



United Nations

FCCC/ARR/2021/SVK



Framework Convention on  
Climate Change

Distr.: General  
7 October 2022

English only

---

## **Report on the individual review of the annual submission of Slovakia submitted in 2021\***

**Note by the expert review team**

### *Summary*

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2021 annual submission of Slovakia, 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 20 to 25 September 2021 remotely.

---

\* In the symbol for this document, 2021 refers to the year in which the inventory was submitted, not to the year of publication.



## Contents

	<i>Page</i>
Abbreviations and acronyms .....	3
I. Introduction .....	5
II. Summary and general assessment of the Party's 2021 annual submission .....	6
III. Status of implementation of recommendations included in the previous review report.....	8
IV. Issues and problems identified in three or more successive reviews and not addressed by the Party .....	21
V. Additional findings made during the individual review of the Party's 2021 annual submission .....	22
VI. Application of adjustments.....	32
VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol .....	32
VIII. Questions of implementation .....	32
<b>Annexes</b>	
I. Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Slovakia in its 2021 annual submission .....	33
II. Information to be included in the compilation and accounting database .....	37
III. Additional information to support findings in table 2 .....	40
IV. Reference documents .....	41

## Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
2019 Refinement to the 2006 IPCC Guidelines	<i>2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	“Guidelines for review under Article 8 of the Kyoto Protocol”
B <sub>0</sub>	maximum methane-producing capacity
C	carbon
CaO	calcium oxide
CER	certified emission reduction
CH <sub>4</sub>	methane
CM	cropland management
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
Convention reporting adherence	adherence to the “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
COPERT	software tool for calculating road transport emissions
CPR	commitment period reserve
CRF	common reporting format
CSC	carbon stock change
DE	digestible energy
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU	European Union
FAOSTAT	statistical database of the Food and Agriculture Organization of the United Nations
FM	forest management
FMRL	forest management reference level
FMRL <sub>corr</sub>	forest management reference level technical correction
GE	gross energy intake
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
Kyoto Protocol Supplement	<i>2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol</i>
LFG	landfill gas

LULUCF	land use, land-use change and forestry
MSW	municipal solid waste
N	nitrogen
N <sub>2</sub> O	nitrous oxide
NA	not applicable
NCV	net calorific value
NE	not estimated
N <sub>ex</sub>	nitrogen excretion
NF <sub>3</sub>	nitrogen trifluoride
NFI	national forest inventory
NH <sub>3</sub>	ammonia
NIR	national inventory report
NMVOG	non-methane volatile organic compound
NO	not occurring
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
Revised 1996 IPCC Guidelines	<i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>
RMU	removal unit
RV	Revegetation
SEF	standard electronic format
SF <sub>6</sub>	sulfur hexafluoride
SIAR	standard independent assessment report
SOC	soil organic carbon
SWDS	solid waste disposal site(s)
TOW	total organic load in wastewater
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”
VS	volatile solid(s)
WDR	wetland drainage and rewetting
Wetlands Supplement	<i>2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands</i>

## I. Introduction

1. This report covers the review of the 2021 annual submission of Slovakia, organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the “UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention” (annex to decision 13/CP.20). The review took place from 20 to 25 September 2021 remotely<sup>1</sup> and was coordinated by Veronica Colerio, Sabin Guendehou and Pedro Torres (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Slovakia.

Table 1

**Composition of the expert review team that conducted the review for Slovakia**

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Newton Paciornik	Brazil
	Detelina Petrova	Bulgaria
Energy	Branca Americano	Brazil
	Melanie Hobson	United Kingdom
	Katrina Young	United Kingdom
IPPU	Kendal Blanco Salas	Costa Rica
	Clemencio Nhantumbo	Mozambique
	Koen E.L. Smekens	Belgium
Agriculture	Steen Gyldenkærne	Denmark
	Baasansuren Jamsranjav	Mongolia
	Miguel Angel Taboada	Argentina
LULUCF and KP-LULUCF	Markus Didion	Switzerland
	Inge G.C. Jonckheere	Belgium
	Timothy Paul Liersch	Australia
Waste	Gabor Kis-Kovacs	Hungary
	Inês Sousa Mourão	Cabo Verde
	Hans Oonk	Netherlands
Lead reviewers	Newton Paciornik	
	Koen E.L. Smekens	

2. The basis of the findings in this report is the assessment by the ERT of the Party’s 2021 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

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

<sup>1</sup> Owing to the circumstances related to the coronavirus disease 2019, the review had to be conducted remotely.

<sup>2</sup> Issues are defined in decision 13/CP.20, annex, para. 81.

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

4. A draft version of this report was communicated to the Government of Slovakia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.
5. Annex I presents the annual GHG emissions of Slovakia, including totals excluding and including LULUCF, indirect CO<sub>2</sub> emissions, and emissions by gas and by sector, and contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.
6. Information to be included in the compilation and accounting database can be found in annex II.

## II. Summary and general assessment of the Party’s 2021 annual submission

7. Table 2 provides the assessment by the ERT of the Party’s 2021 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 2021 annual submission of Slovakia

<i>Assessment</i>	<i>Issue/problem ID#(s) in table 3 or 5<sup>a</sup></i>
Date of submission	Original submission: NIR, 15 April 2021; CRF tables (version 4), 14 April 2021; SEF tables, 15 April 2021
Review format	Centralized review conducted remotely
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:
	(a) Identification of key categories? Yes G.6, L.14
	(b) Selection and use of methodologies and assumptions? Yes G.2, E.6, E.13, A.5, A.13, L.4, L.5, L.8, L.13, L.14, KL.4, KL.9
	(c) Development and selection of EFs? Yes I.9, L.1, KL.5, KL.15
	(d) Collection and selection of AD? Yes I.3, I.11, A.8, L.8, L.10
	(e) Reporting of recalculations? Yes W.6, KL.10
	(f) Reporting of a consistent time series? Yes E.7, E.11, A.7
	(g) Reporting of uncertainties, including methodologies? Yes G.4, G.5, L.2, W.6
	(h) QA/QC? QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)
	(i) Missing categories, or completeness? <sup>b</sup> Yes L.6, L.11, KL.8
	(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 L.6, L.11
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable? Yes
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements? No

Assessment	Issue/problem ID#(s) in table 3 or 5 <sup>a</sup>
(b) Performance of the national system functions?	No
Have any issues been identified related to the national registry:	
(a) Overall functioning of the national registry?	No
(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	No
Have any issues been identified related to the reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the SIAR?	No
Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of the reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	Yes G.1
Have any issues been identified related to the following reporting requirements for KP-LULUCF:	
(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	Yes KL.11
(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.11, KL.12, KL.13, KL.14
(c) Reporting requirements of decision 6/CMP.9?	Yes KL.5
(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	NA
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18? Yes
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol? NA
	Has the Party submitted a revised estimate to replace a previously applied adjustment? NA Slovakia does not have a previously applied adjustment
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties? Yes
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review? No
Questions of implementation	Did the ERT list any questions of implementation? No

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

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

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

8. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 3 March 2020,<sup>4</sup> and had not been resolved by the time of publication of the report on the review of the Party's 2019 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

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

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
General			
G.1	Article 3.14 (G.9, 2019) Transparency	Report in the NIR, in accordance with decision 15/CMP.1, annex, paragraph 25, on the changes in the information provided regarding the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the last submission, including, for example, any changes in fiscal and emission reduction policies, maintaining the sustainability of biofuel production and use, and incorporating climate-related issues into its official development assistance to developing countries.	Not resolved. The information in the NIR on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol is the same as that in the 2020 NIR submission.  During the review, the Party confirmed that no changes have been made to the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since its previous submission.  The ERT considers that the recommendation has not yet been addressed because the Party has not yet reported on the changes in the information provided regarding the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since its 2020 submission. The ERT notes that, if there are no changes, this should be stated in the NIR.
G.2	Methods (G.5, 2019) Accuracy	Reconcile the information contained in CRF table summary 3 and table 6.3 of the NIR to reflect the methodology improvements that have been introduced. For those key categories in the agriculture and LULUCF sectors where a tier 1 method is still being applied and the respective decision trees in the 2006 IPCC Guidelines indicate the use of a higher-tier method, either move to higher-tier methods or explain the reasons for the use of tier 1 in line with the	Not resolved. A tier 1 method was used for several key categories in the agriculture (3.D.a.1 (inorganic N fertilizers)) and LULUCF (4.A (forest land)) sectors according to CRF table summary 3.  During the review, the Party confirmed that major methodological improvements are planned under the project for adapting the NIR to the enhanced transparency framework under the Paris Agreement and applying the 2019 Refinement to the 2006 IPCC Guidelines. The project will be finalized by the end of 2023 and implementation is planned for the 2024 submission.

<sup>4</sup> FCCC/ARR/2019/SVK. The ERT notes that the report on the individual inventory review of Slovakia's 2020 annual submission has not been published yet owing to insufficient funding for the review process. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2019 annual submission.



<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
		provisions of paragraph 11 of the UNFCCC Annex I inventory reporting guidelines.	
G.3	Notation keys (G.2, 2019) (G.6, 2017) Transparency	Report all emissions considered insignificant as “NE” and justify that the likely level of those emissions is below the threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party reported all emissions considered insignificant as “NE”, namely those that were below the threshold according to paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines (see ID#s E.5 and E.7 below). Other emissions that are considered insignificant (e.g. ID# L.6) are discussed below in the relevant sector, hence this general issue can be considered resolved.
G.4	Uncertainty analysis (G.7, 2019) Convention reporting adherence	Include in the NIR a quantitative uncertainty assessment for the base year and the latest inventory year for all categories as required by paragraph 15 of the UNFCCC Annex I inventory reporting guidelines. This could best be done by providing the results in the format of table 3.2 of the 2006 IPCC Guidelines (vol. 1, chap. 3, p.3.31).	Addressing. The Party reported in annex 3 to its NIR the uncertainty analysis in the format of table 3.2 of the 2006 IPCC Guidelines (vol. 1, chap. 3, p.3.31). However, the ERT noted that table A3.1 (pp.478–482) of annex 3 presents a quantitative uncertainty assessment only for the latest inventory year for all categories. Further, only the abbreviations of the IPCC categories from the CRF tables are used, such as “1A1” (i.e. without the full name, such as “1A1. fuel combustion – energy industries – liquid fuels”) and the base year is not included.  During the review, Slovakia provided the ERT with the uncertainty calculation spreadsheets for 2019.
G.5	Uncertainty analysis (G.8, 2019) Transparency	Include in the NIR the information on effort prioritization, inventory improvements and methodological choice that was provided during the review of the 2019 submission, that is, that the results of the uncertainty assessment are reflected in the annual improvement plan, where the actions for specific sectors and categories are prioritized on the basis of their level of importance for the inventory, and that continuous improvement of the inventory methodology for significant categories is carried out on the basis of the outcomes of the uncertainty analysis. Further, provide the description of underlying assumptions used for the estimation of uncertainties in line with paragraph 42 of the UNFCCC Annex I inventory reporting guidelines.	Addressing. The Party reported in its NIR that prioritization of inventory improvements (p.36) is performed on an annual basis, including by a quantitative uncertainty assessment for the base year and the latest inventory year. However, the ERT noted that a description of underlying assumptions used for the estimation of uncertainties in line with paragraph 42 of the UNFCCC Annex I inventory reporting guidelines was not provided.  During the review, the Party clarified that prioritization for improvements is given to those categories of the inventory where uncertainty is higher. Specific information was provided in the relevant sectoral chapters of the NIR. Furthermore, Slovakia clarified that underlying assumptions used for estimating uncertainties applied to EFs and AD are mostly based on the default values provided in the 2006 IPCC Guidelines and/or expert judgment.
Energy			
E.1	Fuel combustion – reference approach – peat – CO <sub>2</sub> (E.3, 2019) (E.21, 2017) Convention reporting adherence	Report peat consumption and the associated emissions in the reference approach for 2011 onward.	Resolved. The Party reported in CRF table 1.A(b) that “NO” has been changed to “IE” for peat consumption and associated emissions. Peat consumption is included under the fuel types brown coal briquettes and patent fuel.

