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

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2022 annual submission of Finland, 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 12 to 17 September 2022 in Bonn.

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



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Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
2019 Refinement to the 2006 IPCC Guidelines	<i>2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	“Guidelines for review under Article 8 of the Kyoto Protocol”
BOD	biochemical oxygen demand
CER	certified emission reduction
CH ₄	methane
CM	cropland management
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
Convention reporting adherence	adherence to the “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
Eurostat	statistical office of the European Union
FM	forest management
FMRL	forest management reference level
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPCC good practice guidance for LULUCF	<i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>
IPPU	industrial processes and product use
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
MCF	methane correction factor
MMS	manure management system(s)
N	nitrogen
N ₂ O	nitrous oxide
NA	not applicable
NE	not estimated
NF ₃	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
PFC	perfluorocarbon

QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF ₆	sulfur hexafluoride
SIAR	standard independent assessment report
UNFCCC Annex I inventory reporting guidelines	“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
UNFCCC review guidelines	“Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”
WDR	wetland drainage and rewetting
Wetlands Supplement	<i>2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands</i>

I. Introduction

1. This report covers the review of the 2022 annual submission of Finland, 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 12 to 17 September 2022 in Bonn and was coordinated by Emma Salisbury and Roman Payo (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Finland.

Table 1

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

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Olia Glade	New Zealand
	Manfred Ritter	Austria
Energy	Graham Anderson	Germany
	Amir Dillawar	Guyana
	Rianne Dröge	Kingdom of the Netherlands
	Awassada Phongphiphat	Thailand
IPPU	Kakhaberi Mdivani	Georgia
	Lorenz Moosmann	European Union
	Clemencio Nhamtumbo	Mozambique
Agriculture	Yu’e Li	China
	Mahmoud Medany	Egypt
	Lilian Portillo	Paraguay
	Lilia Taranu	Republic of Moldova
LULUCF and KP-LULUCF	Valentin Bellassen	France
	Dinh Hung Nguyen	Viet Nam
	Nele Rogiers	Switzerland
Waste	Qingxian Gao	China
	Gabor Kis-Kovacs	Hungary
Lead reviewers	Qingxian Gao	
	Olia Glade	

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

3. The ERT has made recommendations that Finland resolve identified findings, including issues¹ designated as problems.² Other findings, and, if applicable, the encouragements of the ERT to Finland to resolve related issues, are also included in this report.

¹ Issues are defined in decision 13/CP.20, annex, para. 81.

² Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

4. A draft version of this report was communicated to the Government of Finland, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.
5. Annex I presents the annual GHG emissions of Finland, including totals excluding and including LULUCF, indirect CO₂ emissions, and emissions by gas and by sector, and contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.
6. Information to be included in the compilation and accounting database can be found in annex II.

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

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

Table 2

Summary of review results and general assessment of the 2022 annual submission of Finland

Assessment		Issue/problem ID#(s) in table 3 or 5 ^a			
Date of submission	Original submission: NIR, 14 April 2022; CRF tables (version 6), 14 April 2022; SEF tables, 28 March 2022				
Review format	Centralized				
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:				
	(a) Identification of key categories?			No	
	(b) Selection and use of methodologies and assumptions?			Yes	L.1, L.4, L.7
	(c) Development and selection of EFs?			Yes	
	(d) Collection and selection of AD?			No	
	(e) Reporting of recalculations?			No	
	(f) Reporting of a consistent time series?			No	
	(g) Reporting of uncertainties, including methodologies?			No	
	(h) QA/QC?			QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness? ^b			No	
	(j) Application of corrections to the inventory?	No			
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	Yes			
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes			
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:				
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?			No	
	(b) Performance of the national system functions?	No			

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

^a Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

^b Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

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

8. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 19 January 2021,³ and had not been resolved by the time of publication of the report on the review of the Party's 2020 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

Table 3

Status of implementation of recommendations included in the previous review report for Finland

<i>ID#</i>	<i>Issue/problem classification^{a, b}</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
General		No issues identified.	
Energy			
E.1	Fuel combustion – reference approach – gaseous fuels – CO ₂ (E.9, 2020) Convention reporting adherence	Correct the reported units and values for gaseous fuels under the reference approach in CRF table 1.A(b).	Resolved. The Party has corrected the reported units and values for gaseous fuels under the reference approach in CRF table 1.A(b) across the time series.
E.2	1.A.1.a Public electricity and heat production – biomass – CO ₂ (E.7, 2020) Accuracy	Determine the appropriate CO ₂ EF for biogas from the referenced plant for which a remapping of fuels was carried out for the 2020 submission and transparently report this information in its NIR.	Resolved. The Party determined the appropriate CO ₂ EF for thermal biogas (from biomass gasification) from the referenced plant for which a remapping of fuels was carried out for the 2020 submission and transparently reported it in its NIR (table 3.2-4, p.85). The recalculations and subsequent emission changes were also discussed in its 2021 NIR (section 3.2.4.5, p.98, and section 10.1, p.439, and table 10.4-2, p.449).
E.3	1.A.3.d Domestic navigation – gaseous fuels – CO ₂ , CH ₄ and N ₂ O (E.8, 2020) Accuracy	Improve the collection of AD on liquefied natural gas used for domestic navigation and transparently report estimates and any recalculations.	Resolved. The Party reported in its 2021 NIR (p.119) and 2022 NIR (p.120) that it has improved the collection of AD on liquefied natural gas used for domestic navigation. The AD on liquefied natural gas (consumption, import and export) for the energy balance are collected by Statistics Finland directly from the terminals, from the information on related fuel taxes and from point sources of energy and manufacturing industries. Finland transparently reported the estimates in CRF table 1.A(a)s3 and the NIR (p.103). During the review week, Finland explained that the improved data have been used since the 2020 submission and extended to include inventory years 2019 and 2020, but no need for changes for the previous years was identified. Therefore, there are no recalculations to be reported in the subsequent NIRs.
E.4	1.C.1 Transport of CO ₂ – CO ₂	Use the most appropriate notation key for fugitive emissions of CO ₂ transported	Resolved. The Party transparently reported in its NIR (section 3.4.1.1, p.136) the use of “IE” as the most appropriate notation key for fugitive emissions of CO ₂ transported

³ FCCC/ARR/2020/FIN. The ERT notes that the report on the review of Finland's 2021 annual submission has not been published yet owing to insufficient funding for the review process. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2020 annual submission.

