the average of 1985–1987, the Party needs to ensure a consistent time series for the six IPCC land categories for 1966 onward. The ERT noted that Hungary considers the soils pool in equilibrium until 1985 and that a sound justification for this assumption is needed, or the emissions and removals have to be estimated by applying a 20-year transition period and on the basis of a recalculated time series of land-use category areas, including land-use conversions prior to 1985. The ERT is of the view that the estimation process for land-use categories converted to other land uses, in relation to the above-ground and below-ground biomass pools, for land-use conversion is also affected by the transition period adopted, since it results in a different amount of areas converted from one land-use category to another land-use category. During the review, the Party clarified that it did not consider the soils pool in equilibrium until 1985. In contrast, the Party stated that, owing to the lack of pre-1985 data, making an assumption for the years before 1985 may result in large errors; therefore, it did not apply any related assumptions (i.e. land-use change areas) from which emissions could be calculated. The Party explained that a 20-year default transition period was applied for the soils pool, while for the above-ground and below-ground biomass pools the transition period is taken to be one year, implying that when biomass is destroyed during a conversion (with the exception of wood that enters the HWP pool (estimated based on sound science) or the deadwood pool), its carbon content is assumed to be oxidized in the year of the conversion. The ERT recommends that the Party (1) 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; (2) adopt a 20-year transition period, as per the 2006 IPCC Guidelines, for all IPCC categories; and (3) report GHG emissions and removals on the basis of the recalculated time series of land-use category areas.	
L.20	4.C.1 Grassland remaining grassland – CO_2	The Party reported carbon stock changes for mineral soils in CRF table 4.C. However, the methodological description of the process for estimating these changes in the NIR does not explain how changes in management practices result in soil carbon stock changes. The ERT noted that, according to equation 2.25 from the 2006 IPCC Guidelines (vol. 4, chap. 2), without clear evidence of a change in management practice, carbon stock changes in the same area are deemed not to occur. During the review, Hungary clarified that, as reported in the NIR (section 6.4.1), it assessed the distribution of the area of the various soil carbon stock change subcategories by climate and soil type	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		(table 6.4.1), on the basis of which (supported by limited information) it attempted to estimate data to determine changes in management practices (section 6.7.2.3). This assessment showed that the distribution of the various subcategories within the grassland category change over time, although to a very negligible extent year-on-year, which was also indicated in the NIR (table 6.7.3); however, the ERT noted that, although management practices are described in this table, data are only reported for 2016, meaning that changes cannot be observed. It is these changes in the grassland subcategories that result in changes in the mean SOC calculated for grassland, and this (little) change (together with the large area) results in the small carbon stock changes in the time series. Hungary noted that the aforementioned methodology is applied for methodological completeness only, rather than for absolute precision, and since the changes are very small, this methodology meets the requirement as far as practicable. The Party further clarified that the estimation process has to be carried out in the same area and soil carbon stock changes are triggered by changes in management practices. The ERT recommends that the Party 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, and encourages it to include in the NIR a summary table, for grassland remaining grassland, containing the annual area and the annual percentage for management practices applied in the same area.	
L.21	4(IV).2 N leaching and run-off – N_2O	The Party reported N_2O emissions from N leaching and run-off in CRF table 4(IV) (0.02 kt N_2O for 2018), but reported the AD as "NE". During the review, it clarified that it reported annual emissions from mineral soils associated with loss of soil carbon from soil organic matter as a result of changes to land use or management using equation 11.10 from the 2006 IPCC Guidelines (vol. 4, chap. 11), which does not require any AD directly, rather the quantity F_{SOM}. It acknowledged, however, that the amount of N fertilizer is a potential source of emissions under this category and could be used as AD. Hungary believed that reporting the annual amount of N mineralized in mineral soils associated with loss of soil carbon (i.e. F_{SOM}) was not meaningful in this case, which is why such data were not reported. However, the ERT noted that this information must be reported as AD, in kg N/year, to ensure transparency, accuracy and comparability. The Party agreed with the ERT and indicated that the relevant AD will be provided in the next annual submission. The ERT recommends that the Party provide the relevant AD (i.e. F_{SOM}, in kg N/year) in CRF table 4(IV) in the next annual submission.	Yes. Transparency
Waste			
W.13	5.A Solid waste disposal on land – CH_4	The NIR (p.451) distinguishes between managed (D1) and well-managed (D5) landfills. Landfills categorized as D5 are regarded as well-managed and therefore an oxidation rate of 10 per cent is applied. The Party did not explicitly explain its assumptions regarding the oxidation rate of 0 per cent applied for D1 landfills, but since average oxidation seems to correlate to the amount of waste landfilled at D5 landfills (table 7.2.3), oxidation at D1 landfills appears to be assumed to be zero. The 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.15) permit an oxidation rate of 10 per cent when managed landfills are covered with soil. During the review, the ERT asked the Party to clarify how it calculated emissions from managed landfills, partially without and partially with CH_4 oxidation, across the time series, noting that the waste model contained in the 2006 IPCC Guidelines does not allow for this distinction directly. The Party provided its waste model in response. When	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		evaluating the calculation file provided, the ERT noted that for 2017–2018 the oxidation rate was assumed to be 10 per cent at both D1 and D5 landfills, which could lead to CH_4 emissions being underestimated. Hungary explained that D5 landfills are modern landfills that comply with the EU landfill directive, to which daily temporary soil covers are applied. D1 landfills are also covered in Hungary, but the Party noted that there may be a delay between waste being deposited and covers being applied, for example owing to modernization efforts or post-closure management requirements. In 2017, for example, all D1 and D5 landfills in Hungary were covered. As a result, the ERT concluded that the emission estimates for 2017–2018 are accurate and do not result in emissions being underestimated. For the period prior to 2003, Hungary does not have access to information on managed landfill covers; therefore, the ERT concluded that the oxidation rate assumption of 0 per cent is justified. During the review, Hungary identified a report from 2009 on the implementation of the EU landfill directive, indicating that in 2007–2009 all managed landfills met the requirements from the EU landfill directive and were therefore covered. This report will enable Hungary to improve its assumptions regarding the covering of landfills and CH_4 oxidation for 2007–2016. The ERT recommends that Hungary improve its description of its assumptions about landfill covers for D1 landfills in the NIR, explaining that these landfills are covered but not necessarily immediately after the waste is deposited. The ERT also recommends that Hungary improve its time series of covers and CH_4 oxidation for 2007–2016 to take into account the conclusions of the 2009 report on the implementation of the EU landfill directive that from 2007 onward all managed landfills met the requirements of the EU landfill directive and were therefore covered.	
