



SLOVAK REPUBLIC

ANNUAL REPORT 2022

Submission according to the Article 7 of the Regulation (EU) No 525/2013¹, Article 7 of the Decision 529/2013/EU² and relevant articles of the Regulation (EU) No 749/2014³



Slovak Hydrometeorological Institute

Ministry of Environment of the Slovak Republic

Bratislava, January 15, 2022

1. INTRODUCTION

The Slovak Republic is submitting to the European Commission the SVK Annual Report 2022 according to Article 7 of the Regulation (EU) No 525/2013 (MMR), Article 7 of the Decision 529/2013/EU and relevant Articles of the Regulation (EU) No 749/2014.^{1,2,3}

The whole package of the Annual Report 2022 of the Slovak Republic comprises:

1. SVK_Annual_Report_2022.pdf – Annual Report of the Slovak Republic in written form according to the Regulation (EU) 525/2013;
2. SVK_CRF_1990 – 2020 – CRF tables generated using the CRF Reporter software, version 6.0.8 accompanied by the xml file;
3. SEF Tables for the year 2021;
4. Tabular format specified in Annexes I-VI to the 749/2014 Regulation;
5. Sectoral tables of used methodologies and emission factors for the EU key categories.

Submission is uploaded via the EIONET Central Data Repository tool of the EEA.

2. DETAILS OF PREPARING THIS SUBMISSION

COUNTRY:	SLOVAK REPUBLIC
Date of completion:	January 15, 2022
Legal guarantor of report :	Ministry of the Environment of the Slovak Republic
	Directorate for Climate Change and Air Protection (National Focal Point)
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Overall description of the delivered information and reporting requirements in this submission is summarised in the table "SVK_MMR-IR_Annex_1_15-01-2022".

¹ Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting Greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC, OJ, 18.6.2013, p. 13;

² Decision No 529/2013/EU of the European Parliament and of the Council of 21 May 2013 on accounting rules on greenhouse gas emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities;

³ Commission Implementing Regulation (EU) No 749/2014 of 30 June 2014 on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) No 525/2013 of the European Parliament and of the Council, OJ L.203,11:7:2014, p. 23.

3. INFORMATION TO ASSESS ACTUAL PROGRESS

Article 7(1):

- (a) **Anthropogenic emissions of greenhouse gases listed in Annex I to the Regulation and the anthropogenic emissions of greenhouse gases referred to in Article 2(1) of Decision No 406/2009/EC for the year 2020, in accordance with UNFCCC reporting requirements. Without prejudice to the reporting of the greenhouse gases listed in Annex I to this Regulation, the CO₂ emissions from IPCC source category '1.A.3.a civil aviation' shall be considered equal to zero for the purposes of Article 3 and Article 7(1) of Decision No 406/2009/EC:**

The Slovak Republic is providing information on the anthropogenic GHG emissions and sinks as required in the Article 7(1). This information is included in the CRF tables 1990 – 2020 generated by the CRF Reporter software version 6.0.8 by the xml file as a part of annual GHG inventory submitted on January 15, 2022. Summary emissions data are presented in the **Tables 1 – 3** of the Report below.

The total national emissions of GHGs in the inventory year 2020 were estimated to be **36 964.53 Gg of CO₂ eq. excluding LULUCF and excluding indirect emissions**. Net GHG emissions were 28 213.94 Gg of CO₂ eq. including LULUCF sector and excluding indirect emissions. The aggregated emissions of GHGs decreased significantly in year 2020 excluding LULUCF, compared to the year 2019 particularly in energy and IPPU sectors. It can be considered, that overall trend of the GHG emissions in Slovakia is stable with the decrease in the last years and decrease compared to the base year 1990 with the drop of 49.62% (-55.36% including LULUCF). When the LULUCF sector is included to the net aggregated emissions in 2020, emissions decreased by more than 4.5 Tg of CO₂ eq. (14%) compared to previous year 2019.

The major changes in the national inventory in the 2022 submission are caused by recalculations in energy, agriculture, LULUCF and waste sectors for previous years or for whole time series. Several recalculations are connected with the upgrade of methodological approach for fugitive emissions in energy, agriculture and waste sectors and are in line with the improvement plans of Slovakia for the years 2020 and 2021, reflecting also the recommendations from the previous reviews.

Several general improvements in transparency of reporting, allocation of emissions and accuracy were made in this submission reflecting the ERT recommendations since the previous review following approved improvements plan for the year 2021. Major recalculations were made previously in residential heating, fugitive emissions from oil and natural gas, solvents, agriculture and waste sectors and categories as recommended by the ERT or TERT during previous reviews. Further information on recalculations can be found in the **Table 5** of this Report.

The emissions without LULUCF in 2020 are lower than in 2019 and reached the lowest level since the base year. This larger decrease was also expected in the proxy inventory published in July 2021 and can be explained by several reasons. GHG emissions decreased mostly in energy, transport and IPPU sectors, both in EU ETS and ESD parts across all categories, mostly in manufacturing industry, mineral production, chemical industry and metal industry. Combination of the COVID-19 pandemic situation, reconstruction of the blast furnace in the U.S. Steel company and phasing out of the fossil power plant in Nováky caused the emissions reduction in 2020.

The latest available GHG emission projections published in the March 2021, proposed emissions decrease as an effect of the successful implementation of the policies and measures and their effect on the improvement in energy intensity and industrial production efficiency accompanied with the declining of the transport, waste and agriculture emissions in the WAM scenario. These projections will be further updated in 2022. However, during the whole period 1991 – 2020, the total greenhouse gas emissions in the Slovak Republic did not exceed the level of 1990.

The major share of the aggregated emissions excluding LULUCF in 2020 goes to the CO₂ emissions comprising about 84% of the total. The share of CH₄ emissions is about 8.8%, N₂O emissions about 5.3%, and F-gases emissions about 1.9% (1.8% are HFCs emissions) of the total, respectively. The share of gases is almost comparable with the 1990 base year structure.

Total CO₂ emissions excluding LULUCF in 2020 were estimated at 31 053.72 Gg with 49.5% reduction against base year. Emissions of CO₂ have decreased in comparison with the previous inventory year 2019 by 7.9% due to their decrease in energy – all categories and transport; and IPPU sectors – chemical and metal industry.

Total CH₄ emissions excluding LULUCF in 2020 were estimated at 3 254.84 Gg of CO₂ eq. (130.19 Gg CH₄) with decrease by 55.42% in comparison with the base year. Emissions of CH₄ have decreased by 2.08% compared to the previous inventory year 2019 due to decrease of emissions in energy (services and households, and fugitive emissions). The slight decrease of emissions was also recorded in forest fires.

Total N₂O emissions excluding LULUCF in 2020 were estimated at 1 954.28 Gg of CO₂ eq. (6.56 Gg N₂O) with the reduction by 54.43% compared to the base year. Emissions of N₂O have slightly increased by 0.37% compared to the previous inventory year 2019 due to increase of emissions in waste and agriculture sectors.

Total emissions of F-gases in 2020 were estimated at 701.69 Gg with the increase (HFCs) by more than 100% if compared to the base year 1990. Decreasing trend is visible in comparison with the previous year and the fluctuation in HFCs emissions is occurring in current inventory submission since the year 2014. The emissions of HFCs recorded decrease in comparison with the previous year (2019) by 4.51% and emissions are again almost on the level of the year 2016. The emissions of F-gases were approximately constant since 2010 because of the almost complete replacement of HFCs gases. Another reason of the change in trend is the use of HFC-32 and HFC-134a in mobile air conditioners (ACs). Coolant R134a showed continuing increasing trend mainly because of rising uses of cars with ACs. This trend stopped in 2010. It was caused by smaller purchases of cars in Slovakia since 2010, which resulted in a smaller bank of HFC-134a in Slovakia.

Total actual HFCs emissions reported in the category 2.F Product uses as substitutes for ODS were 678.88 Gg of CO₂ eq. in 2020 and they increased by more than 100% compared to the base year, but decrease in comparison with the previous year by 5.81%. The decrease is due the lower disposal emissions. This increasing trend is visible since the base year and is caused by supplying HCFCs gases by the HFCs.

The actual emissions of PFCs in the category 2.F did not occur in 2020, only 5.61 Gg of CO₂ eq. occurred in the aluminium industry (2.C.3 category). SF₆ emissions occurred in the category 2.G – Other products manufacturing with the value of 17.20 Gg of CO₂ eq. in 2020. PFCs and SF₆ emissions slightly increased in 2020. This was caused by increase of industrial production.

No NF₃ emissions are occurring in Slovakia. Emissions of HFCs, PFCs and SF₆ in Slovakia are only from consumption of the F-gases in industry (mostly aluminium production, construction, building and services sectors). Slovakia does not produce any of the F-gases.

The energy sector represents the major share of aggregated emissions in 2020 and covers about 24 574.35 Gg of CO₂ eq. (66.48% from total), the industrial processes sector covers 8 129.82 Gg of CO₂ eq. (21.99%), the agriculture sector about 2 586.95 Gg of CO₂ eq. (7.00%) and the waste sector 1 673.41 Gg of CO₂ eq. (4.53%). The sinks from LULUCF sector were estimated at the level of -8 750.59 Gg of CO₂ eq. in 2020, which means that removals are almost 1.8 Tg higher compared to the previous year.

The GHG emissions from energy sector based on sectoral approach data in 2020 were estimated to be 24 149.25 Gg of CO₂ eq., including the transport emissions (7 035.04 Gg of CO₂ eq.). This means decrease by about 55% when compared to the base year and decrease by about 8% in comparison with the previous year 2019.