<i>ID#</i>	<i>Issue/problem classification^{a, b}</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
	(E.11, 2020) Comparability	between pulp and paper mills and precipitated calcium carbonate plants, ensuring consistency between CRF tables 1.A(a)s2 and 1.C, and transparently document in its NIR where the emissions are included.	between pulp and paper mills and precipitated calcium carbonate plants, ensuring consistency between CRF tables 1.A(a)s2 and 1.C. The Party reported “IE” in CRF table 1.C and provided information in CRF table 9 that the associated CO ₂ emissions have been allocated to pulp, paper and print (1.A.2.d).
IPPU			
I.1	2.B.8 Petrochemical and carbon black production – CO ₂ (I.3, 2020) Comparability	Report “IE” for CO ₂ emissions from ethylene production (category 2.B.8.b) in CRF table 2(I)A-Hs1 and explain in the NIR and in CRF table 9 the allocation of the associated CO ₂ emissions under subcategory 1.A.1.b.	Resolved. The Party reported “IE” for CO ₂ emissions from ethylene production in CRF table 2(I)A-Hs1 and provided information about the allocation of the associated CO ₂ emissions under the energy sector in its NIR (section 4.3.5, p.174) and in CRF table 9.
I.2	2.B.8 Petrochemical and carbon black production – CH ₄ (I.4, 2020) Completeness	Report CH ₄ emissions from venting and flaring in ethylene production (category 2.B.8.b) or confirm with the plant operator the assumption that all CH ₄ is combusted to CO ₂ and no venting or fugitive emissions occur, substantiating this assumption, for example, with verified data from the measurement of emissions from flanges, valves and other process equipment or emissions from the combustion of waste gas in energy recovery systems. If emissions from venting and flaring in ethylene production do occur, improve the transparency of its NIR by including background information on estimated CH ₄ emissions from venting and flaring. If emissions from venting and flaring are assumed to be insignificant, provide relevant justifications in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party included estimates of CH ₄ emissions from venting and flaring in ethylene production in CRF table 2(I)A-Hs1 and reported in its NIR (section 4.3.5, pp.174–175) the information on estimated fugitive CH ₄ emissions from venting and flaring in ethylene production based on the measured total emissions of volatile organic compounds.
I.3	2.D.1 Lubricant use – CO ₂ (I.2, 2020) (I.5, 2018) Convention reporting adherence	Refer, in the NIR, to the EF used to estimate CO ₂ emissions from lubricant use as default instead of country-specific.	Resolved. The Party correctly referenced the EF (20 t C/TJ) used to calculate CO ₂ emissions from lubricant use in the NIR (section 4.5.2.1) and reported it as the IPCC default value in NIR tables 1.4-1 and 4.5-1 and in CRF table Summary3s1. The previous ERT noted that incorrect information regarding the method for lubricant use (2.D.1) was included in table 4.1-1 (p.155). This table provides information on the key categories from the IPPU sector. During the review, the Party clarified that lubricant use (2.D.1) is

ID#	Issue/problem classification ^{a, b}	Recommendation from previous review report	ERT assessment and rationale
not a key category according to the level assessment, so the category is not included in table 4.1-1.			
Agriculture			
A.1	3.B Manure management – CH ₄ and N ₂ O (A.5, 2020) Transparency	Incorporate in the NIR the explanation provided during the review on limited data and research on different types of cover on slurry and any additional information to justify the appropriateness of the assumption used to calculate N ₂ O and CH ₄ emissions from slurry MMS with floating cover.	Resolved. The ERT considers that the recommendation has been fully addressed because the Party incorporated in its NIR the additional information to justify the appropriateness of the assumption used to calculate N ₂ O (p.272) and CH ₄ (p.273) emissions from liquid/slurry MMS. The same N ₂ O EF was used for natural crust and floating cover because permeable covers have been found to function similarly to natural crusts (VanderZaag et al., 2008), and most floating covers used in Finland are permeable, although more research on the effect of different covers on GHG emissions is needed. For CH ₄ , methane conversion factors from the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.17) of 10 and 17 per cent were used for natural/floating crust cover and no natural/floating cover, respectively.
LULUCF			
L.1	4.C.1 Grassland remaining grassland – CO ₂ (L.8, 2020) Transparency	Include information on the expert judgment applied to losses from living biomass on grassland remaining grassland in its NIR, together with a justification of how this approach improves upon the tier 1 approach detailed in the 2006 IPCC Guidelines (vol. 4, chap. 6.2.1.1).	Addressing. The Party included in its NIR (appendix_6c, p.384) information on the expert judgment applied to losses from living biomass on grassland remaining grassland. However, a justification of how this approach improves upon the tier 1 approach detailed in the 2006 IPCC Guidelines (vol. 4, chap. 6.2.1.1) has not been provided. During the review, the Party acknowledged that there is no clear evidence that the applied approach improves upon the tier 1 approach. The ERT considers that the recommendation has not yet been fully addressed because the Party has not provided the requested justification.
L.2	4.G HWP – CO ₂ (L.6, 2020) (L.15, 2018) Convention reporting adherence	Update the uncertainty analysis for HWP and replace the default value of uncertainty of the HWP estimates (50 per cent) with a country-specific estimate based on the results of national studies (e.g. Hamberg, Henttonen and Tuomainen, 2016). If that is not possible, validate the high value of uncertainty by calculating the overall uncertainty using the values of uncertainty of AD and other parameters from the 2006 IPCC Guidelines or those based on expert judgment.	Resolved. The ERT considers that the recommendation is fully addressed because the Party updated in its NIR (p.371) the uncertainty analysis for HWP and replaced the default value of uncertainty of the HWP estimates (50 per cent) with a country-specific estimate based on uncertainties of AD and other parameters from the 2006 IPCC Guidelines and expert judgment.
Waste			
W.1	5.D Wastewater treatment and discharge – CH ₄	Explain in the NIR that the MCF parameters for domestic wastewater treatment based on expert judgment (Jouttijärvi, Laukkanen and	Resolved. The ERT considers that the recommendation is fully addressed because the Party added explanatory text in its NIR (p.425) confirming that the MCF parameter used

<i>ID#</i>	<i>Issue/problem classification^{a, b}</i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
	(W.5, 2020) Transparency	Pipatti, 1999) were confirmed by measurements carried out in 2012–2017.	for domestic wastewater (0.01) was verified by measurements carried out in one plant in 2012–2017.
KP-LULUCF			
KL.1	AR – CO ₂ (KL.1, 2020) (KL.9, 2018) Accuracy	Estimate the CSC in living biomass for afforestation older than 20 years by applying age-specific values for living biomass increment.	Resolved. The ERT considers that the recommendation is fully addressed because the Party reported in its NIR (p.384) that the CSC in living biomass for afforestation was estimated by applying age-specific values for living biomass increment for the age classes 0–10, 11–20, 21–30 and more than 30 years.
KL.2	FM – CO ₂ (KL.5, 2020) (KL.10, 2018) Transparency	Provide transparent information in the NIR on the technical correction made to the FMRL by clearly stating which issues were addressed in the technical correction and by including references to the relevant sections of the NIR where the methodology is described.	Resolved. The ERT considers that the recommendation is fully addressed because the Party reported in its NIR (table 11.5-2, pp.476–478) a transparent overview of the modifications made to the GHG inventory and the FRML technical correction, including information about the submission on which each technical correction was implemented, together with references to the relevant sections of the NIR where the methodology is described.

^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 2021 annual submission of Finland was not available at the time of this review. Therefore, the recommendations reflected in this table are taken from the 2020 annual review report. For the same reason, 2021, 2019 and 2017 are 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, and as documented in table 4, the ERT assessed that there were no issues identified in three or more successive reviews that had not been addressed by the Party.

Table 4

Issues and/or problems identified in three or more successive reviews and not addressed by Finland

<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed^a</i>
General	No issues identified.	–
Energy	No issues identified.	–
IPPU	No issues identified.	–
Agriculture	No issues identified.	–
LULUCF	No issues identified.	–

<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed^a</i>
Waste	No issues identified.	–
KP-LULUCF	No issues identified.	–

^a Reports on the reviews of the 2017, 2019 and 2021 annual submissions of Finland have not yet been published. Therefore, 2017, 2019 and 2021 were not included when counting the number of successive years for this table. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive reviews and 2015/2016 is counted as one year.