KP-LULUCF			
KL.2	General (KP-LULUCF)	The Party reported areas of land subject to KP-LULUCF in the CRF tables and in NIR tables 6.5.1, 6.5.3, 6.5.11, 6.5.14, 11.2, 11.3 and 11.8. However, the ERT noted that the information provided in the NIR was not sufficient for it to clearly understand the 20-year transition period applied for carbon stock changes in soils for these activities. During the review, the Party clarified that the default 20-year transition period was applied for deforestation, as reported in the NIR (pp.352 and 396). It also clarified that carbon stock changes in soils are estimated for deforestation activities only, as for AR and FM activities the soils are demonstrated not to be a net source; for FM, no transition takes place, and for AR the calculation involves the term "Land under AR since 1990 (that is still in the transition phase)", which means that the Party only considers those areas for the demonstration of not a net source that had been converted to forest not more than 20 years before the year of the demonstration and not the total area of AR. Hungary stated that there is an error in NIR table 11.8 for "Land under AR" for 2018, clarifying that the error does not affect the estimate, since the correct value was used in the calculation. The ERT recommends that the Party correct the value reported in NIR table 11.8 for "Land under AR" and enhance the transparency of the NIR by clearly explaining the transition period applied for KP-LULUCF activities.	Yes. Transparency
KL.3	Deforestation – CO_2, CH_4 and N_2O	The Party reported a deforested area in CRF table 4(KP-I)A.2 and included figures on forest land converted to other land uses in NIR table 6.5.2. However, the ERT noted inconsistencies between these two tables; for 2018, the deforested area was reported as 18.70 kha (or 18,700.35 ha) in CRF table 4(KP-I)A.2 in the original submission of April 2020, whereas forest land area converted to other land-use categories was reported as 2,218 ha (forest subcompartments) and 3,378 ha (forest and other subcompartments) in NIR table 6.5.2. During the review, the Party clarified that the areas reported in NIR table 6.5.2 are annual values, whereas CRF table 4(KP-I)A.2 contains cumulative values (of forest subcompartments since 1990), and reported that it plans to revise all figures for the next	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		annual submission. The ERT noted that the cumulative values (from 1990) reported in NIR table 6.5.2 equate to 18,701 and 41,126 ha for forest subcompartments and forest and other subcompartments, respectively. Hungary clarified during the review that it used two data sets for deforestation activities to cover the two types of land under managed forests (and forestry in general) and the two different emission estimation methodologies applied. The first methodology applies to biomass, which is found in forest subcompartments only. To estimate emissions from biomass (as noted in NIR section 6.5.6.1.1), the methodology described in NIR section 6.4.4 was applied. The equation in that section is based on the area of conversion, which in the case of deforestation is equal to the forest subcompartment area. Since, according to CRF table 4(KP-I)A.2, biomass is the largest emission pool, an area of 18.70 kha was reported in the table in the original 2020 submission (considering that emissions from litter and deadwood are also covered there). Emissions from soils were estimated by taking the entire category area (i.e. forest and other subcompartments). The ERT noted that this approach essentially results in two deforestation areas. The first deforestation area (i.e. 18,700.35 ha for forest subcompartments for 2018) is used to estimate carbon stock changes in the biomass and DOM pools, while the second (i.e. 41,125.91 ha for forest and other subcompartments for 2018) is used to estimate carbon stock changes in the soils pool. In response, Hungary noted that that the larger deforested area covers all pools under deforestation, noting that part of this area is covered by infrastructure like roads that does not contain any biomass; as such, the AD for estimating emissions from loss of biomass are not for area but for biomass (of forest subcompartments), although area is related to them. The ERT noted that this is not in accordance with the Kyoto Protocol Supplement (section 2.6.3) or the UNFCCC Annex I inventory reporting guidelines (para. 37) and could result in emissions being underestimated owing to the requirement to report all carbon stock changes and non-CO_2 emissions during the commitment period in land subject to direct human-induced deforestation since 1990. Therefore, the ERT concluded that CO_2, CH_4 and N_2O emissions from the biomass and DOM pools were possibly underestimated and included this issue in the list of potential problems and further questions raised by the ERT. In this list, the ERT recommended that the Party either demonstrate that its current approach to estimating CO_2, CH_4 and N_2O emissions from the biomass and DOM pools under deforestation does not lead to emissions being underestimated; or, if this was not possible, estimate the carbon stock changes, for all carbon pools, for land subject to deforestation activities on the basis of the actual deforested area (i.e. an annual value representing the area deforested) for all reporting years of the second commitment period and report AD and carbon stock changes in the CRF tables, for the disaggregated levels used (subcompartments), for land subject to deforestation activities. In response to the list of potential problems and further questions raised, Hungary resolved the issue by submitting revised CRF tables recalculating the carbon stock change estimates for all carbon pools using a revised area for all years of the commitment period (e.g. 41,125.91 ha for 2018). AD and carbon stock changes are now reported separately for forest subcompartments and the other subcompartments. The ERT noted that the estimates for CH_4 and N_2O emissions, resulting from only a subset of the total deforestation area, did not change, but noted that this is plausible since CH_4 and N_2O emissions from land only occur under certain conditions. Overall, the revised estimates for CO_2 emissions from deforestation increased by 37.73–64.13 kt CO_2 eq for between 2013 and 2018, with an increase in emissions of 54.73 kt CO_2 eq for 2018.	