Emissions in the road transportation have decreased by about 13% compared to the year 2019 and increased by 3.1% in comparison with the base year. Decrease in comparison with the previous year is caused by the COVID-19 pandemic situation when diesel freight transport dropped during the first half of year 2020. It can be expected further increase in transport in the next years.

The total emissions from industrial processes sector in 2020 were estimated to be 8 129.82 Gg of CO₂ eq. with the larger 6.5% decrease compared to the previous year and decrease by 12% compared to 1990. Decrease of emissions was observed mostly in the EU ETS categories, mainly in iron&steel production. Mitigation of technological emissions reported in IPPU sector is difficult and expensive. Therefore, implementation of effective regulations only has influence on stabilisation of trends (emission trends not fully follow increasing production).

The emissions from agriculture sector were estimated to be 2 586.95 Gg of CO₂ eq. It is decrease by almost 57% in comparison with the base year and slight increase (0.6%) in comparison to the previous year level. The agriculture sector shows the highest (comparable with the energy sector) decrease in emissions since the base year 1990, namely due to significant decrease in cattle numbers and synthetic fertilizers use. Several recalculations were made in this submission reflecting the further implementation of the IPCC 2006 Guidelines and new national data. Major methodological changes and recalculations were made in direct soils emissions of N₂O (improvement in manure applied on soils and crop residues) and indirect soil emissions (leaching and run-off categories). These changes were based on new research data and statistics, implementation of the ESD review recommendations and led to more consistent time series. Further information can be found in the **Table 5** of this Report.

The emissions from waste sector were estimated to be 1 673.41 Gg of CO₂ eq. Emissions are almost at the same level as in previous years (increase by 0.4%) and the time series do not show significant fluctuations in trend. Compared to the base year, the emissions increased by almost 19%, due to increasing methane emissions from solid waste disposal sites. The emissions from incineration with energy use in municipal and industrial waste were included into energy sector, in several categories depending on the industry source (municipal waste in 1.A.1a – Energy Industries, other fuels). The revaluation of sewage sludge treatment and small changes in wastewater treatment emissions were the driving force for the trend changes in the last submissions.

Indirect emissions from IPPU sector (solvents) were estimated in this submission. Time series was reconstructed with the base year on the level 87.77 Gg of CO₂ and the latest inventory year on the level 45.88 Gg of the CO₂. Total GHG emissions without LULUCF and with indirect CO₂ emissions were 37 010.41 Gg of CO₂ eq. and with LULUCF and with indirect CO₂ were 28 259.81 Gg of CO₂ eq.

Table 1: Summary of the GHG emissions in 2020 and 2019 according to the gases and sectors (determined as of 15. 01. 2022)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2020					
	Gg of CO ₂ equivalents					
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆
1. Energy	23 696.10	670.78	207.46	NO	NO	NO
2. Industrial Processes	7 284.86	1.46	141.81	678.88	5.61	17.20
3. Agriculture	72.12	1 053.22	1 461.62	NO	NO	NO
4. LULUCF	-8 809.32	22.14	36.59	NO	NO	NO
5. Waste	0.64	1 529.38	143.39	NO	NO	NO
KP LULUCF	-7 976.22	22.06	14.55	NO	NO	NO
<i>Memo Items - International Transport</i>	69.51	0.05	0.56	NO	NO	NO
Total (excluding LULUCF)	31 053.72	3 254.84	1 954.28	678.88	5.61	17.20
Total (including LULUCF)	22 244.40	3 276.98	1 990.87	678.88	5.61	17.20

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2019					
	Gg of CO ₂ equivalents					
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆
1. Energy	25 852.43	722.91	218.88	NO	NO	NO
2. Industrial Processes	7 795.84	1.43	157.05	720.74	5.19	8.86
3. Agriculture	68.25	1 068.04	1 435.95	NO	NO	NO
4. LULUCF	-6 955.86	24.50	39.10	NO	NO	NO
5. Waste	0.67	1 531.45	135.14	NO	NO	NO
KP LULUCF	-6 023.69	24.43	16.11	NO	NO	NO
<i>Memo Items - International Transport</i>	201.40	0.08	1.63	NO	NO	NO
Total (excluding LULUCF)	33 717.19	3 323.83	1 947.02	720.74	5.19	8.86
Total (including LULUCF)	26 761.33	3 348.34	1 986.12	720.74	5.19	8.86

Table 2: Summary of the GHG emissions in 1990 – 2020 according to the gases (determined as of 15. 01. 2022)

GREENHOUSE GAS EMISSIONS	Base year 1990	1991	1992	1993	1994	1995	1996	1997
	<i>Gg of CO₂ equivalents</i>							
CO ₂ emissions excluding net CO ₂ from LULUCF	61 470.19	53 283.80	48 884.20	46 348.52	43 754.33	44 142.33	44 023.48	44 095.51
CO ₂ emissions including net CO ₂ from LULUCF	51 185.47	42 295.70	37 337.48	34 973.55	32 902.07	33 787.53	33 728.77	33 953.88
CH ₄ emissions excluding CH ₄ from LULUCF	7 300.92	6 950.26	6 270.25	5 971.15	5 654.95	5 644.75	5 507.53	5 278.25
CH ₄ emissions including CH ₄ from LULUCF	7 311.00	6 958.60	6 281.85	5 992.90	5 660.81	5 651.76	5 517.30	5 285.84
N ₂ O emissions excluding N ₂ O from LULUCF	4 288.77	3 374.70	2 767.99	2 300.69	2 750.68	2 897.16	3 075.54	3 070.60
N ₂ O emissions including N ₂ O from LULUCF	4 385.30	3 458.81	2 852.56	2 389.72	2 825.92	2 963.58	3 139.71	3 128.01
HFCs	NO	NO	NO	NO	0.20	13.32	28.39	41.21
PFCs	314.86	309.73	288.24	180.32	153.23	132.65	40.72	40.16
SF ₆	0.06	0.04	0.04	0.09	17.62	10.15	11.16	11.47
Total (excluding LULUCF)	73 374.79	63 918.51	58 210.71	54 800.77	52 331.01	52 840.35	52 686.83	52 537.20
Total (including LULUCF)	63 196.70	53 022.86	46 760.18	43 536.57	41 559.85	42 558.98	42 466.05	42 460.57

GREENHOUSE GAS EMISSIONS	1998	1999	2000	2001	2002	2003	2004	2005
	<i>Gg of CO₂ equivalents</i>							
CO ₂ emissions excluding net CO ₂ from LULUCF	43 824.66	43 035.49	41 135.93	43 220.93	41 962.05	42 294.61	42 781.51	42 789.65
CO ₂ emissions including net CO ₂ from LULUCF	32 665.55	32 542.29	30 686.70	33 482.01	31 727.47	32 516.24	32 989.03	36 486.13
CH ₄ emissions excluding CH ₄ from LULUCF	5 139.78	5 047.36	4 834.14	4 695.02	4 588.25	4 386.37	4 367.60	4 342.53
CH ₄ emissions including CH ₄ from LULUCF	5 147.23	5 096.31	4 858.74	4 706.42	4 607.34	4 423.61	4 380.50	4 366.44
N ₂ O emissions excluding N ₂ O from LULUCF	2 758.15	2 327.99	2 601.09	2 949.10	2 881.19	2 837.37	3 067.30	3 032.12
N ₂ O emissions including N ₂ O from LULUCF	2 811.43	2 406.10	2 655.76	2 991.31	2 920.63	2 887.31	3 101.11	3 071.11
HFCs	54.61	77.29	105.04	138.78	178.46	213.52	254.39	292.99
PFCs	29.10	16.27	14.91	16.02	17.18	26.45	23.63	24.16
SF ₆	12.65	12.64	13.04	13.33	14.78	15.06	15.43	16.38
Total (excluding LULUCF)	51 818.95	50 517.05	48 704.17	51 033.18	49 641.90	49 773.37	50 509.85	50 497.83
Total (including LULUCF)	40 720.57	40 150.90	38 334.20	41 347.87	39 465.86	40 082.18	40 764.08	44 257.21

GREENHOUSE GAS EMISSIONS	2006	2007	2008	2009	2010	2011	2012	2013
	<i>Gg of CO₂ equivalents</i>							
CO ₂ emissions excluding net CO ₂ from LULUCF	42 553.62	40 968.66	41 359.94	37 622.55	38 404.58	37 985.27	35 910.61	35 496.08
CO ₂ emissions including net CO ₂ from LULUCF	33 408.29	32 233.52	33 648.59	30 141.96	31 699.60	30 952.21	27 871.74	26 825.69
CH ₄ emissions excluding CH ₄ from LULUCF	4 194.60	4 085.80	4 074.75	3 921.30	3 907.70	3 866.63	3 740.49	3 721.50
CH ₄ emissions including CH ₄ from LULUCF	4 209.69	4 110.65	4 090.35	3 944.31	3 925.91	3 888.47	3 782.22	3 735.30
N ₂ O emissions excluding N ₂ O from LULUCF	3 161.03	3 086.10	3 153.32	2 714.33	2 672.08	2 146.27	1 912.23	1 945.17
N ₂ O emissions including N ₂ O from LULUCF	3 192.88	3 123.20	3 183.38	2 748.32	2 701.54	2 178.10	1 957.93	1 973.19
HFCs	341.49	388.26	454.47	516.93	597.24	605.03	628.20	646.88
PFCs	42.47	29.42	42.76	21.00	25.01	20.11	25.66	9.81
SF ₆	16.71	17.39	18.85	19.51	19.62	20.80	21.24	22.30
Total (excluding LULUCF)	50 309.91	48 575.64	49 104.09	44 815.61	45 626.24	44 644.11	42 238.43	41 841.74
Total (including LULUCF)	41 211.53	39 902.44	41 438.41	37 392.03	38 968.93	37 664.72	34 286.98	33 213.18