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

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

Table 5

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

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?^a</i>
General		No general findings additional to those included in table 3 were made by the ERT during the review.	
Energy			
E.5	1. General (energy sector)	<p>The Party reported in its NIR (p.68) several technical problems caused by CRF Reporter. For example, using “C” prevents the aggregation in parent cells, resulting in incorrect emission figures. Finland explained that it did not consider manually inputting the correct sum because it would be time-consuming and might result in subsequent calculation and data transfer errors. Therefore, Finland elected to use “IE” instead of “C” for confidential data in subcategories 1.A.3.e (CRF table 1.A(a)s3) and 1.A.5.b (CRF table 1.A(a)s4). Furthermore, in CRF table 1.A(d), Finland reported that “NA” could not be entered in the last column (“Reported under”), therefore cells are left empty for fuels where no emissions occur. Finland also reported that part of the notation key explanations and official comments that were saved in CRF Reporter are not visible in the CRF tables. However, explanations are included in the documentation boxes of the CRF tables.</p> <p>The ERT noted that this reporting is not in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 8.2.5, table 8.1) and paragraph 37 in the UNFCCC Annex I inventory reporting guidelines because the notation keys for the information on data gaps were not inserted fully and correctly.</p> <p>During the review, the Party reported that for the next annual submission it will follow up on whether or not these technical problems caused by CRF Reporter have been fixed. The Party will report “C” for subcategories 1.A.3.e (CRF table 1.A(a)s3) and 1.A.5.b (CRF table 1.A(a)s4) if possible.</p>	Yes. Comparability

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
E.6	Fuel combustion – reference approach – solid and gaseous fuels – CO ₂	<p>The ERT recommends that the Party use appropriate notation keys for subcategories 1.A.3.e (CRF table 1.A(a)s3) and 1.A.5.b (CRF table 1.A(a)s4) in line with paragraph 37 in the UNFCCC Annex I inventory reporting guidelines and explain in detail any technical problems with CRF Reporter in the NIR.</p> <p>The Party reported in its CRF table 1.A(c) discrepancies between the reference approach and the sectoral approach of more than 2 per cent for solid fuels (4.75 per cent) and gaseous fuels (3.5 per cent) for 2020. The Party did not document the reasons for these specific discrepancies in its NIR (section 3.2.1).</p> <p>During the review, the Party clarified that the discrepancy in gaseous fuels is related to captured and stored CO₂, which is reported as recovered CO₂ in gaseous fuels in subcategory 1.A.2.d (manufacturing industries and construction – pulp, paper and print). The calculated amount of this stored CO₂ is approximately 0.1–0.2 Mt CO₂ per year. Under the sectoral approach, if the gaseous fuels were reported by excluding the stored CO₂, the amount would be 4,111 kt CO₂ for 2020, resulting in a difference of –0.9 per cent compared with the reference approach. For the discrepancy in solid fuels, the Party explained that there are some uncertainties related to stock change and feedstock data because the information received from companies is not completely suitable for the reference approach calculation and reporting. The relative uncertainty and difference in the comparison between the two approaches for solid fuels has increased, especially since 2014, because the consumption of hard coal, for which the data-collection system is reliable and accurate, has decreased. Meanwhile, the information for the sectoral approach is highly reliable because the point source data (fuel combusted in facilities) were checked from at least three independent data sources for each facility. This comparison is performed with the assistance of an energy statistics team in order to achieve identical consumption figures for both inventory and energy statistics. Therefore, the Party considers that the fuel combustion data for the sectoral approach are the best available data and that the emissions are not underestimated. The Party reported that the above explanations will be included in the next annual submission of the NIR.</p>	Not an issue/problem
E.7	Fuel combustion – reference approach – all fuels – CO ₂	<p>The ERT encourages the Party to investigate and document in its next NIR the discrepancy between the reference and sectoral approach at the fuel level if the discrepancy is more than 2 per cent.</p> <p>The Party reported total CO₂ emissions from fuel combustion under the reference approach in CRF tables 1.A(b) and 1.A(c). The ERT noted recalculations of total CO₂ emissions in some years, including 2014 (–3.50 per cent), 2015 (–3.50 per cent), 2017 (–2.51 per cent), 2018 (–2.18 per cent) and 2019 (–3.07 per cent). However, the Party did not report the recalculations of the reference approach in its NIR.</p> <p>During the review, the Party clarified that there are annual changes in the reference approach and sectoral approach data; for example, some figures may have been preliminary in part, or errors in the source data for the reference approach may have been discovered after the submission. In addition to these updates or error corrections, there was one notable change in the calculation method concerning the treatment of transport biofuels. Initially, the method change was applied only for 2018 inventory data in the 2020 NIR by mistake. The Party then recalculated the whole time series in the 2021 submission. However, the Party reverted to the original calculation method in the 2022 submission because the original method provides more accurate results. The original method avoids double counting of transport biofuels in the reference approach by subtracting the reported domestic use of biofuels (which, overall, is very reliable information) from the imports of fossil diesel and gasoline. Hence, biogenic fuels are not included as both fossil fuels and biofuels in the apparent consumption.</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
IPPU	Agriculture	<p>The ERT recommends that the Party transparently document in its next NIR the recalculations of the reference approach made in the 2022 submission, with explanatory information and justifications for any recalculations.</p> <p>No findings for the IPPU sector additional to those included in table 3 were made by the ERT during the review.</p>	
A.2	3.B Manure management – CH ₄ and N ₂ O	<p>The Party reported in its NIR (p.276) and during the review in response to ID#A.1 above that the effects of different slurry cover materials on CH₄ and N₂O emissions have been investigated, using available research and international knowledge exchange, in order to improve the EFs.</p> <p>During the review, Finland clarified that it will continue to investigate the use of different types of cover on slurry in future farm surveys on manure management. At present, the Party has no research and survey results from which to derive new EFs as there is little information on the subject in the available data sets. The Party will continue to monitor the scientific literature and other similar sources, both domestic and international, to obtain more information on the effect of different types of cover on emissions and will consider applying any new EFs or parameters it obtains. In the meantime, the Party will continue to assume that the effect of permeable floating cover is similar to that of natural crust, as suggested by VanderZaag et al. (2008).</p> <p>The ERT commends Finland for its effort to improve EFs and encourages the Party to develop country-specific EFs for N₂O and CH₄ emissions from different cover types.</p>	Not an issue/problem
A.3	3.B Manure management – CH ₄	<p>The Party reported in the NIR (table 5.3-8, p.274) country-specific EFs used for calculating CH₄ emissions from manure management for 2020. The ERT noted that the country-specific EFs are not sufficiently precise for it to be able to reproduce or assess the relevant emission estimates for manure management from poultry, because the EF for this category is shown as 0.0 (kg CH₄/head/year) in table 5.3-8, while in CRF table 3.B(a)s1 the same EF is shown as 0.03 (kg CH₄/head/year).</p> <p>During the review, the Party clarified that more decimals will be added to the NIR of the next annual submission.</p> <p>The ERT recommends that the Party apply a sufficient level of precision for the EFs in the NIR (the same or similar to that used for the CRF tables).</p>	Yes. Transparency
A.4	3.B.5 Indirect N ₂ O emissions – N ₂ O	<p>The Party reported in its NIR (table 5.4-8, p.287) that the default EF used for calculating N leaching and run-off from agricultural soils is 0.0075 kg N₂O-N/kg N (2006 IPCC Guidelines, table 11.3). The ERT noted that the IEF shown in CRF table 3.D differs between the years; for example, the IEF for leaching and run-off is 0.01 (0.00796) kg N₂O-N/kg N for 2020 and 0.0075 kg N₂O-N/kg N for 1990, which is not consistent with the use of the default EF across the time series for tier 1 estimations.</p> <p>During the review, the Party clarified that N₂O emissions from leaching and run-off in managed soils are calculated as a fraction of the N input from several sources (i.e. synthetic fertilizers, manure including pasture and bedding, sewage sludge and other organic fertilizers, crop residues), and as a fraction of the N mineralized from loss in soil organic carbon in mineral soils owing to changes in management practices. Net soil carbon change, which is calculated using the dynamic soil carbon model Yasso07 (see NIR, p.282), is positive for the earliest years and thus the amount of N that is leached due to N mineralization is “NA” for 1990–1993. However, since 1994 some carbon has been lost owing to changes in management practices, and consequently</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
A.5	3.D Direct and indirect N ₂ O emissions from agricultural soils – N ₂ O	<p>the amount of N mineralized has been included in the modelling. CRF table 3.D therefore includes the emissions and the amount of leached N due to mineralization in the total N₂O emissions, as well as the total N that is lost through leaching and run-off. As CRF table 3.D calculates the IEF directly from these reported total sums, the IEF is slightly higher than the default EF (0.0075) from 1994 onward. For the next annual submission, the Party is planning to apply the new default EF5 (i.e. 0.011 kg N₂O-N/kg N) according to the 2019 Refinement to the 2006 IPCC Guidelines (table 11.3).</p> <p>The ERT noted the explanation provided but considers it inconsistent with the statement in the NIR and CRF table 3.D that the Party uses default EFs in conjunction with tier 1 methodology.</p> <p>The ERT recommends that the Party incorporate in its NIR the explanation provided during the review on the calculation of the EF used for N leaching and run-off from agricultural soils in order to improve the transparency of the NIR.</p> <p>The Party reported in its NIR (p.281) that the direct emissions from dung and urine on pasture are calculated using the IPCC default EFs (2006 IPCC Guidelines, vol. 4, chap. 11, table 11.3), which is an incorrect reference. The ERT noted that the Party should be referring to table 11.1. The ERT noted that the same situation occurred in the case of leaching, for which a reference to the IPCC default EF gives table 11.1 of the 2006 IPCC Guidelines instead of table 11.3.</p> <p>During the review, the Party stated that the references will be corrected in the NIR of the next annual submission.</p> <p>The ERT recommends that the Party correct the references in its NIR and strengthen the QC procedure to ensure the correct use of references across the NIR.</p>	Yes. Convention reporting adherence
A.6	3.D.a Direct N ₂ O emissions from managed soils – N ₂ O	<p>The Party reported in its NIR (table 5.4-2, p.279) the direct N₂O emissions from mineralization associated with loss of N₂O from soil organic matter (mineral soils). The ERT noted that the value reported for direct N₂O emissions from mineralization associated with loss of N₂O from soil organic matter (mineral soils) is 0.20 kt, while CRF table 3.D gives this value as 0.31 kt.</p> <p>During the review, the Party clarified that the 2020 emissions (0.20 kt) reported in NIR table 5.4-2 have been incorrectly reported as emissions from 2004. This error applies only to column M (i.e. mineralization on mineral soils) in table 5.4-2. The error will be corrected in the next NIR.</p> <p>The ERT recommends that the Party correct the reported direct N₂O emissions from mineralization associated with the loss of N₂O from soil organic matter (mineral soils) in the next NIR (table 5.4-2).</p>	Yes. Convention reporting adherence
A.7	3.G Liming – CO ₂	<p>The Party reported in its NIR (table 5.1-2, p.247) that category 3.G (liming) (CO₂) is a key category (level and trend). The Party estimated CO₂ emissions from liming by applying the tier 1 method from the 2006 IPCC Guidelines. The ERT noted that the recommended method that corresponds to the decision tree in the 2006 IPCC Guidelines (vol. 4, figure 11.4) is a tier 2 method, because category 3.G is a key category. The ERT also noted that the 2006 IPCC Guidelines (vol. 4, chap. 11.3.1) indicate that emissions estimated using the tier 2 method are likely to be lower than those estimated using the tier 1 approach.</p>	Not an issue/problem