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
E.2	1.A.1.a Public electricity and heat production – other fossil fuels – CH <sub>4</sub> and N <sub>2</sub> O (E.4, 2019) (E.24, 2017) Accuracy	Implement the planned improvement highlighted in the NIR 2017 (chap. 3.2.6.1) regarding correcting identified inconsistencies in the reporting for industrial waste, validate the AD for municipal and industrial solid waste incineration and improve the estimation of the ratio of fossil fuel to biomass of the waste incinerated.	Resolved. The Party reported in its 2020 NIR (pp.63–66) details of the recalculations performed as a result of the analysis of municipal waste incineration AD to correct the identified inconsistencies. Three data sources were used to compare AD, and the reasons for the differences among them were identified and the time series of incinerated waste AD updated. The composition of the incinerated MSW was also reviewed, with an improvement being made in the estimation of the ratio of fossil fuel to biomass waste. Slovakia's analysis found that the fraction of fossil fuel waste was erroneously low, largely due to the share of plastics in waste being erroneously low. A revision of emissions from waste incineration for energy purposes for the entire time series was provided, with the increase in emissions largely due to an increase in the estimated fossil fuel fraction of MSW. The allocation of MSW and industrial waste incineration is explained in the NIR (pp.70–71).
E.3	1.A.1.c Manufacture of solid fuels and other energy industries – solid fuels – CO <sub>2</sub> (E.6, 2019) (E.25, 2017) Transparency	Explain in the NIR the high value of the CO <sub>2</sub> IEF for this category and how it was obtained.	Addressing. The Party reported in its 2020 NIR (p.67) that the IEF for CO <sub>2</sub> for this category (e.g. 199 t CO <sub>2</sub> /TJ (2017) and 193 t CO <sub>2</sub> /TJ (2018)) is high because blast furnace gas, which has a high carbon content, often represents a significant share of the total fuels in this category. For example, in 2017, blast furnace gas accounted for more than 70 per cent of total fuels. The information about consumption of the two main fuels in this category, namely coking and blast furnace gas, was obtained directly from an iron and steel producer operating in the country (US Steel).  During the review, the Party clarified that the blast furnace gas EFs are plant-specific.  The ERT considers that the recommendation has not yet been fully addressed because the Party did not include this explanation in its NIR, where it is also relevant, as the CO <sub>2</sub> IEF for solid fuels is high in comparison with that of other Parties.
E.4	1.A.3.b Road transportation – other liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (E.24, 2019) Transparency	Report emissions of other liquid fuels under this category as “IE” in CRF table 1.A(a)s3 and provide the explanation in the NIR and CRF table 9 that the emissions from combustion of lubricants in two-stroke engines are included in those of gasoline.	Resolved. The Party reported emissions of other liquid fuels as “IE” in CRF table 1.A(a)s3 and provided an explanation in the NIR (p.473) that the emissions from the combustion of lubricants in two-stroke engines are included in those of gasoline.
E.5	1.A.3.d Domestic navigation – gasoline and biomass – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (E.25, 2019) Consistency	Use expert judgment and/or one of the recalculation techniques included in the 2006 IPCC Guidelines (vol. 1, chap. 5.3.3) to estimate the CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions for gasoline for 1990–2015 and biomass for 2007–2015 and explain in the NIR the methods used.	Resolved. The Party reported in its NIR (p.94) that expert judgment was used along with proxy data, including ship operator income and annual tourist numbers, to estimate gasoline and biogasoline consumption from 2008 onward, which was when gasoline-powered vessels started operating. Gasoline and biomass consumption are reported as “NO” in CRF table 1.A(a)s3 for 1990–2007.

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
E.6	1.A.4 Other sectors – solid fuels – CH <sub>4</sub> (E.17, 2019) (E.36, 2017) Accuracy	Estimate and report CH <sub>4</sub> emissions from solid fuels for category 1.A.4 using at least a tier 2 methodology (in accordance with the 2006 IPCC Guidelines) if the emissions are identified as key, and if this is not practical, explain in the NIR any national circumstances that may affect this issue.	Addressing. The Party reported in its NIR (pp.102–103) on progress in improving estimates of solid fuel consumption in households, but CH <sub>4</sub> emissions from solid fuels are estimated using a tier 1 methodology and are still identified as a key category.  During the review, the Party clarified that a tier 2 approach is possible for estimating CO <sub>2</sub> emissions, as country-specific CO <sub>2</sub> EFs are available, but a tier 2 approach for non-CO <sub>2</sub> gases requires much more detail on the combustion technology and operating conditions, which is not yet available. Significant resources would be required for research in this area.
E.7	1.A.5.b Mobile – military diesel oil and military gasoline – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (E.26, 2019) Consistency	Use expert judgment and/or one of the recalculation techniques included in the 2006 IPCC Guidelines (vol. 1, chap. 5.3.3) to estimate the emissions of CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O for this category for gasoline (1990–2014), diesel (1990–2014) and biomass (2007–2014) and explain in the NIR the methods used.	Addressing. The Party reported in its 2020 NIR (pp.107–108) that a linear regression had been performed to estimate the consumption of gasoline and diesel oil for this category over the time series and that biomass is reported as “NO” because military fuels do not contain a biocomponent.  During the review, the Party clarified that the AD had been estimated using expert judgment.  The ERT considers that the recommendation has not yet been fully addressed because the NIR contains no explanation of the fuel consumption estimation methodology (linear regression) for gasoline or diesel oil and states (p.105) that gasoline and diesel oil from military use are estimated from 2016 onward, whereas consumption is reported for the whole time series in CRF table 1.A(a)s4.
E.8	1.B.2.a Oil – liquid fuels – CO <sub>2</sub> and CH <sub>4</sub> (E.20, 2019) (E.38, 2017) Comparability	Report CO <sub>2</sub> and CH <sub>4</sub> emissions from distribution of oil products (1.B.2.a.5) as “NE” and explain in the NIR that the activities occur in Slovakia but emissions were not estimated because the 2006 IPCC Guidelines do not include methodologies to estimate them.	Resolved. The Party reported in its NIR (p.122) and CRF table 1.B.2 that “NE” is used for category 1.B.2.a.5 (oil – distribution of oil products) because, although the activities occur in Slovakia, emissions were not estimated, as the 2006 IPCC Guidelines do not include relevant methodologies.
E.9	1.B.2.b Natural gas – gaseous fuels – CH <sub>4</sub> (E.21, 2019) (E.20, 2017) (E.31, 2016) (E.31, 2015) Accuracy	Move to a higher-tier approach in accordance with the decision tree in the 2006 IPCC Guidelines (vol. 2, figure 4.2.1).	Resolved. The Party reported in its NIR (p.124) that a tier 3 approach has been implemented for categories 1.B.2.b.4 (natural gas – transmission and storage) and 1.B.2.c.1.ii. (venting – gas). The ERT notes, however, that the method applied has not been reported transparently (see ID# E.13 in table 5).
IPPU			
I.1	2.A.2 Lime production – CO <sub>2</sub> (I.13, 2019) Transparency	Improve the transparency of chapter 4.7.3 of the NIR by explaining that CO <sub>2</sub> emissions from lime production by the pulp and paper industry are not estimated because of the use of the kraft chemical recovery process, which results in biogenic CO <sub>2</sub> emissions originating from biomass input. Further,	Resolved. The Party explained in chapter 4.7.3.2 of the NIR (p.148) that CO <sub>2</sub> emissions from lime production by the pulp and paper industry are not estimated because of the use of the kraft chemical recovery process, which results in biogenic CO <sub>2</sub> emissions originating from biomass input. The incorrect reference to lime production in the pulp and paper industry in chapter 4.7.3.2 was corrected.

ID#	Issue/problem classification <sup>a, b</sup>	Recommendation made in previous review report	ERT assessment and rationale
I.2	2.B.1 NH <sub>3</sub> production – CO <sub>2</sub> (I.3, 2019) (I.4, 2017) Transparency	revise NIR chapter 4.7.3.2 to exclude references to lime production in the pulp and paper industry.  Include information in the NIR on the import-export-production-use balance of urea.	Resolved. The Party reported in annex 4.3 to its NIR (p.222) the import-export-production-use balance of urea.
I.3	2.D.3 Other (non-energy products from fuels and solvent use) – CO <sub>2</sub> (I.8, 2019) (I.9, 2017) Transparency	Report the AD used in the estimation of CO <sub>2</sub> emissions from urea used in catalytic converters (i.e. equal to 5–7 per cent of fuel consumption for EURO 5 and 3–4 per cent for EURO 6 diesel oil passenger and heavy-duty vehicles) and explain in the NIR how those CO <sub>2</sub> emissions are estimated.	Addressing. The Party did not report the AD used but explained in the NIR (p.181) that it uses the default values of the COPERT model, which is used to estimate CO <sub>2</sub> emissions from urea used in catalytic converters.  During the review, Slovakia explained that the AD cannot be reported because they consist of two completely different types of data: (1) the amount of urea in vehicles, calculated using the default values of the COPERT model; and (2) actual amounts of urea used in industrial plants for selective catalytic reduction technology. The Party also stated that it does not have an appropriate methodology for aggregating the number of vehicles using selective catalytic reduction technology with the amount of urea used in industrial plants to provide an overall figure for AD for CRF table 2(I).A-Hs2. When the calculated amount of urea used in vehicles is added to the actual amount of urea from industrial plants, this results in a high uncertainty level of AD.  The ERT considers that the recommendation has not yet been fully addressed because the Party did not provide the AD required to estimate the CO <sub>2</sub> emissions from urea used in catalytic converters, which would allow the ERT to access and assess the emissions estimated, even though the Party did not use these AD to estimate the CO <sub>2</sub> emissions.
I.4	2.D.3 Other (non-energy products from fuels and solvent use) – CO <sub>2</sub> (I.14, 2019) Accuracy	Recalculate the CO <sub>2</sub> emissions reported in category 2.D.3 (other – solvent use) by using the most recent information on NMVOC emissions as AD. Further, undertake QA/QC activities to ensure the accuracy of the indirect CO <sub>2</sub> emissions for category 2.D.3, in particular regarding the consistency of the underlying NMVOC emissions with the relevant Convention on Long-Range Transboundary Air Pollution submission.	Resolved. The Party reported in its NIR (p.180) the recalculations for this category, which had led to a significant increase in the CO <sub>2</sub> emissions reported for 2015 in the 2021 submission compared with those reported in the 2018 submission. Slovakia provided a transparent explanation of the updated methodology in chapter 4.10.3 of the NIR. The Party also stated that it completed in 2020 a thorough QA/QC process to harmonize reporting for this category with its corresponding submission under the EU directive on national emission ceilings (directive 2016/2284/EU) as part of the Convention on Long-Range Transboundary Air Pollution.
I.5	2.F Product uses as substitutes for ozone-depleting substances – HFCs (I.11, 2019) (I.13, 2017) Transparency	Improve the explanation of the methodology applied to estimate emissions and stocks for categories 2.F.4 (especially for 2000 onward) and 2.F.5 (especially for 1997–2006) for example by providing a numerical example clarifying the applied approach and applied lifetime factor.	Resolved. The Party provided in its NIR (pp.201–203) an explanation of the methodology applied to estimate emissions and stocks for categories 2.F.4 (aerosols) (especially for 2000 onward) and 2.F.5 (solvents) (especially for 1997–2006), including numerical examples.