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT recommends that Hungary revise its methodological description in the NIR to reflect how it determined the appropriate areas of deforestation for forest subcompartments and other subcompartments, and ensure consistency between the areas and the emissions and removals reported in the NIR and in CRF table 4(KP-I)A.2.	
KL.4	FM – CO_2, CH_4 and N_2O	The Party reported a time series of forest areas under the Convention and forest areas subject to FM under the Kyoto Protocol in its NIR (table 6.5.1). However, the FM area included in NIR table 6.5.1 (1,799,312 ha) is different from that reported in CRF table 4(KP-I)B.1 (1,764.62 kha (or 1,764,617 ha) for 2018). During the review, the Party clarified that NIR table 6.5.1 contains errors, and the correct FM areas should be as follows for 2008–2018: 1,744.74 kha, 1,750.78 kha, 1,753.71 kha, 1,757.66 kha, 1,762.39 kha, 1,766.23 kha, 1,767.69 kha, 1,767.47 kha, 1,766.44 kha, 1,766.55 kha and 1764.62 kha. It stated that these figures will be provided in the next annual submission. However, the ERT noted that the corrected areas reported by the Party for NIR table 6.5.1 were not fully consistent with the areas reported in CRF table 4(KP-1)B.1 for 2014 and 2016. Further, Hungary stated in the NIR (p.487) that the FM area has declined by the area of deforested stands and increased by the area of "found forest" over time. The ERT noted that, if reporting areas increase, land and the associated carbon stock changes and non-CO_2 emissions have to be reported starting from the year in which the land was first reported under FM, avoiding any double counting of land or overestimation of removals. During the review, the Party clarified that NIR tables 6.5.7 (showing the estimation methodology) and 11.6 demonstrate how "found forest" is taken into account in the estimation process. The ERT recommends that the Party correct the values for the FM areas reported in NIR table 6.5.1 for 2008–2018. The ERT also recommends that Hungary 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.	Yes. Transparency
KL.5	FM – CO_2, CH_4 and N_2O	The Party described its application of a technical correction to the FMRL in the NIR (section 11.5.2.3). The ERT noted that the FM area reported for 2008–2018 (see ID# KL.4 above) is different from the area used in the FMRL assessment that was calculated by the two models applied for the projection (i.e. G4M and EFISCEN). During the review, the Party clarified that there was a small difference between the FM area reported in CRF table 4(KP-1)B.1 (1,764.62 kha for 2018) and that used in the FMRL assessment (e.g. 1,657 kha for 2008 and 1,622 kha (using the G4M) and 1,652 kha (using the EFISCEN model) for 2020), attributable to several factors. In Hungary's view, it is not feasible for the two complex models used to take into account such area differences each year, but it plans to apply a technical correction to address this issue in 2021 or 2022. The ERT noted that this is not in accordance with the Kyoto Protocol Supplement (section 2.7.6) or decision 2/CMP.7, paragraph 14, because the different FM areas reported (i.e. due to recalculated historical data) triggers the need to apply a technical correction, without which removals for FM will be overestimated. This issue was therefore included in the list of potential problems and further questions raised by the ERT. In the list of potential problems, the ERT recommended that the Party update the $FMRL_{corr}$ to ensure consistency between the current FM areas and the FM areas used to calculate the FMRL reported, and provide transparent information on the factors leading to this technical correction (ensuring the criteria in table 2.7.1 of the Kyoto Protocol Supplement have been met), including the historical GHG estimates for the years used to estimate the FMRL, the methods used to calculate the technical correction and the results (i.e. the $FMRL_{corr}$), as well as a discussion of any differences between the $FMRL_{corr}$ and the FMRL. In response to the list of potential problems and	Yes. KP reporting adherence

