United Nations

FCCC/ARR/2022/LVA

Framework Convention on Climate Change

Distr.: General
12 April 2023

English only

Report on the individual review of the annual submission of Latvia 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 Latvia, conducted by an expert review team in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol". The review took place from 10 to 15 October 2022 in Bonn.

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

Contents

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
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
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
CSB	Central Statistical Bureau of Latvia
CSC	carbon stock change
DE	digestible energy
DOC	degradable organic carbon
DOM	dead organic matter
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU ETS	European Union Emissions Trading System
FAO	Food and Agriculture Organization of the United Nations
FM	forest management
FMRL	forest management reference level
$Frac_{LEACH-(H)}$	fraction of nitrogen input to managed soils that is lost through leaching and run-off
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
IAR	international assessment and review
IE	included elsewhere
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
MCF	methane correction factor
MMS	manure management system(s)
MSW	municipal solid waste
N	nitrogen
N_2O	nitrous oxide
NA	not applicable

NE	not estimated
NF_3	nitrogen trifluoride
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
R_{AG}	ratio of above-ground residues dry matter to harvested yield for a crop
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
SWDS	solid waste disposal site(s)
UNFCCC Annex I inventory reporting guidelines	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
UNFCCC review guidelines	"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention"
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*

I. Introduction

1. This report covers the review of the 2022 annual submission of Latvia, organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (annex to decision 13/CP.20). The review took place from 10 to 15 October 2022 in Bonn and was coordinated by Sohel Pasha, Claudia do Valle and Nalin Srivastava (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Latvia.

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

Area of expertise	*Name*	*Party*
Generalist	Mark Hunstone	Australia
	Mayra Rocha	Brazil
Energy	Maya Fukuda	Japan
	Haakon Marold	Australia
	Victoria Novikova	Belarus
	David O'Toole	Australia
IPPU	Valentina Idrissova	Canada
	Thapelo Clifford Mohale Letete	South Africa
	Takuji Terakawa	Japan
Agriculture	Michael Anderl	Austria
	Britta Maria Hoem	Norway
	Giovanna Lunkmoss de Christo	Brazil
LULUCF and KP-LULUCF	Andrea Brandon	New Zealand
	Oksana Butrym	Ukraine
	Iordanis Tzamtzis	Greece
Waste	Takefumi Oda	Japan
	Sirinthornthep Towprayoon	Thailand
Lead reviewers	Mark Hunstone	
	Mayra Rocha	

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

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

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

5. Annex I presents the annual GHG emissions of Latvia, including totals excluding and including LULUCF, indirect CO_2 emissions, and emissions by gas and by sector, and

[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.

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 Latvia

Assessment			*Issue/problem ID#(s) in table 3 or 5[a]*
Date(s) of submission	Original submission: NIR, 14 April 2022; CRF tables (version 2), 14 April 2022; SEF tables, 14 April 2022		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	L.2
	(c) Development and selection of EFs?	Yes	E.5, L.7
	(d) Collection and selection of AD?	Yes	E.1
	(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]	Yes	I.3, L.5, L.8, L.9
	(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?	No	W.7
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	No	E.12
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?	Yes	G.3
	(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	

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
	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?	Yes	KL.3
	(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	Latvia 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 2 March 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 Latvia

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
General			
G.1	Key category analysis (G.1, 2020) (G.5, 2018) Transparency	Provide in the NIR a short description of the differences between the categories used for the key category analysis and the categories in the CRF tables that better reflect national circumstances, similar to the description provided during the review.	Resolved. The Party provided additional information in NIR section 1.5.1 (p.64) regarding the key category analysis, explaining that it used approaches 1 and 2 of the 2006 IPCC Guidelines to identify key categories but made minor modifications to the list of IPCC categories. For example, it amended the types of fuel covered in transport and further disaggregated categories in both the agriculture (by animal species) and LULUCF (e.g. by taking into account soil type) sectors to better reflect its national circumstances.
G.2	National system (G.5, 2020) Transparency	Improve the description in the NIR of the national system regarding the corresponding roles and responsibilities of all organizations involved within the system, in particular by including further details on responsibilities and their scope, of the natural gas transmission, storage and distribution enterprises, and clarify that their responsibilities consist of gathering data, estimating emissions, developing the calculation methods and enabling QA/QC activities and verification.	Resolved. The Party included in the NIR (sections 1.2.1, 1.2.2 and 1.4.1 and tables 1.1 and 1.3) additional information on the national system regarding the corresponding roles and responsibilities of all organizations involved within the system, including further details on responsibilities and their scope, of the natural gas transmission, storage and distribution enterprises, and clarified that their responsibilities consist of gathering data, estimating emissions, developing the calculation methods and enabling QA/QC activities and verification.
G.3	National system (G.6, 2020) KP reporting adherence	Where necessary, strengthen the institutional, legal and procedural national system arrangements for organizations other than the Latvian inventory agency that are required to collect data and estimate emissions, such as cement companies and natural gas	Addressing. The Party included in the NIR (sections 1.2.1, 1.2.2 and 1.4.1 and tables 1.1 and 1.3) additional information on national system arrangements. However, in some economic sectors, data and information provided by private companies, as established within the national system, still did not fully enable the Latvian inventory agency to report GHG inventory estimates in accordance with the 2006 IPCC Guidelines, including conducting QA/QC procedures for the estimates. For example,

[3] FCCC/ARR/2020/LVA.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		transmission, storage and distribution enterprises, with the aim of collecting sufficient additional information to ensure the quality of the GHG inventory, as indicated in decision 19/CMP.1, annex, paragraph 7, in conjunction with decisions 3/CMP.11 and 4/CMP.11, and include in the NIR information on the steps taken to strengthen these arrangements, as well as information required by paragraph 50(a) of the UNFCCC Annex I inventory reporting guidelines on the country-specific methods used, as necessary.	gas transmission and distribution companies did not provide detailed information on their methods for estimating gas leakages from the network and in residential and commercial properties, thus preventing replication of the emission estimates reported under subcategory 1.B.2.b natural gas. In addition, cement companies did not provide the clinker production data needed to inform estimates under category 2.A.1 cement production, preventing the Party from increasing the accuracy of those estimates and limiting the scope for category-specific QC procedures and peer review of estimates. During the review, the Party clarified that the methods for estimating gas leakages from natural gas transmission, storage and distribution systems in Latvia and at the end user level are considered commercially confidential, preventing it from providing methodological details in the NIR. Regarding category 2.A.1 cement production, the Party clarified that cement companies provide all the data required to calculate emissions for the GHG inventory in accordance with national regulations and EU ETS reporting requirements, including for clinker production data. The ERT considers that the recommendation has not yet been fully addressed, as data and information provided by private companies continue to be limited. Since the Party provided sufficient information during review on natural gas distribution and cement to assure the ERT of the quality of the GHG inventory, the ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.
G.4	Uncertainty analysis (G.3, 2020) (G.7, 2018) Convention reporting adherence	Include a quantitative uncertainty assessment for the base year in the NIR.	Resolved. The Party included a quantitative uncertainty assessment for the base year (1990) in NIR section 1.6.1 and annexes A.2.1 and A.2.2 in accordance with paragraph 15 of the UNFCCC Annex I inventory reporting guidelines. The total inventory uncertainty for 1990 is 25 per cent including LULUCF and 4 per cent excluding LULUCF.
G.5	Uncertainty analysis (G.7, 2020) Convention reporting adherence	(a) Correct the errors in the uncertainty values for the CO_2 EF for gaseous fuels for subcategory 1.A.4.c agriculture/forestry/fishing, and for the CO_2 and CH_4 EFs for subcategories 1.B.2.b natural gas and 1.B.2.c venting and flaring to improve the accuracy of the overall uncertainty assessment in the next annual submission; (b) Include in the NIR the valid uncertainty values applied in the analysis, including the explanations provided to the ERT during the review and justifications for (1) the high uncertainty estimate for 3.H urea application in 1990; (2) the higher uncertainty value for AD of fuels used in aviation and shipping in	(a) Resolved. Latvia corrected the errors in the uncertainty values as follows: (1) 5 per cent for the CO_2 EF for gaseous fuels under category 1.A.4.c agriculture/forestry/fishing; and (2) 10 per cent for the EFs for CO_2 and CH_4 for all subcategories of categories 1.B.2.b natural gas and 1.B.2.c venting and flaring, except subcategory 1.B.2.b.6 other, for which the value was corrected to 35 per cent. (b) Resolved. The Party included in the NIR explanations and justifications for (1) the high uncertainty estimates for category 3.H urea application in 1990 (section 5.7, p.339); (2) the higher uncertainty value for AD on fuels used in aviation and shipping in 1990 compared with the latest year (section 3.2.6.1, p.157); and (3) the variable AD uncertainty for N_2O in category 5.D.2 industrial wastewater across the time series (section 7.5.2.3, p.465). The Party explained in NIR section 5.7 that an uncertainty value of 50 per cent is applied for EFs, while an uncertainty value of 2 per cent is applied to AD. CSB data for urea application were available for 2007 onward. FAO data for 2002 and 2003 were also available. Data for all other years were derived by extrapolating available statistical values. Therefore, a higher uncertainty value was

