United Nations

FCCC/ARR/2018/LVA

Framework Convention on Climate Change

Distr.: General
3 April 2019

English only

Report on the individual review of the annual submission of Latvia submitted in 2018*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual greenhouse gas inventory covering emissions and removals of greenhouse gas emissions 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 inventory review of the 2018 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 17 to 22 September 2018 in Bonn.

* In the symbol for this document, 2018 refers to the year in which the inventory was submitted, not to the year of publication.

GE.19-05592(E)

1905592

Contents

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
Annex A sources	source categories 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"
B_o	maximum methane-producing capacity
C	carbon
CER	certified emission reduction
CH_4	methane
CLRTAP	Convention on Long-range Transboundary Air Pollution
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
EF	emission factor
EMEP/EEA	European Monitoring and Evaluation Programme/European Environment Agency
ERT	expert review team
ERU	emission reduction unit
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
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
$Frac_{leachMS}$	value of the percentage of managed manure nitrogen losses due to run-off and leaching
$Frac_{Remove}$	fraction of above-ground residues of crop removed annually for purposes such as feed, bedding and construction
GHG	greenhouse gas
GM	grazing land management
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP-LULUCF activities	activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
Kyoto Protocol Supplement	*2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
N	nitrogen
NA	not applicable
NCV	net calorific value
NE	not estimated

NFI	national forest inventory
NH_3	ammonia
NIR	national inventory report
NO	not occurring
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
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 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories: Wetlands*

I. Introduction[1]

1. This report covers the review of the 2018 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" (decision 13/CP.20). The review took place from 17 to 22 September 2018 in Bonn and was coordinated by Mr. Tomoyuki Aizawa and Mr. Simon Wear (secretariat). Table 1 provides information on the composition of the ERT that conducted the review of Latvia.

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

Area of expertise	*Name*	*Party*
Generalist	Mr. Mikhail Gytarskiy	Russian Federation
	Ms. Agnieszka Patoka-Janowska	Poland
Energy	Mr. Alexey Cherednichenko	Kazakhstan
	Mr. Pedro Faria	United Kingdom of Great Britain and Northern Ireland
	Mr. Peter Seizov	Bulgaria
IPPU	Ms. Elsa Hatanaka	Japan
	Ms. Qing Tong	China
Agriculture	Ms. Hongmin Dong	China
	Mr. Chang Liang	Canada
LULUCF	Ms. Oksana Butrym	Ukraine
	Mr. Markus Didion	Switzerland
	Mr. Igor Onopchuk	Ukraine
Waste	Mr. Philip Acquah	Ghana
	Mr. Pavel Gavrilita	Republic of Moldova
	Mr. Julius Madzore	Zimbabwe
Lead reviewers	Mr. Acquah	
	Mr. Gytarskiy	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2018 annual submission, in accordance with the Article 8 review guidelines. The ERT notes that the individual inventory review of Latvia's 2017 annual submission did not take place during 2017 owing to insufficient funding for the review process.

[1] At the time of publication of this report, the Party had submitted its instrument of ratification of the Doha Amendment; however, the Amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the Amendment.

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

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

5. Annex I shows annual GHG emissions for Latvia, including totals excluding and including the LULUCF sector, indirect CO_2 emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from KP-LULUCF activities, if elected, by gas, sector and activity for Latvia.

6. Information to be included in the compilation and accounting database can be found in annex II.

II. Summary and general assessment of the 2018 annual submission

7. Table 2 provides the assessment by the ERT of the 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 inventory of Latvia

Assessment			*Issue or problem ID#(s) in table 3 and/or 5*[a]
Dates of submission	Original submission: 13 April 2018 (NIR), 13 April 2018, Version 2 (CRF tables), 15 April 2018 (SEF-CP2-2017 tables) Revised submissions: 10 May 2018, Version 3 (CRF tables), 10 May 2018 (SEF-CP2-2017 tables) Unless otherwise specified, the values from the latest submission are used in this report		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	1. Have any issues been identified in the following areas:		
	(a) Identification of key categories	Yes	G.5
	(b) Selection and use of methodologies and assumptions	Yes	E.6, I.12, KL.7
	(c) Development and selection of EFs	Yes	E.16, E.18, A.5, L.12
	(d) Collection and selection of AD	Yes	E.12
	(e) Reporting of recalculations	No	
	(f) Reporting of a consistent time series	Yes	E.18, I.1, I.8, KL.5
	(g) Reporting of uncertainties, including methodologies	Yes	G.7, E.1
	(h) QA/QC	QA/QC procedures were assessed in the context of the national system	

[2] Issues are defined in decision 13/CP.20, annex, paragraph 81.
[3] Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

Assessment			*Issue or problem ID#(s) in table 3 and/or 5[a]*
		(see para. 2 in this table)	
	(i) Missing categories/completeness[b]	Yes	A.14, L.7, L.10, L.16, W.8, W.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.1, W.9
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.10
Supplementary information under the Kyoto Protocol	2. Have any issues been identified related to the national system:		
	(a) The overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements	No	
	(b) Performance of the national system functions	No	
	3. Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry	Yes	G.4
	(b) Performance of the functions of the national registry and the technical standards for data exchange	No	
	4. Have any issues been identified related to reporting of information on ERUs, CERs, AAUs and RMUs and on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the standard independent assessment report?	No	
	5. 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 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	
	6. Have any issues been identified related to the reporting of LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as follows:		
	(a) Reporting requirements in 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.5
	(c) Reporting requirements of decision 6/CMP.9	Yes	KL.11

Assessment			*Issue or problem ID#(s) in table 3 and/or 5[a]*
	(d) Country-specific information to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34	NA	
CPR	Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Did the Party submit a revised estimate to replace a previously applied adjustment?	NA	The Party 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 the assessment of 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 questions of implementation?	No	

[a] The ERT identified additional issues and/or problems in all sectors that are not listed in this table but are included in table 3 and/or 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 issues and/or problems raised in the previous review report

8. Table 3 compiles all the recommendations made in previous review reports that were included in the previous review report, published on 7 March 2017.[4] For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2018 annual submission and provided the rationale for its determination, which takes into consideration the publication date of the previous review report and national circumstances.

Table 3
Status of implementation of issues and/or problems raised in the previous review report of Latvia

ID#	*Issue and/or problem classification[a, b]*	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	QA/QC and verification (G.4, 2016) (G.4, 2015) (14, 2014)	Allocate sufficient resources for the implementation of the QA/QC plan, especially with regard to the QC activities	Resolved. The ERT noted that QA/QC processes are in place and have advanced since the 2016 annual submission (developments described in the 2018

[4] FCCC/ARR/2016/LVA. The ERT notes that the individual inventory review of Latvia's 2017 annual submission did not take place during 2017. As a result, the latest previously published review report reflects the findings of the review of the Party's 2016 annual submission.

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(table 3, 2013) Adherence to the UNFCCC Annex I inventory reporting guidelines	performed by the inventory compilers preparing the NIR and the CRF tables.	NIR (pp.48−55)). The QA/QC manager is assigned to check completeness. The ERT did not identify problems with the completeness of the NIR tables or a lack of explanations regarding the use of notation keys.
G.2	QA/QC and verification (G.11, 2016) (G.4, 2011) Transparency	Strengthen QA/QC procedures by ensuring the completeness of all elements included in the appendix to annex I to decision 24/CP.19 (table 10.8 in chapter 10 of the NIR was missing).	Resolved. No incompleteness issues were identified regarding table 10.8 in chapter 10. Latvia has strengthened QA/QC procedures and, among other activities, assigned to the QA/QC manager the tasks of checking the completeness of elements included in the appendix to annex I to decision 24/CP.19.
G.3	QA/QC and verification (G.12, 2016) (G.12, 2015) Transparency	Include a specific QC procedure in the QA/QC plan for monitoring the use of notation keys and ensure that the use of the notation key "IE" is explained transparently in the NIR and CRF table 9.	Resolved. According to the 2018 NIR (pp.50–51), Latvia has included such a specific QC procedure in the QA/QC plan.
G.4	National registry (G.13, 2016) (G.13, 2015) Comparability	Establish a previous period surplus reserve account as soon as technically possible.	Addressing. The Party informed the ERT during the review that a previous period surplus reserve account had been established and that information in this regard will be provided to the secretariat.
Energy			
E.1	1. General (energy sector) (E.10, 2016) (E.10, 2015) Transparency	Provide a reference to documented expert judgment from data providers and transparently explain in the NIR why, although the source of AD remained the same, the AD uncertainty was significantly decreased from 50 to 2 per cent in response to the consultation process with data providers.	Addressing. The Party reflected in the NIR that the uncertainty analysis was carried out using approach 1, and provided information on this in the NIR (chapter 1.6 and annex 2). However, the NIR does not provide information that supports the uncertainty of the AD for the residential sector being 2 per cent.
E.2	Comparison with international data (E.3, 2016) (E.3, 2015) (34, 2014) (33, 2013) Accuracy	Use data from both Eurostat and the International Energy Agency to conduct QC of the CRF tables, and provide a clear explanation for any differences.	Addressing. The Party provided in the NIR information about its collection of initial data, including from both Eurostat and the International Energy Agency. The previous ERT had asked the Party to provide a clear explanation for any differences between national data and International Energy Agency data in the NIR, but the current ERT noted that this information was still not provided in the 2018 NIR.
E.3	1.A. Fuel combustion – sectoral approach – CO_2 (E.5, 2016) (E.5, 2015) (37, 2014) Accuracy	Update more regularly the analysis of the NCVs for the fuels used.	Resolved. The Party regularly conducts analyses, and updated the NCVs for the fuels used and presented information on progress in the NIR (pp.109–115).
E.4	Fuel combustion – reference approach – liquid fuels – CO_2 (E.11, 2016) (E.11, 2015)	Investigate the reasons for the difference in diesel oil statistics from the Central Statistical Bureau of Latvia and consumption data and provide a	Resolved. Latvia analysed the differences between the reference approach and the sectoral approach for each fuel type and reported the results in the NIR (chapter 3.2.1 and annex A3.3). Differences after 1998 are generally explained in the NIR. The NIR