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue/problem?[a]
		further questions raised, Hungary subsequently reported an updated technical correction to address this issue and the issue listed in ID# KL.6 below, in which it recalculated the underlying FM areas to reflect the various subcompartment areas, the updated area of deforestation and the inclusion of "found forest" in FM areas. The FM areas increased by 0.50–4.37 kha for between 2013 and 2017 as a result, with no change observed for 2018, while the changes in removals ranged from a decrease of 655.73 kt CO_2 eq to an increase of 112.93 kt CO_2 eq for between 2013 and 2018, with an increase of 103.91 kt CO_2 eq reported for 2018 (due not to a change in FM area in 2018 but to the issues described in ID# KL.6 below). The technical correction resulted in a change from –40.37 to –255.44 kt CO_2 eq/year for the second commitment period. Hungary also provided the documentation recommended by the ERT. The ERT noted a slight correction to the AR area for 2014 (a decrease of 1.29 kha) and 2016 (an increase of 0.08 kha), while the recalculation of reported AR emissions and removals caused estimated removals to fall by 43.97 kt CO_2 eq for 2015 and increase by 31.84 kt CO_2 eq for 2018. The ERT deemed these recalculations to be acceptable on the basis of the recalculated data for deforestation and FM activities. The ERT recommends that the Party transparently explain in the NIR all factors leading to the technical correction and the updated $FMRL_{corr}$ (e.g. following the checklist in table 2.7.1 of the Kyoto Protocol Supplement), including the rationale for calculating the technical correction, the methods used for the calculation and the results, as well as a discussion of the differences between the $FMRL_{corr}$ and the original FMRL.	
KL.6	FM – CO_2, CH_4 and N_2O	The Party described its technical correction to the FMRL in the NIR (section 11.5.2.3). The ERT noted that in the NIR (table 11.15) Hungary reported that there were no changes in the method used for reporting emissions from FM or forest land remaining forest land after the adoption of the FMRL. The ERT also noted that the FMRL was assessed using two models (i.e. G4M and EFISCEN) with an ex post calibration or adjustment using an offset, defined as the difference between the average historical net FM emissions for 2000–2008 and the average mean values from the two models for the same period. During the review, the Party clarified that the approach applied for the FMRL assessment was not adopted in the inventory; instead, relevant equations from the 2006 IPCC Guidelines and the Kyoto Protocol Supplement were applied consistently for all years for the GHG inventory. It stated that, to address the issue of using two different approaches, it will repeat the ex post calibration of the models and, if necessary, apply a technical correction. According to the Party, the models for the FMRL and the GHG inventory calculation system are completely different, and this is the reason for applying the ex post calibration. The ERT noted that this is not in accordance with the Kyoto Protocol Supplement (section 2.7.6) or decision 2/CMP.7, paragraphs 14–15, because the different methods used for GHG reporting and for the FMRL assessment triggers the need to apply a technical correction to ensure methodological consistency with the FMRL. Failure to apply the technical correction will cause removals for FM to be overestimated. This issue was thus included in the list of potential problems and further questions raised by the ERT. Noting the recommendation to update the technical correction to ensure consistency between the current FM areas and the FM areas used to calculate the FMRL (see ID# KL.5 above), in the list of potential problems, the ERT recommended that the Party provide transparent information on the factors leading to this technical correction (ensuring the criteria in table 2.7.1 of the Kyoto Protocol Supplement have been met), including the historical GHG estimates for the years used to estimate the FMRL, the methods used to calculate the technical correction and the results (i.e. the $FMRL_{corr}$), as well as a discussion of any differences between the $FMRL_{corr}$ and the FMRL. In response to the list of potential problems and further questions raised, Hungary corrected the FM areas and estimates of CO_2 emissions and removals (see ID# KL.5 above), added the organic soils pool (which was not included in the	Yes. KP reporting adherence