GREENHOUSE GAS EMISSIONS	2014	2015	2016	2017	2018	2019	2020
	<i>Gg of CO₂ equivalents</i>						
CO ₂ emissions excluding net CO ₂ from LULUCF	33 580.02	34 399.27	34 842.46	36 024.91	36 020.60	33 717.19	31 053.72
CO ₂ emissions including net CO ₂ from LULUCF	26 876.21	27 181.13	27 551.52	28 839.34	29 747.10	26 761.33	22 244.40
CH ₄ emissions excluding CH ₄ from LULUCF	3 521.26	3 515.01	3 470.40	3 445.06	3 341.61	3 323.83	3 254.84
CH ₄ emissions including CH ₄ from LULUCF	3 541.79	3 538.06	3 489.47	3 466.25	3 362.53	3 348.34	3 276.98
N ₂ O emissions excluding N ₂ O from LULUCF	2 091.96	1 912.77	2 059.49	1 903.97	1 919.03	1 947.02	1 954.28
N ₂ O emissions including N ₂ O from LULUCF	2 125.36	1 950.21	2 095.46	1 941.28	1 956.21	1 986.12	1 990.87
HFCs	653.84	734.88	673.37	739.06	702.77	720.74	678.88
PFCs	11.15	8.50	6.49	8.62	7.78	5.19	5.61
SF ₆	14.17	14.31	5.82	7.08	9.39	8.86	17.20
Total (excluding LULUCF)	39 872.39	40 584.75	41 058.02	42 128.70	42 001.18	39 722.84	36 964.53
Total (including LULUCF)	33 222.51	33 427.10	33 822.12	35 001.63	35 785.79	32 830.58	28 213.94

Table 3: Summary of the GHG emissions in 1990 – 2020 according to the sectors (determined as of 15. 01. 2022)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1990)	1991	1992	1993	1994	1995	1996	1997
	<i>Gg of CO₂ equivalents</i>							
1. Energy	56 279.49	49 847.40	45 611.66	41 642.02	39 181.66	38 723.51	38 353.40	38 183.69
2. Industrial Processes	9 701.66	7 509.96	7 147.33	8 171.74	8 386.20	9 307.81	9 627.11	9 674.96
4. Agriculture	5 987.29	5 148.28	4 049.95	3 586.17	3 458.56	3 504.26	3 401.06	3 355.57
5. Land Use, Land-Use Change and Forestry	-10 178.10	-10 895.65	-11 450.53	-11 264.20	-10 771.16	-10 281.37	-10 220.77	-10 076.62
6. Waste	1 406.35	1 412.88	1 401.77	1 400.84	1 304.59	1 304.78	1 305.26	1 322.97
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1998	1999	2000	2001	2002	2003	2004	2005
<i>Gg of CO₂ equivalents</i>								
1. Energy	37 634.91	36 890.74	35 982.78	37 939.61	35 484.42	36 271.90	35 723.70	36 222.32
2. Industrial Processes	9 815.02	9 434.79	8 529.84	8 703.28	9 740.42	9 345.51	10 623.90	10 089.27
4. Agriculture	3 024.87	2 835.08	2 817.09	2 999.84	3 008.11	2 728.74	2 717.18	2 725.96
5. Land Use, Land-Use Change and Forestry	-11 098.38	-10 366.15	-10 369.97	-9 685.30	-10 176.04	-9 691.19	-9 745.77	-6 240.62
6. Waste	1 344.15	1 356.43	1 374.46	1 390.44	1 408.96	1 427.21	1 445.07	1 460.27
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2006	2007	2008	2009	2010	2011	2012	2013
<i>Gg of CO₂ equivalents</i>								
1. Energy	35 331.43	33 683.04	34 171.36	31 675.45	32 020.50	31 466.97	29 208.81	28 954.10
2. Industrial Processes	10 941.23	10 800.48	10 678.67	9 115.13	9 423.49	9 024.28	8 954.84	8 665.63
4. Agriculture	2 520.27	2 604.87	2 747.98	2 478.74	2 607.63	2 534.11	2 427.73	2 585.58
5. Land Use, Land-Use Change and Forestry	-9 098.38	-8 673.20	-7 665.68	-7 423.58	-6 657.31	-6 979.39	-7 951.45	-8 628.57
6. Waste	1 516.98	1 487.24	1 506.07	1 546.28	1 574.62	1 618.75	1 647.06	1 636.44
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2014	2015	2016	2017	2018	2019	2020	
<i>Gg of CO₂ equivalents</i>								
1. Energy	26 612.68	27 272.83	27 438.87	28 358.62	28 214.75	26 794.23	24 574.35	
2. Industrial Processes	8 880.59	9 084.87	9 292.40	9 574.07	9 553.64	8 689.12	8 129.82	
4. Agriculture	2 744.44	2 537.98	2 682.97	2 521.07	2 543.37	2 572.24	2 586.95	
5. Land Use, Land-Use Change and Forestry	-6 649.88	-7 157.66	-7 235.90	-7 127.07	-6 215.40	-6 892.26	-8 750.59	
6. Waste	1 634.68	1 689.07	1 643.79	1 674.94	1 689.42	1 667.25	1 673.41	

(b) Data in accordance with UNFCCC reporting requirements on their anthropogenic emissions of carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen oxides (NO_x) and volatile organic compounds, consistent with data already reported pursuant to Article 7 of Directive 2001/81/EC² and the UNECE Convention on Long-Range Transboundary Pollution, for the year 2019:

According to the new rules for the reporting of the air pollutants recalling the Article 7 of the MMR- IR and the Annex I of the NECD, annual emission reporting requirements as referred to in the first subparagraph of Article 7 of the MMR-IR for the year 2020 was set on 15 February 2022. Therefore, it is not possible to report preliminary emissions these pollutants for the year 2020 in this report. Emissions of the CO, NO_x, SO₂ and NMVOC for the year 2020 will be reported in the March 15, 2022 resubmission of the annual GHGs inventory submission 2022.

The Slovak Republic is providing here the final estimate of emissions of CO, NO_x, SO₂ and NMVOC for the year 2019 resubmitted under the NECD on March 15, 2021, as required in the Article 15.1 in this report. This information is included in the CRF tables 1990 – 2019 generated by the CRF Reporter software as a part of annual GHG inventory submitted on January 15, 2022. In addition, preliminary data on indirect GHG emissions for the year 2020 are partly included in the agriculture and waste sectors.

The overview of the final NO_x, CO, NMVOC and SO₂ emissions for the year 2019 and reporting on consistency of the reported data on air pollutants in the table “SVK_MMR-IR_Article_7_15-01-2022” is accompanied January 15, 2022 submission.

The explanation of differences for the NECD and GHG inventories on air pollutants for the year 2019 is provided in the table “SVK_MMR-IR_Article_7_15-01-2022” is accompanied January 15, 2022 submission.

Recalculations were made in the IPPU sector for the NO_x, NMVOC, SO₂ and CO emissions. Emissions from the category 2.C.7.c were reallocated. Emissions from copper production were included in the category 2.C.7.a and emission from aluminium production into the category 2.C.3.

In the transport, a new methodology for the category 1.A.3.c based on tier 2 approach was applied. In addition, category 1.A.2.g.vii was recalculated due to change of methodology. Emissions from the vehicles from this category was redistributed among categories 1.A.2.g.vii, 1.A.4.a.ii and 1.A.4.bii for the year 2019. In the **Agriculture**, emission in the categories 3.B, 3.D.a.2.a and 3.D.a.3 were recalculated to comply with EMEP/EEA GB 2019. In addition, recalculated data on pollutants (indirect GHG emissions) is provided in the categories 5.C, 5.D and 5.A. In category 5.A, the emissions of NMVOC were recalculated following the recommendation from the NECD review 2020. Emissions from wastewater handling (5.D) were recalculated due to inclusion of residual gases burning and change of activity data for domestic wastewater handling to comply with the data from GHG inventor. In the category 5.C, category 5.C.b.ii was calculated for the first time. Non-municipal waste incinerated was redistributed among three categories 5.C.b.i, 5.C.b.ii and 5.C.b.iii. Category 5.C.b.v – Cremation was recalculated due to improvement of the activity data.

Final data on NO_x, CO, NMVOC and SO₂ emissions for the years 1990 – 2020 (and improved time series based on recalculations) will be included in the GHG inventory submitted on March 15, 2022 after NECD and CLRTAP submissions (February 15, 2022).

² Directive was amended as follow: Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC

(c) Anthropogenic greenhouse gas emissions by sources and removals of carbon dioxide by sinks resulting from land-use, land-use change and forestry during the year 2020:

The Slovak Republic is providing information on the anthropogenic GHGs emissions and sinks in the LULUCF sector as required in the Article 24. This information is included in the CRF tables 1990 – 2020 generated by the CRF Reporter software version 6.0.8 as a part of annual GHG inventory submitted on January 15, 2022.