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	Transparency	transparent explanation as to why real consumption of diesel fuel in the country is higher than apparent consumption.	states that there are statistical differences for diesel oil in the energy balance that are not taken into account when calculating the reference approach. Latvia assumes that the statistical differences are caused by illegal imports of fuel.
E.5	Fuel combustion – reference approach – other fossil fuels – CO_2 (E.12, 2016) (E.12, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Ensure that CO_2 emissions from biomass combustion are not included in the estimate of total GHG emissions using the sectoral approach, and correct the reference approach calculation for CO_2 emissions from other fuels.	Addressing. The NIR (p.108) states that biomass use is considered to be CO_2 neutral, so emissions from biomass combustion are not included in the CO_2 balance. The ERT noted that the recalculated differences in the CO_2 emissions from other fossil fuels had decreased to a less significant extent (from –0.04 to 0.20 per cent) compared with the previous submission (from –54.48 to 0.05 per cent). However, the ERT noted that the NIR does not explain the fact that the Party does not include CO_2 from biomass combustion in the total GHG emissions, although CH_4 and N_2O emissions from biomass combustion are included in the national total, or provide any explanations for the recalculation of the reference approach.
E.6	Feedstocks, reductants and other non-energy use of fuels – all fuels (E.13, 2016) (E.13, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Recalculate excluded carbon under reference approach in accordance with the 2006 IPCC Guidelines (volume 2, chapter 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 oils was reported as "NO").	Not resolved. The NIR states that consumption of bitumen, lubricants, coke, white spirits and paraffin is reported in CRF table 1.A(d) and the EFs used are 22.00 t/TJ, 20.00 t/TJ, 29.20 t/TJ, 20.00 t/TJ and 20.00 t/TJ, respectively. However, in CRF table 1.A(d), the IEF for bitumen is reported as 0.00–0.04 t/TJ, the IEF for lubricants as 4.0 t/TJ for all years, the IEF for coke (reported under coke oven/gas coke) as "IE" (for 1990–2013) and "NO" (for 2014–2016), and the IEF for paraffin (reported under other oil) as "IE" for all years. During the review, the Party stated that in CRF table 1.A(d) the values reported in the column "Carbon emission factor" are not the same as those shown in the 2006 IPCC Guidelines as they were calculated on a different basis. However, the ERT noted that in the text of the NIR there is no additional information provided about the methodology and approaches used to calculate a country-specific coefficient. The ERT also noted that the values referred to in the NIR (bitumen (22.00 t/TJ), lubricants (20.00 t/TJ) and coke (29.20 t/TJ)) are from the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* instead of the 2006 IPCC Guidelines. The 2006 IPCC Guidelines provide the following default EFs: 80,700 kg CO_2/TJ for bitumen and 73,300 kg CO_2/TJ for lubricants.
E.7	1.A Fuel combustion – sectoral approach – all fuels – CO_2 (E.14, 2016) (E.14, 2015) Transparency	Provide transparent information in the NIR on the NCVs used for all types of fuel, as well as any changes made since previous annual submissions.	Resolved. The Party regularly conducts analyses, and updated the NCVs for fuels and presented information on progress in the NIR (pp.109–115).
E.8	1.A Fuel combustion – sectoral approach – solid fuels – CO_2	Consider shifting to a tier 2 methodology given that stationary combustion of solid	Resolved. The ERT noted that the tier 2 was applied and the NIR provides information on country-specific EFs for each fuel (pp.99–100).

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(E.14, 2016) (E.14, 2015) Accuracy	fuels is a key category.	
E.9	1.A Fuel combustion – sectoral approach – all fuels – CO_2 (E.15, 2016) (E.15, 2015) Transparency	Update the text in the 2017 NIR to document the application of the default oxidation factor of 1.	Resolved. The ERT noted that Latvia included information on the oxidation factor used for calculations in the NIR (p.117). In CRF table 1.A(b), the Party reported the use of an oxidation factor of 1 in accordance with the 2006 IPCC Guidelines.
E.10	1.A. Fuel combustion – sectoral approach – gaseous fuels – CO_2 (E.17, 2016) (E.17, 2015) Consistency	Transparently report all parameters used for the calculation of the country-specific EFs and provide the rationale for large inter-annual fluctuations in the trend and all recalculations made since the previous annual submission.	Addressing. In the NIR (table 3.17), the Party presented information about the calculation of a country-specific EF for natural gas for the whole time series. However, neither rationale for large inter-annual fluctuations in the trend nor recalculations were provided in the NIR.
E.11	1.A Fuel combustion – sectoral approach – gaseous fuels – CO_2 (E.18, 2016) (E.18, 2015) Transparency	Present the NCVs used for natural gas in the NIR.	Resolved. The ERT noted that the Party presented all the necessary information about the NCV for natural gas and the calculation of the relevant GHG emissions in the NIR (chapter 3.2.4.2, table 3.17).
E.12	1.B.2.b Natural gas – gaseous fuels – CH_4 (E.19, 2016) (E.19, 2015) Accuracy	Revise the AD for this category and report the relevant AD for gas volumes in CRF table 1.B.2 in accordance with the 2006 IPCC Guidelines so that the AD values in this table are consistent with the natural gas volumes reported for the reference approach.	Not resolved. During the review, the ERT asked the Party about progress in solving the question raised in the previous review report. The Party replied that the process of analysing the difference in data sources is ongoing. The reference approach is calculated using data from the energy balance prepared by the Central Statistical Bureau of Latvia, but the AD and emissions reported for subcategory 1.B.2.b are received directly from the Latvian natural gas provider company Latvijas Gāze.
E.13	1.B.2.b Natural gas – gaseous fuels – CH_4 (E.19, 2016) (E.19, 2015) Comparability	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 NIR shows the same AD in table 3.53 as reported in table 3.52 of the 2016 NIR.
E.14	1.B.2.b Natural gas – gaseous fuels – CH_4 (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. During the review, the ERT noted that in the NIR (chapter 3.3.2) the Party presented information about the length of the pipeline transport and distribution in km, as received from Latvijas Gāze, but there was no additional information about the methodology used for the CH_4 emission estimation.

ID#	*Issue and/or problem classification*[a, b]	*Recommendation made in previous review report*	*ERT assessment and rationale*
IPPU			
I.1	2. General (IPPU) (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.	Addressing. On the basis of the previous review report, the Party had planned the development of an integrated database and other improvements to undertake capacity-building projects to achieve better time-series consistency for several categories in the early years of the time series. The Party informed the ERT that an integrated database was not used for the 2018 annual submission, but national experts worked in parallel databases (their own databases and an integrated database) during the preparation of the 2018 inventory. The process of implementing the integrated database is ongoing because all the functions need to be tested to ensure that they work properly.
I.2	2.A.1 Cement production – CO_2 (I.3, 2016) (I.3, 2015) (47, 2014) Transparency	Provide information on the sources of data used to estimate clinker production using the mass balance approach.	Resolved. The NIR (p.179) states that the AD source is the plant's GHG report under the EU ETS.
I.3	2.A.1 Cement production – CO_2 (I.10, 2016) (I.10, 2015) Transparency	Transparently report how the amount of clinker production has been estimated by providing a clear methodological description and the sources of data used in the annual submission.	Addressing. The NIR (p.179) states that the AD source was the plant's GHG report under the EU ETS, and also provides the two-step mass balance equations for calculating produced clinker. However, the ERT noted that the relationship between clinker production, produced clinker and the data source of used clinker in the mass balance equations was not clearly and consistently described. The Party acknowledged that the parameter descriptions were unclear and stated that it will revise them for its next annual submission.
I.4	2.A.1 Cement production – CO_2 (I.11, 2016) (I.11, 2015) Transparency	Update the explanation in the NIR to reflect the modified approach to estimating emissions from cement kiln dust for 1990–1994.	Resolved. The explanation in the NIR has been updated (p.179). The Party used the default cement kiln dust correction factor (1.02) from the 2006 IPCC Guidelines to estimate emissions from cement production for 1990–1994 because official data on cement kiln dust for that period are not available.
I.5	2.A.2 Lime production – CO_2 (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.	Not resolved. In the NIR (p.186), the Party states that it used equation 2.6 from the 2006 IPCC Guidelines tier 2 method for estimating CO_2 emissions from lime production. The ERT noted that the values for the parameters of equation 2.6 are not clearly stated in the NIR (see ID# I.10 in table 5).
I.6	2.A.3 Glass production – CO_2 (I.13, 2016) (I.13, 2015) Accuracy	Make efforts to collect the necessary data and ensure that the tier 2 method is properly applied, or estimate CO_2 emissions by applying a tier 1 method from the 2006 IPCC Guidelines, using a default cullet ratio and national-level AD.	Resolved. The Party estimated CO_2 emissions from glass production for 1990–2016 using a tier 3 method from the 2006 IPCC Guidelines to achieve better accuracy.
I.7	2.C.1 Iron and steel production – CO_2 (I.14, 2016) (I.14,	Estimate CO_2 emissions for this category by applying the methodology and EFs from the	Resolved. The Party applied the tier 2 methodology and EFs from the 2006 IPCC Guidelines and specifies in the NIR to which categories the

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	2015) Comparability	2006 IPCC Guidelines, and clearly specify in the NIR to which categories the emissions were allocated.	emissions are allocated (p.214).
I.8	2.F Product uses as substitutes for ozone depleting substances – HFCs (I.15, 2016) (I.15, 2015) Consistency	Ensure the proper use of notation keys in accordance with decision 24/CP.19, annex I, paragraph 37, and, if appropriate, ensure that a complete and consistent time series is reported for this gas.	Addressing. The Party elaborated in its NIR that in its 2016 annual submission there were overestimations and underestimations of emissions in category 2.F.1, based on an evaluation study of F-gases performed in 2016, and therefore recalculated the emission estimates for category 2.F.1 for 1998–2016 for its 2018 annual submission. However, the Party informed the ERT that, because there is insufficient information on F-gas consumption prior to 1998, it did not recalculate the emission estimates for 1995–1997. The ERT suggests that the Party consider using splicing techniques (2006 IPCC Guidelines, volume 1, chapter 5) to obtain estimates for the period 1995–1997 to achieve time-series consistency.
I.9	2.G.3 N_2O from product uses – N_2O (I.9, 2016) (I.9, 2015) (52, 2014) (50, 2013) Completeness	Report emissions from fire extinguishers and aerosol cans as "NE" if unable to collect the necessary data to estimate and report the emissions.	Resolved. The Party provided estimates of N_2O emissions from anaesthetics and aerosol cans for 1990–2016 in CRF table 2(I).A-Hs2 and in the NIR (pp.270–271).
Agriculture			
A.1	3.A.1 Cattle – CH_4 (A.5, 2016) (A.5, 2015) Consistency	Incorporate the parameters for forage quality in the annual submission and ensure that time-series consistency for all years is maintained.	Resolved. The Party provided sufficient information on forage quality and related research activities on forage quality and the digestibility in the NIR (pp.288–289).
A.2	3.A.1 Cattle – CH_4 (A.6, 2016) (A.6, 2015) Transparency	Transparently describe both qualitatively and quantitatively all improvements and subsequent recalculations that are implemented in the annual submission.	Resolved. The Party provided sufficiently detailed information that explains the recalculations for each specific category (NIR, pp.308–309 and pp.320–321).
A.3	3.A.1 Cattle – CH_4 (A.7, 2016) (A.7, 2015) Transparency	Report in the NIR the methodology used to estimate the annual average weight of dairy cattle, including the results of the expert analysis of the proportion of different breeds of dairy cattle and data on cattle weight in the Agricultural Data Centre's animal and herd register.	Resolved. The Party provided in the NIR (pp.291–292) information on and references for its estimation of the average weight of dairy cattle for the entire time series.
A.4	3.A.1 Cattle – CH_4 (A.8, 2016) (A.8, 2015) Transparency	Report the findings on the digestibility of feed in the country, providing documentation in the NIR regarding the development and rationale for the selection of a country-specific digestibility coefficient of 65 per cent, as	Resolved. Information on forage quality, digestibility and feeding ration for cattle is provided in the NIR (pp.288–289). The NIR also provides a summary of the conclusion of the research activity that the digestibility of feed for cattle typically fluctuates by around 65 per cent in Latvia.