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		original FMRL), revised the estimates of HWP emissions and removals under FM (causing estimated net carbon stock changes to increase from 87.68 to 552.56 kt C), recalculated historical non-CO_2 emissions and applied an ex post calibration to address the variation in FM areas. Hungary documented these changes in tabular format similar to table 2.7.1 of the Kyoto Protocol Supplement. The ERT notes the recommendation in ID# KL.5 above; no further recommendation is necessary under ID# KL.6.	
KL.7	FM – CO_2	The Party included in the NIR (p.509) information demonstrating that litter in areas subject to FM activities is not a source, stating that, in the absence of a litter monitoring system, it applied the information in NIR section 6.5.4.2.2 and assumed that the results of the analysis for not a net source for the forest land remaining forest land category are valid for FM. The ERT noted that the section referred to does not exist, to which the Party clarified that section 6.5.4.3.1 was meant. The ERT noted, however, that section 6.5.4.3.1 does not contain any litter-specific information, but rather quantitative information on the deadwood pool under forest land remaining forest land. While it mentioned generally that the litter pool is growing, it did not provide sufficient data to demonstrate the assertion that the litter pool is not a net source. This is not in line with decision 2/CMP.7, annex, paragraph 26, or the Kyoto Protocol Supplement (section 2.3.1), which require the provision of transparent and verifiable information demonstrating that the pool is not a net source. However, the ERT noted that the litter pool is not included in Hungary's FMRL inscribed in the appendix to decision 2/CMP.7 and, therefore, lack of such information does not affect the Party's accounting. This issue was therefore not included in the list of potential problems and further questions raised by the ERT. The ERT recommends that the Party enhance the transparency of its 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).	Yes. KP reporting adherence
KL.8	FM – CO_2	The Party provided information in the NIR (section 11.3.1.2) demonstrating that soils in areas subject to FM are not a net source. However, the ERT noted that the figures in NIR table 11.8 show a very small sink for soils subject to FM activities (e.g. –0.2 kt C for 2018) and that the information provided by Hungary is not sufficiently robust to demonstrate that this is not a net source, particularly when the related uncertainties of the calculation methods are taken into account. During the review, the Party clarified that the "not a net source" principle contained in decision 2/CMP.8, annex II, paragraph 2(e), is usually applied when, considering that uncertainties are reduced as far as practicable, it is not possible to estimate a certain quantity. Further, Hungary stated that demonstrating that soils are not a net source needs to be based on a sound scientific methodology, with consideration given to uncertainties, which it explicitly reported in the NIR. The Party explained that the data reported in NIR table 11.8, updated annually, demonstrate that, overall, even considering all conservative methodological elements, the soils pool is a net sink, noting that the small inter-annual variability that occurs is well within the uncertainty range of the approach applied. It therefore considers that it has applied the elements in the Kyoto Protocol Supplement (section 2.3.1) designed to demonstrate that the soils pool is not a net source, resulting in carbon stock estimates heavily biased towards emissions rather than removals. According to the Party, one element of the demonstration of not a net source is the assumption of large emissions due to artificial regeneration, as well as the sink of all forests between two consecutive regenerations. In the NIR (pp.353–354), the Party stated that it is currently analysing over 20 years of measurements from the Hungarian Soil Protection and Monitoring System to further corroborate its assessment that soils in areas subject to FM activities are not a net source. The preliminary results show that the annual average	Yes. KP reporting adherence