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
<b>Agriculture</b>			
A.1	3.B.3 Swine – CH <sub>4</sub> (A.13, 2019) Accuracy	Investigate the possibility of elaborating specific VS excretion rates for each subcategory of swine, taking into account the weight of animals and revise NIR table 5.33 accordingly, by presenting the revised values of VS excretion for each subcategory.	Resolved. The Party reported in its NIR (p.274) and CRF table 3.B(a)s1 the use of a tier 2 approach based on national data for CH <sub>4</sub> emission estimation in manure management for swine categories, taking into account the weight of animals. Country-specific parameters were introduced into the estimation method. The national approach was based on the number of animals divided by subcategories per region and the calculation of VS excretion rates, which were calculated from the GE, digestibility of the feed, ash content and methane conversion factor, expressed as inputs to the equation for the estimation of country-specific EFs. Table 5.45 (pp.279–280) in the NIR presents the revised values of VS excretion for each subcategory in 2019.
A.2	3.B.3 Swine – CH <sub>4</sub> (A.14, 2019) Transparency	Correct the equation used to calculate GE in the NIR and indicate explicitly the calculation of DE from metabolizable energy.	Resolved. The Party reported in its NIR (p.276) and CRF table 3 the information required by the recommendation. The Party used a methodological approach with more accurate country-specific data such as GE (in MJ/head/day) and digestibility of feed (DE in per cent) and new ash content data. The digestibility of feed (DE in per cent) was provided by the Department of Animal Feed of the Research Institute for Animal Production (in Nitra) of the National Agricultural and Food Centre and was calculated as a weighted average of calculated values from the feed ration. The digestibility was estimated on the basis of each supplemented feeding ration. Metabolizable energy and ash content for pigs were obtained from local scientific publications. GE was calculated according to another local scientific publication, from DE and feed. Nutrition data were derived from estimated daily feed intake (NIR p.277).
A.3	3.B.3 Swine – N <sub>2</sub> O (A.15, 2019) Accuracy	Investigate the possibility of elaborating more accurate Nex rate values for each subcategory of swine in order to increase the accuracy of the estimate and revise accordingly NIR table 5.37 using Nex rate values for each subcategory of swine.	Resolved. The Party reported in its NIR (p.284) and CRF table 3.B(b) a country-specific Nex rate for each subcategory of swine, based on the tier 2 method from the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.58). The Nex rates were developed on the basis of the N content of the feed and the amount of N-containing feed ingredients in the diet determined for the entire time series. Feeding rations for different subcategories of pig were estimated with feeding ration optimization software developed by the Research Institute for Animal Production (in Nitra) of the National Agricultural and Food Centre. The N intakes were determined from the crude protein content of each feed ingredient in the feeding ration for all subcategories of swine.
A.4	3.D.a.4 Crop residues – N <sub>2</sub> O and CH <sub>4</sub> (A.16, 2019) Accuracy	Revise the methodology description in the NIR taking into account the improvements made in response to the list of potential problems and further questions from the ERT, including the use of a country-specific value for sugar beet (20 kg N/ha), consideration of only below-ground residues for maize used for silage, and	Addressing. The Party reported in its NIR (p.298) and CRF table 3.D the value of N/year and the methodological approaches used for the calculation. A country-specific value for potential N nutrition of sugar beet was considered instead of the default value of the 2006 IPCC Guidelines (vol. 4, chap. 11, p.11.5), which, according to the Party, is not accurate for conditions in the country. A country-specific value of 20 kg N/ha for sugar beet was therefore used, from Torma (2017). No specific information was given in the NIR about maize used for silage but

ID#	Issue/problem classification <sup>a, b</sup>	Recommendation made in previous review report	ERT assessment and rationale
		consideration of alfalfa and clover as perennial crops with a four- and three-year rotation respectively.	<p>Slovakia reported that all above-ground residues of crops, including maize, are removed annually for domestic livestock fodder. In the case of clover and alfalfa residues, they are grown in three- and four-year rotations respectively in monocultures for seed-growing purposes. A fraction of total area that is renewed annually of 0.2 was assumed for the forage or pasture renewal, assuming a five-year renewal frequency. These values were based on expert judgment.</p> <p>The pasture grazing period is 200 days per year on average and there are specific management systems for sheep, horses and goats (and for some non-dairy cattle) (NIR pp.280–281). The occurrence of grazing was considered in CRF table 3.D under category 3.D.a.3 (urine and dung deposited by grazing animals) but a fraction of above-ground residues of alfalfa and clover removed annually for purposes such as feed bedding and the construction sector was used for calculating the annual amount of N in crop residues (NIR p.299, table 5.64), showing that crop removal by grazing during pasture was not considered in calculations of crop residues in meadows. The same was applied to alfalfa and clover residues that are clipped for fodder. The omission of above-ground biomass removal by grazing or clipping could lead to a potential overestimation of crop residues and issues of both transparency and accuracy.</p> <p>During the review, the Party clarified that mostly cereal and silage are consumed by livestock; only a limited amount of meadow is consumed. The exact amount of consumed meadow is not available, and DE values are very high but comparable with neighbouring countries. Data on feeding doses are available for key animal categories, where a tier 2 approach is used. The forage consumption from pasture is included as part of feeding rations, and other parameters for digestibility of feed are calculated on the basis of this value.</p> <p>The ERT considers that the recommendation has not yet been fully addressed because the Party did not estimate the amount of forage consumed by livestock during the 200-day grazing period or how this affects crop residue returns to the soil. The DE percentage values are higher than those expected when livestock graze meadows for 200 days per year. The calculation of crop residues and N in crop residues needs to be clarified and, if necessary, corrected by the Party. The DE percentage values should also be clarified, and this could affect CH<sub>4</sub> emissions because of the lower digestibility of feed.</p>
A.5	3.D.a.4 Crop residues – N <sub>2</sub> O (A.17, 2019) Accuracy	Investigate how to consistently report N input from straw in animal manure applied to soils (currently reported under category 3.D.a.2.a) and straw removals under category 3.D.a.4 (crop residues) and revise the estimates accordingly.	Not resolved. The Party reported in its NIR (p.280) and CRF table 3.B(b) that deep bedding containing straw was used as an animal waste management system for swine and poultry. However, N in litter used for bedding was not considered in the calculations. The Party stated in its NIR (p.293) and CRF table 3.B(b) that managed manure N, available for application to managed soils, was calculated using equation 10.34 of the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.65). For this equation, there are limited data available from the scientific literature

ID#	Issue/problem classification <sup>a, b</sup>	Recommendation made in previous review report	ERT assessment and rationale
A.6	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N <sub>2</sub> O (A.12, 2019) (A.12, 2017) Transparency	Estimate and report N <sub>2</sub> O emissions from cultivation of organic soils, or, if they are considered insignificant, report them as “NE” and justify that the likely level of emissions is below the threshold indicated in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	<p>indicating the amount of N contained in organic bedding material applied for livestock. Taking this into account, N in straw values of 0.8 and 5.5 kg N/animal/year are recommended for market and breeding swine respectively by the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.66). These N in straw values were not used by the Party.</p> <p>During the review, the Party clarified that the N content from straw in category 3.B (N<sub>2</sub>O emissions from manure management) was subtracted from the total N applied to managed soils owing to the lack of AD. The ERT asked the Party why the recommended default N in straw values were not used. The Party explained that, according to expert judgment, these values are not reliable hence were not used. Further, it noted that they are also not used by the neighbouring countries that it consulted.</p> <p>The ERT considers that the exclusion of N in straw values in deep bedding from the calculation for swine and poultry animal waste management systems results in a possible underestimation of N<sub>2</sub>O emissions from manure management and a possible overestimation of N<sub>2</sub>O emissions from crop residues of straw residues for bedding. The ERT recommends that the Party adopt the criteria of default N in straw values recommended by the 2006 IPCC Guidelines (vol. 4, chap. 10, p.10.66) to avoid possible underestimation or overestimation of N<sub>2</sub>O emissions relating to straw used for deep bedding.</p>
A.7	3.G Liming – CO <sub>2</sub> (A.18, 2019) Consistency	Ensure the consistency of the time series by investigating whether burned lime is excluded from liming products for 1990–2013, and if this is the case, modify the AD to exclude burned lime. Clarify in the NIR for which years burned lime is excluded from liming products reported as AD for this category.	<p>Resolved. The Party reported in its NIR (p.302) and CRF table 3.D that the area of organic soils is very limited on land used for agriculture. It is an area of 2,303 ha that is constant across the time series, according to information available from the National Soils Database and National Soils Register. Emissions from this source (44,078 Gg CO<sub>2</sub> eq for 2019 (NIR p.303, table 5.67)) are below the threshold of significance for all years and therefore “NE” has been used for N<sub>2</sub>O emissions in CRF table 3.D.</p> <p>Resolved. The Party reported in its NIR (pp.253–254) that excluding burned lime from liming products was performed for the time series 1990–2019. More detailed information reflecting the previous recommendation is available in the NIR.</p>
LULUCF			
L.1	4. General (LULUCF) – CO <sub>2</sub> (L.1, 2019) (L.1, 2017) (L.1, 2016) (L.1, 2015)	Continue the ongoing technical research in order to provide reliable data for estimating CSC in living biomass, dead organic matter and soil organic matter.	Addressing. In the NIR, the Party states that technical research to provide reliable data for estimating CSC in living biomass, dead organic matter and soil organic matter is continuing (NIR p.322), although no progress has been reported since the previous submission.

ID#	Issue/problem classification <sup>a, b</sup>	Recommendation made in previous review report	ERT assessment and rationale
	(66, 2014) (44, 2013) Accuracy		<p>During the review, the Party clarified that, owing to a lack of support for addressing these issues, the national LULUCF experts were unable to make the progress expected in this area. The Party will continue to report on any developments on this issue.</p> <p>The ERT considers that the Party should describe transparently in the NIR the relevant limitations to providing reliable data and to consider the 2006 IPCC Guidelines, in particular the relevant decision trees (e.g. vol. 4, chap. 1, figure 1.3), which provide guidance as to how tier 1 methods can be justified even for key categories (see also ID#s L.4 and L.5 below).</p>
L.2	4. General (LULUCF) – CO <sub>2</sub> (L.2, 2019) (L.10, 2017) Convention reporting adherence	When using default uncertainty values for parameters, use default values from the 2006 IPCC Guidelines and not from the <i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i> , and reference the source of those values.	Addressing. The Party continues to work on improving the uncertainty estimates and its progress so far and workplan are described in chapter 6.5 (pp.323–324) of the NIR. Work on the Monte Carlo simulation started in the second half of 2018 and continued throughout 2019 and 2020. Preliminary results of the application of the Monte Carlo simulation are provided in annex A6.2 to the NIR. Work will continue, subject to the availability of capacity and resources.
L.3	4.A.1 Forest land remaining forest land – CO <sub>2</sub> (L.13, 2019) Transparency	Clarify in the NIR the main data sources for harvested timber, for example by including in the NIR the information on reporting of wood harvesting volumes provided to the ERT during the 2019 review, complemented by additional information on any verification measures in place.	Resolved. The Party reported in its NIR (pp.329–330) information on and clarification of the main data sources of harvested timber and verification measures.
L.4	4.A.1 Forest land remaining forest land – CO <sub>2</sub> (L.14, 2019) Accuracy	Implement the planned improvement to move to a higher-tier method for estimating the CSC in deadwood and include natural mortality in the estimates for this category following the use of a higher-tier method for deadwood, if appropriate.	Not resolved. Slovakia has not implemented the planned improvement to move to a higher-tier method for estimating CSC in deadwood, including natural mortality, in the estimates owing to problems with the conversion of deadwood stock (m <sup>3</sup> /ha) to deadwood carbon stock (t/ha) between the first and second NFI for various reasons, including (1) relevant NFI data requested by the Slovakian NIR expert were not provided and (2) data on carbon stocks in deadwood from the first NFI were processed using a different methodology from that used for the second – data sets from the first NFI can therefore not be used to determine the CSC in the deadwood pool.
L.5	4.A.1 Forest land remaining forest land – CO <sub>2</sub> (L.15, 2019) Accuracy	Investigate whether changes to dead organic matter pools are likely to be significant and if so, include in the inventory dead organic matter estimates in line with the data obtained from the second NFI cycle and/or similar relevant national data. If it is concluded that the changes to the pools are not significant, explain this in the NIR to justify the use of the tier 1 method.	<p>Addressing. Work is continuing to obtain robust estimates of carbon stocks of the deadwood pool for the second NFI (2015–2016) and to derive CSC estimates between the first and the second NFI.</p> <p>During the review, the Party confirmed that, once the data on carbon stocks in the deadwood pool for the second NFI are available, they will be used either to further support the justification that deadwood is not a source in FM, or to apply a tier 2 approach for calculating CSC in the deadwood pool for the category forest land remaining forest land or for FM activity.</p>