The total sinks from LULUCF sector were estimated to be -8 750.59 Gg of CO₂ eq. which means increase of removals compared the previous year by more than 1.8 Gg. The estimation of emissions and sinks in the LULUCF sector are fluctuating within time series. The final values of sinks are influenced by the lower harvest of wood. Other categories remain almost at the same level in comparison with the previous years.

The recalculations were implemented in this submission due to introducing of new calculation of CSC in DW carbon pools connected with all categories except HWP and correction of tree species composition value in 4.A.1 category. Improvements based on the ERT recommendations made during UNFCCC 2021 centralised review were partly included in the 2022 GHG inventory submission.

Preparation of the revision of methodology and national parameters research for the Wetlands category (see draft LULUCF NIR Chapter). This revision is planned to be implemented in future, while major difficulties occurred in data collection back to the base year and preparation of sustainable methodological approach, therefore work needs to be continue also in the next years. Implementation of first results into inventory is included in the SVK NIR LULUCF Chapter.

(d) Anthropogenic greenhouse gas emissions by sources and removals of CO₂ by sinks resulting from LULUCF activities pursuant to Decision No 529/2013/EU and the Kyoto Protocol and information on the accounting of these greenhouse gas emissions and removals from LULUCF activities, in accordance with Decision No 529/2013/EU and with Article 3(3) and (4) of the Kyoto Protocol, and relevant decisions thereunder, for the years between 2008 or other applicable years and the year 2020:

The Slovak Republic is providing information on the accounting of the anthropogenic GHGs emissions and removals resulting from LULUCF activities and the Kyoto Protocol as required in the Article 24. This information is included in the KP CRF tables 2013 – 2020 generated by the CRF Reporter software version 6.0.8 as a part of annual GHG inventory submitted on January 15, 2022.

A report describing the progress in the implementation of LULUCF actions (“Report on progress in implementation of LULUCF actions to the European Commission”) required by Article 3.2 of Decision No 529/2013/EU of the European Parliament and of the Council of 21 May 2013 on accounting rules on greenhouse gas emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities was submitted as a separate document by 15 March 2018. According to the revised Report to Facilitate Determination of the Assigned Amount for the Second Commitment Period of the Kyoto Protocol from September, 2016, the Slovak Republic has officially declared in Part III of this report the following statement: In order to report under Article 3.3 (ARD activities: afforestation, reforestation and deforestation), the Slovak Republic has selected the following threshold values for the forest definition: forest land includes land with minimum tree crown cover of 20% for trees capable to reach minimum height of 5 m in situ. The minimum area for forest is 0.3 ha. Temporarily unstock areas are included (forest regeneration areas). For linear formations, a minimum width of 20 m is applied. This definition is applicable also for reporting of the second commitment period and also under Article 3.4. The

Slovak Republic has chosen to account for the activities under Article 3.3 (afforestation, reforestation and deforestation) and under Article 3.4 (forest management) for the whole commitment period.

In 2020, total removals from afforestation/reforestation activities were -600.42 Gg of CO₂ eq. (changes in 50.09 kha to the end of 2020). Total emissions from deforestation were 45.17 Gg of CO₂ eq. (changes in 9.02 kha to the end of 2020). In 2020, total removals under the Article 3.3 of the KP were -555.25 Gg of CO₂ eq. with the changed area of 59.12 kha. Net removals from FM activity were -7 384.36 Gg of CO₂ eq. with the changes on the area at the end of 2020: 1 977.01 kha.

The emissions/removals for ARD activities were recalculated in 2022 submission since the year 2013. The main reason for recalculation in AR activities included the new calculation of CSC in DW carbon pools following the ERT recommendation and recalculations in D activities included the recalculation of CSC in DW carbon pools.

Information is included in **Table 4** and more information can be found in the SVK NIR KP-LULUCF 2022.

(e) Any changes to the information referred to in points (a) to (d) for the years between the relevant base year and the year 2019, indicating the reasons for these changes:

The Slovak Republic is providing information on the changes and recalculations of the anthropogenic GHGs emissions and removals as required in the Article 9. This information is included in the CRF tables 8s1 – 8s4 for the years 1990 – 2019 generated by the CRF Reporter software version 6.0.8 as a part of annual GHG inventory submitted on January 15, 2022. The reason for recalculations of the base year or period and of year 2019 referred to in Article 8 of the MMR-IR are shown in table “SVK_MMR-IR_Article_8_15-01-2022” accompanied this submission.

Description and explanation of recommendations connected with the recalculations are included in **Table 5** of this Report the table “SVK_MMR-IR_Article_16_15-01-2022”. Reporting on major changes to methodological descriptions for the year 2019 is shown in the sectoral tables of used methodologies for the EU key categories and emission factors accompanied this submission.

Table 4: Emissions and removals resulting from activities under the Articles 3.3 and 3.4 of the Kyoto Protocol in 2013 – 2020 (determined as of 15. 01. 2022)

ACTIVITIES	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
	Gg of CO ₂ equivalents								
Total 3.3 and 3.4	-7 719.18	-5 754.67	-6 336.37	-6 223.82	-6 151.83	-5 300.55	-5 983.15	-7 939.61	-51 409.18
A. Article 3.3 activities	-411.43	-411.86	-449.13	-508.18	-501.51	-467.98	-551.88	-555.25	-3 857.22
A.1 Afforestation/Reforest.	-454.30	-474.49	-509.65	-536.47	-557.71	-579.55	-591.12	-600.42	-4 303.71
A.2 Deforestation	42.87	62.63	60.53	28.28	56.20	111.57	39.24	45.17	446.48
B. Article 3.4 activities	-7 307.75	-5 342.80	-5 887.25	-5 715.63	-5 650.32	-4 832.57	-5 431.28	-7 384.36	-47 551.96
B.1 Forest Management	-7 307.75	-5 342.80	-5 887.25	-5 715.63	-5 650.32	-4 832.57	-5 431.28	-7 384.36	-47 551.96

Table 5: List of recalculations in January 15, 2022 submission (version 1) against April 15, 2021 submission (version 4) with short explanation

RECALCULATED CATEGORY (SUBMISSION 2021 v4 VERSUS SUBMISSION 2022 v1)		YEARS	GHG AFFECTED	EXPLANATION
1. ENERGY SECTOR				
1.A.1.a.iv	Public Electricity and Heat Production – Other for Other fuels and Biomass	2019	CO ₂ , CH ₄ , N ₂ O	An issue with incorrect municipal waste consumption in one MSW incinerator was identified. In current submission the consumption was corrected.
1.A.5.a	Other – Stationary	2008-2019	CO ₂ , CH ₄ , N ₂ O	An improvement in LFG consumption was included in current submission. The activity data were modified for the years 2008 – 2019.
1.B.1.b	Solid Fuel Transformation - Charcoal	2019	CH ₄	Charcoal production in Slovakia for the year 2019 was revised by FAO STAT.
1.B.2.a.2	Oil and Natural Gas and Other Emissions from Energy Production – Oil Production	2010-2019	CO ₂ , CH ₄	Crude oil production for the years 2010 – 2019 was provided directly by companies. There were significant differences between statistical data and real data provided by companies. Slovakia in this NIR started to use real data. The difference was between - 53% and 4%. Between years 2010 and 2013 there is a small rise in crude oil production and afterwards the real production was significantly lower than statistical data. These data are measured directly by the wells and are connected to direct measurements of fugitive emission changed reported in chapter 3.5.4.2 and chapter 3.5.4.3
1.B.2.b.2	Oil and Natural Gas and Other Emissions from Energy Production – Natural Gas Production	2010-2019	CO ₂ , CH ₄	Natural gas production for the years 2010 – 2019 was provided directly by companies. There were significant differences between statistical data and real data provided by companies. Slovakia in this NIR started to use real data. The difference was between -4% and -40%, which correspond to decrease in NG production between 4.11 to 59.30 million m ³ . This data also affected emissions of NG processing.
1.B.2.b.3	Oil and Natural Gas and Other Emissions from Energy Production – Natural Gas Processing	2010-2019	CO ₂ , CH ₄	See above.
1.B.2.b.4	Oil and Natural Gas and Other Emissions from Energy Production – Transmission and storage	2014-2019	CO ₂ , CH ₄	In the category 1.B.2.b.4 was, in the NIR 2021, used incorrect constant, which resulted in incorrect methane emissions.
1.B.2.b.6	Oil and Natural Gas and Other Emissions from Energy Production – Natural Gas Other/Storage	2010-2019	CO ₂ , CH ₄	Natural gas storage data for the years 2010 – 2019 were also provided by the companies operating NG reservoirs for the Slovak Republic. These data were cross-checked by the national expert with statistical data. After this cross-check it was