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		amount of carbon accumulated in plots in the forest land remaining forest land category is about 0.181 t C/ha, thus significantly larger than the amount assumed in the current annual submission. The ERT noted that the soils pool is not included in the Party's FMRL inscribed in the appendix to decision 2/CMP.7 and, therefore, any issues related to the robustness of the supporting information provided by the Party will not affect its accounting. This issue was thus not included in the list of potential problems and further questions raised by the ERT. The ERT recommends that the Party enhance the transparency of its 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.	

[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 2020 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 2020 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 2020 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 for Hungary, base year[a]–2018

(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions including indirect CO_2 emissions[b]*		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)[c]*	*KP-LULUCF (Article 3.3 of the Kyoto Protocol)[d]*	*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	108 131.45	109 888.54	NA	NA	NA		NA	
1990	91 333.81	93 950.88	NA	NA				
1995	69 559.53	75 352.36	NA	NA				
2000	72 560.08	73 234.56	NA	NA				
2010	60 534.82	64 856.75	NA	NA				
2011	59 324.07	63 239.46	NA	NA				
2012	54 918.40	59 569.73	NA	NA				
2013	53 071.18	56 763.15	NA	NA		–1 094.47	NA	–1 802.58
2014	52 243.50	57 391.17	NA	NA		–927.35	NA	–3 239.95
2015	55 074.47	60 797.34	NA	NA		–940.46	NA	–3 662.06
2016	56 729.19	61 257.34	NA	NA		–864.58	NA	–3 127.01
2017	58 607.31	63 781.35	NA	NA		–921.22	NA	–3 558.68
2018	58 559.63	63 219.56	NA	NA		–766.45	NA	–3 302.44

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

[a] "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.

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

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

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

Table I.2

Greenhouse gas emissions by gas for Hungary, excluding land use, land-use change and forestry, average for 1985–1987 to 2018

(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	85 685.26	12 756.28	11 132.59	NO	371.08	NO	7.31	NO
1990	73 464.85	11 721.80	8 376.09	NO	375.72	NO	12.42	NO
1995	61 690.77	8 597.50	4 749.68	37.15	222.72	NO	54.53	NO
2000	58 608.27	8 566.31	5 405.13	283.99	283.11	NO	87.74	NO
2010	52 123.68	7 713.51	3 727.61	1 198.23	1.68	NO	92.05	NO
2011	50 322.15	7 630.45	3 918.95	1 287.73	2.11	NO	78.07	NO
2012	46 776.68	7 680.18	3 855.72	1 177.80	1.81	NO	77.53	NO
2013	43 704.81	7 511.40	4 196.83	1 250.04	1.74	NO	98.34	NO
2014	43 862.71	7 329.74	4 429.95	1 683.36	1.40	NO	84.00	NO
2015	46 627.61	7 352.83	4 532.27	2 164.87	1.13	NO	118.62	NO
2016	47 395.71	7 302.65	4 802.04	1 626.13	0.78	NO	130.03	NO
2017	49 684.85	7 374.46	4 801.38	1 801.16	1.12	NO	118.38	NO
2018	49 628.49	7 272.00	4 858.70	1 358.02	0.79	NO	101.56	NO
Percentage change average for 1985–1987 to 2018	**–42.1**	**–43.0**	**–56.4**	**NA**	**–99.8**	**NA**	**1 288.6**	**NA**