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
		1990 compared with the latest year; and (3) the variable AD uncertainty for N_2O in category 5.D.2 industrial wastewater across the time series.	applied to the AD for urea application for the base year. The Party reported in the NIR (section 3.2.6.1) that for certain categories (domestic aviation and domestic navigation), fuel consumption for the base year (1990) was determined using a calculation model and an extrapolation method (derived from a study by the Institute of Physical Energetics, 2004). Consequently, the uncertainty for fuel consumption is assumed to be 20 per cent. Regarding the uncertainty for N_2O emissions in category 5.D.2, the Party explained in NIR section 7.5.2.3 that fluctuations in AD are the main reason for the high AD uncertainty. AD for N_2O emissions decreased gradually from 1990 to 2000. For 2001 and subsequent years, AD decreased but tended to fluctuate more significantly, leading to an increase in uncertainty for the 2020 submission. This decrease is attributable to the rapid curtailment of industrial activities after 1990 owing to the collapse of the former Soviet Union and the use of better environmental technologies in wastewater treatment, as well as to the allocation of industrial wastewater to urban wastewater treatment plants.
Energy			
E.1	Fuel combustion – reference approach – gaseous fuels – CO_2 (E.13, 2020) Accuracy	Conduct an investigation, in cooperation with the gas companies and CSB (as the institution responsible for the energy balance), in order to (1) clarify and document the scope of losses in the natural gas system of Latvia, (2) harmonize reporting of gas leakages reported in the GHG inventory and the energy balance losses, and (3) understand and accurately clarify the reasons for the differences in the reported natural gas consumption between the sectoral and reference approaches, make any recalculation found necessary, and document in the NIR of the next annual submission all the relevant findings of this investigation.	Not resolved. While the Party reported in its NIR (annex 3, section A.3.1, p.313) information about natural gas losses (453 TJ in 2020) and statistical differences for the whole time series, it did not provide details in the NIR of the relevant findings of the investigation into natural gas losses in relation to the reference approach. The ERT noted that inconsistencies remain between gas leakages reported in CRF table 1.B.2 (transmission and storage and distribution losses) and natural gas losses reported in annex 3 to the NIR (section A.3.1). The reasons for the differences were not clear to the ERT. During the review, the Party clarified that the statistical differences and losses for the whole time series are presented in annex 3 to the NIR (section A.3.1) and the relevant information on the natural gas losses will be provided in the next annual submission. The ERT noted that the statistical differences and losses data reported for natural gas in annex 3 to the NIR (section A.3.1) are consistent with the differences in gaseous fuel consumption between the sectoral and reference approaches (NIR figure 3.6, p.101) and therefore this issues was not included in the list of potential problems and further questions raised.
E.2	Feedstocks, reductants and other non-energy use of fuels – all fuels – CO_2 (E.5, 2020) (E.6, 2018) (E.13, 2016) (E.13, 2015) Convention reporting adherence	Recalculate excluded carbon under the reference approach in accordance with the 2006 IPCC Guidelines (vol. 2, chap. 6.6, equation 6.4) for the entire time series (the EFs for lubricants and coke were not consistent with the 2006 IPCC Guidelines and the excluded carbon for bitumen and other oil was reported as "NO").	Resolved. In the 2020 submission, the Party revised and reported in CRF table 1.A(d) the carbon excluded from the reference approach in accordance with the 2006 IPCC Guidelines (vol. 2, chap. 6.6, pp.6.7–6.8) for the entire time series and applied EFs for all fuels (including lubricants, coke, bitumen and other oil) that are consistent with the EF default values from the 2006 IPCC Guidelines (vol. 2, chap. 2, table 2.2, p.2.16). In the NIR (p.110), the Party reported that other oil includes paraffin waxes and white spirits, and consistently reported emissions from other oil under non-energy use and fuel combustion in CRF tables 1.A(b) and 1.A(d) respectively.
E.3	Feedstocks, reductants and other non-energy use	Improve the data on and documentation of lubricant consumption in the NIR, in	Resolved. The Party provided in its NIR (section 3.2.3.2, p.111, and section 3.2.6.1.2, p.144) additional explanations for the calculation and reporting of emissions from the

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	of fuels – liquid fuels – CO_2 (E.14, 2020) Transparency	particular for energy purposes, and enhance the consistency and transparency of reporting on non-energy use data on lubricants in both the NIR and CRF tables 1.A(b) and 1.A(d), including by clearly documenting lubricant consumption in road transportation engines and the resulting CO_2 emissions, and in interproduct transfers of lubricants.	consumption of lubricants in road transportation, which are consistent with those given in CRF tables 1.A(b) and 1.A(d).
E.4	Feedstocks, reductants and other non-energy use of fuels – liquid fuels – CO_2 (E.15, 2020) Transparency	Investigate the scope of other oil data reported in the inventory, particularly for unspecified other oil products, for example by consulting with CSB, clearly document in the NIR the scope of fuels that are included within the other oil AD, present in the NIR disaggregated AD for all fuels reported under other oil across the time series and provide in the NIR and CRF tables consistent AD in accordance with the fuel type definitions in the 2006 IPCC Guidelines (vol. 2, chap. 1, table 1.1, pp.1.12–1.16).	Resolved. The Party clearly reported in its NIR (pp.109–111 and table 3.14) the scope of fuels (bitumen, lubricants, coke, white spirits and paraffin waxes) that are included in other oils and reported consistent information in CRF table 1.A(b) in accordance with the fuel type definitions in the 2006 IPCC Guidelines (vol. 2, chap. 1, table 1.1, pp.1.12–1.16).
E.5	1.A.1 Energy industries – biomass – CO_2 (E.7, 2020) (E.16, 2018) Transparency	Provide information on the difference in the CO_2 EF for landfill gas and sludge gas between the IPCC default value and the value used by Latvia, or use the default CO_2 EF for these gases.	Addressing. The Party reported in the NIR (p.115) that it used IPCC default EFs for landfill and other biogas. However, no information was provided in NIR table 3.20 (p.122) on any recalculations performed for category 1.A.1 energy industries. During the review, the Party clarified that recalculations for this category were reported in the 2021 submission, and CO_2 EFs for landfill gas, sludge gas and other biogas were corrected in accordance with the recommendation of the previous ERT. CO_2 emissions from biogas combustion under category 1.A.1 energy industries increased by 6.8 per cent. However, on the basis of the information reported in the NIR, it is not clear to the ERT whether the recalculations include those resulting from the adoption of default EFs from the 2006 IPCC Guidelines for CO_2 for landfill and other biogas and whether the Party actually applied the IPCC default EFs. The ERT noted that CO_2 emissions from landfill gas and sludge gas used as fuels are of biogenic and not fossil origin, and therefore this issue was not included in the list of potential problems and further questions raised.
E.6	1.A.1.a Public electricity and heat production – solid fuels – CO_2 (E.8, 2020) (E.18, 2018) Accuracy	Apply country-specific EFs for the whole time series.	Resolved. The Party reported in its NIR (table 3.16, p.115) country-specific CO_2 EFs (94.08, 91.60 and 96.54 t/TJ) and carbon content (67.32, 71.15 and 63.50 per cent) for coal depending on its NCV. CO_2 EFs are consistent with the 2006 IPCC Guidelines for other bituminous coal (89.5–99.7 t/TJ). As reported in the 2021 NIR (table 10.2, p.477), emissions from coal were recalculated after the CO_2 EF was corrected for the whole time series.

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
E.7	1.A.3.e.i Pipeline transport – all fuels – CO_2, CH_4 and N_2O (E.16, 2020) Comparability	Report CO_2, CH_4 and N_2O emissions for subcategory 1.A.3.e.i pipeline transport for liquid, solid and other fossil fuels and biomass using the notation key "NO" instead of "IE" for the entire time series, providing relevant explanations in the NIR, and report CO_2, CH_4 and N_2O emissions from gaseous fuels (natural gas) under this subcategory in CRF table 1.A(a) (sheet 3) for the entire time series, providing relevant documentation on the method, AD and EFs used in the estimates in the NIR.	Addressing. The Party reported CO_2, CH_4 and N_2O emissions for subcategory 1.A.3.e.i pipeline transport for liquid, solid, gaseous and other fossil fuels and biomass in CRF table 1.A(a) (sheet 3) using the notation key "NO" instead of "IE" for the entire time series. During the review, the Party explained that after consultation with the natural gas companies, it was confirmed that natural gas is not consumed in pipeline transport. However, the Party did not provide this explanation in the NIR.
E.8	1.B.2.b Natural gas – gaseous fuels – CH_4 (E.10, 2020) (E.13, 2018) (E.19, 2016) (E.19, 2015) Transparency	Aggregate detailed individual data and present them in the NIR so as to highlight the information that is important for the transparency of the inventory without disclosing individual data that would compromise confidentiality.	Not resolved. The Party reported in the NIR (p.178) that the methodology used for emission calculations by natural gas companies was submitted to inventory compilers. During the review, the Party provided the methodologies used by these companies to estimate emissions, which are based on equipment-level factors and methods. However, the NIR (table 3.57) contains the same AD as previous NIRs for the amounts of natural gas leaked (table 3.59 of the 2020 NIR and table 3.53 of the 2018 NIR). The ERT considers that the recommendation has not yet been addressed because the Party has not yet provided an explanation in the NIR for the method used, and the data presented remain unchanged.
E.9	1.B.2.b Natural gas – gaseous fuels – CH_4 (E.11, 2020) (E.14, 2018) (E.8, 2016) (E.8, 2015) (41, 2014) (41, 2013) Transparency	Describe methods and data used in the NIR, including more detailed background information, such as on the length of the pipeline and the materials used for the distribution network, on the pressure conditions of the different parts of the network, on flow rates and on annual reconstruction rates to explain the improvements made to the network.	Addressing. The Party reported in the NIR (p.178) additional information on pipeline lengths and composition. However, it did not provide detailed background information to explain the improvements made to the network in the NIR. During the review, Latvia provided details of the equipment-level methods used by gas companies to estimate CH_4 emissions for subcategory 1.B.2.b natural gas. However, the NIR did not contain a description of these methods or any information on relevant parameters used in the calculations.
E.10	1.B.2.b Natural gas – gaseous fuels – CH_4 (E.12, 2020) (E.22, 2018) Transparency	Obtain information on how the data provider generated the AD and CH_4 emissions and if necessary, conduct QA/QC procedures as described in the 2006 IPCC Guidelines (vol. 2, chap. 4.2.3).	Resolved. The Party reported in the NIR (p.181) that natural gas companies report fugitive CH_4 emissions in accordance with methodologies that are verified and approved by the Environment State Bureau. The Party also reported in the NIR (p.181) that it has carried out additional QA/QC of tier 1 calculations in accordance with procedures described in the 2006 IPCC Guidelines (vol. 2, chap. 4.2.3). During the review, the Party provided the tier 1 calculations for which the QA/QC was performed, which the ERT verified.
E.11	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4	Provide in the NIR a time series of CH_4 and CO_2 emission estimates for subcategories 1.B.2.b.4 transmission and storage, 1.B.2.b.5	Not resolved. The Party did not provide in the NIR a time series of CH_4 and CO_2 emission estimates for subcategories 1.B.2.b.4 transmission and storage and 1.B.2.b.5 distribution and 1.B.2.c.ii gas (venting), or information on the comparison of these