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		well as data to substantiate its use.	
A.5	3.A.4 Other livestock – CH_4 (A.9, 2016) (A.9, 2015) Accuracy	Report in the NIR on the possibility of obtaining separate EFs for deer and reindeer on the basis of data from the Agricultural Data Centre, and use the latest research results related to emissions from deer and reindeer in Nordic countries.	Not resolved. The Party did not provide a specific improvement plan in its NIR for obtaining separate EFs for deer and reindeer.
A.6	3.B Manure management – CH_4 and N_2O (A.10, 2016) (A.10, 2015) Transparency	Describe in the NIR the methodology used for the distribution of manure management systems, including references to relevant research on the development of the methodology.	Resolved. The Party provided sufficient information and references in relation to manure management systems in its NIR (p.298, p.302 and annex A.3.5).
A.7	3.B.1 Cattle – CH_4 (A.11, 2016) (A.11, 2015) Transparency	Provide documentation in the NIR to support the use of a relatively low CH_4 IEF value for dairy cattle for 1990–2002.	Resolved. The Party provided information on and justification for the relatively low CH_4 IEF for dairy cattle in the NIR (p.300).
A.8	3.D Direct and indirect N_2O emissions from agricultural soils – N_2O (A.12, 2016) Transparency	Include the results of the project under the European Economic Area Financial Mechanism 2009–2014 Programme in the annual submission, specifically the results of the analyses of the B_o values and country-specific MCF for anaerobic digesters.	Resolved. Justifications for the B_o value and MCF with anaerobic digesters were provided in the NIR (pp.298–299).
LULUCF			
L.1	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.12, 2016) Consistency	Recalculate the entire time series for future annual submissions.	Resolved. Latvia recalculated the estimates of GHG emissions and removals for the entire time series, including for forest land and FM.
L.2	4.A.1 Forest land remaining forest land – CO_2 (L.14, 2016) (L.13, 2015) Accuracy	Either provide additional information supporting the use of an average value of 0.58 for the biomass ratio for spruce trees overall, or implement a biomass expansion factor for spruce that is stratified, for example, by species volume distribution by age-class or growing stock level.	Resolved. Latvia provided a more recently developed ratio of stem to above-ground biomass for different species in the NIR (table 6.17), noting that these values were not used in the calculations. The ERT recognized that this recommendation is not relevant anymore; however, a new issue was raised (see ID# L.14 in table 5).
L.3	4.A.2 Land converted to forest land – CO_2 (L.15, 2016) (L.14, 2015) Transparency	Provide in the NIR the following information to support the use of a 150-year transition period: (1) the reason why two generations of trees (150 years) was considered appropriate to properly encompass carbon stock in harvesting residues, stumps and the above-ground fraction of dead trees; and (2)	Addressing. Latvia included the rationale for choosing the 150-year transition period in the NIR (chapter 6.4.2.2). However, there was no information in the NIR regarding progress on implementing the Yasso model for afforestation. During the review, the Party provided such information, indicating that it needs to include growth functions for afforested land, which will be finished in 2019. The ERT notes that this information on progress of implementation should

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		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).	be included in the NIR.
L.4	4.A.2 Land converted to forest land – CO_2 (L.16, 2016) (L.15, 2015) Comparability	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. Latvia estimated and reported CSC for conversions to forest land. However, the values were aggregated and reported under the category grassland converted to forest land (NIR, p.352, and CRF table 4.A). The ERT was informed by Latvia during the review of its intention to report CSC separately for each category. The ERT notes this planned improvement, which should be implemented in the next annual submission.
L.5	4.B.2.2 Grassland converted to cropland – CO_2 (L.18, 2016) (L.17, 2015) Transparency	Ensure consistency in reporting between the NIR and CRF table 4.B regarding CO_2 emissions and removals from the conversion of grassland to cropland.	Addressing. Latvia eliminated the inconsistency in the reporting of the methodology between its NIR and the CRF tables. However, the ERT noted that carbon removals from organic soils were reported for 2007–2016 in CRF table 4.B instead of emissions. The Party informed the ERT that this was a mistake and the emissions will be recalculated for the next annual submission.
L.6	4.C.2 Land converted to grassland – CO_2 (L.19, 2016) (L.18, 2015) Transparency	Ensure consistency in reporting between the NIR and CRF table 4.C regarding emissions from land converted to grassland, including the description of the methodology implemented and the data used to estimate the emissions.	Resolved. Latvia consistently reported information in the NIR (p.367) and CRF table 4.C in the category land converted to grassland.
L.7	4.C.2 Land converted to grassland – CO_2 (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. Latvia used the notation keys “NO”, “NE” and “NA” to report these pools, justifying this by reference to a scientific study and NFI soil monitoring data. Latvia informed the ERT during the review of its intention to use tier 1 methodology to estimate CSC from land conversions (see ID# L.16 in table 5).
L.8	4.C.2.2 Cropland converted to grassland	Update the CSC figures for soils on the basis of national studies	Resolved. Latvia reported “NA” for CSC in mineral soils for cropland converted to grassland, justifying

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	– CO_2 (L.21, 2016) (L.20, 2015) Accuracy	as soon as feasible after scientific validation.	this by reference to a national study by Bārdule et al. (2017).
L.9	4.D.1 Wetlands remaining wetlands – CO_2 (L.22, 2016) (L.21, 2015) Transparency	Describe clearly the methodology, AD and definitions used to estimate CO_2 emissions and removals from wetlands remaining wetlands.	Resolved. Latvia provided information on the methodology, AD and definitions used in the calculation in its NIR (chapter 6.7.2).
L.10	4.E.2 Land converted to settlements – CO_2 (L.23, 2016) (L.22, 2015) Completeness	Continue the methodological work for estimating CSC in living biomass and dead organic matter for cropland converted to settlements and grassland converted to settlements and report the estimates in the annual submission.	Not resolved. Latvia continued to report "NE" or "NO" for CSC in the living biomass and dead organic matter pools for conversion of cropland and grassland to settlements. The Party informed the ERT that the CSC will be estimated after completion of the next NFI cycle.
Waste			
W.1	5.A Solid waste disposal on land – CH_4 (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).	Addressing. The Party did not justify in the NIR that there is no significant underestimation of emissions resulting from its use of a shorter time (44 years). However, the ERT noted that Latvia provided time-series data for waste disposal for 1965 onward in the NIR (p.400). The time series now covers the 50-year period required for the first-order decay estimation of emissions, which the Party used. The Party assumed that the default data on solid waste disposal for 1965–1974 were the same as for 1975, owing to the unavailability of data on gross domestic product for the period 1965–1974 to estimate the amount of waste disposed of. Survey results data for 1975 and 2002 were used to estimate waste disposed of in 1976–2001.
W.2	5.A.1 Managed waste disposal sites – CH_4 (W.10, 2016) (W.10, 2015) Transparency	Present degradable organic carbon values for the different waste fractions in the NIR for the entire time series.	Resolved. The Party provided degradable organic carbon values for the managed waste disposal sites for the different waste fractions in the NIR (p.404, table 7.9) and bulk degradable organic carbon and default values for unmanaged sites.
W.3	5.C.2 Open burning of waste – N_2O (W.11, 2016) (W.11, 2015) Comparability	Use the appropriate notation key for reporting N_2O emissions for 1999–2007, and implement a QA/QC procedure that will ensure the proper use of notation keys.	Resolved. "NO" was used for reporting the N_2O emissions in the NIR (p.414) and CRF tables 5 and 5.C, suggesting that an appropriate QA/QC procedure has been implemented.
W.4	5.D.2 Industrial wastewater – CO_2 and CH_4 (W.13, 2016) (W.13, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Use the appropriate notation key for the amount of CH_4 flared and the amount of CH_4 for energy recovery, and strengthen the QA/QC procedures so as to ensure the proper use of notation keys.	Resolved. The activity does not occur and all the biogas produced is reported under the energy sector. "NO" was used to report CH_4 flared and recovered for energy use in CRF tables 5 and 5.D, suggesting that an appropriate QA/QC procedure has been implemented (see ID# W.11 in table 5).