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
		<p>During the review, the Party clarified that sufficiently detailed country-specific data are not available for it to develop country-specific EFs for a tier 2 method. The contribution of category 3.G to the level assessment is very low compared with other key categories (see annex 1 to the NIR, p.515).</p> <p>The ERT encourages the Party to make efforts to develop country-specific EFs for a tier 2 method when the required data become available.</p>	
LULUCF			
L.3	4.A.2 Land converted to forest land – CO ₂	<p>The Party reported in its NIR (p.325) that “In the subcategory cropland converted to forest land, agricultural biomass of 4 t C ha⁻¹ was removed as a loss in the carbon stock of living biomass in the conversion.” The Party reported in its NIR (p. 335) that “The removal of biomass after the conversion of grassland to cropland was 4.1 t C/ha.” This implies that the mean biomass of grassland is 4.1 t C ha⁻¹. The ERT could not find any information on the loss (i.e. the initial change) of carbon stocks in living biomass for the subcategory grassland converted to forest land.</p> <p>During the review, the Party clarified that there are no large grazing land areas or permanent grasslands in Finland. The area of grassland consists mostly of abandoned fields that are slowly gaining tree biomass and turning into forest land (NIR section 6.6.1). When this type of grassland finally converts to forest, no biomass is removed but the grass is left growing on the site together with the trees and, as trees grow slowly, it can be considered that the grass keeps growing through the whole conversion period of 20 years. This is why no biomass loss is reported during the conversion. This is a very different type of conversion than a case where, for example, cropland is actively turned into forest land and the crop or grass is harvested and thus a loss is reported.</p> <p>The ERT recommends that the Party include the above information and justification on the loss of carbon stocks in living biomass for the subcategory grassland converted to forest land in subsequent annual submissions.</p>	Yes. Transparency
L.4	4.B Cropland – CO ₂	<p>The Party reported in its NIR (section 6.5.2.1, p.334, and appendix_6c, p.381) a method for estimating CSC in living biomass in cropland remaining cropland that takes into account the gains and losses in living biomass of apple trees and currants. This implies that the mean biomass of cropland will vary from year to year. However, when estimating CSC in living biomass for cropland converted to other land uses or from land converted to cropland), the Party uses a country-specific mean biomass of 4 t C ha⁻¹ for cropland for all years (NIR sections 6.4.2.2, 6.5.2.2, 6.6.2.2, 6.7.2.2 and 6.8.2.2). The ERT noted that there is an inconsistency between the method used for estimating CSC in living biomass in cropland remaining cropland and the method used for estimating CSC in living biomass in cropland converted to other land uses or land converted to cropland.</p> <p>During the review, the Party clarified that the cultivation area of apple trees and currants is very small: around 2,500 ha in recent years (NIR table 4_App_6c) compared with the total cropland area of 2,500,000 ha. Finland has allocated all cultivation of apple trees and currants to cropland remaining cropland owing to its low significance (around 0.1 per cent of total cropland area).</p> <p>The ERT agrees with the Party that the cultivation area of apple trees and currants is very small compared with the total cropland area, and the CSC in living biomass of apple trees and currants has low significance in the mean biomass of cropland, which therefore can be assumed to be a constant of 4 t C ha⁻¹. In this case, however,</p>	Yes. Accuracy