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	(E.17, 2020) Transparency	distribution and 1.B.2.c.ii gas (venting) using the tier 1 method and default EFs presented in tables 4.2.4–4.2.5, as appropriate, from the 2006 IPCC Guidelines (vol. 2, chap. 4, p.4.41 and p.4.49 or p.4.57, respectively) and provide information in the NIR on the comparison of these estimates with the tier 3 estimates, including explanations of any differences, as a verification of the reported estimates in accordance with paragraph 41 of the UNFCCC Annex I inventory reporting guidelines.	estimates with the tier 3 estimates. The ERT noted that the total CH_4 and CO_2 emissions reported in CRF table 1.B.2 were consistently higher than those derived using the tier 1 method across the time series, with differences in the range of 93–99 per cent for CO_2 and 1–118 per cent for CH_4. During the review, the Party provided the ERT with a comparison of tier 3 and tier 1 estimates and explained that the tier 1 methodology from the 2006 IPCC Guidelines uses default EFs and the country's total annual natural gas consumption.
E.12	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.18, 2020) Transparency	Provide in the NIR a clear description of the methodology and AD used by the gas companies for estimating fugitive CO_2 and CH_4 emissions for subcategory 1.B.2.b.6 other, including information on the coverage of emission sources under the subcategory, and clearly explain in the NIR the reported trend in emissions across the time series.	Not resolved. The NIR (section 3.3.2.2, p.179) does not specify how gas companies obtained or calculated AD on natural gas leakages or how emissions were estimated for fugitive CO_2 and CH_4 emissions for subcategory 1.B.2.b.6 other. The ERT noted that the Party has not provided an explanation for the significant inter-annual variations in emissions reported, for example in NIR table 3.55 (p.177), where the value reported for 2017 (6.11 kt CH_4) is higher than those for 2016 and 2018 (4.66 and 3.64 kt CH_4 respectively). During the review, the Party provided a clear description of the methodology and AD used by gas companies to estimate fugitive emissions, which are based on average emission rates for residential and commercial equipment. The ERT considers that the recommendation has not yet been addressed because the Party has not yet included this information in the NIR and clearly explained in the NIR the reported trend in emissions across the time series.
IPPU			
I.1	2. General (IPPU) (I.1, 2020) (I.1, 2018) (I.1, 2016) (I.1, 2015) (46, 2014) Consistency	Implement the planned improvement to undertake capacity-building projects to achieve better time-series consistency for several categories in the early years of the time series.	Resolved. The Party reported in NIR section 4.1 (p.186) that to achieve better time-series consistency, improvements have been implemented within the European Economic Area Financial Mechanism 2009–2014 – National Climate Policy programme, and that the implementation of an integrated database as part of these improvements has enabled the Party to identify errors in previous calculations, leading to improvements in time-series consistency. During the review, the Party clarified that the integrated database has been the main focus of the improvement programme for the IPPU sector and has been used to calculate emissions for entry in the CRF tables. The ERT considers that the recommendation has been fully addressed because the Party has implemented the planned improvements and reported on its progress in the NIR.
I.2	2.A.2 Lime production – CO_2 (I.3, 2020) (I.5, 2018) (I.12, 2016) (I.12, 2015) Transparency	Update the text in the NIR to reflect the revised EF calculation and AD for CO_2 emissions from lime production.	Addressing. The Party reported in its NIR (pp.196–197) the equation used to calculate CO_2 emissions from the production of different types of lime as well as the revised EF calculation. The Party also reported the AD used for calculating emissions in NIR table 4.9. Columns 2 and 3 of this table specify the amount of lime produced from limestone and dolomite, respectively, which are used as AD in the equation; however,

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			the heading of column 4, "Limestone used in quicklime production (iron and steel industry)", and the statement on NIR page 196 that "amounts of limestone for the production of quicklime are used to determine AD and CO_2 emissions within the iron and steel industry" appear to be incorrect. During the review, the Party clarified that the heading and statement are indeed incorrect and that column 4 of NIR table 4.9 actually specifies the amount of quicklime produced, which is used as AD for the calculation. The ERT considers that the recommendation has not yet been fully addressed because the NIR still specifies the quantities of limestone used as the AD used for the calculation of emissions associated with quicklime production, instead of the quantity of quicklime produced.
I.3	2.F.1 Refrigeration and air conditioning – HFCs (I.7, 2020) (I.12, 2018) Completeness	Provide an estimation of HFC emissions related to the management of refrigerant containers.	Addressing. The Party reported in its NIR (p.252) that on the basis of the 2006 IPCC Guidelines (vol. 3, chap. 7, equations 7.10–7.11) it estimated HFC emissions from management of refrigerant containers, applying default EFs and AD from its fluorinated gas database, and, finding these emissions to be below 0.05 per cent of total national GHG emissions for 2013–2018, characterized them as below the threshold of significance for Latvia. The ERT notes that paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines stipulates that emissions may be defined as insignificant only at the category level, as indicated in the CRF tables. Estimation of emissions from management of refrigerant containers is only one element in equation 7.10 of the 2006 IPCC Guidelines and as such the threshold cannot be used to justify excluding the emissions from reporting. Nevertheless, the ERT found that any possible underestimate is below the significance threshold for application of an adjustment in accordance with decision 22/CMP.1, annex, paragraph 80(b), in conjunction with decision 4/CMP.11 (5.23 kt CO_2 eq in 2020) and therefore this issue was not included in the list of potential problems and further questions raised.
I.4	2.F.1 Refrigeration and air conditioning – HFCs (I.8, 2020) Transparency	Include in the NIR detailed information on the methodology, assumptions, AD and EFs used for estimating HFC emissions from disposal of equipment for subcategories 2.F.1.a commercial refrigeration, 2.F.1.c industrial refrigeration and 2.F.1.f stationary air conditioning, clearly explaining the use of notation keys for relevant years of the time series where numerical values are not reported, and continue reporting HFC emissions from disposal of equipment for relevant subcategories under category 2.F.1 refrigeration and air conditioning in future annual submissions.	Addressing. The Party reported in its NIR the methodologies, assumptions, AD and EFs used in estimating HFC emissions from disposal of equipment for 1995–2020 for subcategories 2.F.1.a commercial refrigeration (pp.251–254), 2.F.1.c industrial refrigeration (pp.257–259) and 2.F.1.f stationary air conditioning (pp.264–265). For 1990–1994 the Party used the notation key "NO" and explained that HFCs were not produced or used in the country during that period. Regarding AD for subcategory 2.F.1.a commercial refrigeration, the Party reported in the NIR (p.253) that data for 2006–2016 were either obtained from its reporting under national regulation 563 of the Cabinet of Ministers of Latvia (on restrictions and prohibitions relating to activities using ozone-depleting substances and fluorinated gases) or extrapolated, but without specifying which data were obtained and which were extrapolated or why extrapolation was used for certain data. During the review, the Party clarified that, under subcategory 2.F.1.a commercial refrigeration, data for HFC-32 for 2006–2008 and 2012 were obtained from national regulation 563, while data for 2009–2011 were extrapolated. The Party also clarified that all data for HFC-134a, HFC-125, HFC-143a, HFC-23 and

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			HFC-152a for 2006 were obtained from reports submitted under national regulation 563. The ERT considers that the recommendation has not yet been fully addressed because the Party did not include in the NIR the detailed information about the sources of AD for subcategory 2.F.1.a commercial refrigeration provided to the ERT during the review.
Agriculture			
A.1	3.A.1 Cattle – CH_4 (A.9, 2020) Transparency	Include in the NIR or in an annex to the NIR information on the calculation of gross energy intake values for the whole time series for the animal subgroups considered under other mature cattle, including changes in animal weight and population, and, if possible, for all subcategories of cattle.	Addressing. The Party reported in its NIR (p.304, table 5.10) the non-dairy cattle population, divided by subcategory (growing cattle and other mature cattle) for 1990–2020. However, although the Party reported the changes in cattle weight, divided by subcategory, for the whole time series (at five-yearly intervals), data on other parameters (weight gain and DE) for the estimation of gross energy intake were not fully reported. While the NIR (p.302) contains an explanation for the data on the digestibility rate, it does not contain any data for the subcategory of non-dairy cattle. During the review, the Party clarified that the data for the subcategory of non-dairy cattle are included in the NIR (section 5.2.2.2, tables 5.11 and 5.12). However, the ERT noted that NIR table 5.11 shows only five-yearly data for 1990–2020, instead of data for the whole time series, as reported in the 2021 NIR (table 5.11). Additionally, NIR table 5.11 provides data on only weight, gross energy intake and EFs for dairy, growing and mature cattle, while NIR table 5.12 provides data on gross energy intake and EFs for other non-dairy cattle subgroups. The Party did not provide data on other parameters such as weight, weight gain and DE for all the subcategories and the time series used in the calculation. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet reported data on all the parameters used for the calculation of gross energy intake for all subcategories of cattle.
A.2	3.B Manure management – CH_4 (A.10, 2020) Transparency	Report in the NIR information on the nature of the biogas plants operating in the country, including documentation explaining that the residence time of the manure is short (daily emptying) and further document, as part of the next annual submission, the assumed leakage value from biogas plants using references that are available to be reviewed.	Addressing. The Party reported in its NIR (p.312) that the production of biogas by manure management from livestock has been occurring since 2007. Annual information from the Latvian Biogas Association and the Rural Support Service was used to estimate the number of biogas plants established in the country and the type and quantity of raw materials used in each plant. The Party also reported in its NIR (p.314) that almost all biogas plants are built on large dairy or pig farms, where manure from smallholdings is not used owing to high transportation costs. In terms of residence time, the Party explained that manure from large farms is pumped to the biogas plants every day, and therefore long periods of manure storage are uncommon in Latvia. Furthermore, the Party reported in its NIR (p.314) a value of 2 per cent for CH_4 leakage emissions for category 3.B.1.4 (derived from Swedish and national studies). However, the Party still did not include more detailed information on the number of biogas plants, the type and quantity of manure and the amount of biogas produced for the whole time series. During the review, the Party explained that detailed information and assumptions are included in the NIR, including references.

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			Nevertheless, the ERT considers that the Party has yet to fully address this recommendation.
A.3	3.B Manure management – CH_4 and N_2O (A.11, 2020) Transparency	(a) Expand the information provided in the NIR on how the MMS distribution used in the calculations is derived for the complete time series, including by specifying the changes made compared with the MMS distribution provided in the technical paper by Priekulis and Aboltins (2015), considering that the same MMS distribution values for 2013 have been reported since the 2016 annual submission and that these values differ from those in the cited paper; (b) Provide information in the NIR on grazing days, including references for the values used, for each animal category or subcategory, as appropriate.	Addressing. (a) The Party provided in its NIR (p.312) additional information on the MMS distribution and references used in the calculations, including national legislation and studies. The Party stated that the calculation of MMS distribution is reviewed every year as part of a QC procedure carried out by experts from Latvia University of Life Sciences and Technologies. However, the Party did not include in the NIR an analysis of the technical paper by Priekulis and Aboltins (2015) or national references for the complete time series; (b) The Party reported in its NIR (p.313) the grazing period of livestock, sourced from a research paper by the Latvia University of Life Sciences and Technologies. However, the Party did not include the values for each animal subcategory. During the review, the Party clarified that it implemented the recommendation by including in NIR section 5.3.2.1 additional information and references. However, the ERT considers that the recommendation has been only partially addressed because the Party did not include a detailed enough description of the method used and the share of MMS distribution for each animal category and subcategory. Additionally, the Party did not present the number of grazing days for each animal subcategory.
A.4	3.B.1 Cattle – CH_4 and N_2O (A.12, 2020) Accuracy	Clarify in the NIR whether and to what extent deep bedding is used in national cattle production, in particular for calves, and consider the possible use of deep bedding in estimating CH_4 and N_2O emissions from manure management for subcategory 3.B.1 cattle, considering the applicable different default MCFs and EFs provided in the 2006 IPCC Guidelines (vol. 4, chap. 10, tables 10.17 and 10.21, pp.10.44–10.47 and 10.62–10.64, respectively) compared with solid storage of manure.	Resolved. The Party reported in its NIR (p.312) that deep bedding was common in Latvia only until 1990. The Party provided references for two studies to support this affirmation – a national research paper on manure management produced in 2016, in which several national experts evaluated MMS in Latvia, and another research paper on experience of manure data collection on pilot farms. The ERT noted that the paper on experiences of manure data collection mentions the use of deep litter for beef cattle in Latvia (according to information provided in table 2.2 of the paper, two pilot farms used deep litter (or deep bedding) for beef cattle). The ERT asked the Party to respond to the questions raised by the previous ERT and to provide more information and references to prove that deep litter is not used in Latvia. The ERT also asked the Party to provide the Excel calculation sheet for estimating CH_4 and N_2O emissions from manure management for subcategory 3.B.1 cattle. The Party pointed out that table 10.18 of the 2006 IPCC Guidelines (vol. 4, chap. 10) defines cattle and swine deep bedding as follows: “as manure accumulates, bedding is continually added to absorb moisture over a production cycle and possibly for as long as 6 to 12 months. This manure management system also is known as a bedded pack manure management system and may be combined with a dry lot or pasture”. The Party explained that the term “deep bedding” has a different meaning in Latvia than in the 2006 IPCC Guidelines. The practice of using added bedding material continually for as long as 6 to 12 months was stopped before 1990. Also, national legislation provides that a deep cattle shed is an animal lodging where solid manure is accumulated for at least half a