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
KP-LULUCF			
KL.1	General (KP-LULUCF) (KL.2, 2016) (KL.2, 2015) (96, 2014) (110, 2013) (88, 2012) (119, 2011) (113, 2010) Transparency	Improve the transparency of the reporting on the uncertainty analysis.	Resolved. Latvia provided information on uncertainties of activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in its NIR (chapter 11.3.1.5).
KL.2	Afforestation and reforestation – CO_2 (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. During the review Latvia provided to the ERT five publications regarding CSC in the mineral soils pool on AR land. The ERT notes that this issue would be resolved if Latvia included the summaries from these publications and numerical information in the NIR to justify the assumption that CSC in mineral soils is not statistically significant.
KL.3	Afforestation and reforestation – CO_2 (KL.10, 2016) (KL.10, 2015) Transparency	Include detailed information explaining the link between the definition of afforestation in the NIR and the AD trends in KP-LULUCF tables 4(KP-I)A.1 and 4(KP-I)B.1 in order to allow a thorough assessment of changes to be made.	Addressing. Latvia provided information on naturally afforested land in its reporting under Article 3, paragraph 4, of the Kyoto Protocol (NIR, p.460). However, naturally afforested land was not reported separately in CRF table 4(KP-I)B.1.
KL.4	Forest management – CO_2 (KL.8, 2016) (KL.8, 2015) (108, 2014) (125, 2013) Transparency	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.	Addressing. Emissions due to harvesting were reported for AR, deforestation and FM in CRF tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.1 separately. However, in the NIR (p.466) the Party indicated that emissions due to carbon losses in living biomass were included in the FM category; thus, the ERT notes that the description of the estimations should be reflected in the NIR.
KL.5	Forest management – CO_2 (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. Latvia reported a revised technical correction to the FMRL in the NIR (p.472, chapter 11.5.2.3) and CRF tables. However, the ERT noted that no quantitative information was included regarding the reasons for recalculations and the resulting CSC in pools due to recalculations (see ID# KL.6 below).
KL.6	Forest management – CO_2 (KL.12, 2016) (KL.12, 2015) Consistency	Review the calculation of the technical correction to the FMRL already made, including the apparent mismatch between the time series presented during the review and the values presented in CRF table 4(KP-I)B.1.1.	Resolved. Latvia included a list of the improvements that resulted in the revised technical correction (NIR, chapter 11.5.2.3).
KL.7	Forest management – CO_2 (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	Not resolved. Latvia continued to report CSC in the dead organic matter and soil organic matter pools in the FM category as "NO".

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
		of NFI plots.	
KL.8	Forest management – CO_2 (KL.13, 2016) (KL.13, 2015) Accuracy	If the gain–loss method for FM estimates is maintained, consider the use of a matrix indicating the impacts of disturbances on different pools, as per the methodology included in the 2006 IPCC Guidelines (volume 4, chapter 2, table 2.1).	Resolved. Latvia informed the ERT during the review that it is not considering using the matrix on the influence of disturbances on different pools that is included in the 2006 IPCC Guidelines. The ERT noted that it is the Party's decision whether to use the matrix or any other methods since there is no mandatory language in the 2006 IPCC Guidelines.
KL.9	Biomass burning – CO_2 (KL.9, 2016) (KL.9, 2015) (109, 2014) Transparency	Include an explanation regarding the use of the notation key "IE" to report CO_2 emissions from controlled burning in the NIR.	Resolved. Information on the accounting of burned residues was included in the NIR (chapter 6.10.2).
KL.10	Biomass burning – CO_2, CH_4 and N_2O (KL.14, 2016) (KL.14, 2015) Transparency	Include complete information demonstrating that all woody biomass harvesting, including burned residues, are included in the losses in the biomass estimates in the LULUCF sector.	Resolved. Latvia stated in its NIR (p.385) that biomass residues from harvesting, burned in a controlled manner, were included in biomass losses under forest land.

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

[b] The review of the 2017 annual submission of Latvia did not take place during 2017 and, as such, the 2017 annual review report was not available at the time of this review. Therefore, the previous recommendations reflected in table 3 are taken from the 2016 annual review report. For the same reason, 2017 is excluded from the list of review years in which the issue could have been identified.

IV. Issues identified in three 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 included in table 4 have been identified in three successive reviews, including the review of the 2018 annual submission of Latvia, and have not been addressed by the Party.

Table 4
Issues identified in three successive reviews and not addressed by Latvia

ID#	Previous recommendation for the issue identified	Number of successive reviews issue not addressed[a]
General		
	No issues identified	
Energy		
E.2	Use data from both Eurostat and the International Energy Agency to conduct QC of the CRF tables, and provide a clear explanation for any differences	4 (2013–2018)
E.14	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,	4 (2013–2018)

ID#	*Previous recommendation for the issue identified*	*Number of successive reviews issue not addressed*[a]
	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	
IPPU		
I.1	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	3 (2014–2018)
Agriculture		
	No issues identified	
LULUCF		
	No issues identified	
Waste		
	No issues identified	
KP-LULUCF		
KL.2	Improve the transparency of the reporting on the uncertainty analysis	3 (2014–2018)
KL.4	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	4 (2013–2018)

[a] The review of the 2017 annual submission of Latvia did not take place during 2017. Therefore, 2017 was not included when counting the number of successive years for table 4. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were held in conjunction with each other, 2015 and 2016 are not considered successive years but as one year.

V. Additional findings made during the individual review of the 2018 annual submission

10. Table 5 contains findings made by the ERT during the individual review of the 2018 annual submission of Latvia that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2018 annual submission of Latvia

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
General			
G.5	Key category analysis	Latvia's NIR (chapter 1.5.1) states that for the 2018 annual submission the Party used approach 1 and 2 from the 2006 IPCC Guidelines to identify key categories for 1990–2016. However, in addition the NIR states that the list of IPCC categories was modified to reflect the particular national circumstances of the Party, but no further explanation for this is provided in the NIR. During the review, the Party clarified that the list of IPCC categories was modified to reflect particular national circumstances such as fuel use in transport, more disaggregated agricultural categories and more disaggregated LULUCF categories, and that such an approach improves the transparency, completeness and consistency of the reporting. The ERT recommends that, to improve transparency, the Party 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.	Yes. Transparency
G.6	QA/QC and verification	The NIR (chapter 1.2.3) includes information on the QA/QC plan. It mentions that the QA/QC plan was determined in legislation and prepared to improve the transparency, comparability and completeness of the GHG inventory. The QA/QC plan describes the QC procedures to be applied before and during the compilation of the GHG inventory. However, from the information provided in the NIR it is not clear which actions are part of the QA/QC plan. During the review, the Party provided a list of the main elements of the QA/QC plan. The ERT recommends that the Party include information on the main elements of the QA/QC plan in the NIR.	Yes. Transparency
G.7	Uncertainty analysis	Latvia performed a quantitative uncertainty assessment following approach 1 from the 2006 IPCC Guidelines. The uncertainty assessment provided in the NIR (table 1.5, and annex 2, tables A.2.1 and A.2.2) was performed for the latest inventory year (2016) and the trend between the base year and the latest inventory year. However, the ERT noted that, according to paragraph 15 of the UNFCCC Annex I inventory reporting guidelines, the quantitative uncertainty assessment is to be performed for at least the base year and the latest inventory year and for the trend between these two years. During the review, the Party explained that, according to the 2006 IPCC Guidelines (volume 1, chapter 3), "approach 1 assumes that the relative ranges of uncertainty in the emission and activity factors are the same in the base year and in year t. This assumption is often correct or approximately correct", and therefore the Party did not perform a separate uncertainty assessment for the base year. The ERT recommends that Latvia include a quantitative uncertainty assessment for the base year in the NIR.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
G.8	National system	The NIR (chapter 13) mentions that there were changes introduced to the national system. Regarding inventory preparation, in accordance with a new national regulation (No. 737 "Development and management of national system for greenhouse gas inventory and projections" of 12 December 2017), the national arrangements for the GHG inventory were supplemented with additional AD providers and sources for the energy, IPPU, agriculture and	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		LULUCF sectors. During the review, the Party explained the changes and their impact on inventory preparation. The ERT commends the Party for introducing elements that further strengthen the national system.	
G.9	Article 3, paragraph 14, of the Kyoto Protocol	Latvia reported in its NIR (chapter 15) that there were changes in its reporting on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since its previous annual submission. The Party described in its NIR the changes regarding renewable energy sources and environmental taxes in the context of reporting on the progressive reduction or phasing out of market imperfections, fiscal incentives, tax and duty exemptions and subsidies in all GHG-emitting sectors, taking into account the need for energy price reforms to reflect market prices and externalities. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.	Not an issue/problem
Energy			
E.15	1. General (energy sector)	Previous ERTs encouraged the Party to use the data and parameters collected under the EU ETS to approve, improve and verify the inventory AD and EFs (see document FCCC/ARR/2016/LVA, ID# E.9). During the review, Latvia indicated that it used EU ETS data where possible; for example, to calculate emissions from waste burning. The ERT noted that the information on the use of the data and parameters collected under the EU ETS is provided in the NIR; however, while data are used separately, they are not used for the purpose of comparison and verification of data from the Central Statistical Bureau. The ERT encourages Latvia to use the data and parameters collected under the EU ETS to approve, improve and verify the inventory AD and EFs, and to provide the results of this verification in the NIR.	Not an issue/problem
E.16	1.A.1 Energy industries – other fossil fuels – CO_2	In the NIR, the Party provided information about use of landfill and sludge gas in the country. There are six landfills in Latvia that collect biogas from landfills and one wastewater treatment plant. According to the information in the NIR, these plants were not able to provide information on carbon content percentage in working mass of landfill gas and sludge gas. The CO_2 EFs for landfill gas and sludge gas are based on some assumptions about the molecular weight of CH_4. The NIR states that the CO_2 EF for landfill gas and sludge gas is 51.13 kg CO_2/GJ. The ERT noted that these values are lower than the IPCC default value (14.9 kg C/GJ (54.63 kg CO_2/GJ)) provided in the 2006 IPCC Guidelines (volume 2, chapter 1, table 1.3) and the IPCC default is based on the theoretical number of CH_4 molecules. The ERT also noted that the current assumption may lead to an underestimation of emissions. The ERT believes that future ERTs should consider this issue further to ensure that emissions for this category are not underestimated. The ERT recommends that Latvia 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.	Yes. Accuracy
E.17	Fuel combustion –	The NIR (p.97) states that the differences in natural gas consumption between the sectoral and reference approach	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
	reference approach – gaseous fuels – CO_2	are mainly due to distribution losses that occur every year. The ERT raised a question during the review about the relationship between this difference and the fugitive emissions reported under subcategory 1.B.2.b natural gas. Latvia responded that it is not possible to use information on natural gas losses in the calculation procedure for the reference approach. The ERT does not consider the Party's explanation for the differences between the sectoral and reference approach for natural gas to be appropriate, on the basis of the Party's explanation for natural gas leakage and the calculation procedure used for the reference approach. The ERT recommends that Latvia investigate the reason for the differences between the sectoral and reference approach for natural gas and, if necessary, revise the explanation for this in the NIR.	
E.18	1.A.1.a Public electricity and heat production – solid fuels – CO_2	The ERT noted that the CO_2 IEF for solid fuels for 2016 (102.65 t/TJ) is different from that for 1990–2015 (94.60 t/TJ), which is the IPCC default EF. The NIR (p.109) states that the EF was updated on the basis of a research report prepared in 2017 by the Ministry of Environmental Protection and Regional Development. The ERT noted that this is an issue of accuracy and time-series consistency. During the review the Party informed the ERT that CO_2 emissions from solid fuels will be recalculated for the whole time series for the next annual submission, applying an updated EF based on the research. The ERT believes that future ERTs should consider this issue further to ensure that emissions for this category are not underestimated. The ERT recommends that Latvia apply country-specific EFs for the whole time series.	Yes. Accuracy
E.19	1.A.1.a Public electricity and heat production – all fuels – CO_2	The ERT noted that an oxidation factor of 1 was used (IPCC default value). The 2006 IPCC Guidelines state that for some fuels this fraction may in practice not be negligible and therefore, where available, representative country-specific values based on measurements should be used (i.e. the fraction of carbon oxidized is assumed to be 1 in deriving default CO_2 EFs). In response to a question raised by the ERT, the Party informed the ERT that a country-specific oxidation factor for solid fuels is not available and using any other oxidation factor without justification or documentation is not in line with the 2006 IPCC Guidelines; therefore, Latvia uses the oxidation factor of 1 provided in the 2006 IPCC Guidelines for all fuels owing to the lack of country-specific values.	Not an issue/problem
E.20	1.A.1.c Manufacture of solid fuels and other energy industries – peat – CO_2, CH_4 and N_2O	The NIR (chapter 3.1) describes the energy consumption and emissions from fuel combustion in Latvia in detail. It explains (p.85) that peat and peat briquettes (local fuels) were widely used in Latvia in 1990, accounting for 1 per cent of total energy consumption; however, the amount of peat products used for stationary burning has decreased, accounting for only 0.02 per cent of the total in 2016. NIR table 3.2 shows the consumption of each fuel type for the time series and shows the consumption of peat briquettes and peat decreasing constantly since 1990. CRF table 1.A(s)1 provides peat consumption AD of 3,216.90 TJ for 1990 and 34.00 TJ for 2016, which is consistent with the description in the NIR. The NIR states (p.106) that category 1.A.1 energy industries includes emissions from the manufacture of solid fuels (peat briquettes and charcoal production plants) and that these emissions are reported under category 1.A.1.c manufacture of solid fuels and other energy industries, although GHG emissions from peat combustion in this category are reported as "NO" for 2016. The ERT notes that the description on page 106 of the NIR is not fully consistent with the reporting in the CRF tables for 2016. The ERT encourages the Party to describe	Not an issue/problem