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
		<p>this assumption should be applied consistently in Finland’s GHG inventories, which means that there is no CSC in living biomass under cropland remaining cropland.</p> <p>The ERT recommends that the Party improve the method for estimating CSC in living biomass for cropland converted to other land uses or land converted to cropland so that it takes into account the annual CSC in living biomass of apple trees and currants to maintain the consistency with the method for estimating CSC in living biomass for cropland remaining cropland.</p>	
L.5	4.B.2 Land converted to cropland – CO ₂	<p>The Party reported in its NIR (table 6.5-2, p.335) the areas of land converted to cropland by land use and soil type. These areas are also reported in CRF table 4.B. The ERT noted that the figures for wetlands – organic, for 2017–2020, have small discrepancies when compared with the corresponding figures reported in CRF table 4.B (e.g. the figures for 2020 are 19.6 in the NIR and 20.1 in CRF table 4.B respectively).</p> <p>During the review, the Party clarified that the figures reported in CRF table 4.B are correct and that the area of conversion from inland water to cropland is missing from the figures reported in NIR table 6.5-2. The figures for wetlands – organic converted to cropland in NIR table 6.5-2 will be corrected in the next annual submission.</p> <p>The ERT recommends that the Party correct the figures for wetlands – organic converted to cropland in its NIR so that they are consistent with the corresponding figures in CRF table 4.B.</p>	Yes. Convention reporting adherence
L.6	4.C Grassland – CO ₂	<p>The Party reported in its NIR (section 6.6.2.1, p.334, and appendix_6c, p.383) a method for estimating CSC in living biomass in grassland remaining grassland, in which the gains and losses in tree biomass on abandoned fields are taken into account. This implies that the mean biomass of grassland will vary from year to year. However, when estimating CSC in living biomass for grassland converted to other land uses or from land converted to grassland, the Party uses a country-specific mean biomass of 4.1 t C ha⁻¹ for grassland for all years (NIR sections 6.4.2.2, 6.5.2.2, 6.6.2.2, 6.7.2.2 and 6.8.2.2). The ERT noted therefore that there is an inconsistency between the method used for estimating CSC in living biomass reported under grassland remaining grassland and the method used for estimating CSC in living biomass reported under grassland converted to other land uses or land converted to grassland.</p> <p>During the review, the Party clarified that the methodology indeed differs between remaining and converted grassland categories because the CSCs in trees are only allocated to grassland remaining grassland. When a land is converted to grassland or grassland is converted to other land use, Finland assumes that these are treeless areas or that trees are not removed. In Finland, grassland areas are most often converted to forest land, and trees are not removed when grassland converts to the land categories forest land or other wetlands.</p> <p>The ERT recommends that the Party include in its next NIR the provided clarification of the differences between the methodology for remaining and converted grassland categories.</p>	Yes. Transparency
L.7	4.E.2 Land converted to settlements – CO ₂	<p>The Party reported in its NIR (p.351) that “When land is converted to developed use, such as for infrastructure or urban areas, the trees and other biomass are either completely removed or some biomass is left to grow on the site. To estimate the losses in living biomass due to land conversion from forest land to settlements the area was divided into three categories according to the new land use and whether trees still exist after conversion (treeless roads and power lines, other treeless settlements, and land with tree cover, such as parks).” This implies that areas of settlements with tree cover still have some living biomass on them. Also, the Party reported in its NIR (sections 6.5.2.2, 6.6.2.2 and 6.7.2.2) that when settlements are converted to cropland, grassland or wetlands, the</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
L.8	4(I) Direct N ₂ O emissions from N input to managed soils – N ₂ O	<p>initial change of living biomass is 0 t C ha⁻¹. The ERT noted that when the subcategory settlements with tree cover is converted to cropland, grassland or wetlands, the emissions due to the initial change in living biomass will be underestimated because the subcategory settlements with tree cover has some biomass on it, while the initial change is 0 t C ha⁻¹.</p> <p>During the review, the Party clarified that Finland is a sparsely inhabited country in which land is not intensively used and land-use conversions are rare. Multiple land-use conversions on one site in 20 years are the exception. Built-up areas with buildings usually remain as such for a long time and multiple land-use changes are rare. Tree growth is also slow, so rapid land-use changes are not common in land with trees. Faster changes to settlements and then to other land use usually concerns treeless land use, such as sand pits and land below power lines. The observed settlement changes to wetlands so far have been on open land (e.g. from power lines to bogs, or from sand pits to water ponds). The description of these change types in the NIR is not sufficiently detailed.</p> <p>The ERT recommends that the Party either better justify the method used and provide clarification on why conversions of settlements with tree cover to cropland, grassland or wetlands are rare in Finland or use a method that takes into account the initial change in living biomass for conversions of settlements with tree cover to cropland, grassland or wetlands.</p> <p>The Party reported in its NIR (p.354) that “The IPCC default method (tier 1) is used to estimate N₂O emissions from forest fertilization (2006 IPCC Guidelines). Equation 3.2.18 is applied using country-specific activity data and the IPCC default emission factor.” The ERT noted that equation 3.2.18 is from the IPCC good practice guidance for LULUCF, not from the 2006 IPCC Guidelines. Therefore, it is not clear which guidelines were applied for estimating N₂O emissions from forest fertilization.</p> <p>During the review, the Party clarified that both the IPCC good practice guidance for LULUCF and the 2006 IPCC Guidelines are applicable: equation 3.2.18 in the IPCC good practice guidance for LULUCF applies specifically to direct N₂O emissions from forest fertilization and can be used directly; and this equation is embedded in equation 11.1 of the 2006 IPCC Guidelines, which applies to all direct N₂O emissions from managed soils. Equation 11.1 can be used for specific land-use categories if specific AD are available, as is the case for forest land. The reference to the equation applied will be updated in the next annual submission to correspond to equation 11.1 of the 2006 IPCC Guidelines.</p> <p>The ERT recommends that the Party refer to equation 11.1 of the 2006 IPCC Guidelines (vol. 4) instead of equation 3.2.18 of the IPCC good practice guidance for LULUCF in the next annual submission.</p>	Yes. Transparency
L.9	4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CH ₄	<p>The Party reported in its NIR (p.356) that “Country-specific emission factors for CH₄ from drained organic land by drainage class are net emission[s] of 11.6 kg CH₄ ha⁻¹ for poorly or recently drained land and net uptake of –2.8 kg CH₄ ha⁻¹ for well-drained land (based on Ojanen et al, 2010) (table 6.10-4).” However, the ERT noted that there is an inconsistency between the figures in the text and the corresponding figures in NIR table 6.10-4, which are 1.16 g CH₄ and –0.28 g CH₄ respectively.</p> <p>During the review, the Party clarified that the figures in the text are correct and the unit of the figures in table 6.10-4 should be “g CH₄ m⁻²”, not g CH₄, and this inconsistency will be corrected in the next annual submission.</p> <p>The ERT recommends that the Party revise the unit of EFs for CH₄ from drained organic land from g CH₄ to g CH₄ m⁻² in NIR table 6.10-4 in the next annual submission.</p>	Yes. Transparency