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			year. According to the 2006 IPCC Guidelines and national assumptions, if added bedding material is removed before six months of use, the MMS should be referred to as solid manure. The Party also explained that there is some confusion around the use of the term "deep litter" in Latvian agriculture. Officially, the 2006 IPCC Guidelines and national legislation state that a deep litter system is where bedding material is removed within 6 to 12 months. However, in the agriculture sector in Latvia, the term "deep bedding" is used if manure with bedding material is not removed every day. Therefore, to ensure consistency with IPCC definitions, the Party reported that the most suitable definition for its common agricultural practices was a solid storage system, described in table 10.8 of the 2006 IPCC Guidelines as "the storage of manure, typically for a period of several months, in unconfined piles or stacks. Manure is able to be stacked due to the presence of a sufficient amount of bedding material or loss of moisture by evaporation". The ERT considers that the accuracy issue has been resolved, as per the explanation of the Party, and that the Party correctly used the MCF and EF for manure management from the 2006 IPCC Guidelines (vol. 4, chap. 10, tables 10.17 and 10.21, pp.10.44–10.47 and 10.62–10.64 respectively), considering conditions in the country.
A.5	3.B.3 Swine – CH_4 (A.13, 2020) Transparency	Provide in the NIR references to the additional publications mentioned during the review (e.g. Frolova et al., 2019; Kaasik et al., 2002) and include the explanation provided to the ERT of how it was sought to establish the most accurate values of DE under Latvian conditions used in the calculations.	Addressing. The Party reported in its NIR (p.316) the value of 80 per cent for feed digestibility for sows, explaining that several publications were revised and used to estimate DE, including national and neighbouring countries' data. Additionally, the Party reported that consultations held with national experts confirmed that the digestibility of swine feed in Latvia is up to 80 per cent. However, the Party did not include references for the publications or confirm whether they include Frolova et al. (2019) and Kaasik et al. (2002). During the review, the Party clarified that additional information was included in the NIR (section 5.3.2.1); however, the ERT noted that this information is not clearly reported. The ERT considers that the recommendation has not yet been fully addressed because the Party still needs to provide references and more detailed information on the studies and consultations with experts that supported the establishment of the DE parameter used in the calculations. The ERT notes that, as the DE value for piglets is the midpoint of the range provided by the 2006 IPCC Guidelines (vol. 4, chap. 10, table 10.2, p.10.14), and the upper limit of the range of representative DE (70–80 per cent) was used for sows and fattening pigs, the ERT considers that this transparency issue does not lead to a potential underestimate of CH_4 or N_2O emissions.
A.6	3.D.a.4 Crop residues – N_2O (A.14, 2020) Transparency	Explain in the NIR which values used for estimating N_2O emissions from crop residues are country-specific and which are default values, and provide more information on the referenced 2018 national study by Kārkliņš and Līpenīte, specifically on the country-specific value of 1.00 for R_{AG}.	Addressing. The Party explained in its NIR (p.331 and table 5.33) that calculations on the annual amount of N in crop residues are mainly based on national data of crop production (area and yield, from the CSB database) and default values from the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.2, p.11.17), except the factor for wheat, which was based on national references and the IPCC default. The Party provided more information in its NIR on the national R_{AG} values (p.331) and explained that according to long-term national studies (Ruža, 2007) N content of above-ground

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			residues amounts to 0.005, N content of below-ground residues amounts to 0.006 and R_{AG} ranges from 1.00 to 1.10 for wheat. Furthermore, the Party reported that according to national research results (Kārkliņš and Līpenīte, 2018) R_{AG} is equal to 1.10 or 1.00 or 0.85 if the yield is below 2.5, 2.5–5 or above 5 t/ha respectively. During the review, the Party clarified that the sources of the values used in the estimation of N_2O emissions from crop residues (i.e. country-specific or default values) are included in NIR table 5.33 (p.331). However, the table does not present the values or provide full references for the information used.
A.7	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O (A.15, 2020) Transparency	Expand the information in the NIR on the methodology used for estimating the area of organic soils, specifically by including the explanations provided to the ERT during the review on how the area of organic soils in cropland and grassland was estimated using data from the NFI and giving reasons why changes (recalculations) in the area of organic soils can be expected to occur regularly to take into account the results from the NFI cycles.	Resolved. The Party reported in its NIR (p.332) that data on the annual area of managed organic soils for the agriculture sector are taken from the data for the LULUCF sector, produced by the Latvian State Forest Research Institute "Silava". For the LULUCF sector, the Party reported that the area of organic soils in forest land is reported according to the structure and distribution of forest stand types. The total area of organic soils and the total area of forests were updated on the basis of research data on land-use structure based on the NFI. In the NIR, the Party included information on the methodology used to estimate the area of organic soils, using the definition provided in the NFI, which stipulates that soil is classified as organic if the organic layer (known as the "H horizon") is at least 20 cm deep. During the review, the Party explained that recalculations were performed for the 2021 and 2022 NIRs to reflect the continuous improvement of AD. Additionally, the Party explained that for the 2021 NIR it used new country-specific EFs (resulting from scientific studies) for drained organic soils in cropland. Additionally, a recalculation was performed on the organic carbon stock in mineral soils in forest land converted to cropland after a transition period of 20 years to ensure consistency between equilibrium carbon stocks in different land-use types. The ERT considers that the recommendation has been fully addressed because the Party included in its NIR more detailed information on the methodology used in calculating the area of organic soils and explained that the area of organic soils is expected to be recalculated regularly to take into account the results of NFI cycles.
A.8	3.D.b.2 N leaching and run-off – N_2O (A.8, 2020) (A.15, 2018) Transparency	Provide in the NIR more information on the choice of a country-specific $Frac_{LEACH-(H)}$ based on the results of agricultural run-off monitoring by Sudars et al. (2016).	Resolved. The Party reported in its NIR (p.335) an estimated value of 0.23 for $Frac_{LEACH-(H)}$, based on national references (Sudars et al., 2016). The Party explained that, considering the general situation in Latvia, with the sown area and N used for fertilization, national experts concluded that the weighted average N leaching factor in agricultural areas has never been estimated to be higher than 0.23. The Party justified the values used by pointing out that they had already been approved in other studies (e.g. Rivza et al., 2018, conducted on the basis of projects under the national research programme EVIDEnT such as on analysis of GHG emissions from the agricultural sector and economic assessment of emission reduction measures and analysis of the contribution of the forestry sector to the fulfilment of climate policy goals).

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LULUCF			
L.1	4. General (LULUCF) (L.1, 2020) (L.11, 2018) Convention reporting adherence	Eliminate the inconsistencies between NIR tables 6.8–6.9 and CRF table 4.A for 1990, the inconsistent reporting of the area of organic soils for cropland and grassland within the CRF tables, and the errors in the EF used for estimating emissions from organic soils on grassland converted to cropland and the CO_2 emissions from biomass burning, and strengthen the QA/QC procedures to avoid such errors.	Resolved. The Party eliminated the remaining minor inconsistencies in the area of organic soils reported in CRF tables 4.B–4.C and the area of cultivated organic soils reported under the agriculture sector in CRF table 3.D. NIR tables 5.34 (p.333), 6.21 (pp.378–379) and 6.24 (p.388) contain consistently reported areas of organic soils. The ERT noted that Latvia strengthened its QA/QC procedures, introducing manual data checks to compare figures imported into CRF Reporter with the calculated values.
L.2	4. General (LULUCF) – CO_2 (L.2, 2020) (L.12, 2018) Accuracy	Implement the model in a consistent manner for the mineral soils pool for the forest land, cropland and grassland categories, paying particular attention to the balanced estimation of CSC during conversion.	Addressing. The Party reported in its NIR (pp.347–348) that it is in the process of implementing the improved quantitative results of modelling (using the Yasso model) to characterize CSC in mineral soils in forest land, cropland and grassland (as summarized in section 10.4, table 10.5, pp.487–488). From page 360 onward, multiple references are made to sector-specific improvements and plans for improving mineral soil estimates in forest land, grassland and cropland. During the review, the Party clarified that the latest studies have found no significant difference in mineral soil organic carbon stocks between grassland and cropland or between forest land and grassland, and that these findings have been included in the GHG inventory. The Party also clarified that ongoing modelling improvements were not included in the inventory so as to avoid the potential overestimation of CO_2 removals in mineral soils and the potential use of these estimates in drafting climate policy while they are subject to change. The Party did not provide any scientific substantiation of CO_2 removals in mineral soils in afforested areas. Considering that afforested areas (mainly cropland abandoned after 1990) accounted for about 10 per cent of total forest area in 1990, the effect of an overestimation of CO_2 removals in soil would significantly affect the GHG balance. The ERT considers that the recommendation has not yet been fully addressed because the Party has not implemented the Yasso model in a consistent manner (i.e. mineral soil estimates are reported for forest land converted to cropland but mineral soil emission estimates are not reported for cropland converted to forest land ("NA" is reported)) (as shown in CRF tables 4.A and 4.B), and the accuracy of the current estimates cannot be verified.
L.3	4.A.1 Forest land remaining forest land – CO_2 (L.4, 2020) (L.13, 2018) Transparency	Include in the NIR the justification for why the country-specific value (0.52 t C/ha) is much lower than that in the Wetlands Supplement (2.6 t C/ha).	Resolved. The Party reported that, following national-scale research projects in the country's peatlands, it developed a climatically appropriate country-specific EF for drained organic soils in forest land, which it included in its NIR (section 6.4.2.1, pp.370–372).
L.4	4.A.2 Land converted to forest land – CO_2	Provide in the NIR the following information to support the use of a 150-year transition	Resolved. The Party reported in its NIR (section 6.4.2.2, p.373) detailed information on the progress of implementation of the Yasso model for afforestation to evaluate