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		the latest situation of energy consumption, especially if consumption of peat has ceased.	
E.21	1.A.2 Manufacturing industries and construction – liquid fuels – CO_2, CH_4 and N_2O	The NIR (p.126) states that all consumption of diesel oil in this subcategory is assumed to be consumed as stationary combustion because it is impossible to separate the consumption into stationary combustion and mobile combustion (off-road vehicles). In response to a question raised by the ERT, Latvia explained that the amount of consumption of liquid fuels could be separated for each fuel (e.g. diesel oil, residual fuel oil and liquefied petroleum gas); however, it is impossible to identify separately the amounts used for stationary combustion and off-road vehicles. The ERT commends the Party for providing information on the assumption used to separate fuel consumption into stationary combustion and mobile combustion. The ERT encourages the Party to find a way to separate fuel consumption into stationary combustion and mobile combustion to increase the comparability and accuracy of the estimates.	Not an issue/problem
E.22	1.B.2.b Natural gas – natural gas – CH_4	The ERT noted that CH_4 emissions under subcategory 1.B.2.b.5 distribution are reported as a constant value (0.476 kt CH_4) for 1990–2013. The ERT also noted that the AD for this subcategory are reported as a constant value (694,188.00 m^3) except for 1992 (594,188.00 m^3). However, the NIR (table 3.52) states that the length of pipelines for transport was 1,109 km in 1990 and 1,240 km in 2013 and that pipelines for distribution were 2,882 km in length in 1997 and 4,934 km in 2013 (years before 1997 are not reported in the table). The ERT found it unusual that the AD and emissions remained the same despite the length of pipelines increasing. During the review, the Party explained that the information is provided by Latvijas Gāze and is based on the company's measurements and/or estimates of natural gas leakages/emissions, and that Latvia receives the final numbers in the form of tables needed for reporting purposes. The ERT considers that it is not clear how the data provider generated this information. The ERT recommends that Latvia 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 (volume 2, chapter 4.2.3).	Yes. Transparency
IPPU			
I.10	2.A.2 Lime production – CO_2	In the NIR (p.186) the Party states that it used equation 2.6 from the 2006 IPCC Guidelines tier 2 method for estimating CO_2 emissions from lime production. The ERT noted that, according to the 2006 IPCC Guidelines tier 2 method for lime production, the AD should relate to lime production by type and the EF should be, correspondingly, for CO_2 emissions/t lime produced. However, the Party used data on raw material (dolomite and limestone) as AD (NIR, p.185) and a country-specific CO_2 EF/t raw material (NIR, p.186), which is not the correct application of the 2006 IPCC Guidelines. The NIR (p.185, table 4.10) shows that the Party has a good data basis from the EU ETS to apply the 2006 IPCC Guidelines tier 2 method for lime production. The ERT recommends that the Party shift from raw material input based on a country-specific method to the correct application of a production output-based method using the 2006 IPCC Guidelines tier 2 method for lime production (volume 3, chapter 2, p.2.21), providing AD on lime production by type and a country- or plant-specific CO_2 EF /t lime production. If country- or plant-specific EFs are not available, the Party may use the output lime production	Yes. Accuracy