<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
L.6	4.B.1 Cropland remaining cropland – CO <sub>2</sub> (L.6, 2019) (L.12, 2017) Completeness	Report the area and associated CSC in organic soils for cropland in CRF table 4.B, replacing the “NO” currently reported.	<p>Addressing. The Party reported in its NIR (p.342) that there are about 5.5 kha of organic soils, including 2.3 kha on cropland, in the country. Slovakia explained that it reported both the area and the emissions as “NE” in CRF table 4.B because the emissions are below the threshold of significance.</p> <p>The ERT considers that the recommendation has not yet been fully addressed because the Party did not report the area of 2.3 kha of organic soils on cropland in CRF table 4.B. Furthermore, the ERT considers that the assumption that emissions are below the threshold of significance is not sufficiently justified to support the use of “NE”. Following decision 24/CP.19, the Party should in this case indicate why such emissions or removals have not been estimated.</p>
L.7	4.B.1 Cropland remaining cropland – CO <sub>2</sub> (L.11, 2019) Convention reporting adherence	Improve the QC procedures to ensure that the recalculations are correctly reflected in the NIR.	Resolved. The Party provided detailed information on recalculations in chapter 6.4 of its 2020 NIR and the current NIR.
L.8	4.B.1 Cropland remaining cropland – CO <sub>2</sub> (L.16, 2019) Transparency	Investigate the options to include periodic cuttings, including, but not limited to, pruning and thinning, in the estimation of annual losses in perennial croplands and report on progress in the next annual submission.	<p>Addressing. The Party did not report on progress in estimating annual losses in perennial cropland in its NIR.</p> <p>During the review, Slovakia provided the following expert opinion: regular pruning of permanent crops (orchards and vineyards) should not be included in the estimate of annual losses owing mainly to the small area involved and the absence of historical data on changes in the area. In addition, the cut material is left in the rows when the crops are trimmed, so wood and green waste are returned to the soil in the form of mulch. The ERT noted that this information is lacking in the NIR.</p> <p>The ERT considers that the recommendation has not yet been fully addressed because the Party did not report on progress or provide in the NIR the information regarding the expert opinion that was presented during the review.</p>
L.9	4.B.1 Cropland remaining cropland – CO <sub>2</sub> (L.17, 2019) Transparency	Include in the NIR additional information regarding CSC in mineral soils in both perennial cropland remaining perennial cropland and annual cropland remaining annual cropland, highlighting the parameters and underlying assumptions behind the use of relative stock change factors that led to the estimated gains in SOC.	Resolved. The Party reported in its NIR (p.342) how it derived the emission removals in the mineral soil pool on cropland remaining cropland. Slovakia explained that full tillage is not possible for perennial cropland remaining perennial cropland so a stock change factor of 1.02, corresponding to reduced tillage, was used. For annual cropland remaining annual cropland, a stock change factor of 1.10, corresponding to no tillage, was used on the unused proportion of annual cropland remaining annual cropland. For the proportion of annual cropland remaining annual cropland that is in use, the Party applied a tier 1 method, assuming that soils are in equilibrium, with reference to the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1).

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
Waste			
W.1	5. General (waste) – CH <sub>4</sub> and N <sub>2</sub> O (W.5, 2019) Convention reporting adherence	Improve the QC procedures to ensure that the waste sector recalculations are correctly reflected in the NIR.	Resolved. The Party reported in its NIR (pp.387–388) that several sector-specific QA/QC and verification procedures were applied to AD. The Party also reported in its NIR (p.389) that, following extensive revisions and recalculations for category 5.A (solid waste disposal on land), the implementation process was finalized at the national level on 8 April 2021. The Party reported that a presentation of the new methodology and resulting emissions from municipal and industrial SWDS followed by a discussion highlighted several areas for further improvement but the principles and results of the recalculation were accepted at the national level.
W.2	5. General (waste) – CH <sub>4</sub> and N <sub>2</sub> O (W.6, 2019) Transparency	Provide information about sludge treatment in the appropriate sections of chapter 7 of the NIR.	Addressing. The Party reported in its NIR (p.411) the various types of treatment for domestic and industrial sludge from wastewater. These include direct application to land, landfilling, production of compost, incineration and temporary storage on site. The amounts landfilled are considered in chapter 7.5.2 (non-municipal disposal sites (industrial)) and chapter 7.7.1 (waste incineration). However, in chapter 7.6, on the biological treatment of solid waste, no reference is made to sludge.  The ERT considers that the recommendation has not yet been addressed because the Party did not include information about sludge in the section of its NIR referring to the biological treatment of solid waste.
W.3	5.A Solid waste disposal on land – CH <sub>4</sub> (W.7, 2019) Convention reporting adherence	Correct the error in table 7.7 of the NIR regarding the amount of MSW treated in SWDS and enhance the QC activities carried out in the process of finalizing the waste sector entries in the NIR.	Resolved. The Party reported in its NIR (p.393) and in CRF table 5.A the same amount of total annual waste treated in SWDS of 1,294,811 t for 2019, demonstrating that the QC activities have been enhanced.
W.4	5.A Solid waste disposal on land – CH <sub>4</sub> (W.8, 2019) Transparency	Explain in the NIR that the emissions from non-municipal waste disposal sites are included in the emissions reported in CRF table 5.A.	Resolved. The Party reported in its NIR (p.397) that emissions from non-municipal waste from industrial, agricultural and other non-municipal activities are included in the emissions reported in CRF table 5.A, as explained in chapter 7.5.2 of the NIR.
W.5	5.D Wastewater treatment and discharge – CH <sub>4</sub> and N <sub>2</sub> O (W.9, 2019) Transparency	Update NIR figure 7.5 to represent population values and wastewater discharge pathways for domestic and industrial wastewater in the latest year of the inventory.	Resolved. The Party reported in figure 7.8 of its NIR (p.409) the typical balance of wastewater discharge pathways for domestic and industrial wastewater, representing population values. This balance is based on data for 2019 from the Statistical Office of the Slovak Republic and the NIR states that it is used for documentation only – not for modelling.
W.6	5.D.2 Industrial wastewater – N <sub>2</sub> O (W.10, 2019) Convention reporting adherence	Correct the erroneous reference to CH <sub>4</sub> emissions in NIR chapter 7.8.2.2. Further, provide in the NIR additional information about why there is such a high uncertainty of N <sub>2</sub> O emissions due to the N <sub>2</sub> O EF from industrial wastewater treatment.	Addressing. The Party reported in its NIR (p.414) that the uncertainty of N <sub>2</sub> O emissions from industrial wastewater ranges from –40 to 31 per cent. Uncertainties were corrected according to new expert knowledge and harmonized with the CH <sub>4</sub> uncertainty values.

ID#	Issue/problem classification <sup>a, b</sup>	Recommendation made in previous review report	ERT assessment and rationale
W.7	5.D.2 Industrial wastewater – CH <sub>4</sub> (W.11, 2019) Transparency	Include in the NIR the reason for sludge removed being reported as “NE” in CRF table 5.D.	<p>During the review, the Party clarified that approach 1 was carried out for the uncertainty calculation using table 3.2 (vol. 5, chap. 3, p.3.15) of the 2006 IPCC Guidelines. According to the recalculation, the uncertainty of CH<sub>4</sub> emissions from industrial wastewater with applied uncertainty of individual calculation parameters (TOW, ±15 per cent; B<sub>0</sub>, ±20 per cent; and methane correction factor, ±25 per cent) led to an estimated range of uncertainty of CH<sub>4</sub> emissions of –50 to 80 per cent. The Party also clarified that the uncertainty of N<sub>2</sub>O emissions from industrial wastewater depends on the uncertainty of measured N<sub>total</sub> (treated + untreated) in effluent from wastewater treatment plants (national expert value: ±25 per cent) and uncertainty of EFeffluent (national expert value: from –90 to 100 per cent). The total uncertainty of N<sub>2</sub>O emissions from industrial wastewater is between –95 and 150 per cent.</p> <p>The ERT considers that the recommendation has not yet been addressed because the Party did not include in the NIR the explanation provided during the review for the high value of uncertainty of N<sub>2</sub>O emissions.</p> <p>Resolved. The Party reported in CRF table 5.D the amounts of sludge removed from industrial wastewater.</p>
KP-LULUCF			
KL.1	General (KP-LULUCF) (KL.9, 2019) Transparency	Indicate the correct accounting period in the CRF accounting table.	Resolved. The Party indicated the correct accounting period in the CRF accounting table.
KL.2	Deforestation – CO <sub>2</sub> (KL.11, 2019) Accuracy	Recalculate the deforestation estimates by using correctly the carbon content values in the estimation of above-ground biomass losses and report them in the next annual submission.	Resolved. The Party recalculated the entire time series for deforestation for the second commitment period and reported the recalculation in its 2020 NIR (p.420).
KL.3	FM – general (KL.4, 2019) (KL.1, 2017) (KL.6, 2016) (KL.6, 2015) Transparency	Make the improvements required to ensure methodological consistency between the FMRL and the reporting of emissions and removals from FM, particularly in the methodological approach used to estimate the contribution of HWP, including the application of a technical correction to the FMRL.	Resolved. The methodological approach to estimating the contribution of HWP has been reported in the NIR (p.445). The remaining methodological inconsistencies are addressed in ID# KL.4 below.
KL.4	FM – CO <sub>2</sub> (KL.5, 2019) (KL.9, 2017) Accuracy	Explain the main factors responsible for the reporting of a greater sink during the commitment period compared with the FMRL, with the aim of showing that the accounting quantity can be	Addressing. The Party reported in its NIR (p.445) that it plans to discuss with the Joint Research Centre of the European Commission the main factors responsible for the reporting of a greater sink during the commitment period compared with the FMRL.

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation made in previous review report</i>	<i>ERT assessment and rationale</i>
		explained by deviations in policy assumptions compared with those included in the FMRL rather than by differences in the factors/parameters, including increments, used in the FMRL and in the actual estimates of emissions and removals, as requested in the Kyoto Protocol Supplement.	During the review, the Party clarified that the final technical corrections of the FMRL will be implemented by the Joint Research Centre during 2021 and 2022. Negotiations are currently under way on this issue between national and Joint Research Centre LULUCF experts.
KL.5	FM – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (KL.6, 2019) (KL.10, 2017) Accuracy	Report the correct FM cap (20,796.023 kt CO <sub>2</sub> eq) in the CRF accounting table.	Not resolved. The Party reported a cap of 20,548.13 kt CO <sub>2</sub> eq in its CRF accounting table, which does not correspond to the value of 20,796.023 kt CO <sub>2</sub> eq presented in the report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Slovakia (FCCC/IRR/2016/SVK, p.11).  During the review, the Party clarified that the FM cap is recalculated regularly on the basis of the most recent total GHG emissions.  The ERT notes, however, that paragraph 12 of decision 6/CMP.9 states that the accounting quantity for the FM cap shall be calculated on the basis of the base year or period emissions reported in the annual GHG inventory report due by 15 April 2015, taking into account any corrections or adjustments made during the review process of that report, and shall remain fixed for the second commitment period. This is the basis for the recommendation that the FM cap be reported in the CRF accounting table as 20,796.023 kt CO <sub>2</sub> eq, consistent with the value in the above-mentioned report (FCCC/IRR/2016/SVK, p.11).
KL.6	FM – CO <sub>2</sub> (KL.12, 2019) Transparency	Include the information on how deforestation areas are distinguished from temporarily unstocked areas under FM in the NIR.	Resolved. The Party provided information on how deforestation areas are distinguished from temporarily unstocked areas under FM in chapter 11.4.3 of the NIR.
KL.7	FM – CO <sub>2</sub> (KL.13, 2019) Transparency	Continue to analyse the values of carbon content by different types of soils and site conditions, characterizing different types of forests, and report on this in the NIR. In addition, provide in the NIR further evidence that the deadwood pool is not a source under FM.	Addressing. Work is continuing to evaluate NFI data on deadwood (see also ID# L.1 above).

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

<sup>b</sup> The report on the review of the 2020 annual submission of Slovakia was not available at the time of this review. Therefore, the recommendations reflected in this table are taken from the 2019 annual review report. For the same reason, 2020 and 2018 are excluded from the list of review years in which issues could have been identified.

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

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2021 annual submission of Slovakia, and had not been addressed by the Party at the time of publication of this review report.

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

<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed<sup>a</sup></i>
General	No issues identified.	
Energy		
E.3	Explain in the NIR the high value of the CO <sub>2</sub> IEF for solid fuels in category 1.A.1.c (manufacture of solid fuels and other energy industries).	3 (2017–2021)
E.6	Estimate and report CH <sub>4</sub> emissions from solid fuels for category 1.A.4 using at least a tier 2 methodology (in accordance with the 2006 IPCC Guidelines) if the emissions are identified as key, and if this is not practical, explain in the NIR any national circumstances that may affect this issue.	3 (2017–2021)
IPPU		
I.3	Report the AD used in the estimation of CO <sub>2</sub> emissions from urea used in catalytic converters (i.e. equal to 5–7 per cent of fuel consumption for EURO 5 and 3–4 per cent for EURO 6 diesel oil passenger and heavy-duty vehicles) and explain in the NIR how those CO <sub>2</sub> emissions are estimated.	3 (2017–2021)
Agriculture	No issues identified.	
LULUCF		
L.1	Continue the ongoing technical research in order to provide reliable data for estimating CSC in living biomass, dead organic matter and soil organic matter.	6 (2013–2021)
L.2	When using default uncertainty values for parameters, use default values from the 2006 IPCC Guidelines and not from the <i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i> , and reference the source of those values.	3 (2017–2021)
L.6	Report the area and associated CSC in organic soils for cropland in CRF table 4.B, replacing the “NO” currently reported.	3 (2017–2021)
Waste	No issues identified.	
KP-LULUCF		
KL.4	Explain the main factors responsible for the reporting of a greater sink during the commitment period compared with the FMRL, with the aim of showing that the accounting quantity can be explained by deviations in policy assumptions	3 (2017–2021)

<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed<sup>a</sup></i>
	compared with those included in the FMRL rather than by differences in the factors/parameters, including increments, used in the FMRL and in the actual estimates of emissions and removals, as requested in the Kyoto Protocol Supplement.	
KL.5	Report the correct FM cap (20,796.023 kt CO <sub>2</sub> eq) in the CRF accounting table.	3 (2017–2021)

<sup>a</sup> Reports on the reviews of the 2018 and 2020 annual submissions of Slovakia have not yet been published. Therefore, 2018 and 2020 were not included when counting the number of successive years for this table. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive reviews and 2015/2016 is counted as one year.