RECALCULATED CATEGORY (SUBMISSION 2021 v4 VERSUS SUBMISSION 2022 v1)		YEARS	GHG AFFECTED	EXPLANATION
				found out that there was a difference in the methodology of companies and the Statistical Office of the Slovak Republic. Companies reported NG that flowed through the reservoirs throughout the year and the Statistical office reported only the balance of the reservoirs in the end of the year. Thus Slovakia decided to move to plant specific activity data. These data significantly increased and varied between years according of the needs of sector using NG.
3. AGRICULTURE				
3.D.1.1	Inorganic N Fertilizers	2000-2011	N ₂ O	Revision of nitrogen inorganic fertilizers consumption for the years 2000 – 2011.
3.D.1.2.a	Animal Manure Applied to Soils	1990-2019	N ₂ O	Straw-based system N inputs from deep bedding in the poultry and swine categories was implemented.
3.D.1.2.b	Sewage Sludge Applied to Soils	1990-2019	N ₂ O	The industrial sludge consumption for agricultural purposes was completed into inventory and revisions were implemented.
3.D.1.2.c	Other Organic Fertilizers Applied to Soils	1990-2019	N ₂ O	The revision of parameters for the estimation of nitrogen content for compost, digestate and green manure were implemented.
3.D.1.4	Crop Residues	1990-2019	N ₂ O	The recalculation of crop residues was performed due to the implementation of $Frac_{Remove}$ for cereal crops used for bedding purposes.
3.D.2.1	Atmospheric Deposition	1990-2019	N ₂ O	The revision of category 3.D.2.1 was performed due to changes in category 3.D.1.1 - Inorganic N Fertilizers from 2000 to 2011 and category 3.D.1.2 - Organic N Fertilizer in all time-series
3.D.2.2	Nitrogen Leaching and Run-off	1990-2019	N ₂ O	The revision of category 3.D.2.1 was performed due to changes in category 3.D.1.1 - Inorganic N Fertilizers in 2000 to 2011, 3.D.1.2 -Organic N Fertilizer in all time-series and 3.D.1.4 - Crop Residues. Correction of used $Frac_{Leach}$ was implemented.
3.G.1	Liming Limestone CaCO ₃	1990-2019	CO ₂	The revision of activity data since 1998 was performed. The calcium substances containing only CaO or Ca were subtracted from activity data, due to mentioned substances do not emit CO ₂ emissions. Based on new activity data since the year 1998, extrapolation was performed back to base year.
3.G.2	Liming Dolomite CaMg(CO ₃) ₂	1990-2019	CO ₂	The revision analysis of activity data since 1998. The substances contain magnesium oxide and magnesium were subtracted from activity data (no CO ₂ emissions). Based on new activity data since the year 1998, extrapolation was performed back to base year.
4. LULUCF				
4.A.1	Forest Land Remaining Forest Land	1990-2019	CO ₂	In the category 4.A, both subcategories 4.A.1 Forest Land remaining Forest Land and 4.A.2 Land converted to Forest Land was recalculated for the whole time period since 1990. The main reason for recalculation in 4.A.1 and 4.A.2 included the calculation of CSC in DW carbon pools following the ERT recommendation. Another reasons of recalculation in 4.A.1 was change and correction of root-to-shoot ratios (using only 0.2 for coniferous and 0.24 for broadleaved; no specific value for oaks following the ERT recommendation.
4.A.2	Land Converted to Forest Land	1990-2019	CO ₂	See above.
4.B.2	Land Converted to Cropland	1990-	CO ₂	In the category 4.B, subcategory 4.B.2 Land converted to Cropland was recalculated for the whole time period since 1990. The main reason for recalculation 4.B.2

RECALCULATED CATEGORY (SUBMISSION 2021 v4 VERSUS SUBMISSION 2022 v1)		YEARS	GHG AFFECTED	EXPLANATION
		2019		category included the recalculation of CSC in DW carbon pools (FL converted to CL) following the ERT recommendation.
4.C.2	Land Converted to Grassland	1990-2019	CO ₂	In the category 4.C, subcategory 4.C.2 Land converted to Grassland was recalculated for the whole time period since 1990. The reason of recalculations included the recalculation of CSC in DW carbon pools (FL converted to GL) following the ERT recommendation.
4.E.2	Land Converted to Settlements	1990-2019	CO ₂	In the category 4.E, subcategory 4.E.2 Land converted to Settlements was recalculated for the whole time period since 1990. The reason of recalculations included the recalculation of CSC in DW carbon pools (FL converted to SL) following the ERT recommendation.
4.F.2	Land Converted to Other Land	1990-2019	CO ₂	In the category 4.F, subcategory 4.F.2 Land converted to Other land was recalculated for the whole time period since 1990. The reason of recalculations included the recalculation of CSC in DW carbon pools (FL converted to OL) following the ERT recommendation.
5. WASTE				
5.A.1	5.A.1.a – Anaerobic Managed Waste Disposal Sites 5.A.1.b – Semi-aerobic Managed Waste Disposal Sites	1990-2019	CH ₄	Based on the new available data, activity data on ISW landfilling was revised for the years 1990 – 2019. Real data on landfilling of ISW for the groups 01-19 from the EWC with the DOC higher than 0 were used. Resulting methane emissions generating from the six groups of ISW (02, 03, 04, 15, 17 and 19) were summarised according to the biodegradable share of Food, Wood, Paper, Textile, C + D waste, Mix_Package and Sludge.
5.B.1.a	Biological treatment of solid waste – Municipal Solid Waste	1993-2019	CH ₄ , N ₂ O	The recalculation of activity data and emissions was processed due to the implementation of composted sewage sludge from the municipal wastewater treatment plant. The Source of data is the Water Research Institute.
5.C.1	5.C.1.1.b – Other Waste Incineration Biogenic 5.C.1.2.b – Other Non-Biogenic	1990-2019	CO ₂ , CH ₄ , N ₂ O	Emissions of CO ₂ , CH ₄ and N ₂ O for the category Waste Incineration – industrial waste were recalculated in this submission due to the addition of industrial and sewage sludge incineration into the calculation. Activity data of industrial and sewage sludge incineration without energy recovery were added to the calculation to comply with data from wastewater treatment plants presented in category 5.D.
5.D.1	Wastewater Treatment - Protein Consumption	2019	N ₂ O	Protein consumption for the year 2019 was updated based on the statistics reported by the ŠÚ SR.
7. KP LULUCF				
3.3 ARD	Afforestation and Reforestation and Deforestation	2013-2019	CO ₂	The emissions/removals for ARD activities were recalculated in 2022 submission since the year 2013. The main reason for recalculation in AR activities included the new calculation of CSC in DW carbon pools following the ERT recommendation and recalculations in D activities included the recalculation of CSC in DW carbon pools.

(f) Information on indicators, as set out in Annex III, for the year 2020:

The Slovak Republic is providing information on the annual indicators in the table “SVK_MMR Article7(f)_15-1-2022” for the years 1990 – 2020 as a part of annual GHG inventory submitted on January 15, 2022. Information on economic indicators is available based on data provided by the Statistical Office of the Slovak Republic.

Information on indicators is available in the template (tables of priority, additional priority and supplementary indicators data). Statistical information is based on the information directly provided by the Statistical Office of the Slovak Republic, Departments of National Accounts, Cross-cutting Statistics and Production Statistics. The additional information was completed from the online statistical database SLOVSTAT and PRODSLOV (www.statistics.sk). The time series are not yet complete due to the changes in statistical methodology in the previous years. Statistical information was revised with NACE rev2 classification since 2000. Within the revision of annual national accounts finalised on 31 August 2011, the Statistical Office implemented Commission Regulation (EU) No 715/2010 of 10 August 2010 amending Council Regulation (EC) No 2223/96 as regards adaptations following the revision of the statistical classification of economic activities NACE Revision 2 and the statistical classification of products by activity (CPA) in national accounts. Within the meaning of this regulation the national accounts data are submitted to Eurostat after 31 August 2011 under the ESA 95 transmission programme of national accounts data using NACE Rev.2 broken down by industry in time series 2000 – 2020 (constant prices). Several small recalculations took place and are highlighted by red colour directly in tables.

In addition, several indicators were updated based on the revisions of the statistical data or inventory data. All changes in the time series are highlighted in the table “SVK_MMR_Article7(f)_15-1-2022” in red with the explanation provided for the individual parameter.

(g) Information from the national registry on the issue, acquisition, holding, transfer, cancellation, retirement and carry-over of AAUs, RMUs, ERUs, CERs, tCERs and ICERs for the year 2021:

The Standard Electronic Format (SEF) tables are providing information on AAUs, ERUs, RMUs, CERs, ICERs and tCERs in the Slovak National Emission Registry. The tables include all required information on Kyoto Protocol units in the Slovak National Emission Registry during the reported period as well as information on transfers of the units during the reported period to and from other Parties of the Kyoto Protocol.

The Standard Electronic Format report containing information on the second commitment period of the Kyoto Protocol (CP2) for the reported period is included in the submission (*RREG1_SK_2021_2_1.xlsx*) as well as, for completeness, the Standard Electronic Format report containing information on the first commitment period (*RREG1_SK_2021_1_2.xlsx*).

Slovakia did issue its full assigned amount for the second commitment period, 202 268 939 AAUs, in February 2021. No other transactions carrying Kyoto Protocol units occurred during 2021.

(h) Summary information on concluded transfers pursuant to Article 3(4) and (5) of Decision No 406/2009/EC, for the year 2021:

Slovakia did not arrange or conclude any transfer of AEAs pursuant to Article 3(4) and (5) of Decision No 406/2009/EC in the year 2021.

The Slovak Republic is providing information on the anthropogenic GHGs emissions covered by the ESD in the table “SVK_MMR-IR_Annex X_15-01-2022” for the year 2020. In the **Table 6** below, the time series for the period 2013 – 2020 is provided.