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?^a</i>
L.10	4(V) Biomass burning – CO ₂ , N ₂ O and CH ₄	<p>The Party reported in its NIR (p.364) that “The applied non-woody above-ground biomass on grassland wildfires was 2.3 t C ha⁻¹, which is derived from the same calculations as in section 6.5.2.2 Land converted to cropland, when grassland is converted to cropland.” The Party also reported in its NIR (section 6.5.2.2, p.335) that when grassland is converted to cropland the biomass loss is 4.1 t C ha⁻¹ (national data). The ERT noted that the method used for deriving the above-ground biomass of grassland (2.3 t C ha⁻¹) from the biomass loss of grassland (4.1 t C ha⁻¹) is not transparently described in the NIR.</p> <p>During the review, the Party clarified that above-ground and below-ground biomass values are based on the measured biomasses reported in Palosuo et al. (2015) and that the NIR text will be clarified in the next annual submission.</p> <p>The ERT recommends that the Party clarify in the NIR how the above-ground biomass of grassland is derived.</p>	Yes. Transparency
Waste			
W.2	5.D.1 Domestic wastewater – CH ₄	<p>The Party reported in its NIR (p.426) that AD for uncollected wastewater reported under domestic wastewater are based on population. However, it was not clear which per capita BOD value was applied in the calculations. During the review, the Party clarified that it used the 2006 IPCC Guidelines default value of 60 g BOD/person/day (vol. 5, chap. 6, p.6.14).</p> <p>The ERT recommends that the Party include in its NIR information on the per capita BOD value used in the NIR</p>	Yes. Transparency
W.3	5.D.1 Domestic wastewater – N ₂ O	<p>The Party reported “NO” in CRF table 5.D under additional information for the parameter T_{PLANT} = degree of utilization of modern, centralized wastewater treatment plants. However, international statistics (e.g. Eurostat data or data from the European Union directive on urban wastewater treatment) indicate that Finland has predominantly advanced centralized wastewater treatment plants in operation. The ERT noted that the methodological description in the NIR contains no information on whether direct N₂O emissions from advanced centralized wastewater treatment plants are estimated, although the 2006 IPCC Guidelines (vol. 5, chap. 6.3.1, box. 6.1, p.6.26) provide guidance on estimating these emissions.</p> <p>During the review, the Party acknowledged that it chose not to include direct N₂O emissions on the basis of the 2006 IPCC Guidelines, which state (p.6.24) that “direct emissions from nitrification and denitrification at wastewater treatment plants may be considered as a minor source”. Furthermore, the Party suggested changing its reporting from “NO” to “NE” and adding this source to the list of insignificant sources in the NIR (annex 5, table 2).</p> <p>The ERT agrees with the approach suggested by the Party, especially as the ERT made a conservative estimate of direct N₂O emissions for 2020 following the methodology in the 2006 IPCC Guidelines using equation 6.9, which resulted in emissions of 5.6 kt CO₂ eq (i.e. below the threshold of significance of 23.86 kt CO₂ eq for 2020).</p> <p>The ERT recommends that the Party change its reporting for the parameter T_{PLANT} in CRF table 5.D either by replacing “NO” with “NE”, with the relevant justification in line with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines in the NIR or by providing a numerical estimate when it becomes available. The ERT encourages Finland to estimate the degree of utilization of modern, centralized wastewater treatment plants and, using these AD, include an emission estimate for direct N₂O emissions in future submissions.</p>	Yes. Comparability

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? ^a
KP-LULUCF			
KL.3	HWP – CO ₂	<p>The Party reported in table 11.1-1 of its NIR (p.455) two total rows for AR activities from 2013 to 2020: one excluded HWP under AR and the other included HWP under AR. The ERT noted that the total net CO₂ eq emissions/removals for AR reported in CRF table 4(KP) correspond to the total row that excludes HWP under AR in NIR table 11.1-1. This implies that the HWP under AR may not be included in the reporting.</p> <p>During the review, the Party clarified that HWP under AR was mistakenly included twice in NIR table 11.1-1: the first time in the CO₂ row and the second time in the HWP under AR row. The numbers in the CRF tables are correct and this means that HWP under AR is included in the reporting.</p> <p>The ERT noted that this mistake and the lack of transparency has no influence on the accounted emissions and removals of the Kyoto Protocol activities AR, deforestation and FM.</p>	Yes. Transparency
KL.4	Deforestation – general	<p>The Party reported in CRF table 4(KP-I)A.2.1 that for 2020 there was 2.30 kha of land that is otherwise subject to FM.</p> <p>The ERT noted that in CRF table 4(KP-I)A.2 of the same inventory year, the total area of AR under deforestation is also 2.30 kha (1.22 kha for Region 1 and 1.08 kha for Region 2). Therefore, the area of AR under deforestation may be mistakenly reported as the area of land otherwise subject to FM. In fact, if an area of deforested land is subsequently converted back to forest, it should be reported under AR, not under FM, and therefore the deforested land otherwise subject to FM is always zero.</p> <p>During the review, the Party responded that, in accordance with the guidance in the <i>2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol</i> (section 1.3, p.1.13), it had interpreted this guidance as if these lands were not reported under Article 3, paragraph 3, of the Kyoto Protocol, so this would be the secondary option under Article 3, paragraph 4, of the Kyoto Protocol. Specifically, these areas are forest land after the latest land-use change and therefore would fulfil the FM criteria if not reported under Article 3, paragraph 3, of the Kyoto Protocol.</p> <p>The ERT is of the view that, since the third row of CRF table 4(KP-I)A.2.1 is headed “Article 3.3 activities: Deforestation”, the table is aimed at providing supplementary background data for the activity deforestation under Article 3, paragraph 3, of the Kyoto Protocol. The ERT notes that this mistake has no influence on the accounted emissions and removals of the activities AR, deforestation and FM.</p>	Yes. Transparency

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

VI. Application of adjustments

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

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 Finland and the final values agreed by the ERT. The final quantities of units to be issued and cancelled are presented in table I.6.