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

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

Table I.3

Greenhouse gas emissions by sector for Hungary, average for 1985–1987 to 2018

(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
Average for 1985–1987	79 561.34	15 165.79	12 012.79	–1 757.08	3 212.61	NO
1990	68 483.44	11 809.21	9 978.41	–2 617.08	3 679.82	NO
1995	57 176.72	8 257.95	5 997.53	–5 792.82	3 920.16	NO
2000	54 652.91	8 298.33	6 132.92	–674.48	4 150.40	NO
2010	48 580.65	6 454.36	5 672.76	–4 321.93	4 148.98	NO
2011	46 796.23	6 537.86	5 888.00	–3 915.39	4 017.37	NO
2012	43 611.13	6 019.47	5 923.22	–4 651.33	4 015.90	NO
2013	41 183.84	5 453.94	6 326.31	–3 691.97	3 799.06	NO

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2014	40 668.40	6 444.23	6 574.49	–5 147.67	3 704.04	NO
2015	43 118.63	7 307.87	6 790.56	–5 722.87	3 580.28	NO
2016	44 247.53	6 454.64	7 098.81	–4 528.15	3 456.37	NO
2017	45 856.93	7 332.46	7 110.19	–5 174.05	3 481.77	NO
2018	45 518.85	7 111.69	7 145.64	–4 659.94	3 443.39	NO
Percentage change average for 1985–1987 to 2018	**–42.8**	**–53.1**	**–40.5**	**165.2**	**7.2**	**NA**

Note: 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[a]–2018, for Hungary
(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[b]	*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				–255.44				
Base year	NA				NA	NA	NA	NA
2013		–1 254.65	160.18	–1 802.58	NA	NA	NA	NA
2014		–1 120.59	193.24	–3 239.95	NA	NA	NA	NA
2015		–1 197.11	256.65	–3 662.06	NA	NA	NA	NA
2016		–1 190.98	326.40	–3 127.01	NA	NA	NA	NA
2017		–1 280.04	358.81	–3 558.68	NA	NA	NA	NA
2018		–1 241.33	474.88	–3 302.44	NA	NA	NA	NA
Percentage change base year–2018					**NA**	**NA**	**NA**	**NA**

Note: Values in this table include emissions from land subject to natural disturbances, if applicable.
[a] 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.
[b] The value reported in this column relates to 1990.

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

Table I.5

Accounting quantities for activities under Article 3, paragraph 3, and forest management and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol for Hungary

(kt CO_2 eq)

		Net emissions/removals								
GHG source/sink activity	*Base year*[a]	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*Total*[b]	*Accounting parameters*	*Accounting quantity*[c]
A.1. AR		–1 254.650	–1 120.594	–1 197.111	–1 190.977	–1 280.038	–1 241.333	–7 284.702		–7 284.702
Excluded emissions from natural disturbances[d]		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
A.2. Deforestation		160.181	193.239	256.653	326.398	358.813	474.882	1 770.166		1 770.166
B.1. FM								–18 692.707		–11 160.038
Net emissions/removals		–1 802.582	–3 239.947	–3 662.059	–3 127.006	–3 558.676	–3 302.437	–18 692.707		
Excluded emissions from natural disturbances[d]		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
Any debits from newly established forest		NO	NO	NO	NO	NO	NO	NO		NO
FMRL[e]									–1 000.000	
Technical corrections to FMRL									–255.445	
FM cap									30 680.949	–11 160.038
B.2. CM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.3. GM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.4. RV (if elected)	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.5. WDR (if elected)	NA	NA	NA	NA	NA	NA	NA	NA		NA

[a] Net emissions and removals from CM, GM, RV and/or WDR, if elected, in the Party's base year as established in decision 9/CP.2.
[b] Cumulative net emissions and removals for all years of the commitment period reported in the annual submission under review.
[c] The accounting quantity is the total quantity of units to be issued or cancelled for a particular activity.
[d] The Party indicated that it does not intend to exclude emissions from natural disturbances.
[e] As inscribed in the appendix to the annex to decision 2/CMP.7 in kt CO_2 eq per year.