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	(L.6, 2020) (L.3, 2018) (L.15, 2016) (L.14, 2015) Transparency	period: progress on, or results of, the implementation of the Yasso model for afforestation to evaluate actual CSC in deadwood and soils on afforested land (the model has already been implemented for cropland, grassland and forest land).	actual CSC in deadwood and soils on afforested land and justification for the 150-year transition period for CSC in deadwood and soils on afforested land. The Party indicated (NIR p.373) that the use of a 150-year transition period is based on field measurement and expert judgment, explaining that this is the time it takes for two generations of forest stands to complete their cycles, and the time required for the CSC from harvest residues, stumps and DOM to reach a steady state.
L.5	4.A.2 Land converted to forest land – CO_2 (L.7, 2020) (L.4, 2018) (L.16, 2016) (L.15, 2015) Completeness	Continue the methodological work for estimating CSC in living biomass, deadwood and litter for cropland converted to forest land, wetlands converted to forest land and settlements converted to forest land as well as in mineral soils (cropland converted to forest land and settlements converted to forest land) and organic soils (wetlands converted to forest land), and report the estimates in the annual submission.	Addressing. The Party reported in its NIR (p.373) that it is continuing to carry out methodological work for estimating CSC in living biomass, deadwood and litter for cropland converted to forest land, wetlands converted to forest land and settlements converted to forest land, as well as in mineral soils (cropland converted to forest land and settlements converted to forest land) and organic soils (wetlands converted to forest land). The Party reported "NA" in CRF table 4.A for CSC in mineral soils (for cropland converted to forest land and settlements converted to forest land). As mineral soil emissions are reported for forest land converted to cropland and forest land converted to settlements, reporting remains incomplete (see ID# L.2 above). During the review, the Party clarified that it reported "NA" because emissions/removals were found to be insignificant. CSC in land converted to forest land is reported as "NA" to avoid overestimation of carbon removals, hence no emissions are excluded from reporting. According to the Party, this approach can be considered as conservative reporting. The Party also clarified that CSC in living biomass, deadwood and litter (for cropland converted to forest land, wetlands converted to forest land and settlements converted to forest land) and in organic soils (for wetlands converted to forest land) is now reported in CRF table 4.A. Methodological work for estimating CSC in living biomass and DOM has been improved on the basis of a national study to determine increment, mortality and harvest rate in Latvia (Krumsteds et al., 2019). The ERT notes that estimation of CSC in mineral soils for cropland converted to forest land and settlements converted to forest land is the only outstanding issue.
L.6	4.B Cropland – CO_2 and CH_4 (L.8, 2020) (L.15, 2018) Transparency	Include in the NIR an explanation for the specific area reported in CRF table 4(II).	Resolved. The Party reported in its NIR (p.381) and CRF table 4(II) that for subcategory 4.B.1.1 drained organic soils, only the area of drainage ditches and corresponding CH_4 emissions for cropland remaining cropland and land converted to cropland is reported (3.95 kha for 2020), as the CH_4 EF for drained organic soils is 0 according to the 2006 IPCC Guidelines. Drainage ditches (reported in the NIR (p.381) as 3.95 ha for 2020) in organic soils were determined using a tier 1 approach from the Wetlands Supplement (NIR table 2.4), on the assumption that the area of drainage ditches is 5 per cent of the total area of organic soils in cropland (NIR section 6.5.2.1, p.381).
L.7	4.B.2.2 Grassland converted to cropland – CO_2	Use the country-specific factors for the GHG inventory to estimate CSC in the living biomass pool for this category as soon as they	Addressing. The Party reported in its NIR (p.382) that changes in living biomass and DOM for grassland converted to cropland are reported as "IE" to avoid double counting emissions, as the input of carbon into soil from the biomass pool is included in the calculation of CSC in mineral soils, using the Yasso model. The Party plans to

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	(L.10, 2020) (L.16, 2018) Accuracy	are available and provide detailed information on this in the NIR.	include the use of country-specific biomass expansion factors for estimating CSC in the living biomass pool for the next annual submission. The resources for this activity have been allocated and the initial estimates of country-specific biomass expansion factors will soon be published in a scientific peer-reviewed publication. During the review, the Party clarified that country-specific biomass conversion factors and carbon stocks have yet to be developed. The ERT noted the detailed information provided in the NIR on the Party's progress in implementing this recommendation; however, it considers that the recommendation has not yet been fully addressed because the Party has not yet reported country-specific estimates for CSC in the living biomass pool for this category.
L.8	4.C.2 Land converted to grassland – CO_2 (L.11, 2020) (L.7, 2018) (L.20, 2016) (L.19, 2015) Completeness	Continue the methodological work for estimating CSC in living biomass, deadwood and litter for forest land converted to grassland, wetlands converted to grassland and settlements converted to grassland as well as in mineral soils (forest land converted to grassland and settlements converted to grassland) and organic soils (wetlands converted to grassland), and report the estimates in the annual submission.	Addressing. The Party reported in its NIR (pp.391–392) CSC in living biomass, deadwood and litter for forest land converted to grassland, wetlands converted to grassland and settlements converted to grassland, as well as in mineral soils (forest land converted to grassland and settlements converted to grassland) and organic soils (wetlands converted to grassland). The CSC in DOM for wetlands converted to grassland and settlements converted to grassland is reported as "NE", as there are no IPCC tier 1 default values for this pool and these categories. CSC in mineral soils (forest land converted to grassland and settlements converted to grassland) is reported as "NA". During the review, the Party clarified that the results of soil monitoring under national initiatives and the European Union Land Use/Land Cover Area Frame Survey show no significant difference between carbon stocks in cropland, grassland and forest land mineral soils, and, therefore, no CSC is reported in soil following conversions among these categories. The application of the tier 1 approach might lead to the overestimation of CO_2 removals in soil due to afforestation and the conversion of cropland to grassland, as there is no scientific evidence of an increase of soil carbon stock due to conversion of cropland to grassland or forest land. Similarly, conversion of settlements to grassland might not be associated with an increase in soil carbon stock, since this category of land-use change is associated with the abandonment of carbon-rich artificial landscapes such as power lines or peat extraction infrastructure. The ERT considers that the recommendation has not been fully addressed because CSC in mineral soils is reported for grassland converted to settlements but not for settlements converted to grassland.
L.9	4.E.2 Land converted to settlements – CO_2 (L.12, 2020) (L.10, 2018) (L.23, 2016) (L.22, 2015) Completeness	Continue the methodological work for estimating CSC in living biomass and DOM for cropland converted to settlements and grassland converted to settlements and report the estimates in the annual submission.	Addressing. The Party reported in its NIR (p.408) that for cropland converted to settlements and grassland converted to settlements, CSC in living biomass and DOM is calculated using IPCC tier 1 methods. According to the 2006 IPCC Guidelines, when applying tier 1 methods for estimating CSC in DOM for cropland converted to settlements and grassland converted to settlements, the emissions are zero. During the review, the Party clarified that a tier 1 method is applied for these categories, previously reported as "NE". It is assumed that deadwood, litter and living biomass is instantly oxidized owing to land-use change and 20 per cent of the carbon stock is lost in mineral soils (with initial carbon stocks calculated using a tier 1 method) and that

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
			EFs for organic soils in cropland (according to the Wetlands Supplement, table 2.1, p.2.12) are applied to organic soils in land converted to settlements. The Party also clarified that DOM in cropland and grassland is reported in the NFI for areas that are covered by trees but do not meet the criteria to be qualified as forest land. For land-use change to settlements, DOM is reported using the instant oxidation method; however, so far, no cropland and grassland have been converted to settlements and no carbon losses in DOM have been reported. The ERT considers that the recommendation has not yet been fully addressed because the Party reported DOM as "NO". The ERT notes that according to the 2006 IPCC Guidelines (vol. 4, chap. 8, p.8.3.2.1) the tier 1 default assumes all carbon contained in deadwood and litter is lost during conversion. The ERT also notes that DOM must be present in cropland at the point of conversion because the Party reported emissions for land-use change from cropland to settlements, and that these emissions could provide a basis for estimating CSC in DOM for cropland converted to settlements.
L.10	4(V) Biomass burning – CO_2, CH_4 and N_2O (L.13, 2020) (L.17, 2018) Transparency	Include information in the NIR justifying the basis for the reported ratios of harvesting residues affected by burning.	Resolved. The Party transparently reported in its NIR (section 6.10.2.3, pp.415–416) the basis for the reported ratios of harvesting residues affected by burning.
Waste			
W.1	5.A Solid waste disposal on land – CH_4 (W.1, 2020) (W.1, 2018) (W.9, 2016) (W.9, 2015) Transparency	Provide justification in the NIR and the CRF tables for reporting that there is no significant underestimation of emissions resulting from Latvia's use of solid waste disposal data from 1970, using as a proxy for this significance determination the values contained in decision 24/CP.19, annex I, paragraph 37(b).	Resolved. The Party reported in its NIR (section 7.2.1, p.431) that, according to a national study, landfills are assumed to be unmanaged for 1950–2001. The ERT concludes that this confirms that there is no underestimation of emissions resulting from Latvia's use of solid waste disposal data for 1970 onward.
W.2	5.A Solid waste disposal on land – CH_4 (W.7, 2020) Transparency	Correct the reporting errors related to the MCF values in CRF table 5.A for 1990–2001, 2011 and 2012, use an appropriate notation key for 2013 onward, document and justify in the NIR the MCFs used since 1990 and enhance QC procedures to ensure consistency of information reported in the NIR and the CRF tables.	Not resolved. The Party reported in its NIR (pp.431–432, tables 7.5 and 7.6) that it used an MCF of 0.4 for the disposal of waste in rural areas and 0.8 in urban areas for 1950–2001; and an MCF of 0.8 for waste disposed of in deep managed sites in urban areas and 0.4 for waste disposed of on shallow unmanaged sites in rural areas for 2002–2020. The ERT noted from CRF table 5.A that the average MCF for unmanaged landfills is 0.64 for the whole time series and depends on the average weight of the waste disposed of in urban and rural areas. In response to the recommendation of the previous ERT that Latvia estimate the average MCF for unmanaged landfills using the data from NIR tables 7.5 and 7.6, the Party concluded that the weighted average MCF for all unmanaged waste disposal sites was 0.524 for 1990–2001, 0.676 for 2002–2010 and 0.6 for 2011 and 2012, and used the notation key "NO" for 2013 onward as no waste was disposed of in unmanaged landfills for those years. During the review, Latvia clarified that the MCF in CRF table 5.A (0.64) is not used to estimate emissions from unmanaged landfills for 1990–2012 and provided the ERT with an estimation of