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		and input raw material listed in the NIR (p.185, table 4.10) to derive plant-specific EFs.	
I.11	2.A.2 Lime production – CO_2	The ERT noted that there was no dolomite used in lime production in 2011 and 2016, but there was dolomite lime production in other consecutive years (NIR, table 4.10, p.185). During the review, Latvia informed the ERT that in 2011 dolomite was not used in lime production and in 2016 lime production in Latvia ceased. The ERT recommends that the Party describe in its NIR the reason(s) for the fluctuation in AD, particularly the reporting of "NO" for 2011 and 2016.	Yes. Transparency
I.12	2.F.1 Refrigeration and air conditioning – HFCs	The ERT noted that the Party applied equation 7.10 from the 2006 IPCC Guidelines to estimate emissions from refrigeration and air-conditioning equipment. According to that equation, emissions related to the management of refrigerant containers should be estimated, but the Party did not estimate those emissions. The ERT believes that future ERTs should consider this issue further to ensure that emissions are not underestimated. The ERT recommends that the Party provide an estimation of HFC emissions related to the management of refrigerant containers.	Yes. Accuracy
Agriculture			
A.9	3.A.1 Cattle – CH_4	As indicated in the document containing aggregate information on GHG emissions by sources and removals by sinks for Parties included in Annex I to the Convention (FCCC/WEB/AGI/2018), Latvia reported the lowest CH_4 IEF (29.74 kg/head/year) for enteric fermentation of growing cattle among all Parties for 2016 and its CH_4 IEFs for the entire time series (27.26–29.88 kg/head/year) are lower than the IPCC values for North America, Western Europe and Eastern Europe (33.00, 35.00 and 45.00 kg/head/year, respectively) provided in the 2006 IPCC Guidelines (volume 4, chapter 10, table 10.A.2). During the review Latvia explained that growing cattle includes two groups of animal: cattle under 1 year and cattle aged 1–2 years. In 2016, 45 per cent of the cattle population belonged to group 2, and 61 per cent of the group was under 1 year old, with a reported value of 0 per cent for methane conversion rate between 0 and 3 months old. Another reason for the lower IEF is that Latvia uses lower, country-specific, calf weights (180–200 kg). The ERT recommends that Latvia provide information in the NIR to justify the low CH_4 IEF (30.00 kg/head/year) to improve the transparency and comparability of its documentation.	Yes. Transparency
A.10	3.B.5 Indirect N_2O emissions – N_2O	Latvia states in the NIR that the amount of manure N that is lost due to volatilization of NH_3 and nitrogen oxides is estimated with the tier 2 approach using the default NH_3 EFs from the *EMEP/EEA air pollutant emission inventory guidebook 2016*. The ERT considers it unclear exactly which NH_3 EFs have been used for each manure management system and livestock type. During the review Latvia provided a list of the NH_3 EFs used for estimating NH_3 emissions for livestock categories by manure management system. The ERT recommends that Latvia provide in the NIR specific NH_3 EFs by livestock category and by manure management system to improve the transparency of the documentation.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
A.11	3.B Manure management – CH_4	In CRF table 3.B(a)s2 for sheep, the allocation of manure management systems is provided, but not the MCFs (reported as "NA"). Similar issues occur for rabbits, reindeer, fur-bearing animals, goats, horses and poultry. During the review, Latvia clarified that tier 1 EFs were used to calculate CH_4 emissions from manure management for these livestock categories. Latvia also clarified that the allocation of manure management systems is as specified in the 2006 IPCC Guidelines but the MCFs were reported as "NA" because there is no information provided on the MCFs to be used for tier 1 calculations of CH_4 from manure management. The ERT notes that default MCFs with varying temperatures for each climatic zone for these animal types are available in the 2006 IPCC Guidelines (table 10.A-9). The ERT recommends that, in CRF table 3.B(a)s2, Latvia replace the notation key "NA" with numerical values for the MCFs for sheep, goats, rabbits, reindeer, fur-bearing animals, horses and poultry, to improve comparability across Parties.	Yes. Comparability
A.12	3.B.5 Indirect N_2O emissions – N_2O	Latvia uses country-specific $Frac_{leachMS}$ for manure management systems based on expert judgment (NIR, p.307). For 1990–1994, a value of 10 per cent was assigned to $Frac_{leachMS}$ by reducing the value to 1 per cent for slurry storage and 5 per cent for solid storage until 2016. The ERT noted that it is unclear which $Frac_{leachMS}$ and time series were used for manure management systems. During the review, Latvia explained that values of $Frac_{leachMS}$ were developed using a combination of expert judgment and data from agriculture point source run-off monitoring. The agriculture point source run-off monitoring data showed that approximately 10 per cent of N from manure storage was lost from 1990 to 1994. Leaching losses of N from manure management systems decreased after Latvia became a member State of the EU in 2004 because many financial mechanisms were available for manure management improvement. Latvia assumed that all manure storage complies with the requirements of the EU nitrates directive: slurry manure storage ($Frac_{leachMS}$ = 1 per cent) and solid storage ($Frac_{leachMS}$ =5 per cent) from 2013 to 2016. Therefore, a value of 10 per cent was assumed for $Frac_{leachMS}$ for 1990–2004. Values of $Frac_{leachMS}$ between 10 per cent and 5 or 1 per cent were interpolated for 2005–2012 on the basis of observations from agriculture point source run-off monitoring showing the highest water quality since 2013. The ERT considers these explanations to be helpful. The ERT recommends that Latvia provide more information on the choice of $Frac_{leachMS}$ for various manure management systems for the entire time series in the NIR.	Yes. Transparency
A.13	3.D.a.4 Crop residues – N_2O	Latvia assumes 30 per cent of above-ground crop residues for wheat, oats, barley and rye to be removed ($Frac_{Remove}$) for feeding, bedding and construction (NIR, p.316). However, the ERT noted that this is unclear because Latvia also states that $Frac_{Remove}$ is set at 70 per cent for 1990–2000 and then rapidly decreases up until 2010. During the review, Latvia explained that $Frac_{Remove}$ was set at 70 per cent for 1990–2000 on the basis of expert judgment because for that time period a different agricultural practice was used. Since 2010 the specialization of farms in Latvia has stabilized and now crop farms use crop residues for crop production. Therefore, $Frac_{Remove}$ since 2010 is assumed to be 30 per cent and $Frac_{Remove}$ between 2000 and 2010 was interpolated from 70 to 30 per cent. The ERT considers these explanations to be helpful.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		The ERT recommends that Latvia provide more information on the choice of $Frac_{Remove}$ for the entire time series in the NIR.	
A.14	3.D.a.5 Mineralization/immobilization associated with loss/gain of soil organic matter – N_2O	In CRF table 3.D Latvia reported N_2O emissions from mineralization/immobilization associated with gain/loss of soil organic matter as "NO". During the review, Latvia explained that economic activities have not caused any reduction of soil carbon stock and provided two scientific publications that confirm, through modelling and monitoring, the absence of carbon losses in mineral soils (Lupiķis and Lazdiņš, 2017). However, the ERT noted that these publications dealt only with drained organic soils and forest mineral soils, which are not relevant to mineral soils on cropland remaining cropland. Latvia explained that similar work and analyses related to forest soils and drained organic soils will be carried out for cropland remaining cropland. The ERT welcomes Latvia's plan to assess changes in soil organic carbon stocks for cropland remaining cropland. The ERT recommends that Latvia report N_2O emissions from mineralization/immobilization associated with gain/loss of soil organic matter, or provide in the NIR the justification for reporting "NO".	Yes. Completeness
A.15	3.D.b.2 N leaching and run-off – N_2O	Latvia uses a fixed value of $Frac_{LEACH-(H)}$ (23 per cent), deviating significantly from the default value from the 2006 IPCC Guidelines (30 per cent) without providing any justification. During the review Latvia clarified that a $Frac_{LEACH-(H)}$ of 23 per cent is used on the basis of the country-specific results of agricultural run-off monitoring by Sudars et al. (2016). The ERT recommends that Latvia 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), to improve transparency.	Yes. Transparency
A.16	3.I Other carbon-containing fertilizers – CO_2	Latvia states in its NIR (p.324) that there are no data on other carbon-containing fertilizers and reported "NO" in CRF table 3.G-I for the entire time series. However, the ERT noted that FAOSTAT contains the quantity of urea ammonium nitrate and the data source for several years (i.e. 2002, 2003, 2007, 2008 and 2009) for Latvia (http://www.fao.org/faostat/en/#data/RFB). During the review, Latvia acknowledged that the amounts of urea ammonium nitrate used were 2,091 Mg for 2007, 1,025 Mg for 2008 and 3,356 Mg for 2009, and confirmed that these numbers are consistent with those reported by the Food and Agriculture Organization of the United Nations. In other years there was no use of urea ammonium nitrate in Latvia. The Party explained that its assumption of a composition of 30 per cent water, 40 per cent ammonium nitrate, whose formula is NH_4NO_3, and 30 per cent urea, whose formula is $CO(NH_2)_2$, is similar to that reported by Canada in CRF table 3.G-I in its 2018 NIR (Environment and Climate Change Canada, 2018) with an IEF of 0.06 kg C/kg product; for Latvia this would result in CO_2 emissions of 0.46 kt CO_2 eq or 0.0037 per cent of the national total emissions for 2007, 0.23 kt CO_2 eq or 0.0019 per cent of the national total emissions for 2008, and 0.74 kt CO_2 eq or 0.0066 per cent of the national total emissions for 2009. Emissions from urea ammonium nitrate and their contribution to the national total emissions were deemed insignificant because the level of emissions is below 0.05 per cent of the national total GHG emissions and does not exceed 500 kt CO_2 eq, as defined in paragraph 37(b) of the UNFCCC Annex I inventory	Not an issue/problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		reporting guidelines. The ERT agrees with the Party's assessment. The ERT encourages Latvia to report CO_2 emissions from other carbon-containing fertilizers as "NE" for 2007, 2008 and 2009, with the justification of insignificance as defined in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines, and "NO" for all other years of the time series.	
LULUCF			
L.11	4. General (LULUCF)	During the review the ERT identified several inconsistencies between the NIR and the CRF tables; for example, inconsistencies in the reporting of conversions of other land to forest land in NIR tables 6.8 and 6.9 and in CRF table 4.A for 1990, and in the reporting within the CRF tables (e.g. area of organic soils for cropland and grassland (152,469.407 ha) larger than that reported under agriculture (132,698.753 ha)). The ERT also noted that carbon removals were reported instead of emissions from organic soils on grassland converted to cropland, and different values of CO_2 emissions from biomass burning were reported for forest land converted to forest land and for FM. Latvia confirmed these mistakes and stated its intention to correct them in the next annual submission. The ERT recommends that Latvia eliminate the inconsistencies between NIR tables 6.8 and 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 its QA/QC procedures to avoid such errors.	Yes. Accuracy
L.12	4. General (LULUCF)	Latvia broadly uses results and assumptions from the implementation of the Yasso model across the forest land, cropland and grassland categories, especially for the mineral soils pool. For example, Latvia did not report emissions or removals from mineral soils for conversion of cropland to forest land; but it did report CSC in mineral soils from conversion of forest land to cropland. The ERT noted that this results in biased estimations of CSC because of inaccurate conversions between categories. The ERT considers that this issue is connected with the partial implementation of the Yasso model under the LULUCF sector (see ID #L.3 in table 3). During the review Latvia explained that it is planning to implement the Yasso model for different categories in future annual submissions. The ERT welcomes the Party's intention and emphasizes that CSC estimation for the mineral soils pool across the sector should be maintained comprehensively. The ERT recommends that Latvia implement the Yasso 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.	Yes. Accuracy
L.13	4.A.1 Forest land remaining forest land – N_2O	Latvia used the Wetlands Supplement to calculate N_2O emissions from drained organic soils, and a national value developed by Lupiķis and Lazdiņš (2017) for calculating CO_2 emissions. The ERT noted that the country-specific value (0.52 t C/ha) is much lower than that in the Wetlands Supplement (2.6 t C/ha). During the review Latvia provided information on use of the chamber method within the scope of the LIFE REstore project (http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=5255) and	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		evaluation of CSC in long-term (50 years) research sites, on the basis of which Latvia had developed its EF, as the average weighted distribution of nutrient-poor and nutrient-rich soils in forest land. Moreover, the Party provided preliminary data on GHG emissions from other types of land use from the LIFE REstore project, including EFs for forest land remaining forest land. The ERT agrees with the justification provided by the Party and recommends that Latvia include in its NIR the justification for why its country-specific value (0.52 t C/ha) is much lower than that in the Wetlands Supplement (2.6 t C/ha).	
L.14	4.A Forest land – CO_2	Latvia provides updated values of stem biomass to crown biomass and stem biomass to below-ground biomass in the NIR (table 6.17), noting that the values were used for verification of NFI results only. The ERT considered the recommendation made in the previous review report (see ID# L.2 in table 3 above) and noted that it has been resolved since the Party reported updated values. Moreover, Latvia also provided to the ERT a list of publications providing justification for these values, and stated that these expansion factors will be used for its 2019 annual submission because the NFI database needs to be adjusted. The ERT commends Latvia for the input; however, the ERT noted that there is limited information on this matter provided in the NIR. The ERT recommends that Latvia report in the NIR a list of the publications that provide the basis for the values reported in NIR table 6.17 and add them to the list of references.	Yes. Transparency
L.15	4.B Cropland	In CRF table 4.B Latvia reports a total of 98.31 kha organic soils, while in CRF table 4(II) it reports only 4.55 kha for drained organic soils and no values for rewetted organic soils. The Party informed the ERT that CRF table 4(II) reports only the area of ditches, and stated that it will include more information in the next annual submission. The ERT recommends that Latvia include in its NIR an explanation for the specific area reported in CRF table 4(II).	Yes. Transparency
L.16	4.B.2.2 Grassland converted to cropland – CO_2	During the review, in response to a question related to issue ID# L.7 in table 3 raised by the ERT, Latvia explained that the Yasso model includes carbon inputs to soil from biomass; thus, CSC in the living biomass pool was not reported. In response to a follow-up question raised by the ERT, Latvia explained that after completion of a national study in 2020 it plans to introduce CSC estimation for the living biomass pool on the basis of yields of farm crops and biomass conversion factors. The ERT welcomes the Party's intention to develop country-specific factors, and recommends that the Party 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.	Yes. Completeness
L.17	4(V) Biomass burning – CO_2, CH_4 and N_2O	Latvia reports ratios of harvesting residues affected by burning in its NIR (chapter 6.10.2.3) but limited information on what these values were based on. During the review Latvia provided information, namely that for 1990–2010 the values were derived from studies (Liepiņš et al., 2017; Līpiņš, 2004). For more recent years the results of surveys of forest owners were used. The ERT commends Latvia for providing information during the review and recommends that Latvia include	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		information in the NIR justifying the basis for the reported ratios of harvesting residues affected by burning.	
Waste			
W.5	5.A Solid waste disposal on land – CH_4	The NIR (p.400) states that the amount of disposed waste for 1976–2001 was estimated under the assumption of steady growth until 2002. There is no further information on how the Party estimated these data (e.g. method and parameter used). In response to a question raised by the ERT, Latvia stated that data for 1976 and 2001 were used to estimate the data for 1976–2001 and data for 1976 were determined in a research report (LEGMC, 2016). The ERT noted that the estimation method used by the Party seems to be the interpolation method, which is described in the 2006 IPCC Guidelines (volume 1, chapter 5.3.3.3). The ERT encourages the Party to identify the method used for estimating data for 1976–2001 in its NIR and, if necessary, state that the method is in line with the 2006 IPCC Guidelines.	Not an issue/problem
W.6	5.A Solid waste disposal on land – CH_4	The NIR (p.403) states that the Party assumes that CH_4 recovery (50 per cent) is the same for new and old landfill sites, for both managed and unmanaged sites. In response to a question raised by the ERT, the Party explained that there is only one data set measured at the biggest landfill site in Latvia, where CH_4 is collected from both old landfill and new disposal cells; and it assumes that the same value can be applied to all landfill sites. The ERT noted that applying the same value for CH_4 recovery to new and old landfill sites (both for managed and unmanaged) is not realistic. The ERT also noted that Latvia reports an amount of CH_4 for energy recovery in the CRF tables in a unit of mass (kt), which seems to have been actually measured because this amount is also used for the energy sector. The ERT further noted that the 2006 IPCC Guidelines (volume 5, equation 3.1) do not include a "CH_4 recovery" parameter given as a percentage value. The ERT concludes that Latvia did not apply the CH_4 recovery factor (50 per cent) in its estimation. The ERT recommends that Latvia clarify in its NIR whether or not the CH_4 recovery factor (50 per cent) has been applied in its estimation.	Yes. Transparency
W.7	5.A.2 Unmanaged waste disposal sites – CH_4	The NIR (p.404) states that the default oxidation factor of 0.09 was applied, but the ERT noted that the default oxidation factors in the 2006 IPCC Guidelines (volume 5, chapters 3.2.3 and 6.2.2.6) are 0 for managed, unmanaged and uncategorized solid waste disposal sites and 0.1 for managed sites (i.e. covered with CH_4 oxidizing material). In response to a question raised by the ERT, the Party explained that almost all old unmanaged solid waste disposal sites in Latvia are covered by a soil layer and that it applied the default oxidation factor of 0.1 for them. On the basis of national research (see https://www.meteo.lv/lapas/atkritumu-izgaztuvju-datu-savaksana-un-apkoposana-seg-aprekiniem?&id=2182&nid=909), Latvia assumes that 10 per cent of old unmanaged solid waste disposal sites are not covered by soils and the oxidation factor is calculated as 0.1 x (1–0.1) = 0.09. The ERT recommends that Latvia correct the description in its 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 the national research.	Yes. Transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
W.8	5.C.1 Waste incineration – CH_4	Latvia reported CH_4 emissions for category 5.C.1 waste incineration – non-biogenic – other as "NA", while CO_2 and N_2O emissions were estimated (at 0.17 and 0.00002 kt, respectively). The NIR (chapter 7.4.1.2) states that CH_4 emissions from well-functioning incinerators are usually very small. The ERT noted that the 2006 IPCC Guidelines (volume 5, chapter 5.2.2) state that in large and well-functioning incinerators CH_4 emissions are usually very small and it is good practice to apply the CH_4 EFs provided in volume 2, chapter 2, of the guidelines. The ERT also noted that the 2006 IPCC Guidelines (volume 5, chapter 5, equation 5.4) provide a method for estimating CH_4 and therefore that Latvia's reporting of CH_4 emissions as "NA" is not in line with the UNFCCC Annex I inventory reporting guidelines. The ERT believes that future ERTs should consider this issue further to ensure that CH_4 emissions from this category are not underestimated. The ERT recommends that Latvia estimate the CH_4 emissions using the CH_4 EF for fuel combustion in accordance with the 2006 IPCC Guidelines.	Yes. Completeness
W.9	5.C.2 Open burning of waste – CO_2, CH_4 and N_2O	Latvia reports GHG emissions for category 5.C.2 open burning of waste as "NO" for the whole time series, because open burning is not allowed in Latvia according to the Waste Management Law (NIR, chapter 7.4.2). In response to a question raised by the ERT, Latvia explained that there are no official statistics available on illegal waste burning. Latvia assumes that possible emissions from open burning of waste are on a very small scale and probably insignificant. Latvia also informed the ERT that some waste amounts are burned in accidental fires and emissions from that source are estimated for the CLRTAP inventory. Latvia stated that the 2006 IPCC Guidelines do not provide a clear methodology for reporting emissions from burned waste in accidental fires. The ERT notes that the 2006 IPCC Guidelines (volume 5, chapter 5.3.2) provide guidance on collecting AD on open burning of waste. The ERT also notes that the AD in the CLRTAP inventory could be used for GHG inventory estimation and/or to estimate the likely level of emissions for this category. The ERT believes that future ERTs should consider this issue further to ensure that emissions from this category are not underestimated. The ERT recommends that Latvia investigate the possibility of applying AD from the CLRTAP 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.	Yes. Completeness
W.10	5.D.1 Domestic wastewater – CH_4	The ERT noted that NIR table 7.24 had not been updated: it includes values for 2015 (e.g. for population using septic tanks or latrines) although the title of the table states that it is for 2016. During the review, the Party confirmed that this was a mistake. The ERT encourages the Party to update the table used for estimating CH_4 emissions from the national population not connected to centralized wastewater treatment plants (NIR, table 7.24) and enhance the QC procedures for this category.	Not an issue/problem
W.11	5.D.2 Industrial wastewater –	The ERT noted that Latvia reports the amount of CH_4 emissions flared and CH_4 recovered for energy as "NO" in CRF table 5.D. The ERT also noted that no corresponding information is reported in the NIR on CH_4 emissions	Yes, transparency