Table 6: Total GHG emissions distribution between the EU ETS and ESD for the years 2013 – 2020

YEAR	2020	2019	2018	2017	2016	2015	2014	2013
	Gg of CO ₂ equivalents							
Total greenhouse gas emissions without LULUCF	36 964.53	39 722.84	42 001.18	42 128.70	41 058.02	40 584.75	39 872.39	41 841.74
Total verified emissions from stationary installations under Directive 2003/87/EC	18 170.00	19 903.84	22 193.40	22 063.23	21 264.05	21 181.22	20 918.07	21 831.83
CO ₂ emissions from 1.A.3.A civil aviation	0.88	1.83	2.85	3.42	3.56	3.66	3.44	3.40
Total ESR emissions (= C-D-E)	18 793.66	19 817.17	19 804.93	20 062.05	19 790.42	19 399.88	18 950.89	20 006.52
Annual Emission Allocation for year X-2 as defined in the Implementing Act pursuant to Art. 4(3) of Regulation (EU) 2018/842	25 948.87	25 646.45	25 344.02	25 041.60	25 103.60	24 743.57	24 383.53	24 023.50
Difference between AEA allocation and reported total ESR emissions (= G-F)	7 155.22	5 829.28	5 539.09	4 979.54	5 313.18	5 343.69	5 432.64	4 016.97

(i) Information on the use of joint implementation, of the CDM and of international emissions trading, pursuant to Articles 6, 12 and 17 of the Kyoto Protocol, or any other flexible mechanism provided for in other instruments adopted by the Conference of the Parties to the UNFCCC or the Conference of the Parties to the UNFCCC serving as the meeting of the Parties to the Kyoto Protocol, to meet their quantified emission limitation or reduction commitments pursuant to Article 2 of Decision 2002/358/EC and the Kyoto Protocol or any future commitments under the UNFCCC or the Kyoto Protocol, for the year 2021:

All operators of installations included in the EU ETS, individual account holders in the Slovak part of the Union Registry, as well as the Ministry of Environment of the Slovak Republic were allowed according to the provisions of Act no. 414/2012 Coll. as amended to participate in the KP flexible mechanisms in 2020. Installations in the EU ETS were able to use ERUs or CERs up to the limits set up by the Commission Regulation (EU) No 1123/2013.

The use of the Kyoto Protocol units is prohibited for the EU ETS participants since the beginning of 2021.

Slovakia did not perform any transactions related to meeting its commitments under the Kyoto Protocol, i.e. Retirement of the Kyoto Protocol units, in 2021.

(j) Information on the steps taken to improve inventory estimates, in particular in areas of the inventory that have been subject to adjustments or recommendations following expert reviews:

In some cases recommendations raised during the UNFCCC centralised review 2021 (there was not UNFCCC review in 2020) and ESD review in the year 2021 were already implemented in 2022 submission and caused recalculations of emissions (fugitive emissions, agriculture LULUCF, KP LULUCF and waste). More information on recalculation is in the **Table 5** of this Report.

2021 Annual Review of National Greenhouse Gas Inventory Data pursuant to Article 4(3) of Regulation (EU) No 2018/842 and to Article 3 of Decision No 406/2009/EC:

The requirements for the Union review of the national inventory data submitted by Member States are set out in Article 19 of the MMR. The details concerning the review process, such as the timing and steps of conducting of the annual and comprehensive reviews are set out in Chapter III and Annex XVI

of the Commission Implementing regulations (EU) No 749/2014. The annual review 2021 concerning Member States' inventories for the compliance year 2019 was carried out as planned during the spring 2021. The EU inventory team identified 1 significant issue through the checks performed in Step 1. Therefore, a second step of the 2021 annual ESD review was performed. Only significant issues were subject to the second step review checks. The reviewers raised 13 issues (3 from energy, 4 from IPPU, 4 from agriculture, 2 from waste) during the first and the second step of the 2021 annual ESD review (see Final Review Report). The TERT provided a recommendation for none of these issues. Other issues raised during the annual review were clarified and were considered resolved. Therefore, Final Review Report 2021 of national greenhouse gas inventory data pursuant to Article 19(2) of Regulation (EU) No 525/2013 with the official recommendation was provided by the June 30, 2021.

This information that no recommendations were provided during the 2021 review, is listed in the tabular format of Annex IV specified in Article 9.1 to the Implementing Regulation (EU) No 749/2014 ("[SVK_MMR-IR_Article 9_15-01-2022](#)") of the Commission accompanied this submission.

UNFCCC centralised removed review 2021:

Slovakia was reviewed in the UNFCCC centralised removed review during the week from 20th – 25th September 2021. As a result of the 2021 submission' review of Slovakia, "Provisional Main Findings of the ERT" was received in the end of review week. The report included several recommendations and findings in tables 1 and 2, in accordance with paragraph 84 of the annex to decision 13/CP.20. **Saturday paper was not applied**, while no significant under- or over-estimations were found by the ERT.

Slovakia sent comments to the report of "Provisional Main Findings of the ERT" within the deadline with the proposals for deleting or changing of several recommendations. Until January 15, 2022, Slovakia **did not received draft of the Review report 2021**. Therefore, the latest available review report is the [Review report of the 2019 annual submissions of Slovakia](#) submitted to the UNFCCC in 2019 on March 3, 2020.

Slovakia provides complete list of implemented recommendations from the previous reviews in the file "[SVK_MMR-IR_Article 9_15-01-2022](#)" accompanied this submissions. Agreed recommendations were added to Improvement Plan for the year 2022 and were implemented in this or in the next submissions. These recommendations with the comments are listed in the tabular format of Annex IV specified in Article 9.2 to the Implementing Regulation (EU) No 749/2014 ("[SVK_MMR-IR_Article 9_15-01-2022](#)") of the Commission accompanied this submission.

In addition, recommendations commended during the review 2021, where indicated and will be updated after the receiving of the draft review report 2021.

(k) The actual or estimated allocation of the verified emissions reported by installations and operators under Directive 2003/87/EC to the source categories of the national greenhouse gas inventory, where possible, and the ratio of those verified emissions to the total reported greenhouse gas emissions in those source categories, for the year 2020:

The Slovak Republic is providing information on the actual or estimated allocation of the verified emissions included in the EU ETS to the national GHG inventory as required in the Article 14.1. This information is included in the tabular format "[SVK_MMR-IR_Article_10_15-01-2022](#)" as a part of annual GHG inventory submitted on January 15, 2021. Further details can be found in the **Table 7** below and will be included in the SVK NIR 2022 published on March 15, 2022.

Table 7: Actual allocation of the verified emissions reported by installations and operators under Directive 2003/87/EC for the year 2020

CATEGORY	GAS	GHG INVENTORY EMISSIONS	VERIFIED EMISSIONS UNDER DIRECTIVE 2003/87/EC	VERIFIED EMISSIONS/ INVENTORY EMISSIONS
		Gg of CO ₂ or CO ₂ eq.		Ratio in %
Greenhouse gas emissions (total emissions without LULUCF for GHG inventory and without emissions from 1A3a Civil aviation, total emissions from installations under Article 3h of Directive 2003/87/EC)	Total GHG	36 963.65	18 169.12	49.15%
CO ₂ emissions (total CO ₂ emissions without LULUCF for GHG inventory and without emissions from 1A3a Civil aviation, total emissions from installations under Article 3h of Directive 2003/87/EC)	CO ₂	31 052.84	18 087.56	58.25%
1.A Fuel combustion activities, stationary combustion	CO ₂	16 733.48	10 828.41	64.71%
1.A.1 Energy industries	CO ₂	6 404.07	5 970.67	93.23%
1.A.2 Manufacturing industries and construction	CO ₂	5 882.12	4 850.75	82.47%
1.A.3 Transport	CO ₂	6 949.45	168.28	2.42%
1.A.4 Other sectors	CO ₂	4 379.13	6.99	0.16%
1.B Fugitive emissions from fuels	CO ₂	13.17	NO	100.00%
2.A Mineral products	CO ₂	2 218.73	2 189.47	98.68%
2.B Chemical industry	CO ₂	1 130.58	1 307.43	115.64%
2.C Metal production	CO ₂	3 599.08	3 594.85	99.88%
2.B Chemical industry (Nitric acid production)	N ₂ O	75.95	75.95	100.00%
3.C Metal production (Aluminium production)	PFCs	5.61	5.61	100.00%

(I) Where relevant, the results of the checks performed on the consistency of the emissions reported in the greenhouse gas inventories, for the year 2020, with the verified emissions reported under Directive 2003/87/EC:

The Slovak Republic is providing information on the results of the checks performed on the consistency reported GHG emissions with the verified emissions included in the EU ETS as required in the Article 14.2. This information is included in the “SVK_MMR-IR_Article_10_15-01-2022” as a part of annual GHG inventory submitted on January 15, 2022.

Based on preliminary analyses, total GHG emissions verified under the EU ETS represent 49.15% on the total GHG emissions (without LULUCF, without indirect emissions and CO₂ emissions from domestic aviation) based on January 15, 2022 inventory submission. According to the trend started in previous year, the share of the EU ETS emissions is lower, than the share of the EU ESD emissions in the Slovak Republic. This progress was analysed and the resulting outcomes refer to increasing of energy effectivity and decreasing of emissions in large point sources included in the EU ETS scheme. The number of installations fell under the threshold to be included into the scheme and therefore, the ESD emissions increased inter-annually.

Total CO₂ emissions verified under the EU ETS represent 58.25% on the total CO₂ emissions (without LULUCF and domestic aviation) based on January 15, 2022 inventory submission.

Total N₂O emissions verified under the EU ETS represent 3.89% on the total N₂O emissions (without LULUCF and domestic aviation) based on January 15, 2022 inventory submission.

Total PFCs emissions verified under the EU ETS represent 100% on the total PFCs emissions based on January 15, 2022 inventory submission.