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			the weighted average MCF for 1950–1974. The ERT agrees with the estimated average MCF for unmanaged landfills. Latvia noted during the review that, for the next submission, the average MCF will be reported as 0.676 for 1990–2010 and 0.6 for 2011 and 2012. The ERT considers that Latvia has not yet implemented the recommendation to estimate the average MCF for unmanaged landfills or changed the MCF in CRF table 5.A in line with the estimated average MCF.
W.3	5.A Solid waste disposal on land – CH_4 (W.8, 2020) Accuracy	Collect representative data that take into account changes in waste composition and DOC values caused by developments in waste management practices, in particular for all years since 2002, revise the CH_4 emission estimates for this category accordingly as part of the planned improvements for the next annual submission and document in the NIR the updated information used on waste composition and DOC values.	Resolved. The ERT noted that the Party has used the same data for 2002 onward to report on waste composition (NIR table 7.7, p.433). Moreover, the Party did not change the DOC values, whereas the ERT noted that waste composition can change over time in relation to the DOC values. During the review, the Party clarified that data on the composition of waste are not collected as part of annual reporting and therefore it must use the same waste composition data for all years in the time series from 2002, when managed sites started to operate in Latvia. The Party noted that it plans to improve the verification of waste composition in its CH_4 emission calculations. The ERT noted that the trend in waste composition in neighbouring countries suggests that the waste composition reported in NIR table 7.7 would not lead to an underestimate and therefore the issue is considered resolved.
W.4	5.A Solid waste disposal on land – CH_4 (W.9, 2020) Transparency	Obtain detailed information (e.g. through consultations with landfill operators) on how CH_4 recovery data are measured or calculated, and reported by landfill operators under national legislation, and document in the NIR how CH_4 recovery data are verified and applied to the estimates in the national inventory, in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 3, pp.3.18–3.19), specifying all underlying assumptions used in the estimates and the choice of uncertainty values applied.	Addressing. The Party reported in its NIR (p.434) that information on CH_4 recovery is received directly from waste disposal site operators, which provide regular reports about waste management facilities in accordance with national legislation. The Party also reported in the NIR (p.434) that CH_4 recovery is estimated on the basis of the amount of electricity generated from CH_4 recovery, and that all assumptions used in the estimation of CH_4 recovery are in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 3, p.3.19). However, the ERT identified no information on the assumptions used in the estimates or on the choice of uncertainty values applied. The ERT therefore considers that the recommendation has not been fully implemented.
W.5	5.A Solid waste disposal on land – CH_4 (W.10, 2020) Transparency	(a) Investigate the occurrence of co-firing of MSW in stationary combustion activities for 1970–2001 and report in the NIR how the Party avoided the potential double counting of CH_4 emissions from waste disposed of at SWDS during this period, when it used population as a driver for estimating the amount of MSW disposed of; (b) Document in the NIR the assumptions used to account for the portion of MSW sent for	Resolved. (a) The Party reported in the NIR (section 10, p.499) that it carried out the investigation with sectoral experts and concluded that co-firing of MSW did not occur in stationary combustion activities for 1970–2001 and, therefore, there can be no double counting of CH_4 emissions from waste disposed of at SWDS for 1970–2001; (b) The assumptions used to account for the portion of MSW sent for combustion in cement production plants and any other stationary combustion activities were not documented in the NIR. However, during the review, the Party explained that, as the co-firing of MSW in stationary combustion did not occur, no assumptions were used to account for the portion of MSW sent for combustion in cement production plants.

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		combustion in cement production plants and any other stationary combustion activities.	
W.6	5.A.2 Unmanaged waste disposal sites – CH_4 (W.3, 2020) (W.7, 2018) Transparency	Correct the description in the NIR of the default oxidation factor of 0.09 (removing "default") and provide information on how the oxidation factor of 0.09 is calculated using assumptions and relevant information, including national research.	Not resolved. Latvia did not remove the word "default" from the NIR (p.436) or provide information on the use of assumptions in calculating the oxidation factor of 0.09. During the review, the Party clarified that the oxidation factor of 0.09 is used on the assumption that almost all old unmanaged SWDS in Latvia are covered by a soil layer, and that it applied the default oxidation factor of 0.1. On the basis of national research, it is assumed that 10 per cent of old unmanaged SWDS are not covered by soil. To account for this in emission calculations, the oxidation factor is as adjusted to 0.09 (reduced by 10 per cent). The Party also clarified that the word "default" was left in the NIR by mistake and will be removed from the next submission.
W.7	5.C.1 Waste incineration – CH_4 (W.4, 2020) (W.8, 2018) Transparency	Estimate the CH_4 emissions using the CH_4 EF for fuel combustion in accordance with the 2006 IPCC Guidelines.	Addressing. The Party reported in its NIR (p.445 and table 7.19) that in CRF table 5.C CH_4 emissions from incineration are reported as "NE". However, the ERT noted that in CRF table 5.C the notation keys "NO" and "NA" are used. During the review, the Party clarified that a rough estimation of CH_4 emissions from waste incineration is provided in the NIR (section 7.4.1.2), and that "NE" is reported for CH_4 emissions because these emissions are below the threshold of significance. The ERT agrees with the Party's assessment of significance but notes that the proper reporting in CRF table 5.C should be "NE" to ensure consistency with the NIR and in accordance with paragraph 37(b) of the annex to decision 24/CP.19.
W.8	5.C.2 Open burning of waste – CO_2, CH_4 and N_2O (W.5, 2020) (W.9, 2018) Completeness	Investigate the possibility of applying AD from the Convention on Long-Range Transboundary Air Pollution inventory to estimate GHG emissions from accidental fires for the GHG inventory, or report "NE" with the justification that the emissions from open burning of waste are below the threshold defined in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party reported in its NIR (section 7.4.2, p.448) that open burning of waste is not permitted in Latvia under waste management law, and provided an estimate of 0.864 kt CO_2 eq for GHG emissions from accidental fires, which is below the threshold defined in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. The Party reported "NE" for these emissions in CRF table 5.C.
KP-LULUCF			
KL.1	AR – CO_2 (KL.4, 2020) (KL.2, 2018) (KL.3, 2016) (KL.3, 2015) (100, 2014) Transparency	Provide figures in the NIR that demonstrate no statistically significant difference in the carbon stock in mineral soils for historical grassland and afforested land.	Not resolved. Latvia did not report figures in its NIR to demonstrate that there is no statistically significant difference in the carbon stock in mineral soils for historical grassland and afforested land. During the review, Latvia stated that the insignificance of the difference in mineral soil carbon stocks in grassland and afforested land is confirmed by the results of scientific studies such as Kukuļs et al. (2015), Lazdins et al. (2015) and Bardule et al. (2017). While acknowledging the Party's response, the ERT considers that the recommendation has not yet been addressed because the Party has not yet reported the figures in the NIR to demonstrate that there is no statistically significant difference in the carbon stocks in mineral soils in historical grassland and

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			afforested land. However, the ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.
KL.2	FM – CO_2 (KL.7, 2020) (KL.4, 2018) (KL.8, 2016) (KL.8, 2015) (108, 2014) (125, 2013) Comparability	Estimate the carbon losses due to harvesting that took place on AR areas and on FM areas separately and report this transparently in the NIR.	Resolved. The Party reported in its NIR (pp.61 and 512) that no harvesting takes place on afforested lands and that, therefore, there are no emissions from harvesting to report in this category. The ERT noted that the Party reports conflicting information on harvesting activities occurring and not occurring on AR lands (pp. 61 and 512), including that when harvesting takes place on afforested lands it is included in the CSC reported for FM activities. During the review, the Party provided further conflicting information, including that harvesting occurs on AR lands and that carbon loss due to harvesting is deducted from carbon gains in living biomass (above- and below-ground) by assuming instant oxidation. In response to a request for clarification on whether or not harvesting occurs on AR areas, the Party confirmed that forest stands on areas accounted under AR have not yet reached harvest thresholds. The ERT understands that all references to "harvesting" on AR lands in this context refer to pre-harvest FM activities being conducted in these areas, such as thinning and salvage logging to maintain target species composition. Since the Party confirmed that no harvesting has taken place on AR areas, the ERT considers that the NIR (which reports that harvest emissions from AR areas are included in the estimates of CSC on FM lands) is misleading, but notes that this issue does not lead to an underestimation of emissions or overestimation of removals for FM.
KL.3	FM – CO_2 (KL.8, 2020) (KL.5, 2018) (KL.11, 2016) (KL.11, 2015) Transparency	Transparently describe both qualitatively and quantitatively in the NIR the recalculation of forest land estimates in conjunction with technical corrections to the FMRL.	Addressing. The Party did not fully describe qualitatively and quantitatively in the NIR the recalculations it performed for the FM estimates in conjunction with technical corrections to the FMRL. The Party provided in the NIR (pp.525–530) the main reasons for the technical corrections, including both qualitative and quantitative descriptions, but these descriptions were not complete and the ERT was unable to reconcile the quantitative information provided with the sum of technical corrections reported for the FMRL technical correction. During the review, the Party provided data and information, including a table showing elements of the FMRL that were technically corrected. Although the FMRL reported in the NIR was not the final FMRL (the reported figure of –16,115 kt is from Latvia's original submission but was adjusted following the 2011 technical assessment to –16,302 kt), the elements of the corrections were provided to the ERT. The ERT considers that the recommendation has not yet been fully addressed because not all the components of the technical correction were provided in NIR table 11.10 (p.526); however, the ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised.

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
KL.4	FM – CO_2 (KL.9, 2020) (KL.7, 2018) (KL.13, 2016) (KL.13, 2015) Accuracy	More accurately estimate emissions and removals from forest land and FM by including, and where necessary revising, soil and litter estimates, on the basis of the ongoing monitoring of NFI plots.	Resolved. The Party provided in its NIR (section 11.3.1.2, p.513) evidence that the mineral soil pool is not a net source of emissions in forest land and FM, as well as litter estimates in FM. During the review, the Party clarified that estimated emissions and removals from forest land and FM activities are in line with most recent AD provided in the NFI. Forest land soil and litter CSC estimates are based on up-to-date soil properties (carbon stock in litter and mineral soil) determined in permanent 16 x 16 km grids of 95 sample plots of the first-level forest monitoring programme. The results of forest soil monitoring demonstrating that mineral soils in forest lands are not a net source of emissions are corroborated by the results of studies using Yasso model.

[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 Latvia 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, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2022 annual submission of Latvia, and had not been addressed by the Party by the time of publication of this review report.