VIII. Questions of implementation

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

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 Finland in its 2022 annual submission

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

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

	<i>Total GHG emissions excluding indirect CO₂ emissions</i>		<i>Total GHG emissions and removals including indirect CO₂ emissions^a</i>		<i>Land-use change (Article 3.7 bis as contained in the Doha Amendment)^b</i>	<i>KP-LULUCF (Article 3.3 of the Kyoto Protocol)^c</i>	<i>KP-LULUCF (Article 3.4 of the Kyoto Protocol)</i>	
	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>			<i>CM, GM, RV, WDR</i>	<i>FM</i>
FMRL								–20 466.00
Base year ^d	57 710.13	71 151.39	57 876.47	71 317.73	NA		NA	
1990	57 574.51	71 015.77	57 740.85	71 182.11				
1995	58 439.40	71 632.46	58 572.88	71 765.94				
2000	55 082.15	70 130.08	55 190.44	70 238.38				
2010	53 891.83	75 602.47	53 961.71	75 672.35				
2011	45 868.80	67 835.63	45 936.45	67 903.29				
2012	37 700.56	62 290.10	37 762.58	62 352.12				
2013	44 389.11	62 724.31	44 448.85	62 784.05		3 587.48	NA	–47 335.05
2014	37 686.07	58 546.37	37 742.26	58 602.57		3 337.76	NA	–46 089.72
2015	36 209.25	54 970.87	36 264.19	55 025.81		3 359.84	NA	–41 400.74
2016	40 212.49	57 868.14	40 267.79	57 923.44		3 210.99	NA	–38 782.81
2017	38 775.65	55 056.07	38 829.03	55 109.45		3 065.66	NA	–35 735.04
2018	48 732.29	56 125.12	48 785.91	56 178.74		3 018.43	NA	–26 169.41
2019	39 145.10	52 734.65	39 198.47	52 788.02		3 474.09	NA	–31 938.32
2020	30 413.18	47 716.30	30 479.13	47 782.25		2 809.18	NA	–34 799.60

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

^a The Party reported indirect CO₂ emissions in CRF table 6.

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

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

^d “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. Finland has not elected any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

Table I.2

Greenhouse gas emissions and removals by gas for Finland, excluding land use, land-use change and forestry, 1990–2020

(kt CO₂ eq)

	CO ₂ ^a	CH ₄	N ₂ O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF ₆	NF ₃
1990	57 080.68	7 687.13	6 361.59	0.02	0.21	NO	52.48	NO
1995	58 248.99	7 425.68	5 902.93	149.81	1.54	NO	36.98	NO
2000	57 118.21	6 566.27	5 809.16	715.47	3.21	NO	26.06	NO
2010	64 150.63	5 350.01	4 784.12	1 363.18	2.62	NO	21.79	NO
2011	56 704.83	5 178.33	4 651.43	1 342.06	2.97	NO	23.67	NO
2012	51 207.71	5 126.06	4 641.06	1 351.43	3.71	NO	22.16	NO
2013	51 763.49	4 992.14	4 661.00	1 332.24	4.48	NO	30.70	NO
2014	47 652.02	4 894.91	4 717.15	1 300.21	4.03	NO	34.25	NO
2015	44 154.03	4 857.05	4 752.52	1 239.19	1.46	NO	21.56	NO
2016	47 237.16	4 728.64	4 745.85	1 180.82	1.48	NO	29.50	NO
2017	44 631.17	4 611.02	4 730.62	1 110.57	1.61	NO	24.44	NO
2018	45 850.08	4 543.92	4 697.87	1 065.13	1.71	NO	20.03	NO
2019	42 435.21	4 492.79	4 828.58	1 011.33	1.90	NO	18.21	NO
2020	37 661.88	4 401.88	4 721.77	975.87	1.72	NO	19.13	NO
Percentage change 1990– 2020	–34.0	–42.7	–25.8	4 658 372.0	729.4	NA	–63.6	NA

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

^a Including indirect CO₂ emissions as reported in CRF table 6.

Table I.3

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

(kt CO₂ eq)

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
1990	53 461.56	5 544.53	7 506.86	–13 441.26	4 669.16	NO
1995	55 301.74	5 170.38	6 697.81	–13 193.06	4 596.02	NO

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
2000	53 728.95	6 077.43	6 614.85	-15 047.94	3 817.15	NO
2010	60 246.20	6 213.46	6 650.75	-21 710.64	2 561.95	NO
2011	52 796.44	6 157.93	6 473.62	-21 966.83	2 475.30	NO
2012	47 508.11	5 981.01	6 445.56	-24 589.54	2 417.44	NO
2013	48 119.62	5 845.49	6 526.04	-18 335.19	2 292.89	NO
2014	44 268.07	5 602.08	6 573.31	-20 860.31	2 159.10	NO
2015	40 612.39	5 747.94	6 573.72	-18 761.62	2 091.76	NO
2016	43 356.83	5 956.04	6 655.41	-17 655.65	1 955.17	NO
2017	40 920.08	5 780.46	6 550.95	-16 280.42	1 857.96	NO
2018	42 081.08	5 780.65	6 497.09	-7 392.83	1 819.92	NO
2019	38 930.89	5 439.31	6 624.45	-13 589.55	1 793.38	NO
2020	34 297.26	5 182.68	6 565.95	-17 303.12	1 736.37	NO
Percentage change 1990–2020	-35.8	-6.5	-12.5	28.7	-62.8	NA

Notes: (1) Finland did not report emissions or removals for the sector other (sector 6); (2) totals include indirect CO₂ emissions reported in CRF table 6.

Table I.4

Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, base year–2020, for Finland
(kt CO₂ eq)

	<i>Article 3.7 bis as contained in the Doha Amendment^a</i>	<i>Activities under Article 3.3 of the Kyoto Protocol</i>		<i>FM and elected activities under Article 3.4 of the Kyoto Protocol</i>				
	<i>Land-use change</i>	<i>AR</i>	<i>Deforestation</i>	<i>FM</i>	<i>CM</i>	<i>GM</i>	<i>RV</i>	<i>WDR</i>
FMRL				-20 466.00				
Technical correction				-9 198.00				
Base year ^b	NA				NA	NA	NA	NA
2013		-720.12	4 307.60	-47 335.05	NA	NA	NA	NA
2014		-783.83	4 121.60	-46 089.72	NA	NA	NA	NA
2015		-583.38	3 943.21	-41 400.74	NA	NA	NA	NA
2016		-608.79	3 819.78	-38 782.81	NA	NA	NA	NA
2017		-578.95	3 644.60	-35 735.04	NA	NA	NA	NA
2018		-525.49	3 543.92	-26 169.41	NA	NA	NA	NA
2019		-53.91	3 528.00	-31 938.32	NA	NA	NA	NA
2020		-550.23	3 359.41	-34 799.60	NA	NA	NA	NA
Percentage change base year–2020					NA	NA	NA	NA

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

^a The value reported in this column relates to 1990.

^b Finland has not elected to report on any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

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

Table I.5

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

(kt CO₂ eq)

GHG source/sink activity	Base year ^b	Net emissions/removals									Accounting parameters	Accounting quantities ^d
		2013	2014	2015	2016	2017	2018	2019	2020	Total ^c		
A.1. AR		-720.115	-783.833	-583.375	-608.786	-578.949	-525.488	-53.912	-550.228	-4 404.686		-4 404.686
Excluded emissions from natural disturbances ^d		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
A.2. Deforestation		4 307.600	4 121.595	3 943.212	3 819.781	3 644.605	3 543.921	3 528.000	3 359.405	30 268.118		30 268.119
B.1. FM										-302 250.691		-64 938.690
Net emissions/removals		-47 335.049	-46 089.720	-41 400.742	-38 782.812	-35 735.041	-26 169.406	-31 938.319	-34 799.603	-302 250.691		
Excluded emissions from natural disturbances ^d		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
Any debits from newly		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

GHG source/sink activity	Net emissions/removals										Accounting parameters	Accounting quantities ^a	
	Base year ^b	2013	2014	2015	2016	2017	2018	2019	2020	Total ^c			
established forest													
FMRL ^e												-20 466.000	
Technical corrections to FMRL												-9 198.000	
FM cap												19 978.041	-19 978.041
B.2. CM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.3. GM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.4. RV (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.5. WDR (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

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

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

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

^d The Party indicated 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 CO₂ eq per year.