(m) Where relevant, the results of the checks performed on the consistency of the data used to estimate emissions in preparation of the greenhouse gas inventories, for the year 2020, with:

The Slovak Republic is providing information on the results of the checks performed on the consistency of the data used to estimate emissions in preparation of the GHG inventories as required in the Article 7(1)(m).

(i) the data used to prepare inventories of air pollutants under the Directive 2001/81/EC:³

Information on the air pollutants inventory for the year 2019 under Directive (EU) 2016/2284 as required in the task (i) is included in the Table of the Annex II (Article 7) of the Commission Implementing Regulation (EU) No 749/2014 as a part of annual GHG inventory submitted on January 15, 2022. More information can be find in part (b) of this Report. Provided data corresponded to the NECD emission inventory re-submitted on March 2021. Emissions provided in the Table of the Annex II (“SVK_MMR-IR_Article_7_15-01-2022”) for the transport, agriculture and waste sectors are recalculated and will be included in the February 15, 2022 submission under the NECD.

(ii) the data reported pursuant to Article 6(1) of Regulation (EC) No 842/2006; Article 11 IA, reporting on consistency of the data reported on fluorinated greenhouse gases Member States shall report textual information on the results of the checks referred to in Article 7(1)(m)(ii) of Regulation (EU) No 525/2013 including:

(a) a description of the checks performed by the Member State concerning the level of detail, the data sets and the submissions compared;

Checks are carried out according to the data from:

- Operators (data sent to the Ministry of Environment under the Regulations (EU) No 842/2006 and 517/2014);
- Manufacturers, importers, exporters and service, assembling organizations reported over www.szchkt.org by refrigerant;
- According to data from users of SW Leaklog on www.szchkt.org.

The data based on the first two bullets allows to calculation of total consumption of individual F-gases in Slovakia. The data from the SW Leaklog allows calculating the usage of individual F-gases in different categories on the basis of refrigerants leaks. Results of these two approaches were compared-

(b) a description of the main results of the checks and explanations for the main inconsistencies;

Due to the method of obtaining information through www.szchkt.org, the most significant data are data on the import, sale refrigerants (F-gases are not produced in Slovakia), which are compared with data reported by installation and service organization about their use.

The total difference between the data calculated according to the article (a) was less than 2% in 2020. The main difference was in the use of R134a at mobile AC. In this area there are very many small service organizations, which are difficult to monitor. Therefore, the data in this area are corrected by using top-down approach.

(c) information whether the data collected by operators under Article 3(6) of Regulation (EC) No 842/2006 (1) has been made use of and how;

Data collected by operators under Article 3(6) of Regulation (EC) No 842/2006 were used as it was described in part (a).

³ Directive amended by the Directive (EU) 2016/2284

(d) where the checks have not been performed, an explanation of the reasons why the checks were not considered to be relevant.

The checks were done, see part (a), above.

(iii) the energy data reported pursuant to Article 4 of, and Annex B to, Regulation (EC) No 1099/2008:

The Slovak Republic is providing information on the results of the checks performed on the consistency reported GHG emissions with the energy data reported pursuant to Article 4 of and Annex B to the Regulation (EC) No 1099/2008 as required in the Article 17. This information is included in the table "SVK_MMR-IR_Article_12_15-01-2022" submitted on January 15, 2022.

The Statistical Office of the Slovak Republic published energy statistics ENERGY 2020 on their website and the EUROSTAT database published energy statistics online. The correct comparison of the national GHG inventory energy data and the energy statistics as it is written in the Article 17 of the Commission Implementing Regulation (EU) No 2020/1208 was prepared by the deadline of this submission.

Table of the Annex VI contains information from the national GHG inventory submission 2022 and the background data provided by the Statistical Office of the Slovak Republic to the NIS SR based on contract (not published). This information contains also information on average NCV, which are not consistent with the NCV data used by EUROSTAT. Therefore, inconsistencies can be higher as usual.

Based on analyses provided, the consistency of national data reported in the reference approach is in good agreement with the data reported for the EUROSTAT. Differences recognised are mostly caused by rounding and by using national (country specific) NCVs.

Therefore, in fossil solid fuels difference is 0.10% (higher in national inventory), in fossil liquid fuels difference is -0.02% (lower in national inventory), and gaseous fossil fuels with difference -0.04%, (only natural gas is reported here). Major inconsistencies occurred in waste – non-biomass fraction: -90.38% (lower in national inventory), According to the guidelines, only non-biomass fraction of waste is reported is RA. Country specific NCV is used in RA (NCV used by the Statistical Office of the Slovak Republic is more than 40% higher than NCV used in inventory due to different methodology used by the statistics).

(n) Description of changes to the national inventory system:

There were no significant changes in the arrangement of the National Inventory System during inventory year 2021. National Inventory System description is provided in the Chapter 1.2 of the latest SVK National Inventory Report 2021 published in April 2021.

SVK NIS is continuing in the process of strengthening capacity among the national system in line with the improvement and prioritisation plans. The uncertainties calculations were previously based on external cooperation, now (since the year 2021), an internal expert is responsible for all sectors across inventory. In addition, a new expert was involved in the cropland category to strengthen new calculations on land-based matrix and new expert was involved into agricultural team. During previous years, the several new institutions were involved in the inventory, among others in transport (Control and Testing Body for road vehicles), Ministry of Transport of the Slovak Republic – Section of Buildings (for buildings energy balance mostly focusing of residential heating and cooling), State Nature Protection Body (for wetlands identification), new internal (SHMÚ) expert on emission projections and continuing of harmonisation process between the air pollutants and GHG inventories.

Figure and tables below indicate structure and responsibilities of the SVK NIS. On the **Figure 1** a structure of the NIS is depicted, where the Committee on CCP is intergovernmental body responsible for climate change policy implementation on cross-ministerial level. In the **Table 8** is updated list of

internal experts within SHMÚ and in the **Table 9** is a list of external experts and institutions within the NIS SR.

Figure 1: Structure and responsibilities of the National Inventory System of the Slovak Republic

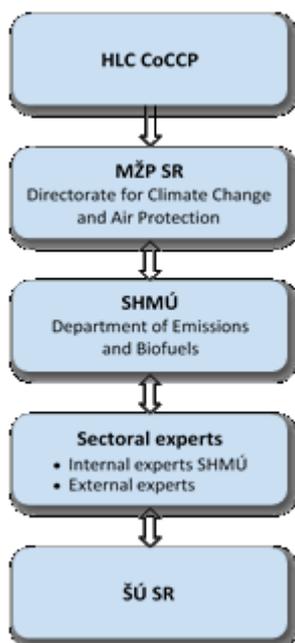


Table 8: List of internal experts in the National Inventory system of Slovak Republic

INTERNAL EXPERTS - SHMÚ		
INSTITUTION	NAME	RESPONSIBILITY
Dept. of Emissions and Biofuels	Ms. Janka Szemesová	NIS coordinator
Dept. of Emissions and Biofuels	Ms. Lenka Zetochová	Deputy of NIS coordinator and data manager
Dept. of Emissions and Biofuels	Mr. Ján Horváth	Energy expert
Dept. of Emissions and Biofuels	Mr. Marcel Zemko Mr. Jozef Orečný	Emission projections experts
Dept. of Emissions and Biofuels	Ms. Michaela Câmpian Ms. Zuzana Jonáček	Other pollutant experts
Dept. of Emissions and Biofuels	Ms. Kristina Tonhauzer	Agricultural expert
Dept. of Emissions and Biofuels	Ms. Monika Jalšovská	NEIS expert
Dept. of Water Quality	Ms. Lea Mrafková	GHG inventory in wastewater sector
Dept. of Numerical Forecasting Models and Method	Mr. Martin Petraš	Uncertainty analyses, QA activity

Table 9: List of main external experts, institutions and data providers in the NIS SR

EXTERNAL INSTITUTIONS/EXPERTS		
INSTITUTION	NAME	RESPONSIBILITY
Profing – company for environmental services in GHG	Mr. Ján Judák	Reference approach and fugitive emissions preparations
Ecosys Slovakia – company for environmental services in energy	Mr. Jiří Balajka	Consultations in energy and emission projections
National Forest Centre Zvolen	Mr. Ivan Barka Mr. Tibor Priwitzer Mr. Pavel Pavlenda	GHG inventory in Forest Land and KP LULUCF
Animal Production Research Centre	Ms. Zuzana Palkovičová Mr. Ondrej Pastierik Mr. Miroslav Záhradník	GHG inventory in agriculture – animal production
Research Institute on Soil Protection Bratislava National Agricultural and Food Institute	Mr. Michal Sviček Mr. Pavol Bezák Ms. Kristína Buchová	Data provider in agriculture sector – soils, LULUCF Cropland and fertilisers
Central Control and Testing Institute in Agriculture	Mr. Štefan Gáborík Ms. Maggioni-Brázová Ildikó	Data provider in the Agricultural sector – soil nutrition
Faculty of Chemical Technology of the Slovak Technical University Bratislava	Mr. Vladimír Danielik Mr. Juraj Labovský	GHG inventory in industrial processes and solvent use sectors and energy – sectoral approach Consultation in fuel balance Consultation for EU ETS
Faculty of Chemical Technology of the Slovak Technical University Bratislava	Mr. Igor Bodík	GHG inventory in waste – wastewater
Independent Expert	Mr. Marek Hrabčák	GHG inventory in waste – SWDS
Statistical Office of the Slovak Republic – Department of Cross-sectoral Statistics	Ms. Maria Lexová	Statistical data provider
Slovak Association for Cooling and Air Conditioning Technology		F-gases data provider
SPIRIT Information Systems – IT services, NEIS databases provider	Mr. Jozef Skákala	NEIS provider, consultation on the NACE classification of sources
ICZ Slovakia a.s.	Mr. Miroslav Hrobák	National Registry focal point
Ministry of Economy	Mr. Juraj Novák	Data provider for renewables
Grassland and Mountain Agriculture Research Institute	Mr. Štefan Pollák	GHG inventory in Grassland

(o) Description of changes to the national registry:

The following changes to the national registry of Slovakia occurred in 2021.