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem?[a] If yes, classify by type*
	CH_4 and N_2O	flared and CH_4 recovered for energy. During the review, the Party explained the reporting of "NO" for this category. The ERT recommends that Latvia provide information in the NIR on CH_4 emissions flared and CH_4 recovered for energy and justify that these emissions are not occurring in the country.	
KP-LULUCF			
KL.11	General (KP-LULUCF)	Latvia reports in its NIR (chapter 11.5.2.1) that the conversion of natural forests to planted forests does not occur in the country. However, the ERT noted that in CRF table NIR-2.1 Latvia provides values for such conversion. Also, there is no definition of natural forests in the NIR. In response to a question raised by the ERT, Latvia explained that there should not be values in the NIR table, because all forests are considered planted and artificially regenerated, respectively, and no changes have taken place. The ERT notes that it is good practice to include a definition of natural forest in the NIR (Kyoto Protocol Supplement, chapter 1.2). The ERT recommends that the Party include a definition of natural forest in the NIR. The ERT also recommends that the Party eliminate the inconsistency in the reported information in the NIR and CRF tables regarding whether conversion of natural forests to planted forests takes place in Latvia.	Yes. Transparency
KL.12	General (KP-LULUCF)	The ERT noted that information in the NIR and CRF tables includes errors and is outdated compared with the Party's responses to questions raised during the review (see ID#s KL.11 and L.11 above and KL.13 below). The Party recognized these errors and expressed its intention to eliminate them in the next annual submission. The ERT noted that several errors and inconsistencies may have been caused by insufficient QA/QC measures. Thus, the ERT recommends that the Party eliminate the errors referred to in ID#s KL.11 above and KL.13 below by developing sector-specific QA/QC procedures to avoid inconsistencies between the NIR and CRF tables for KP-LULUCF activities, and report on these changes in the next annual submission.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
KL.13	Afforestation and reforestation	Latvia reports in its NIR (chapter 11.1.2) that all afforested and deforested land reported in the first commitment period of the Kyoto Protocol are represented in the second commitment period as land under afforestation, deforestation or FM. In response to a question raised by the ERT regarding which areas of AR that were reported as such in the first commitment period are included in FM for the second commitment period, the Party responded that there is a mistake in the relevant sentence in the NIR (naming of first and second commitment periods is misplaced). The Party informed the ERT that certain areas of afforested land reported under FM in the first commitment period have been moved to the category afforested land owing to management activities (thinning, replanting), identified during the recent field visits made by NFI teams, or owing to legal land-use change in the land register. The ERT notes the QA/QC issue of the error in the NIR and refers to the recommendation made in relation to ID# KL.12 above. However, the ERT commends Latvia for providing additional information during the review. The ERT recommends that Latvia include in its NIR a detailed explanation as to how management practices are judged to be evidence of purposeful human actions for afforestation.	Yes. Transparency

[a] Recommendations made by the ERT during the review are related to issues as defined in paragraph 81 of the UNFCCC review guidelines, or problems as defined in paragraph 69 of the Article 8 review guidelines. Encouragements are made to the Party to address all findings not related to such issues or problems.

VI. Application of adjustments

11. The ERT did not identify the need to apply any adjustments to the 2018 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. Latvia has elected commitment period accounting and therefore the issuance and cancellation of units for KP-LULUCF activities is not applicable for the 2018 review.

VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2018 annual submission.

Annex I

Overview of greenhouse gas emissions and removals for Latvia for submission year 2018 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by Latvia in its 2018 annual submission

1. Tables 6–9 provide an overview of total GHG emissions and removals as submitted by Latvia.

Table 6
Total greenhouse gas emissions for Latvia, base year[a]–2016
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions including indirect CO_2 emissions[b]*		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)[c]*	*KP-LULUCF activities (Article 3.3 of the Kyoto Protocol)[d]*	*KP-LULUCF activities (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	15 735.55	26 432.24	15 775.95	26 472.63	NA		NA, NO	
1990	15 732.88	26 429.56	15 773.28	26 469.96				
1995	–423.01	12 927.97	–390.76	12 960.22				
2000	871.94	10 512.54	896.79	10 537.38				
2010	11 016.76	12 373.66	11 032.78	12 389.68				
2011	10 059.07	11 549.99	10 069.81	11 560.72				
2012	7 717.21	11 390.76	7 729.76	11 403.31				
2013	8 280.29	11 297.92	8 295.73	11 313.36		51.59	NA, NO	–6 377.11
2014	12 515.74	11 232.91	12 536.23	11 253.41		47.31	NA, NO	–633.17
2015	12 020.18	11 317.67	12 037.17	11 334.66		44.15	NA, NO	–2 452.25
2016	10 363.42	11 288.68	10 381.12	11 306.39		38.12	NA, NO	–3 553.15

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

[a] "Base year" refers to the base year under the Kyoto Protocol, which is 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, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

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

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

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

Table 7
Greenhouse gas emissions by gas for Latvia, excluding land use, land-use change and forestry, 1990–2016
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	19 846.29	3 538.97	3 084.70	NO, NA, NE	NO, NA	NO, NA	NA, NO	NO, NA
1995	9 199.84	2 088.05	1 669.66	2.50	NO, NA	NO, NA	0.17	NO, NA
2000	7 123.89	1 849.36	1 549.17	14.08	NO, NA	NO, NA	0.88	NO, NA
2010	8 662.97	1 835.72	1 717.57	166.06	NO, NA	NO, NA	7.35	NO, NA
2011	7 893.42	1 782.72	1 705.87	171.24	NO, NA	NO, NA	7.47	NO, NA
2012	7 596.41	1 849.38	1 773.79	175.95	NO, NA	NO, NA	7.78	NO, NA
2013	7 439.03	1 885.99	1 788.62	191.21	NO, NA	NO, NA	8.50	NO, NA
2014	7 259.25	1 956.05	1 823.42	206.11	NA, NO	NA, NO	8.58	NA, NO
2015	7 350.65	1 871.18	1 883.16	219.56	NA, NO	NA, NO	10.12	NA, NO
2016	7 281.32	1 903.78	1 870.56	240.84	NO, NA	NO, NA	9.89	NO, NA
Per cent change 1990–2016	**–63.3**	**–46.2**	**–39.4**	**NA**	**NA**	**NA**	**NA**	**NA**

Note: Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions.
[a] CO_2 emissions include indirect CO_2 emissions reported in CRF table 6.