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

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
General	No issues identified.	
Energy		
E.5	Provide information on the difference in the CO_2 EF for landfill gas and sludge gas between the IPCC default value and the value used by Latvia, or use the default CO_2 EF for these gases.	3 (2018–2022)
E.8	Aggregate detailed individual data and present them in the NIR so as to highlight the information that is important for the transparency of the inventory without disclosing individual data that would compromise confidentiality.	4 (2015/2016–2022)
E.9	Describe methods and data used in the NIR, including more detailed background information, such as on the length of the pipeline and the materials used for the distribution network, on the pressure conditions of the different parts of the network, on flow rates and on annual reconstruction rates to explain the improvements made to the network.	6 (2013–2022)

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
IPPU		
I.2	Update the text in the NIR to reflect the revised EF calculation and AD for CO_2 emissions from lime production.	4 (2015/2016–2022)
I.3	Provide an estimation of HFC emissions related to the management of refrigerant containers.	3 (2018–2022)
Agriculture	No issues identified.	
LULUCF		
L.2	Implement the model in a consistent manner for the mineral soils pool for the forest land, cropland and grassland categories, paying particular attention to the balanced estimation of CSC during conversion.	3 (2018–2022)
L.5	Continue the methodological work for estimating CSC in living biomass, deadwood and litter for cropland converted to forest land, wetlands converted to forest land and settlements converted to forest land as well as in mineral soils (cropland converted to forest land and settlements converted to forest land) and organic soils (wetlands converted to forest land), and report the estimates in the annual submission.	4 (2015/2016–2022)
L.7	Use the country-specific factors for the GHG inventory to estimate CSC in the living biomass pool for this category as soon as they are available and provide detailed information on this in the NIR.	3 (2018–2022)
L.8	Continue the methodological work for estimating CSC in living biomass, deadwood and litter for forest land converted to grassland, wetlands converted to grassland and settlements converted to grassland as well as in mineral soils (forest land converted to grassland and settlements converted to grassland) and organic soils (wetlands converted to grassland), and report the estimates in the annual submission.	4 (2015/2016–2022)
L.9	Continue the methodological work for estimating CSC in living biomass and DOM for cropland converted to settlements and grassland converted to settlements and report the estimates in the annual submission.	4 (2015/2016–2022)
Waste		
W.6	Correct the description in the NIR of the default oxidation factor of 0.09 (removing “default”) and provide information on how the oxidation factor of 0.09 is calculated using assumptions and relevant information, including national research.	3 (2018–2022)
W.7	Estimate the CH_4 emissions using the CH_4 EF for fuel combustion in accordance with the 2006 IPCC Guidelines.	3 (2018–2022)
KP-LULUCF		
KL.1	Provide figures in the NIR that demonstrate no statistically significant difference in the carbon stock in mineral soils for historical grassland and afforested land.	5 (2014–2022)
KL.3	Transparently describe both qualitatively and quantitatively in the NIR the recalculation of forest land estimates in conjunction with technical corrections to the FMRL.	4 (2015/2016–2022)

[a] Reports on the reviews of the 2017, 2019 and 2021 annual submissions of Latvia 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 Latvia that are additional to those identified in table 3.

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

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General		No general findings additional to those included in table 3 were made by the ERT during the review.	
Energy		No findings for the energy sector additional to those included in table 3 were made by the ERT during the review.	
IPPU			
I.5	2.F.1 Refrigeration and air conditioning – HFCs	The Party reported in its NIR (p.259) that AD for subcategory 2.F.1.d transport refrigeration for 2004–2020 were taken from national regulation 563 of the Cabinet of Ministers of Latvia (on restrictions and prohibitions relating to activities using ozone-depleting substances and fluorinated gases) or extrapolated; however, it did not specify for which years the data were obtained from the regulation and for which years the data were extrapolated, or why it used extrapolation for certain years. The ERT noted that this is not in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 1.4) because the Party did not provide sufficient and clear documentation to enable anybody other than the inventory compilers to understand how AD for subcategory 2.F.1.d were obtained for 2004–2020. During the review, the Party clarified that AD for 2010 onward were obtained from national regulation 563 because in 2010 companies began to report regularly on F-gases in accordance with this regulation. However, for 2004–2009, as the data collected from the companies were incomplete, the splicing technique described in the 2006 IPCC Guidelines (vol. 1, chap. 5.3.3) was used to extrapolate data for certain years to ensure time-series consistency. The ERT recommends that the Party report detailed information on how AD for subcategory 2.F.1.d transport refrigeration were obtained for each year of the period 2004–2020.	Yes. Transparency
Agriculture		No findings for the agriculture sector additional to those included in table 3 were made by the ERT during the review.	
LULUCF		No findings for the LULUCF sector additional to those included in table 3 were made by the ERT during the review.	
Waste			
W.9	5.A Solid waste disposal on land – CH_4	The Party reported in NIR table 7.9 (p.435) DOC values for waste streams in managed sites (2006 IPCC Guidelines, vol. 5, chap. 2, table 2.4, p.2.14) and identified that the DOC value used for waste composition was from the waste model (2006 IPCC Guidelines, vol. 5, chap. 3, p.3.7). The ERT notes that DOC of food waste is reported in NIR table 7.9 as 0.17, while the default value in the 2006 IPCC Guidelines is 0.15. The NIR (p.436) mentions that the DOC value of 0.17 used by the Party is based on national research carried out in 2011 and that other EFs are default values taken from the 2006 IPCC Guidelines (vol. 5, chap. 2, table 2.4, p.2.14). During the review, Latvia provided a table of waste modelling data showing that the DOC value of 0.17 is used for managed landfills.	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT recommends that the Party clarify the source of the DOC value for food waste in NIR table 7.9 and clearly explain in the NIR that the DOC value of 0.17 is based on national research.	
W.10	5.A.1 Managed waste disposal sites – CH_4	The Party reported in NIR table 7.6 (p.432) that since 2016 a certain amount of solid waste has been stored in a bioreactor. The ERT noted that since waste still has some organic content, storing it in a bioreactor may generate emissions. The IPCC waste model (2006 IPCC Guidelines, vol. 5, chap. 3, p.3.7) identifies the MCF according to the type of MSW disposal, including unmanaged shallow, unmanaged deep, managed, managed semi-aerobic and uncategorized, with no MCF for bioreactors. During the review, Latvia explained that waste stored in bioreactors is assumed to have been disposed of and is included in calculations as disposed of at managed sites. The MCF used to estimate emissions is 1.	Yes. Transparency
		The ERT considers that using an MCF of 1 for bioreactors is conservative and recommends that the Party explain in the NIR the use of this MCF for bioreactors.	
W.11	5.A Solid waste disposal on land – CH_4	The Party reported in the NIR (p.437) that emissions from solid waste disposal were recalculated following an update to waste composition for managed sites in the IPCC waste model (2006 IPCC Guidelines, vol. 5, chap. 3, p.3.7). However, in the NIR (p.433), it is mentioned that the Party has used the same waste composition for all years since 2002. During the review, Latvia confirmed that, as data on the composition of waste that has been disposed of are not collected as part of annual reporting, it must use the same waste composition for all years in the time series from 2002, when managed sites started operating in Latvia. Waste composition for managed sites was updated in the IPCC waste model to correct to a mistake identified for years before 2002.	Yes. Convention reporting adherence
		The ERT recommends that the Party correct the statement "The same waste composition for all years since 2002 was used" by adding information on waste composition for years before 2002 in future annual submissions.	
KP-LULUCF		No findings for KP-LULUCF additional to those included in table 3 were made by the ERT during the review.	

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

VI. Application of adjustments

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

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

VIII. Questions of implementation

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

Annex I

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

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

Table I.1
Total greenhouse gas emissions and removals for Latvia, base year–2020
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions and removals including indirect CO_2 emissions*[a]		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)*[b]	*KP-LULUCF (Article 3.3 of the Kyoto Protocol)*[c]	*KP-LULUCF (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR*	*FM*
FMRL								–16 302.00
Base year[d]	13 584.71	25 885.55	13 625.11	25 925.96	NA		NO, NA	
1990	13 567.40	25 868.25	13 607.81	25 908.66				
1995	–2 297.51	12 448.48	–2 265.48	12 480.51				
2000	–1 694.41	10 059.78	–1 669.63	10 084.56				
2010	9 922.42	11 801.93	9 938.69	11 818.20				
2011	8 726.50	11 010.68	8 737.42	11 021.60				
2012	7 183.91	10 830.48	7 196.52	10 843.10				
2013	8 364.47	10 742.25	8 379.97	10 757.75		886.60	NO, NA	–6 624.96
2014	12 104.26	10 647.80	12 124.84	10 668.38		626.12	NO, NA	–938.46
2015	10 892.85	10 703.36	10 909.89	10 720.39		642.02	NO, NA	–2 723.06
2016	9 044.26	10 693.31	9 062.02	10 711.08		658.10	NO, NA	–1 826.03
2017	7 631.09	10 733.28	7 650.22	10 752.40		670.56	NO, NA	–3 064.03
2018	10 658.15	11 235.04	10 669.95	11 246.84		686.74	NO, NA	–2 295.19
2019	8 697.75	11 103.63	8 710.42	11 116.30		845.47	NO, NA	–3 069.94
2020	11 093.20	10 446.63	11 106.30	10 459.72		857.42	NO, NA	–1 558.75

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

[a] The Party reported indirect CO_2 emissions in CRF table 6.

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

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

[d] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs, SF_6 and NF_3. Latvia 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 Latvia, excluding land use, land-use change and forestry, 1990–2020
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	19 701.81	3 623.78	2 583.07	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA
1995	9 165.82	2 179.95	1 117.44	17.13	NO, NA	NO, NA	0.17	NO, NA
2000	7 106.25	1 885.83	1 026.99	64.60	NO, NA	NO, NA	0.88	NO, NA
2010	8 570.36	1 805.89	1 220.54	214.05	NO, NA	NO, NA	7.35	NO, NA
2011	7 821.71	1 755.17	1 221.39	215.86	NO, NA	NO, NA	7.47	NO, NA
2012	7 532.02	1 798.84	1 288.45	216.01	NO, NA	NO, NA	7.78	NO, NA
2013	7 383.94	1 821.78	1 314.00	229.53	NO, NA	NO, NA	8.50	NO, NA
2014	7 192.54	1 868.48	1 355.13	243.65	NO, NA	NO, NA	8.58	NO, NA
2015	7 279.14	1 772.69	1 403.93	254.52	NO, NA	NO, NA	10.12	NO, NA
2016	7 228.09	1 795.90	1 402.18	275.02	NO, NA	NO, NA	9.89	NO, NA
2017	7 234.07	1 826.73	1 413.41	267.87	NO, NA	NO, NA	10.32	NO, NA
2018	7 871.17	1 742.30	1 359.75	263.09	NO, NA	NO, NA	10.54	NO, NA
2019	7 661.35	1 743.03	1 443.00	255.11	NO, NA	NO, NA	13.82	NO, NA
2020	7 007.21	1 718.06	1 473.61	248.91	NO, NA	NO, NA	11.94	NO, NA
Percentage change 1990–2020	**–64.4**	**–52.6**	**–43.0**	**NA**	**NA**	**NA**	**NA**	**NA**

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

[a] Including indirect CO_2 emissions as reported in CRF table 6.