## V. Additional findings made during the individual review of the Party's 2021 annual submission

10. Table 5 presents findings made by the ERT during the individual review of the 2021 annual submission of Slovakia that are additional to those identified in table 3.

Table 5

### Additional findings made during the individual review of the 2021 annual submission of Slovakia

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?<sup>a</sup></i>
General			
G.6	Key category analysis	<p>In annex 1 to the NIR, the Party provided only the summary table of key categories, following the structure of table 4.4 of the 2006 IPCC Guidelines (vol. 1, chap. 4, p.4.20). The results of the key category analysis (individual and cumulative percentage contributions from key categories to the national total) were not provided in the NIR.</p> <p>During the review, Slovakia provided the ERT with the calculation spreadsheets for a key category analysis using tables 4.2 and 4.3 of the 2006 IPCC Guidelines (vol. 1, chap. 4, pp.4.14 and 4.16).</p> <p>The ERT recommends that the Party include in the NIR the results of the key category analysis in accordance with paragraphs 39 and 50(d) of the UNFCCC Annex I inventory reporting guidelines.</p>	Yes. Convention reporting adherence
G.7	NIR	<p>In table A2.1 of annex 2 to the NIR, "NE" is used to report CO<sub>2</sub> and CH<sub>4</sub> emissions for energy sector category 1.B.2.a.5 (distribution of oil products) and "IE" to report CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions for energy sector category 1.A.3.b (road transportation) and waste sector categories 5.C (incineration and open burning of waste) and 5.D (wastewater treatment and discharge). These categories are, however, missing from CRF table 9.</p> <p>During the review, Slovakia clarified that the inconsistency between CRF table 9 and table A2.1 of annex 2 to the NIR was due to a transcription error that arose when using the CRF Reporter software.</p> <p>The ERT encourages the Party to ensure consistency between CRF table 9 and the NIR.</p>	Not an issue/problem

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?<sup>a</sup></i>
Energy			
E.10	1.A.5.a Stationary – biogas – CO <sub>2</sub>	<p>The description of category 1.A.5.a (fuel combustion activities – other – stationary) emission estimates and sources in the NIR is very brief (p.106) and not transparent regarding the sources of emissions. It is unclear whether emissions from flared LFG are included in the emissions under this category or under the waste sector, as no relevant information is provided in the NIR chapter on the waste sector.</p> <p>During the review, the Party stated that emissions from LFG flared with energy use are reported (together with other types of biogases) under category 1.A.5.a. The Party clarified that the emissions from LFG and sludge gas allocated to category 1.A.5 (fuel combustion activities – other) are mainly from wastewater treatment plants and emissions allocated under category 1.A.1.a (fuel combustion activities – energy industries – public electricity and heat production) are from cogeneration plants. Furthermore, Slovakia stated that the GHG emission estimation is performed using a country-specific NCV for certain AD and the default EFs for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O provided in the 2006 IPCC Guidelines (vol. 2, chap. 2), and that the inter-annual fluctuation of NCV is between 20.9 and 22.0 TJ/Tm<sup>3</sup>. The Party clarified that CO<sub>2</sub> emissions from LFG and sludge gas consumption are allocated under biomass and are reported as a memo item, with only CH<sub>4</sub> and N<sub>2</sub>O emissions from LFG cogeneration and energy use included in the inventory total.</p> <p>The ERT recommends that the Party clearly describe in the NIR the methods, data and parameters used for calculating emissions of LFG and sludge gas for categories 1.A.1.a (fuel combustion activities – energy industries – public electricity and heat production) and 1.A.5.a (fuel combustion activities – other – stationary), as well as the links of these categories with waste sector reporting.</p>	Yes. Transparency
E.11	1.B.1.a Coal mining and handling – solid fuels – CO <sub>2</sub> and CH <sub>4</sub>	<p>The Party reported in its NIR (p.120) that CO<sub>2</sub> emissions for 1.B.1.a (coal mining and handling) are estimated using CO<sub>2</sub> EFs based on the expert judgment of Hornonitrianske Bane Prievidza mining company, and that the same EFs were used for the Dolina and Čáry mines because their depth is the same as that of the mines of Hornonitrianske Bane Prievidza. The ERT noted that the NIR lacks transparency on the source of the CO<sub>2</sub> EF used and the basis for the expert judgment.</p> <p>During the review, the Party clarified that no EFs are used and CO<sub>2</sub> emission estimates are based on measurements provided by Hornonitrianske Bane Prievidza of mining gases in the venting systems of its mines. Slovakia also clarified that the coal production data in table 3.52 of the NIR (p.119) are incorrect. The Party explained that coal mines in all regions of the country will be closed in 2023; therefore, no mining activity will be reported from 2024 onward. Owing to this situation, there are currently no experts on this issue available and it will not be possible to improve the information provided to the ERT during the review in the future.</p> <p>The ERT recommends that the Party ensure the consistency of the coal production data provided in NIR table 3.52 and the CRF tables and increase the transparency of the description of the method of estimating CO<sub>2</sub> emissions for category 1.B.1.a (coal mining and handling) in the NIR by including the details on the Hornonitrianske Bane Prievidza mining company measurements and the application of these estimates to other mines that were provided to the ERT during the review.</p>	Yes. Transparency
E.12	1.B.1.b Solid fuel transformation – solid fuels – CH <sub>4</sub>	<p>The Party reported in its NIR (p.120) that fugitive CH<sub>4</sub> emissions from solid fuel transformation were calculated using a tier 1 default approach based on tables 1-13–1-14 of the Revised 1996 IPCC Guidelines (vol. 3, chap. 1) because there is no methodology available in the 2006 IPCC Guidelines for this category. The ERT noted that use of methodologies outside the 2006 IPCC Guidelines is acceptable when it can be justified and should reflect the best information available that is applicable to the Party's circumstances. The ERT further noted that the 2019 Refinement to the 2006 IPCC</p>	Not an issue/problem

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
E.13	1.B.2.b Natural gas 1.B.2.c Venting and flaring – natural gas – CH <sub>4</sub>	<p>Guidelines, although its use is not mandatory, includes new EFs for fugitive CH<sub>4</sub> emissions from charcoal production (vol. 2, chap. 4, table 4.3.3) based on more recent scientific studies than those used for the Revised 1996 IPCC Guidelines.</p> <p>During the review, the Party clarified that no comparison had been performed of the EFs for fugitive CH<sub>4</sub> emissions from charcoal production in the Revised 1996 IPCC Guidelines (vol. 3, chap. 1, tables 1-13–1-14) and those in the 2019 Refinement to the 2006 IPCC Guidelines (vol. 2, chap. 4, table 4.3.3).</p> <p>The ERT encourages the Party to use the best and most recent information available when developing emission estimates for categories for which no methods are available in the 2006 IPCC Guidelines. The ERT also encourages the Party to compare the EFs and NCVs in the Revised 1996 IPCC Guidelines with those in the 2019 Refinement to the 2006 IPCC Guidelines and describe in the NIR the reasons for the method and sources chosen.</p> <p>The Party reported in its NIR (p.124) that a new tier 3 method was implemented for categories 1.B.2.b.4 (natural gas transmission and storage) and 1.B.2.c.1.ii (venting of gas). The ERT noted that the previous review report (FCCC/ARR/2019/SVK) included a recommendation to move to a higher-tier approach in accordance with the decision tree in the 2006 IPCC Guidelines (see ID# E.9 in table 3). The ERT also noted that the description of the tier 3 methodology in the NIR is not sufficiently transparent, with no details of the measurement techniques or the modelling approach.</p> <p>During the review, the Party provided a detailed background methodology report and data-collection files, which included the measurement methods, the data reported from companies, the source categories and a trend analysis.</p> <p>The ERT recommends that the Party improve the transparency of the description in the NIR of the methodology used to estimate category 1.B.2.b.4 and 1.B.2.c.1.ii emissions by including summary information on the sources of emissions in these categories (e.g. valves or compressors), the method of measurement or estimation (e.g. infrared camera, Bacharach Hi Flow sampler or specific EFs), the method of back calculation of emissions for years before 2013 (e.g. the extrapolation approach or proxy data used) and the verification of the results.</p>	Yes. Transparency
IPPU			
I.6	2.A.1 Cement production – CO <sub>2</sub>	<p>The Party did not include in table 4.7 of its NIR (p.145) the estimated values of magnesium oxide content for 1990, 1995 or 2000, but explained that these values were estimated using a formula provided below the table. The formula contains the wording “CaO content” on both right and left sides of the equation.</p> <p>During the review, the Party stated that there is an explanation in the NIR (p.146) regarding the missing values of magnesium oxide content. Regarding the formula, the CaO content on the left side is aggregated, or hypothetical, and the CaO content on the right side is the CaO content in the cement clinker.</p> <p>The ERT recommends that the Party include the estimated values of magnesium oxide content in table 4.7 of the NIR with notation explaining how these values were estimated. The ERT also recommends that the Party adopt different wording or symbols for aggregated CaO content and CaO content in the cement clinker.</p>	Yes. Transparency
I.7	2.A.1 Cement production – CO <sub>2</sub>	<p>In the NIR (p.146), the Party did not include the values of cement kiln dust or the mass of slag entering used to estimate the correction factor. The ERT noted that verification of the calculated values of the correction factor is not possible without these values.</p> <p>During the review, the Party provided a table with the values of cement kiln dust and mass of slag entering.</p>	Yes. Transparency



ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
I.8	2.A.2 Lime production – CO <sub>2</sub>	<p>The ERT recommends that the Party provide in the NIR the average values of cement kiln dust and mass of slag entering used to estimate the correction factor, while safeguarding confidentiality, in order to facilitate the verification process.</p> <p>In Slovakia, lime is produced in the sugar, and pulp and paper industries. The raw material used to produce lime in the sugar industry is mineral-based and in the pulp and paper industry it is biomass, although this was not reported in the NIR but was clarified by the Party during the review. In its NIR (p.148), the Party stated that “because of no detailed data about back capturing of CO<sub>2</sub> in the lime and due to the ensuring of conservatism, no capturing of CO<sub>2</sub> is reported in the inventory”.</p> <p>During the review, the Party referred to its NIR (p.148), in which it explained how lime is produced and the assumptions made when estimating the associated CO<sub>2</sub> emissions. Further, Slovakia stated that the sugar plants produce lime without using biomass, and the pulp and paper plant produces lime with biogenic CO<sub>2</sub>, which is not reported as part of the emissions for the category.</p> <p>The ERT encourages the Party to improve its description in the NIR regarding the industries producing lime, including how they produce it, and make efforts to estimate the CO<sub>2</sub> captured during the use of lime for sugar production, as not estimating the CO<sub>2</sub> captured might lead to an overestimation of emissions.</p>	Not an issue/problem
I.9	2.A.3 Glass production – CO <sub>2</sub>	<p>The Party reported in its NIR (p.149) an IEF for glass production of 0.057 t/t glass produced, whereas the 2006 IPCC Guidelines (vol. 3, chap. 2.4.1.2) recommend an EF of 0.20 t/t glass produced for the tier 1 method. This is a significant difference and the explanation provided in the NIR regarding how this IEF was estimated or why the value is so low is limited. Slovakia also stated in the NIR (p.149) that “this value is much lower than the default factor used proposed in the 2006 IPCC Guidelines. It is caused by using alternative additions to raw materials as calumite, colemanit[e] or clay as well as by using of recycled glass”.</p> <p>During the review, the Party stated that the CO<sub>2</sub> emissions were calculated using a tier 3 methodology based on carbonate consumption. Slovakia also explained that using the tier 1 EF (0.2) with average cullet ratio (0.5) led to the IEF of 0.1 and, as the country used alternative additions to raw materials, the IEF is lower than 0.1, so the value of 0.057 is reasonable.</p> <p>However, the ERT notes that according to the 2006 IPCC Guidelines (vol. 1, chap. 6, p.6.13), “inventory compilers should compare country-specific factors with relevant IPCC default EFs, taking into consideration the characteristics and properties on which the default factors are based. The intent of this comparison is to determine whether country-specific factors are reasonable, given similarities or differences between the national source/sink category and the ‘average’ category represented by the defaults. Large differences between country-specific factors and default factors do not necessarily indicate problems, but nevertheless may point to quality issues if the differences cannot be explained”.</p> <p>The ERT recommends that the Party include in the NIR a comparison between the country-specific EF with the tier 1 default value from the 2006 IPCC Guidelines (vol. 3, chap. 2.4.1.2) (using the following equation for calculating the difference, <math>(0.1 - 0.057)/0.1 = x100\%</math>, which leads to a reduction in estimated emissions of 43 per cent) and explain the large difference between the country-specific EF and the tier 1 default value, in accordance with the 2006 IPCC Guidelines QC procedure (vol. 1, chap. 6, p.6.13).</p>	Yes. Transparency
I.10	2.B.1 NH <sub>3</sub> production – CO <sub>2</sub>	<p>The Party reported in its NIR (p.155) an IEF of 1.4 t CO<sub>2</sub>/t NH<sub>3</sub> for ammonia production. The ERT noted that the country-specific EF is lower than the range of default values of EFs recommended in the 2006 IPCC Guidelines (vol. 3, chap. 3, table 3.1), which is 1.694–3.273 t CO<sub>2</sub>/t NH<sub>3</sub> produced, and no explanation was provided by the Party regarding this.</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
		<p>During the review, the Party clarified that the difference is caused by subtracting CO<sub>2</sub> used for urea production, as without the subtraction, the IEF would be 1.6723 t/t NH<sub>3</sub>.</p> <p>The ERT recommends that the Party include in its NIR an explanation as to why the country-specific EF is lower than the range of EF default values of 1.694–3.273 t CO<sub>2</sub>/t NH<sub>3</sub> produced recommended in the 2006 IPCC Guidelines (vol. 3, chap. 3, table 3.1).</p>	
Agriculture			
A.8	3.D.a.4 Crop residues – N <sub>2</sub> O	<p>In table 5.62 of its NIR, the Party reported unusually high values of crop residues and incorrect units for crop yields (for 1990 through 2019). The procedure used to estimate “CROP” is not clear, and apparently refers to the total amount of crop residues. “CROP YIELD” is expressed in kg N/year and this unit does not correspond to crop yield. The procedure used to calculate crop residues, crop yields and N content should be clearly explained and the inconsistencies in units corrected. Taking this into account, the ERT noted that tables 5.62 and 5.63 in the NIR (pp.298–299) contain inconsistencies and possibly errors (e.g. 1990 through 2019) in the calculation of crop residues and N in crop residues.</p> <p>The ERT recommends that the Party clearly explain in the NIR the procedure used to calculate crop residues, crop yields and N content and correct the units used in NIR tables 5.62 and 5.63.</p>	Yes. Transparency
LULUCF			
L.10	Land representation	<p>The Party presents an overview of development trends in the areas of all categories of the sector for 1970–2019 in figure 6.2 of its NIR (p.318). The ERT noted that abrupt changes in the areas of settlements and other land occurred around 1995 (i.e. the area of settlements doubled from approximately 110 to 220 kHa and the area of other land decreased from approximately 250 to 140 kHa) and that data for 2016–2019 are missing for all categories.</p> <p>During the review, the Party clarified that the figure is not complete owing to a technical issue that occurred during the finalization of the NIR, and that a question on the abrupt changes had been resolved by the ERT during the 2011 review. The ERT noted that this was indeed the case and that the ERT in 2011 recommended that “Slovakia provide an explanation for the cause of this abrupt increase in the land area in the NIR” (FCCC/ARR/2011/SVK, paras. 115 and 117). The ERT considers that the information should continue to be included in future NIRs.</p> <p>The ERT recommends that Slovakia provide in the NIR an explanation for the cause of the abrupt increase in the areas of settlements and decrease in other land occurring around 1995 and report land representation data for 2016 onward.</p>	Yes. Transparency
L.11	4. General (LULUCF) – CO <sub>2</sub> and N <sub>2</sub> O	<p>The Party reported in its NIR (p.342) that the area of organic soils (histosols) is about 5.5 kha and the total area of organic soils on cropland is 2.3 kha. The ERT noted that, in the NIR, only the area of 2.3 kha on cropland is discussed and that the Party reported that because emissions from this source are below the threshold of significance across the entire time series, “NE” is used for category 4.B (cropland) (p.342). The ERT also noted that, although an area of 2.3 kha of organic soils on cropland is reported in the NIR, the area of organic soils on cropland is reported as “NE” in CRF table 4.B, which is not consistent with paragraph 37 of the UNFCCC Annex I inventory reporting guidelines, as the Party did not sufficiently justify its assumption that emissions are below the threshold of significance, particularly considering that only 2.3 of 5.5 kha were considered. Furthermore, the ERT noted that other area values have been suggested in the scientific literature, such as 26 kha (Fazekášová et al., 2021), 35 kha (table 1 in Montanarella et al., 2006), and 60 kha (table 1 in Tanneberger et al., 2017).</p>	Yes. Completeness

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
L.12	4. General (LULUCF)	<p>During the review, the Party clarified that a soil survey and laboratory analyses will be carried out in 2021 to determine whether the 5.5 kha value, including the 2.3 kha on cropland, referred to in the NIR as organic soils does in fact meet the conditions of organic soils according to the 2006 IPCC Guidelines (vol. 4, chap. 3, annex 3A.5) and whether the total area value of 5.5 kha remains correct, as the Party considers it likely that the figure is out of date.</p> <p>The ERT recommends that the Party review its estimates of the area of organic soils, in particular as other area values have been suggested in the scientific literature, such as 26 kha (Fazekašová et al., 2021), 35 kha (table 1 in Montanarella et al., 2006), and 60 kha (table 1 in Tanneberger et al., 2017). The ERT also recommends that the Party ensure that it reports on the entire area of organic soils, and include an analysis demonstrating that emissions are below the significance threshold or, alternatively, report estimates.</p> <p>The Party reported in its NIR the area of and emissions from organic soils as “NE” in CRF table 4.B (see also ID# L.11 above). The ERT noted that there is no information on the use of “NE” for emissions from organic soils reported in CRF table 9, which is not in accordance with paragraph 37 of the UNFCCC Annex I inventory reporting guidelines.</p> <p>During the review, the Party clarified that it included table A2.7, which contains information on notation keys used for the LULUCF sector and KP-LULUCF, in annex 2 to its NIR as a result of technical constraints it frequently encountered when using the CRF Reporter software. The ERT noted that table A2.7 does not include information on the use of “NE” for AD and EFs for organic soils on cropland and the table is not comparable with CRF table 9 as it contains information on notation keys that are not associated with completeness, namely “NE” and “IE”.</p> <p>The ERT recommends that the Party, if reporting the area of and emissions from organic soils as “NE” in CRF table 4.B, ensure that it explains in CRF table 9 the notation key used.</p>	Yes. Convention reporting adherence
L.13	4.A.1 Forest land remaining forest land – CO <sub>2</sub>	<p>The Party reported in its NIR (p.331) how deadwood volume on forest land was obtained. The ERT noted that no explanation was provided for the conversion of this volume to the carbon stock presented on page 331 of the NIR.</p> <p>During the review, Slovakia explained that it used the methodology described in the cropland chapter of its NIR (p.344) to convert deadwood volume to biomass and carbon. The methodology involves the application of reduction coefficients obtained from the 2021 NIR of Czechia to account for the decrease in wood density during decomposition and a default carbon content (0.5 t C/t biomass). The ERT noted that the reduction coefficients used in the NIR of Czechia are applicable to the methodology of deadwood collection in that country on the basis of the following decomposition classes: (1) basically solid wood; (2) peripheral layers soft, central hard; (3) peripheral layers hard, central soft; and (4) totally rotten wood (Czechia 2021 NIR p.289). However, Slovakia uses a different classification of decomposition classes, namely fresh, hard, soft and decomposed deadwood (NIR p.344).</p> <p>The ERT recommends that Slovakia justify the conversion of deadwood volume to biomass and carbon, as well as its use and the applicability of reduction factors for deadwood in different decomposition stages used by Czechia. The ERT also recommends that Slovakia present its methodology for the conversion and use of reduction factors from the NIR of Czechia more clearly and consistently for the relevant categories.</p>	Yes. Transparency
L.14	4.A.2 Land converted to forest land	<p>The Party identified in its NIR (p.324 and table A1.1 of annex 1) land conversions to forest land as a key category but applied a tier 1 approach to estimate emissions or removals for living biomass, namely equation 2.7 of the 2006 IPCC Guidelines (vol. 4, chap. 2, p.2.12), including the assumption that biomass on land prior to conversion to forest land is not</p>	Yes. Accuracy

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
		<p>removed (NIR p.325). The ERT noted that the Party did not report whether a particular subcategory is significant, namely whether it accounts for 25–30 per cent of emissions or removals for the overall category, as per the decision tree in figure 1.3 of the 2006 IPCC Guidelines (vol. 4, chap. 1, p.1.13), in order to identify whether a tier 1 approach would be appropriate.</p> <p>During the review, the Party presented to the ERT a draft calculation for living biomass using equations 2.15 and 2.16 of the 2006 IPCC Guidelines (vol. 4, chap. 1, p.2.20), representing a tier 2 approach. The ERT noted that, as the calculation is based on IPCC default values for the biomass stock before and after conversion, it is not appropriate for the tier 2 approach under the 2006 IPCC Guidelines (vol. 4, chap. 4.3.1.1). The Party also did not sufficiently justify (e.g. through a study) the assumption that biomass on land prior to conversion to forest land is not removed.</p> <p>The ERT recommends that the Party further investigate whether the subcategories under land converted to forest land are significant and consider implementing a higher-tier approach, if appropriate, after considering the available data and the significance of the subcategory. If a tier 1 approach is then applied, the ERT recommends that the Party include, in the NIR, a more detailed justification of the assumption that biomass on land prior to conversion to forest land is not removed.</p>	
	Waste		
W.8	5.A.1 Managed waste disposal sites – CO <sub>2</sub>	<p>The Party reported in its NIR (p.396) that emissions from LFG flared with energy use are provided in CRF table 5.A.1.a for 2011 onward without providing AD. The ERT noted that this could lead to double counting if the emissions associated with LFG were also reported under the energy sector (see ID# E.10 above).</p> <p>During the review, the Party clarified that emissions from cogeneration of LFG are not explicitly mentioned in the waste chapter of the NIR because they are processed and reported (together with other types of biogases) using a standard procedure, which is practically identical to that used for fossil fuels, under the energy sector, according to the 2006 IPCC Guidelines (vol. 2, chap. 2). The source of LFG AD (amount of gas burned) is adopted from the disaggregated energy balance data at the plant level provided by the Statistical Office of the Slovak Republic. The emissions from LFG are allocated under category 1.A.5.a (fuel combustion – other – stationary).</p> <p>The ERT recommends that the Party correct the erroneous references in which the burning of LFG is allocated under the waste sector in the waste chapter of the NIR and clearly indicate the amounts of gas burned and its characteristics in the relevant sections of the NIR.</p>	Yes. Transparency
W.9	5.D.1 Domestic wastewater – N <sub>2</sub> O	<p>The Party reported in its NIR (p.37) that the source of input data for protein consumption is table 5-8 of the Statistical Yearbook of Slovakia for the relevant year and the State of the Environment report for 2019. However, in the NIR (p.388) the Party states that data on protein consumption are not published annually by the Statistical Office of the Slovak Republic, so relevant data from FAOSTAT are used. The ERT noted this inconsistency.</p> <p>During the review, the Party clarified that the statement in the NIR (p.388) regarding the use of FAOSTAT data is incorrect, as, since 2018, information on protein consumption has been provided by the Statistical Office of the Slovak Republic (table 5-8) and this source of data is used for the entire time series.</p> <p>The ERT recommends that the Party correct the reference to the sources of information regarding protein consumption in the relevant sections of the NIR, specifically that it deletes the reference to FAOSTAT data being the source of protein consumption.</p>	Yes. Convention reporting adherence