Table 8
Greenhouse gas emissions by sector for Latvia, 1990–2016
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	19 438.01	720.07	5 612.26	–10 696.68	699.62	NO
1995	9 538.12	223.01	2 575.76	–13 350.98	623.34	NO
2000	7 343.93	243.40	2 218.55	–9 640.59	731.50	NO
2010	8 521.68	704.77	2 406.10	–1 356.90	757.13	NO
2011	7 623.35	804.54	2 407.55	–1 490.91	725.28	NO
2012	7 300.90	867.47	2 497.51	–3 673.55	737.44	NO
2013	7 225.96	812.87	2 544.06	–3 017.63	730.46	NO
2014	7 074.33	828.88	2 612.09	1 282.83	738.10	NO
2015	7 198.61	759.79	2 671.65	702.51	704.61	NO
2016	7 256.86	660.22	2 663.43	-925.26	725.87	NO
Per cent change 1990–2016	**–62.7**	**–8.3**	**–52.5**	**–91.3**	**3.8**	**NA**

Notes: (1) Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions. (2) Totals include indirect CO_2 emissions reported in CRF table 6.

Table 9
Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year–2016, for Latvia
(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[a]	*Article 3.3 of the Kyoto Protocol*		*FM and elected Article 3.4 activities of the Kyoto Protocol*[b]				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				–16 302.00				
Technical correction				11 703.39				
Base year	NA				NA	NA	NA	NA, NO
2013		–138.70	190.29	–6 377.11	NA	NA	NA	NA, NO
2014		–147.68	194.99	–633.17	NA	NA	NA	NA, NO
2015		–155.23	199.38	–2 452.25	NA	NA	NA	NO, NA
2016		–165.83	203.95	–3 553.15	NA	NA	NA	NO, NA
Per cent change Base year–2016					**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 refers to 1990.

[b] Latvia has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol, and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

2. Table 10 provides an overview of key relevant data for Latvia's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 10
Key relevant data for Latvia under Article 3, paragraphs 3 and 4, of the Kyoto Protocol in the 2018 annual submission

Key parameters	*Values*
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
Election of activities under Article 3, paragraph 4	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	926.542 kt CO_2 eq (7 412.336 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for:	
1. AR in 2016	NA
2. Deforestation in 2016	NA
3. FM in 2016	NA
4. CM in 2016	NA
5. GM in 2016	NA
6. RV in 2016	NA
7. WDR in 2016	NA

Annex II

Information to be included in the compilation and accounting database

Tables 11–14 include the information to be included in the compilation and accounting database for Latvia. Data shown are from the original annual submission of the Party, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table 11
Information to be included in the compilation and accounting database for 2016, including on the commitment period reserve, for Latvia
($t CO_2 eq$)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
CPR	**68 970 096**			**68 970 096**
Annex A emissions for 2016				
CO_2[a]	7 281 320			7 281 320
CH_4	1 903 778			1 903 778
N_2O	1 870 562			1 870 562
HFCs	240 835			240 835
PFCs	NA, NO			NA, NO
Unspecified mix of HFCs and PFCs	NA, NO			NA, NO
SF_6	9 891			9 891
NF_3	NA, NO			NA, NO
Total Annex A sources	**11 306 386**			**11 306 386**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2016				
3.3 AR	−165 826			−165 826
3.3 Deforestation	203 949			203 949
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2016				
3.4 FM	−3 553 153			−3 553 153

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

Table 12
Information to be included in the compilation and accounting database for 2015 for Latvia
(t CO_2 eq)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions for 2015				
CO_2[a]	7 350 649			7 350 649
CH_4	1 871 183			1 871 183
N_2O	1 883 156			1 883 156
HFCs	219 556			219 556
PFCs	NA, NO			NA, NO
Unspecified mix of HFCs and PFCs	NA, NO			NA, NO
SF_6	10 118			10 118
NF_3	NA, NO			NA, NO
Total Annex A sources	**11 334 662**			**11 334 662**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2015				
3.3 AR	−155 233			−155 233
3.3 Deforestation	199 383			199 383
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2015				
3.4 FM	−2 452 245			−2 452.245

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

Table 13
Information to be included in the compilation and accounting database for 2014 for Latvia
(t CO_2 eq)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions for 2014				
CO_2[a]	7 259 247			7 259 247
CH_4	1 956 052			1 956 052
N_2O	1 823 420			1 823 420
HFCs	206 108			206 108
PFCs	NA, NO			NA, NO
Unspecified mix of HFCs and PFCs	NA, NO			NA, NO
SF_6	8 578			8 578
NF_3	NA, NO			NA, NO
Total Annex A sources	**11 253 405**			**11 253 405**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014				
3.3 AR	–147 685			–147 685
3.3 Deforestation	194 993			194 993
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014				
3.4 FM	–633 171			–633 171

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

Table 14
Information to be included in the compilation and accounting database for 2013 for Latvia
(t CO_2 eq)

	Original submission	*Revised estimate*	*Adjustment*	*Final*
Annex A emissions for 2013				
CO_2[a]	7 439 033			7 439 033
CH_4	1 885 994			1 885 994
N_2O	1 788 619			1 788 619
HFCs	191 207			191 207
PFCs	NA, NO			NA, NO
Unspecified mix of HFCs and PFCs	NA, NO			NA, NO
SF_6	8 503			8 503
NF_3	NA, NO			NA, NO
Total Annex A sources	**11 313 356**			**11 313 356**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013				
3.3 AR	–138 700			–138 700
3.3 Deforestation	190 293			190 293
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013				
3.4 FM	–6 377 108			–6 377 108

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

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which 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 reporting in the Party's inventory are the following:

(a) 3.D.a.5 mineralization/immobilization associated with loss/gain of soil organic matter – N_2O (see ID# A.14 in table 5);

(b) 4.B.2.2 grassland converted to cropland – CO_2 – CSC in living biomass (see ID# L.16 in table 5);

(c) 4.C.2 land converted to grassland – CO_2 (see ID# L.7 in table 3):

(i) Forest land converted to grassland – CSC in living biomass, dead organic matter and mineral soils;

(ii) Wetlands converted to grassland – CSC in living biomass, dead organic matter and organic soils;

(iii) Settlements converted to grassland – CSC in living biomass, dead organic matter and mineral soils;

(d) 4.E.2 land converted to settlements – CO_2 (see ID# L.10 in table 3):

(i) Cropland converted to settlements – CSC in living biomass and dead organic matter;

(ii) Grassland converted to settlements – CSC in living biomass and dead organic matter;

(e) 5.C.1 waste incineration – non-biogenic – other – CH_4 (see ID# W.8 in table 5);

(f) 5.C.2 open burning of waste – CO_2, CH_4 and N_2O (see ID# W.9 in table 5).

Annex IV

Documents and information used during the review

A. Reference documents

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 http://www.ipcc-nggip.iges.or.jp/public/kpsg.

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, Switzerland: IPCC. Available at http://www.ipcc-nggip.iges.or.jp/public/wetlands/.

Annual review reports

Reports on the individual reviews of the 2013, 2014, 2015 and 2016 annual submissions of Latvia, contained in documents FCCC/ARR/2013/LVA, FCCC/ARR/2014/LVA, FCCC/ARR/2015/LVA and FCCC/ARR/2016/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/sites/default/files/resource/AGI%20report_2018.pdf.

Annual status report for Latvia for 2018. Available at https://unfccc.int/sites/default/files/resource/asr2018_LVA.pdf.

Bārdule A, Lupiķis A, Butlers A et al. 2017. Organic carbon stock in different types of mineral soils in cropland and grassland in Latvia. *Zemdirbyste-Agriculture*. 104(1): pp.3–8.

EEA. 2016. *EMEP/EEA air pollutant emission inventory guidebook 2016.* Available at https://www.eea.europa.eu/publications/emep-eea-guidebook-2016.

Environment and Climate Change Canada. 2018. *National Inventory Report 1990–2016: Greenhouse Gas Sources and Sinks in Canada*. Available at https://unfccc.int/documents/65715.

LEGMC (Latvian Environment, Geology and Meteorology Centre). 2016. *Landfill Data Collection and Compilation for GHG Estimates*. Available at http://parissrv.lvgmc.lv/public_reports.

Liepiņš J, Lazdiņš A and Liepiņš K. 2017. Equations for estimating above- and belowground biomass of Norway spruce, Scots pine, birch spp. and European aspen in Latvia. *Scandinavian Journal of Forest Research*. 33(1): pp.58–70. Available at https://doi.org/10.1080/02827581.2017.1337923.

Līpiņš L. 2004. *Koksnes izejvielu resursu un to izmantošanas efektivitātes novērtējums* [Assessment of Wood Resources and Efficiency of Wood Utilization].

Lupiķis A and Lazdiņš A. 2017. *Soil Carbon Stock Changes in Transitional Mire Drained for Forestry in Latvia: A Case Study.* Available at http://www2.llu.lv/research_conf/proceedings2017_vol_1/docs/LatviaResRuralDev_23rd_2017_vol1-55-61.pdf.

Sudars R, Berzina L and Grinberga L. 2016. Analysis of agricultural run-off monitoring program results for estimation of nitrous oxide indirect emissions in Latvia. *In*:

Proceedings of the 15th International Scientific Conference "Engineering for Rural Development", Jelgava, Latvia, 25–27 May 2016. Available at http://tf.llu.lv/conference/proceedings2016/Papers/N198.pdf.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Gancone (Ministry of Environmental Protection and Regional Development), including additional material on the methodology and assumptions used.