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

Table I.6
Key relevant data for Hungary under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2020 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 1 237 679 RMUs
2. Deforestation	Cancel 695 893 units
3. FM	Cancel 1 020 520 units

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

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.6 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 2018, including on the commitment period reserve, for Hungary
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
CPR	**391 037 652**	**–**	**–**	**391 037 652**
Annex A emissions				
CO_2	49 628 491	–	–	49 628 491
CH_4	7 271 998	–	–	7 271 998
N_2O	4 858 697	–	–	4 858 697
HFCs	1 358 022	–	–	1 358 022
PFCs	789	–	–	789
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	101 564	–	–	101 564
NF_3	NO	–	–	NO
Total Annex A sources	**63 219 560**	**–**	**–**	**63 219 560**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 209 489	–1 241 333	–	–1 241 333
Deforestation	420 149	474 882	–	474 882
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 198 531	–3 302 437	–	–3 302 437

Table II.2
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	49 684 847	–	–	49 684 847
CH_4	7 374 460	–	–	7 374 460
N_2O	4 801 381	–	–	4 801 381
HFCs	1 801 161	–	–	1 801 161
PFCs	1 125	–	–	1 125
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	118 379	–	–	118 379
NF_3	NO	–	–	NO
Total Annex A sources	**63 781 353**	**–**	**–**	**63 781 353**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 281 556	–1 280 038	–	–1 280 038
Deforestation	294 679	358 813	–	358 813
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 590 827	–3 558 676	–	–3 558 676

Table II.3
Information to be included in the compilation and accounting database for 2016 for Hungary
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	47 395 710	–	–	47 395 710
CH_4	7 302 655	–	–	7 302 655
N_2O	4 802 040	–	–	4 802 040
HFCs	1 626 134	–	–	1 626 134
PFCs	779	–	–	779
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	130 027	–	–	130 027
NF_3	NO	–	–	NO
Total Annex A sources	**61 257 344**	**–**	**–**	**61 257 344**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 189 008	–1 190 977	–	–1 190 977
Deforestation	288 238	326 398	–	326 398
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 014 077	–3 127 006	–	–3 127 006

Table II.4
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	46 627 613	–	–	46 627 613
CH_4	7 352 831	–	–	7 352 831
N_2O	4 532 274	–	–	4 532 274
HFCs	2 164 871	–	–	2 164 871
PFCs	1 133	–	–	1 133
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	118 624	–	–	118 624
NF_3	NO	–	–	NO
Total Annex A sources	**60 797 345**	**–**	**–**	**60 797 345**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 241 080	–1 197 111	–	–1 197 111
Deforestation	218 237	256 653	–	256 653
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–4 317 786	–3 662 059	–	–3 662 059

Table II.5
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	43 862 711	–	–	43 862 711
CH_4	7 329 740	–	–	7 329 740
N_2O	4 429 951	–	–	4 429 951
HFCs	1 683 364	–	–	1 683 364
PFCs	1 400	–	–	1 400
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	84 003	–	–	84 003
NF_3	NO	–	–	NO
Total Annex A sources	**57 391 168**	**–**	**–**	**57 391 168**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 087 109	–1 120 594	–	–1 120 594
Deforestation	150 669	193 239	–	193 239
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 366 736	–3 239 947	–	–3 239 947

Table II.6
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	43 704 805	–	–	43 704 805
CH_4	7 511 401	–	–	7 511 401
N_2O	4 196 825	–	–	4 196 825
HFCs	1 250 038	–	–	1 250 038
PFCs	1 737	–	–	1 737
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF_6	98 342	–	–	98 342
NF_3	NO	–	–	NO
Total Annex A sources	**56 763 149**	**–**	**–**	**56 763 149**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–1 248 269	–1 254 650	–	–1 254 650
Deforestation	122 451	160 181	–	160 181
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–2 243 959	–1 802 582	–	–1 802 582

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

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

Annex IV

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl.

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

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

IPCC. 2019. *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*. E Calvo Buendia, K Tanabe, A Kranjc, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/.

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2013, 2014, 2015, 2016, 2017 and 2019 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 and FCCC/ARR/2019/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%202020_final.pdf.

Annual status report for Hungary for 2020. Available at https://unfccc.int/sites/default/files/resource/asr2020_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. The following references have been reproduced as received:

Zsembeli J, Czimbalmos R., Kovács Gy.et al. 2013. *Revised calculation of organic carbon stocks of the soil types of Hungary on the base of their humus content* (Research report).