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?<sup>a</sup></i>
W.10	5.D.1 Domestic wastewater – N <sub>2</sub> O	<p>The Party reported in its NIR (p.389) that protein consumption for category 5.D.1 (wastewater treatment and discharge – domestic wastewater) was updated for 2018 on the basis of new statistical data provided by the Statistical Office of the Slovak Republic without referring to similar recalculations applied to the remaining time series.</p> <p>During the review, the Party clarified that protein consumption values for a given year are not available when preparing the new inventory for that year. Therefore, the value of protein consumption for the calculation is always estimated on the basis of the entire time series, using expert judgment, and the value for the previous year is corrected at the same time. For example, in the current submission, protein consumption for 2018 is final, having been recalculated, but for 2019 is preliminary and will be updated in the next annual submission. The Statistical Office of the Slovak Republic reports final values in January, so will only report in January 2022 for 2019.</p> <p>The ERT recommends that the Party include in the relevant sections of the NIR an explanation of (1) how the protein consumption values are estimated, (2) how provisional data for the latest year are presented and then, the following year, recalculated with the final value and (3) the recalculation.</p>	Yes. Transparency
KP-LULUCF			
KL.8	AR – CO <sub>2</sub>	<p>The Party reported net CSC in deadwood in CRF table 4(KP-I)A.1 as “NO”. The ERT could not find a justification for the assumption that deadwood is not a net source of emissions on AR land, which is a key category. Further, the ERT noted that the Party reported information in the NIR (p.436) suggesting an accumulation of deadwood on AR land that could potentially lead to emissions in clearings when wood is not removed from the forest.</p> <p>During the review, the Party clarified that it is not possible to estimate deadwood stocks or the CSC for AR because AD on the amount of living biomass felled in forests before the final extraction of the merchantable timber are not available. The Party confirmed that, given the information reported, the use of “NO” is not correct.</p> <p>The ERT recommends that the Party identify whether the deadwood pool is significant and, if not significant, report net CSC in deadwood in CRF table 4(KP-I)A.1 as “NE” and include an appropriate justification for the use of this notation key, or, if significant, taking into consideration that AR is a key category, provide estimates for the deadwood pool under AR. In the latter case, the Party should demonstrate that no underestimation of emissions attributable to the accumulation of deadwood in clearings when wood is not removed from the forest has occurred.</p>	Yes. Completeness
KL.9	FM – CO <sub>2</sub>	<p>In support of its assumption that deadwood, litter and mineral soils under FM are not net sources of emissions, the Party reported in its NIR (p.440) that this assumption is also made by other countries, for example Austria and Germany.</p> <p>The ERT noted that it is not correct that Austria and Germany assume that deadwood, litter and mineral soils are not considered to be a source of net emissions. In Austria’s 2021 NIR (chapter 6.2.4.1.2 for deadwood and 6.2.4.1.3 for litter and mineral soils), the Party reported on the application of a model to estimate these pools. In Germany’s 2021 NIR (chapter 6.4.2.3 for deadwood and 6.4.2.4 for litter and soil), the Party stated that it applies a tier 2 approach to estimating emissions from these pools.</p> <p>During the review, the Party agreed that it did not correctly report the assumptions made by Austria and Germany that it used to justify its approach.</p> <p>The ERT recommends that the Party revise its justification that deadwood, litter and mineral soils under FM are not net sources of emissions or revise its estimates of emissions and removals from deadwood, litter and mineral soils under FM and remove any incorrect statements from the NIR.</p>	Yes. Transparency

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
KL.10	FM – CO <sub>2</sub>	<p>The Party reported on page 441 in its NIR that no changes in data or methods were made since its 2017 submission, but on page 444, it reported that emissions and removals for FM activities were recalculated. The ERT noted that this information is not consistent.</p> <p>During the review, the Party clarified that the whole time series of emissions and removals for FM have been recalculated. The ERT recommends that the Party correct the statement in the NIR (p.441 in the 2021 NIR) that no changes in data or methods were made since its 2017 submission and explain the recalculations.</p>	Yes. Transparency
KL.11	FM – CO <sub>2</sub>	<p>The Party reported in its NIR (p.445) that the FMRL<sub>corr</sub> reported in its 2018 submission was recalculated but did not provide any details or results of the recalculation. The ERT noted that this is not in accordance with decision 2/CMP.7, annex, paragraph 14, which requires Parties to report information on technical corrections and methodological consistency as part of the annual inventory reports.</p> <p>During the review, the Party clarified that the recalculations in both its 2020 and 2021 annual submissions were preliminary, as a major technical correction, to be conducted with the assistance of the Joint Research Centre of the European Commission, was planned for 2021 and 2022 (see ID# KL.4 in table 3).</p> <p>The ERT recommends that the Party report in its next annual submission, being the year of accounting for the second commitment period of the Kyoto Protocol, on the technical correction by considering the relevant guidance in the Kyoto Protocol Supplement and decisions 2/CMP.7, 2/CMP.8, 6/CMP.9 and 4/CMP.11, including, but not limited to, demonstrating that the method or model used to calculate FMRL<sub>corr</sub> is capable of reproducing the historical data of FM or forest land remaining forest land used for the construction of the FMRL, as reported in the FMRL submission, or if this is not the case, providing a justification.</p>	Yes. KP reporting adherence
KL.12	FM	<p>The ERT noted the need for consistency between the FMRL and actual emission estimates, including the treatment of HWP and natural disturbances, for explaining the differences between the FMRL<sub>corr</sub> and the FMRL, and for demonstrating that model results used for the FMRL reproduce the data for FM for the historical period reported in the FMRL submission.</p> <p>During the review, in response to the question of the ERT on this matter, the Party referred to its decision to opt for end of commitment period accounting (FCCC/TAR/2011/SVK, para. 5) and the major technical correction planned for 2021 and 2022, which is to be conducted with the assistance of the Joint Research Centre of the European Commission (see also ID#s KL.4 in table 3 and KL.13 below).</p> <p>The ERT recommends that the Party demonstrate methodological consistency in its technical correction between the FMRL and reporting for FM during the second commitment period, including in the area accounted for, the treatment of HWP and the accounting of any emissions arising from natural disturbances.</p>	Yes. KP reporting adherence
KL.13	FM – CO <sub>2</sub>	<p>The Party did not report in its NIR the information called for by paragraph 32 of the report of the technical assessment of the forest management reference level submission of Slovakia submitted in 2011 (FCCC/TAR/2011/SVK) on how EU-level policies are being implemented at the national level and the expected impact of these policies on the FMRL. The ERT noted that this is not in accordance with decision 2/CMP.6, appendix II, paragraphs 1 and 12, by which Parties are requested to report on the policies included in the construction of the FMRL and their impacts on the FMRL.</p> <p>During the review, the Party clarified that this information will be provided in its next annual submission in the context of the planned major technical correction of the FMRL.</p>	Yes. KP reporting adherence

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem? <sup>a</sup>
KL.14	FM – CO <sub>2</sub>	<p>The ERT recommends that the Party ensure that it includes in its next annual submission information on how EU-level policies are being implemented at the national level and their expected impact on the FMRL.</p> <p>The Party did not provide in its NIR information on the main factors generating the accounted quantity, namely the difference in net emissions between reporting of FM during the second commitment period and the FMRL. The ERT noted that this is not in accordance with the Kyoto Protocol Supplement (chap. 2.7.5.2) requesting Parties to report on the main factors generating the accounted quantity.</p> <p>During the review, the Party clarified that this information is currently not available.</p> <p>The ERT recommends that the Party ensure that the main factors generating the accounted quantity, namely the difference in net emissions between reporting of FM during the second commitment period and the FMRL, are explained in its next annual submission when accounting for the second commitment period of the Kyoto Protocol.</p>	Yes. KP reporting adherence
KL.15	General (KP-LULUCF) – CO <sub>2</sub>	<p>The Party reported the use of root-to-shoot ratios for broadleaves and conifers for estimating below-ground biomass under deforestation (NIR p.437). The ratios correspond to the default values for temperate forest with above-ground biomass above 150 t/ha from the 2006 IPCC Guidelines (vol. 4, chap. 4, p.4.49). The ERT noted that this is not consistent with the Party's approach for FM, which is based on three different root-to-shoot ratios (oak, all other broadleaves and conifers) applying the approach used for forest land remaining forest land under the Convention (NIR p.437 and p.328, respectively) and could result in inconsistent estimates of emissions and removals from forest under FM and deforestation.</p> <p>During the review, the Party clarified that the available data for deforestation are not sufficient to distinguish broadleaves other than oak from conifers when considering the three genera (oak, all other broadleaves, and conifers) used for FM. The Party further clarified that this approach was implemented in response to the recommendation for ID# KL.8 in the 2017 review (FCCC/ARR/2017/SVK).</p> <p>The ERT recommends using root-to-shoot ratios for broadleaves and conifers for both FM and deforestation to ensure consistency. The ERT also recommends that the Party consider in the selection of default root-to-shoot ratios the size of the above-ground biomass pool given in the 2006 IPCC Guidelines (vol. 4, chap. 4, table 4.4), which was the focus of recommendation ID# KL.8 in the 2017 review (FCCC/ARR/2017/SVK) for root-to-shoot ratios under deforestation.</p>	Yes. Accuracy

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

## **VI. Application of adjustments**

11. The ERT did not identify the need to apply any adjustments for the 2021 annual submission of Slovakia.

## **VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol**

12. Slovakia elected commitment period accounting and therefore the issuance and cancellation of units for KP-LULUCF is not applicable to the 2021 review.

## **VIII. Questions of implementation**

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2021 annual submission.



## Annex I

### Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Slovakia in its 2021 annual submission

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

Table I.1  
Total greenhouse gas emissions and removals for Slovakia, base year–2019  
(kt CO<sub>2</sub> eq)

	<i>Total GHG emissions excluding indirect CO<sub>2</sub> emissions</i>		<i>Total GHG emissions and removals including indirect CO<sub>2</sub> emissions<sup>a</sup></i>		<i>Land-use change (Article 3.7 bis as contained in the Doha Amendment)<sup>b</sup></i>	<i>KP-LULUCF (Article 3.3 of the Kyoto Protocol)<sup>c</sup></i>	<i>KP-LULUCF (Article 3.4 of the Kyoto Protocol)</i>	
	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>			<i>CM, GM, RV, WDR</i>	<i>FM</i>
FMRL								-1 084.00
Base year <sup>d</sup>	63 710.11	73 386.16	63 797.88	73 473.93	NA		NA	
1990	63 710.11	73 386.16	63 797.88	73 473.93				
1995	43 100.61	52 888.94	43 182.70	52 971.03				
2000	38 809.34	48 669.91	38 874.78	48 735.35				
2010	39 216.03	45 363.93	39 265.23	45 413.13				
2011	38 094.80	44 555.47	38 152.41	44 613.08				
2012	34 885.38	42 309.22	34 931.86	42 355.71				
2013	33 766.20	41 862.56	33 812.62	41 908.98		-401.07	NA	-7 036.28
2014	33 744.53	39 862.99	33 794.07	39 912.53		-401.55	NA	-5 094.34
2015	34 095.80	40 712.46	34 152.15	40 768.80		-437.83	NA	-5 648.42
2016	34 421.01	41 112.12	34 473.53	41 164.64		-495.36	NA	-5 468.23
2017	35 641.70	42 226.70	35 689.18	42 274.18		-488.25	NA	-5 385.22
2018	36 488.75	42 159.13	36 541.87	42 212.24		-455.87	NA	-4 566.14
2019	33 605.57	39 948.33	33 650.87	39 993.63		-537.08	NA	-5 157.62

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

<sup>a</sup> The Party reported indirect CO<sub>2</sub> emissions in CRF table 6.