Table I.3
Greenhouse gas emissions and removals by sector for Latvia, 1990–2020
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	19 534.79	655.98	4 985.80	–12 300.85	732.09	NO
1995	9 610.62	227.13	2 004.23	–14 745.99	638.53	NO
2000	7 422.63	286.55	1 678.46	–11 754.19	696.91	NO
2010	8 524.27	749.44	1 878.76	–1 879.51	665.73	NO
2011	7 649.36	846.92	1 890.81	–2 284.18	634.51	NO
2012	7 334.71	905.11	1 974.19	–3 646.58	629.07	NO
2013	7 259.62	848.75	2 032.98	–2 377.78	616.41	NO

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
2014	7 087.40	863.37	2 109.78	1 456.45	607.84	NO
2015	7 195.09	791.23	2 158.16	189.49	575.91	NO
2016	7 267.57	690.99	2 166.93	–1 649.05	585.60	NO
2017	7 253.59	768.38	2 179.77	–3 102.18	550.66	NO
2018	7 698.77	893.97	2 096.21	–576.89	557.90	NO
2019	7 470.85	891.77	2 201.39	–2 405.88	552.29	NO
2020	6 793.45	868.15	2 250.88	646.57	547.25	NO
Percentage change 1990–2020	**–65.2**	**32.3**	**–54.9**	**–105.3**	**–25.2**	**NA**

Note: Totals include indirect CO_2 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 Latvia

(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[a]	*Activities under Article 3.3 of the Kyoto Protocol*		*FM and elected activities under Article 3.4 of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				–16 302.00				
Technical correction				14 829.11				
Base year[b]	NA				NA	NA	NO, NA	NA
2013		–179.80	1 066.40	–6 624.96	NA	NA	NO, NA	NA
2014		–194.12	820.24	–938.46	NA	NA	NO, NA	NA
2015		–208.55	850.57	–2 723.06	NA	NA	NO, NA	NA
2016		–222.75	880.85	–1 826.03	NA	NA	NO, NA	NA
2017		–240.68	911.24	–3 064.03	NA	NA	NO, NA	NA
2018		–254.55	941.29	–2 295.19	NA	NA	NO, NA	NA
2019		–273.17	1 118.63	–3 069.94	NA	NA	NO, NA	NA
2020		–293.25	1 150.67	–1 558.75	NA	NA	NO, NA	NA
Percentage change base year–2020					**NA**	**NA**	**NA**	**NA**

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

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

[b] Latvia 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 Latvia

(kt CO_2 eq)

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]		
A.1. AR		–179.798	–194.118	–208.554	–222.749	–240.683	–254.551	–273.166	–293.251	–1 866.871		–1 866.871
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		1 066.403	820.236	850.570	880.854	911.245	941.293	1 118.634	1 150.670	7 739.905		7 739.905
B.1. FM										–22 100.418		–10 317.298
Net emissions/ removals		–6 624.957	–938.461	–2 723.056	–1 826.028	–3 064.033	–2 295.193	–3 069.940	–1 558.750	–22 100.418		
Excluded emissions from natural disturbances[e]		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 established forest		NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
FMRL[e]											–16 302.000	

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]		
Technical corrections to FMRL											14 829.110	
FM cap											7 394.541	–7 394.541
B.2. CM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.3. GM (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA
B.4. RV (if elected)	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA		NA
B.5. WDR (if elected)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA

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

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

Table I.6
Key data for Latvia under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2022 annual submission

Parameter	*Data*
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	No
3.5% of total base-year GHG emissions, excluding LULUCF and including indirect CO_2 emissions	924.317 kt CO_2 eq (7 394.541 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 1 866 871 RMUs
2. Deforestation	Cancel 7 739 905 units
3. FM	Issue 10 317 298 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.

Annex II

Information to be included in the compilation and accounting database

Tables II.1–II.8 include the information to be included in the compilation and accounting database for Latvia. 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 Latvia
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
CPR	**68 970 096**	–	–	**68 970 096**
Annex A emissions				
CO_2	7 007 212	–	–	7 007 212
CH_4	1 718 059	–	–	1 718 059
N_2O	1 473 606	–	–	1 473 606
HFCs	248 911	–	–	248 911
PFCs	NO, NA	–	–	NO, NA
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	11 937	–	–	11 937
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**10 459 725**	–	–	**10 459 725**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–293 251	–	–	–293 251
Deforestation	1 150 670	–	–	1 150 670
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–1 558 750	–	–	–1 558 750

[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 Latvia
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	7 661 347	–	–	7 661 347
CH_4	1 743 027	–	–	1 743 027
N_2O	1 442 995	–	–	1 442 995
HFCs	255 109	–	–	255 109
PFCs	NO, NA	–	–	NO, NA
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	13 821	–	–	13 821
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**11 116 301**	–	–	**11 116 301**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–273 166	–	–	–273 166
Deforestation	1 118 634	–	–	1 118 634
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				

	Original submission	*Revised submission*	*Adjustment*	*Final value*
FM	–3 069 940	–	–	–3 069 940

[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 Latvia
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	7 871 166	–	–	7 871 166
CH_4	1 742 296	–	–	1 742 296
N_2O	1 359 748	–	–	1 359 748
HFCs	263 090	–	–	263 090
PFCs	NO, NA	–	–	NO, NA
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	10 543	–	–	10 543
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**11 246 844**	–	–	**11 246 844**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–254 551	–	–	–254 551
Deforestation	941 293	–	–	941 293
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–2 295 193	–	–	–2 295 193

[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 Latvia
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	7 234 072	–	–	7 234 072
CH_4	1 826 733	–	–	1 826 733
N_2O	1 413 405	–	–	1 413 405
HFCs	267 872	–	–	267 872
PFCs	NO, NA	–	–	NO, NA
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	10 321	–	–	10 321
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**10 752 404**	–	–	**10 752 404**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–240 683	–	–	–240 683
Deforestation	911 245	–	–	911 245
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–3 064 033	–	–	–3 064 033

[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 Latvia
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				

	Original submission	*Revised submission*	*Adjustment*	*Final value*
CO_2	7 228 090	–	–	7 228 090
CH_4	1 795 901	–	–	1 795 901
N_2O	1 402 177	–	–	1 402 177
HFCs	275 017	–	–	275 017
PFCs	NO, NA	–	–	NO, NA
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	9 891	–	–	9 891
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**10 711 077**	–	–	**10 711 077**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–222 749	–	–	–222 749
Deforestation	880 854	–	–	880 854
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–1 826 028	–	–	–1 826 028

[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 Latvia
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	7 279 136	–	–	7 279 136
CH_4	1 772 689	–	–	1 772 689
N_2O	1 403 931	–	–	1 403 931
HFCs	254 520	–	–	254 520
PFCs	NO, NA	–	–	NO, NA
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	10 118	–	–	10 118
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**10 720 395**	–	–	**10 720 395**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–208 554	–	–	–208 554
Deforestation	850 570	–	–	850 570
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–2 723 056	–	–	–2 723 056

[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 Latvia
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	7 192 541	–	–	7 192 541
CH_4	1 868 478	–	–	1 868 478
N_2O	1 355 133	–	–	1 355 133
HFCs	243 655	–	–	243 655
PFCs	NO, NA	–	–	NO, NA
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	8 578	–	–	8 578
NF_3	NO, NA	–	–	NO, NA

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Total Annex A sources[a]	**10 668 385**	–	–	**10 668 385**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–194 118	–	–	–194 118
Deforestation	820 236	–	–	820 236
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–938 461	–	–	–938 461

[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 Latvia
(t CO_2 eq)

	Original submission	*Revised submission*	*Adjustment*	*Final value*
Annex A emissions				
CO_2	7 383 936	–	–	7 383 936
CH_4	1 821 782	–	–	1 821 782
N_2O	1 314 002	–	–	1 314 002
HFCs	229 528	–	–	229 528
PFCs	NO, NA	–	–	NO, NA
Unspecified mix of HFCs and PFCs	NO, NA	–	–	NO, NA
SF_6	8 503	–	–	8 503
NF_3	NO, NA	–	–	NO, NA
Total Annex A sources[a]	**10 757 752**	–	–	**10 757 752**
Activities under Article 3, paragraph 3, of the Kyoto Protocol				
AR	–179 798	–	–	–179 798
Deforestation	1 066 403	–	–	1 066 403
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol				
FM	–6 624 957	–	–	–6 624 957

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

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which estimation methods are included in the 2006 IPCC Guidelines that were reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of the reporting in the Party's inventory are the following:

(a) 2.F.1 refrigeration and air conditioning (HFCs) (see ID# I.3 in table 3);

(b) 4.A.2 land converted to forest land (CO_2) (see ID# L.5 in table 3);

(c) 4.C.2 land converted to grassland (CO_2) (see ID# L.8 in table 3);

(d) 4.E.2 land converted to settlements (CO_2) (see ID# L.9 in table 3).

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/.

B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2013, 2014, 2015, 2016, 2018 and 2020 annual submissions of Latvia, contained in documents FCCC/ARR/2013/LVA, FCCC/ARR/2014/LVA, FCCC/ARR/2015/LVA, FCCC/ARR/2016/LVA, FCCC/ARR/2018/LVA and FCCC/ARR/2020/LVA 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 Latvia for 2022. Available at https://unfccc.int/sites/default/files/resource/asr2022_LVA.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Agita Gancone (Ministry of Environmental Protection and Regional Development of Latvia), 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:

Bardule A., Lupikis A., Butlers A., Lazdins A., 2017. *Organic carbon stock in different types of mineral soils in cropland and grassland in Latvia.* Zemdirbyste-Agriculture, 104(1), 3–8, DOI: 10.13080/z-a.2017.104.001.

Frolova O., Degola L., Bērziņa L., 2019. *The Pig Feeding and Nitrogen Associated Gaseous Emissions in Latvia*. Available at http://www2.llu.lv/research_conf/proceedings2019_vol_1/docs/LatviaResRuralDev_25th_2019_vol1-188-194.pdf.

Institute of Physical Energetics, 2004. *Evaluation of fuel consumption for domestic aviation and navigation*.

Kaasik A., Leming R., Remmel T., 2002. *Toitainete (N, P, K) kadu veise- ja seakasvatuses.* Agraarteadus, XIII (4), 201−211. Available at https://www.etis.ee/Portal/Publications/Display/a53198b6-11fa-401a-ad3c-8d100d5de801.

Kārkliņš A., Līpenīte I., 2018. *Aprēķinu metodes un normatīvi augsnes iekultivēšanai un mēslošanas līdzekļu lietošanai*. Jelgava: LLU. 200 lpp. / *Calculation methods and standards for soil cultivation and fertilizer use*. Jelgava: LLU. 200 pages.

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