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

Table I.6

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

<i>Parameter</i>	<i>Data</i>
Periodicity of accounting	(a) AR: commitment period accounting (b) Deforestation: commitment period accounting (c) FM: commitment period accounting (d) CM: 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	Yes, for FM ^a
3.5% of total base-year GHG emissions, excluding LULUCF and including indirect CO ₂ emissions	2 497.255 kt CO ₂ eq (19 978.041 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 4 404 686 RMUs
2. Deforestation	Cancel 30 268 119 units
3. FM	Issue 19 978 041 RMUs

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

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

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.5 include the information to be included in the compilation and accounting database for Finland. Data shown are from the Party's annual submission, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table II.1

Information to be included in the compilation and accounting database for 2020, including on the commitment period reserve, for Finland

(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
CPR	216 490 140	–	–	216 490 140
Annex A emissions				
CO ₂	37 661 882	–	–	37 661 882
CH ₄	4 401 880	–	–	4 401 880
N ₂ O	4 721 768	–	–	4 721 768
HFCs	975 873	–	–	975 873
PFCs	1 717	–	–	1 717
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	19 130	–	–	19 130
NF ₃	NO	–	–	NO
Total Annex A sources^a	47 782 251	–	–	47 782 251
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–550 228	–	–	–550 228
Deforestation	3 359 405	–	–	3 359 405
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–34 799 603	–	–	–34 799 603

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

Table II.2

Information to be included in the compilation and accounting database for 2019 for Finland

(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	42 435 207	–	–	42 435 207
CH ₄	4 492 788	–	–	4 492 788
N ₂ O	4 828 581	–	–	4 828 581
HFCs	1 011 334	–	–	1 011 334
PFCs	1 904	–	–	1 904
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	18 207	–	–	18 207
NF ₃	NO	–	–	NO
Total Annex A sources^a	52 788 022	–	–	52 788 022
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–53 912	–	–	–53 912
Deforestation	3 528 000	–	–	3 528 000
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
FM	-31 938 319	-	-	-31 938 319

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

Table II.3

Information to be included in the compilation and accounting database for 2018 for Finland(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	45 850 077	-	-	45 850 077
CH ₄	4 543 916	-	-	4 543 916
N ₂ O	4 697 873	-	-	4 697 873
HFCs	1 065 127	-	-	1 065 127
PFCs	1 714	-	-	1 714
Unspecified mix of HFCs and PFCs	NO	-	-	NO
SF ₆	20 030	-	-	20 030
NF ₃	NO	-	-	NO
Total Annex A sources^a	56 178 738			56 178 738
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-525 488	-	-	-525 488
Deforestation	3 543 921	-	-	3 543 921
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-26 169 406	-	-	-26 169 406

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

Table II.4

Information to be included in the compilation and accounting database for 2017 for Finland(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	44 631 174	-	-	44 631 174
CH ₄	4 611 025	-	-	4 611 025
N ₂ O	4 730 621	-	-	4 730 621
HFCs	1 110 573	-	-	1 110 573
PFCs	1 613	-	-	1 613
Unspecified mix of HFCs and PFCs	NO	-	-	NO
SF ₆	24 443	-	-	24 443
NF ₃	NO	-	-	NO
Total Annex A sources^a	55 109 448			55 109 448
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-578 949	-	-	-578 949
Deforestation	3 644 605	-	-	3 644 605
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-35 735 041	-	-	-35 735 041

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

Table II.5

Information to be included in the compilation and accounting database for 2016 for Finland(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
CO ₂	47 237 162	–	–	47 237 162
CH ₄	4 728 638	–	–	4 728 638
N ₂ O	4 745 849	–	–	4 745 849
HFCs	1 180 816	–	–	1 180 816
PFCs	1 476	–	–	1 476
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	29 501	–	–	29 501
NF ₃	NO	–	–	NO
Total Annex A sources^a	57 923 442			57 923 442
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–608 786	–	–	–608 786
Deforestation	3 819 781	–	–	3 819 781
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–38 782 812	–	–	–38 782 812

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

Table II.6

Information to be included in the compilation and accounting database for 2015 for Finland(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	44 154 035	–	–	44 154 035
CH ₄	4 857 046	–	–	4 857 046
N ₂ O	4 752 517	–	–	4 752 517
HFCs	1 239 190	–	–	1 239 190
PFCs	1 458	–	–	1 458
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	21 565	–	–	21 565
NF ₃	NO	–	–	NO
Total Annex A sources^a	55 025 811			55 025 811
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–583 375	–	–	–583 375
Deforestation	3 943 212	–	–	3 943 212
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–41 400 742	–	–	–41 400 742

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

Table II.7

Information to be included in the compilation and accounting database for 2014 for Finland(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	47 652 022	–	–	47 652 022
CH ₄	4 894 909	–	–	4 894 909
N ₂ O	4 717 151	–	–	4 717 151
HFCs	1 300 206	–	–	1 300 206
PFCs	4 027	–	–	4 027
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	34 251	–	–	34 251
NF ₃	NO	–	–	NO

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Total Annex A sources^a	58 602 566			58 602 566
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-783 833	–	–	-783 833
Deforestation	4 121 595	–	–	4 121 595
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-46 089 720	–	–	-46 089 720

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

Table II.8

Information to be included in the compilation and accounting database for 2013 for Finland(t CO₂ eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
Annex A emissions				
CO ₂	51 763 489	–	–	51 763 489
CH ₄	4 992 139	–	–	4 992 139
N ₂ O	4 660 999	–	–	4 660 999
HFCs	1 332 240	–	–	1 332 240
PFCs	4 479	–	–	4 479
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF ₆	30 700	–	–	30 700
NF ₃	NO	–	–	NO
Total Annex A sources^a	62 784 047			62 784 047
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	-720 115	–	–	-720 115
Deforestation	4 307 600	–	–	4 307 600
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	-47 335 049			-47 335 049

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

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

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

Annex IV

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 2003. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. J Penman, M Gytarsky, T Hiraishi, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html>.

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

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

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2015, 2016, 2018 and 2020 annual submissions of Finland, contained in documents FCCC/ARR/2015/FIN, FCCC/ARR/2016/FIN, FCCC/ARR/2018/FIN and FCCC/ARR/2020/FIN respectively.

Other

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

Annual status report for Finland for 2022. Available at https://unfccc.int/sites/default/files/resource/asr2022_FIN.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Pia Forsell, Päivi Lindh and Sini Niinisto (Statistics Finland), including additional material on the methodology and assumptions used. The following references may not conform to UNFCCC editorial style as some have been reproduced as received:

Ojanen, P., Minkkinen, K., Alm, J. & Penttilä, T. 2010. Soil-atmosphere CO₂, CH₄ and N₂O fluxes in boreal forestry-drained peatlands. *Forest Ecology and Management* 260: 411-421.

Palosuo, Heikkinen & Regina 2015: Method for estimating soil carbon stock changes in Finnish mineral croplands and grasslands. *Carbon Management* 6 5-6: 207-220.

VanderZaag, A. C., Gordon, R. J., Glass, V. M. & Jamieson, R. C. (2008). Floating covers to reduce gas emissions from liquid manure storages: a review. *Applied Engineering in Agriculture*, 24(5), 657-671.