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

<sup>c</sup> Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

<sup>d</sup> “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases except NF<sub>3</sub>, for which the base year is 2000. Slovakia has not elected any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

Table I.2

**Greenhouse gas emissions and removals by gas for Slovakia, excluding land use, land-use change and forestry, 1990–2019**(kt CO<sub>2</sub> eq)

	<i>CO<sub>2</sub><sup>a</sup></i>	<i>CH<sub>4</sub></i>	<i>N<sub>2</sub>O</i>	<i>HFCs</i>	<i>PFCs</i>	<i>Unspecified mix of HFCs and PFCs</i>	<i>SF<sub>6</sub></i>	<i>NF<sub>3</sub></i>
1990	61 563.13	7 300.90	4 294.98	NO	314.86	NO	0.06	NO
1995	44 256.20	5 640.57	2 918.15	13.32	132.65	NO	10.15	NO
2000	41 217.68	4 824.16	2 560.51	105.04	14.91	NO	13.04	NO
2010	38 460.92	3 867.10	2 443.24	597.24	25.01	NO	19.62	NO
2011	38 057.10	3 830.21	2 079.83	605.03	20.11	NO	20.80	NO
2012	35 967.64	3 705.27	2 007.70	628.20	25.66	NO	21.24	NO
2013	35 553.58	3 686.80	1 989.60	646.88	9.81	NO	22.30	NO
2014	33 640.68	3 490.97	2 101.73	653.84	11.15	NO	14.17	NO
2015	34 466.98	3 491.38	2 052.74	734.88	8.50	NO	14.31	NO
2016	34 908.46	3 448.40	2 122.10	673.37	6.49	NO	5.82	NO
2017	36 078.09	3 426.60	2 014.74	739.06	8.62	NO	7.08	NO
2018	36 082.66	3 318.89	2 090.75	702.77	7.78	NO	9.39	NO
2019	33 818.75	3 304.74	2 135.35	720.74	5.19	NO	8.86	NO
<b>Percentage change 1990– 2019</b>	<b>–45.1</b>	<b>–54.7</b>	<b>–50.3</b>	<b>NA</b>	<b>–98.4</b>	<b>NA</b>	<b>15 087.6</b>	<b>NA</b>

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

<sup>a</sup> Including indirect CO<sub>2</sub> emissions as reported in CRF table 6.

Table I.3

**Greenhouse gas emissions and removals by sector for Slovakia, 1990–2019**(kt CO<sub>2</sub> eq)

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
1990	56 279.49	9 789.43	5 998.88	–9 676.05	1 406.13	NO
1995	38 723.51	9 389.89	3 557.24	–9 788.33	1 300.39	NO
2000	35 982.78	8 595.28	2 793.04	–9 860.58	1 364.25	NO
2010	32 011.38	9 472.69	2 396.66	–6 147.90	1 532.40	NO
2011	31 459.80	9 081.90	2 492.36	–6 460.67	1 579.02	NO

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
2012	29 200.66	9 001.32	2 543.44	-7 423.84	1 610.28	NO
2013	28 944.72	8 712.04	2 650.77	-8 096.36	1 601.44	NO
2014	26 603.57	8 930.13	2 773.25	-6 118.46	1 605.58	NO
2015	27 268.37	9 141.21	2 697.69	-6 616.66	1 661.53	NO
2016	27 434.42	9 344.91	2 765.37	-6 691.11	1 619.94	NO
2017	28 357.39	9 621.55	2 643.66	-6 585.00	1 651.59	NO
2018	28 208.27	9 606.75	2 730.83	-5 670.38	1 666.38	NO
2019	26 840.86	8 734.42	2 774.77	-6 342.76	1 643.58	NO
<b>Percentage change 1990–2019</b>	<b>-52.3</b>	<b>-10.8</b>	<b>-53.7</b>	<b>-34.4</b>	<b>16.9</b>	<b>NA</b>

Notes: (1) Slovakia did not report emissions or removals in the sector other (sector 6); (2) totals include indirect CO<sub>2</sub> emissions reported in CRF table 6.

Table I.4

**Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, base year–2019, for Slovakia**  
(kt CO<sub>2</sub> eq)

	<i>Article 3.7 bis as contained in the Doha Amendment<sup>a</sup></i>	<i>Activities under Article 3.3 of the Kyoto Protocol</i>		<i>FM and elected activities under Article 3.4 of the Kyoto Protocol</i>				
	<i>Land-use change</i>	<i>AR</i>	<i>Deforestation</i>	<i>FM</i>	<i>CM</i>	<i>GM</i>	<i>RV</i>	<i>WDR</i>
FMRL				-1 084				
Technical correction				-2 606				
Base year <sup>b</sup>	NA				NA	NA	NA	NA
2013		-443.28	42.22	-7 036.28	NA	NA	NA	NA
2014		-462.92	61.37	-5 094.34	NA	NA	NA	NA
2015		-497.16	59.33	-5 648.42	NA	NA	NA	NA
2016		-523.25	27.89	-5 468.23	NA	NA	NA	NA
2017		-543.92	55.67	-5 385.22	NA	NA	NA	NA
2018		-565.20	109.33	-4 566.14	NA	NA	NA	NA
2019		-576.43	39.34	-5 157.62	NA	NA	NA	NA
<b>Percentage change base year–2019</b>					<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>

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

<sup>a</sup> The value reported in this column relates to 1990.

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

2. Table I.5 provides an overview of key relevant data from Slovakia's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5

**Key relevant data for Slovakia under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2021 annual submission**

<i>Parameter</i>	<i>Data values</i>
Periodicity of accounting	(a) AR: commitment period accounting (b) Deforestation: commitment period accounting (c) FM: commitment period accounting (d) CM: not elected (e) GM: not elected (f) RV: not elected (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	None
Election of application of provisions for natural disturbances	No
3.5% of total base-year GHG emissions, excluding LULUCF	2 599.503 kt CO <sub>2</sub> eq (20 796.023 kt CO <sub>2</sub> eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	NA
2. Deforestation	NA
3. FM	NA

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

## Annex II

### Information to be included in the compilation and accounting database

Tables II.1–II.7 include the information to be included in the compilation and accounting database for Slovakia. Data shown are from the Party's annual submission, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table II.1

#### Information to be included in the compilation and accounting database for 2019, including on the commitment period reserve, for Slovakia

(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>CPR</b>	182 042 046	–	–	182 042 046
<b>Annex A emissions</b>				
CO <sub>2</sub>	33 818 752	–	–	33 818 752
CH <sub>4</sub>	3 304 742	–	–	3 304 742
N <sub>2</sub> O	2 135 346	–	–	2 135 346
HFCs	720 738	–	–	720 738
PFCs	5 191	–	–	5 191
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	8 865	–	–	8 865
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources</b>	<b>39 993 634</b>	–	–	<b>39 993 634</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	–576 426	–	–	–576 426
Deforestation	39 342	–	–	39 342
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	–5 157 619	–	–	–5 157 619

Table II.2

#### Information to be included in the compilation and accounting database for 2018 for Slovakia

(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	36 082 656	–	–	36 082 656
CH <sub>4</sub>	3 318 892	–	–	3 318 892
N <sub>2</sub> O	2 090 750	–	–	2 090 750
HFCs	702 771	–	–	702 771
PFCs	7 780	–	–	7 780
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	9 393	–	–	9 393
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources</b>	<b>42 212 241</b>	–	–	<b>42 212 241</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	–565 198	–	–	–565 198
Deforestation	109 332	–	–	109 332
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
FM	-4 566 144	-	-	-4 566 144

Table II.3

**Information to be included in the compilation and accounting database for 2017 for Slovakia**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	36 078 087	-	-	36 078 087
CH <sub>4</sub>	3 426 598	-	-	3 426 598
N <sub>2</sub> O	2 014 737	-	-	2 014 737
HFCs	739 057	-	-	739 057
PFCs	8 623	-	-	8 623
Unspecified mix of HFCs and PFCs	NO	-	-	NO
SF <sub>6</sub>	7 083	-	-	7 083
NF <sub>3</sub>	NO	-	-	NO
<b>Total Annex A sources</b>	<b>42 274 184</b>	-	-	<b>42 274 184</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	-543 919	-	-	-543 919
Deforestation	55 674	-	-	55 674
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	-5 385 224	-	-	-5 385 224

Table II.4

**Information to be included in the compilation and accounting database for 2016 for Slovakia**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	34 908 461	-	-	34 908 461
CH <sub>4</sub>	3 448 398	-	-	3 448 398
N <sub>2</sub> O	2 122 102	-	-	2 122 102
HFCs	673 370	-	-	673 370
PFCs	6 490	-	-	6 490
Unspecified mix of HFCs and PFCs	NO	-	-	NO
SF <sub>6</sub>	5 818	-	-	5 818
NF <sub>3</sub>	NO	-	-	NO
<b>Total Annex A sources</b>	<b>41 164 641</b>	-	-	<b>41 164 641</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	-523 251	-	-	-523 251
Deforestation	27 889	-	-	27 889
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	-5 468 232	-	-	-5 468 232

Table II.5

**Information to be included in the compilation and accounting database for 2015 for Slovakia**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	34 466 976	-	-	34 466 976
CH <sub>4</sub>	3 491 382	-	-	3 491 382
N <sub>2</sub> O	2 052 744	-	-	2 052 744
HFCs	734 885	-	-	734 885

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
PFCs	8 504	–	–	8 504
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	14 314	–	–	14 314
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources</b>	<b>40 768 805</b>	–	–	<b>40 768 805</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	–497 163	–	–	–497 163
Deforestation	59 328	–	–	59 328
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	–5 648 422	–	–	–5 648 422

Table II.6

**Information to be included in the compilation and accounting database for 2014 for Slovakia**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	33 640 678	–	–	33 640 678
CH <sub>4</sub>	3 490 969	–	–	3 490 969
N <sub>2</sub> O	2 101 729	–	–	2 101 729
HFCs	653 839	–	–	653 839
PFCs	11 148	–	–	11 148
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	14 168	–	–	14 168
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources</b>	<b>39 912 531</b>	–	–	<b>39 912 531</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	–462 920	–	–	–462 920
Deforestation	61 368	–	–	61 368
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	–5 094 335	–	–	–5 094 335

Table II.7

**Information to be included in the compilation and accounting database for 2013 for Slovakia**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	35 553 580	–	–	35 553 580
CH <sub>4</sub>	3 686 801	–	–	3 686 801
N <sub>2</sub> O	1 989 604	–	–	1 989 604
HFCs	646 878	–	–	646 878
PFCs	9 810	–	–	9 810
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	22 303	–	–	22 303
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources</b>	<b>41 908 977</b>	–	–	<b>41 908 977</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	–443 283	–	–	–443 283
Deforestation	42 215	–	–	42 215
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	–7 036 283	–	–	–7 036 283

## **Annex III**

### **Additional information to support findings in table 2**

#### **Missing categories that may affect completeness**

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

- (a) 4.B.1 cropland remaining cropland – CSCs in organic soils (see ID# L.6 in table 3);
- (b) 4. General (LULUCF) – organic soils (CO<sub>2</sub> and N<sub>2</sub>O) (see ID# L.11 in table 5);
- (c) AR – CSCs in deadwood (see ID# KL.8 in table 5).



## Annex IV

### Reference documents

#### A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 1997. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. JL Houghton, LG Meira Filho, B Lim, et al. (eds.). Paris: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency. Available at <https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html>.

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

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

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

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

#### B. UNFCCC documents

##### Annual review reports

Reports on the individual reviews of the 2013, 2014, 2015, 2016, 2017 and 2019 annual submissions of Slovakia, contained in documents FCCC/ARR/2013/SVK, FCCC/ARR/2014/SVK, FCCC/ARR/2015/SVK, FCCC/ARR/2016/SVK, FCCC/ARR/2017/SVK and FCCC/ARR/2019/SVK, respectively.

##### Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at [https://unfccc.int/sites/default/files/resource/AGI%202020\\_final.pdf](https://unfccc.int/sites/default/files/resource/AGI%202020_final.pdf).

Annual status report for Slovakia for 2021. Available at <https://unfccc.int/documents/278801>.

#### C. Other documents used during the review

Responses to questions during the review were received from Janka Szemesová (Slovak Hydrometeorological Institute), including additional material on the methodology and assumptions used. The following references may not conform to UNFCCC editorial style as some have been reproduced as received:

Fazekašová et al., 2021. *Chemical and Phytocoenological Characteristics of Two Different Slovak Peatlands*. Available at <https://doi.org/10.3390/plants10071290>.

Montanarella et al., 2006. *The distribution of peatland in Europe*. Available at <http://www.mires-and-peat.net/pages/volumes/map01/map0101.php>.

Tanneberger et al., 2017. *The peatland map of Europe*. Available at <http://www.mires-and-peat.net/pages/volumes/map19/map1922.php>.

Torma, Stanislav, 2017. *Postharvest residues of sugar beet and their role in the nutrient cycle*.