Table 10: Changes to the national registry of Slovakia which occurred in 2021

Reporting Item	Description
15/CMP.1 annex II.E paragraph 32.(a): Change of name or contact	No change of name or contact occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(b): Change regarding cooperation arrangement	No change of cooperation arrangement occurred during the reported period.

Reporting Item	Description
15/CMP.1 annex II.E paragraph 32.(c): Change to database structure or the capacity of national registry	There have been 6 new EUCR releases (versions 12.4, 13.0.2, 13.2.1, 13.3.3, 13.5.1 and 13.5.2) after version 11.5 (the production version at the time of the last Chapter 14 submission). No changes were applied to the database, whose model is provided in Annex A. No change was required to the application backup plan or to the disaster recovery plan. No change to the capacity of the national registry occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(d): Change regarding conformance to technical standards	The changes that have been introduced with versions 12.4, 13.0.2, 13.2.1, 13.3.3, 13.5.1 and 13.5.2 compared with version 11.5 of the national registry are presented in Annex B. It is to be noted that each release of the registry is subject to both regression testing and tests related to new functionality. These tests also include thorough testing against the DES and are carried out prior to the relevant major release of the version to Production (see Annex B). No other change in the registry's conformance to the technical standards occurred for the reported period.
15/CMP.1 annex II.E paragraph 32.(e): Change to discrepancies procedures	No change of discrepancies procedures occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(f): Change regarding security	No changes regarding security were introduced.
15/CMP.1 annex II.E paragraph 32.(g): Change to list of publicly available information	No change to the list of publicly available information occurred during the reporting period.
15/CMP.1 annex II.E paragraph 32.(h): Change of Internet address	No change of the registry internet address occurred during the reported period.
15/CMP.1 annex II.E paragraph 32.(i): Change regarding data integrity measures	No change of data integrity measures occurred during the reporting period.
15/CMP.1 annex II.E paragraph 32.(j): Change regarding test results	No change regarding test results occurred during reported period.

(p) Information on their quality assurance and quality control plans, a general uncertainty assessment, a general assessment of completeness and, where available, other elements of the national greenhouse gas inventory report needed to prepare the Union greenhouse gas inventory report:

Sectoral experts apply the QA/QC methodology according to the Quality Manual, collect data from providers and process emission inventory for a given sector – they provide partial reports with information on quality and reliability of data on activities and emissions. These partial conclusions serve as a basis to estimate total uncertainties in emission inventories by a coordinator for uncertainties for all sectors. In some cases, tier 2 – Monte Carlo methodology (waste, energy and industry) which requires detailed review of quality of each input parameter, works out uncertainty analysis.

Regarding QA/QC system, the SHMÚ implemented a policy of continuous training process for internal and external experts. Experts are trained during workshop of the SVK NIS. The minutes of the workshop and all relevant documents are sent to sectoral experts of the SVK NIS. The ways of communication within the SVK NIS are via e-mail, phone call, visits and meetings. Although the efficiency of communication is on a high level in our information system, for further improvement a website forum was created.

QA/QC Manual and QC forms were revised. The dates and responsibilities are given. The QA/QC system includes following steps to ensure high quality of inventory report:

- Step 1: QA/QC plans
- Step 2: Matrix of responsibility
- Step 3: Quality control QC
- Step 4: Quality assurance QA
- Step 5: Recommendation list
- Step 6: Improvement plan and prioritisation
- Step 7: Archiving

The quality objectives and the planned QC and QA activities regarding to all sectors are set in QA/QC plans (internal and external). In these documents deadlines and responsibilities are described. These plans are updated and evaluated annually by the quality manager of the NIS and approved by the MŽP SR.

General quality control includes routine checks, correctness, completeness of data, identification of errors, deficiencies and documentation and archiving of the inventory material. Category – specific QC includes reviews of the source categories, activity data and emission factors focusing on key categories and on categories where significant methodological changes or data revision have taken place. Experts fill QC forms during the compilation of inventory, results from QC activities are documented and archived.

Quality assurance is performed after application QC checks concerning the finalised inventory. QA procedures include reviews and audits to assess the quality of inventory and the inventory preparation and reporting process, determine the conformity of the procedures taken and to identify areas where improvements could be made. These procedures are in different levels, include basic reviews of the draft report, quality meetings, internal and external audits, EU and UNFCCC reviews.

The outcomes and experiences from the regular UNFCCC and EU compliance reviews are the main sources for the preparation of recommendation lists and improvement plans based on these recommendations. Lists and plans are updated annually after reviews take place. Prioritisation process is based on problems and recommendation raised during reviews and also based on expert's consultations. Results of prioritisation are included in the improvement plans. Detailed Recommendation List and Improvement Plan are prepared by sectors and delivered to the sectoral experts for consideration and prioritisation of planned activities for the next inventory cycle. Recommendations from the UNFCCC review.

The archive system includes relevant data sources and spreadsheets, reproduce the inventory and review all decisions about assumptions and methodologies. The archiving system checklist contains archiving activities as documenting methods used, including those used to estimate uncertainty and data sources for each category; expert comments; revisions, changes in data inputs or methods and recalculation, also reason and source of changes; documenting the used software for calculation of emission. Each new inventory cycle benefits from effective data and documents management during development of the previous inventory.

Assessment of completeness is one of the elements of quality control procedure in the inventory preparation on general and sectoral level. The completeness of the emission inventory is improving from year to year and the updates are regularly reported in the national inventory reports. The completeness checks for ensuring time series consistency is performed and the estimation is completed in recent inventory submission (2022). The improvements were performed in the previous inventory submissions such as estimation of GHG emissions for the agriculture and transport.

The list of categories reported by the notation keys is provided in the CRF Table 9. Whole overview of notation keys with detailed explanation will be published in the SVK NIR 2022 and submitted on March 15, 2022. Information is divided to sectors and categories. Several categories are reported as not occurring (NO) due to the not existence of the emission source or the source is out of threshold and measurement range. If the methodology does not exist in the IPCC Guidelines, the notation key not applicable (NA) was used. Several NE key categories have been reported in 2022 submission for 1990 – 2020.

Three reasons for not estimated (NE) categories are:

- no methodology is available;
- potential emissions/removals will under the threshold level of emissions in comparison to GHG emissions total;
- insufficient activity data (mostly for indirect GHG emissions like CO, SO₂ or NMVOC).

Table 11: List of NEs in the 2022 submission

GAS	SECTOR	CATEGORY	DESCRIPTION
CO ₂	Agriculture	General	Part of the indirect emissions of CO ₂ are included in the sectoral tables for agricultural soils indirect emissions from other than agricultural sources are not estimated.
CO ₂	Energy	1.B Fugitive Emissions from Fuels/1.B.2 Oil and Natural Gas and Other Emissions from Energy Production/1.B.2.a Oil/1.B.2.a.4 Refining / Storage	Change of notation according to FCCC/ARR 2019 recommendation E.38; emissions are not estimated because the 2006 IPCC guidelines do not include methodologies to estimate these emissions.
CH ₄	IPPU	2.D Non-energy Products from Fuels and Solvent Use/2.D.1 Lubricant Use	No methodology is provided in the 2006 IPCC GL.
CH ₄	IPPU	2.D Non-energy Products from Fuels and Solvent Use/2.D.2 Paraffin Wax Use	No methodology is provided in the 2006 IPCC GL.
N ₂ O	Agriculture	General	Part of the indirect emissions of N ₂ O are included in the sectoral tables for manure management and agricultural soils indirect emissions from other than agricultural sources are not estimated.
N ₂ O	Agriculture	3.D Agricultural Soils/3.D.1 Direct N ₂ O Emissions From Managed Soils/3.D.1.6 Cultivation of Organic Soils	The emissions are under the threshold of significance. See NIR Chapter Agriculture.
N ₂ O	Energy	1.B Fugitive Emissions from Fuels/1.B.2 Oil and Natural Gas and Other Emissions from Energy Production/1.B.2.a Oil/1.B.2.a.4 Refining / Storage	Change of notation according to FCCC/ARR 2019 recommendation E.38; emissions are not estimated because the 2006 IPCC guidelines do not include methodologies to estimate these emissions.
N ₂ O	IPPU	2.D Non-energy Products from Fuels and Solvent Use/2.D.1 Lubricant Use	No methodology is provided in the 2006 IPCC GL.
N ₂ O	IPPU	2.D Non-energy Products from Fuels and Solvent Use/2.D.2 Paraffin Wax Use	No methodology is provided in the 2006 IPCC GL.

Categories included elsewhere (IE) are listed also in the CRF Table 9 with the explanations of reallocation.

Both direct and indirect GHGs as well as precursor gases are covered by the inventory of the Slovak Republic. The geographic coverage is complete; the whole territory of the Slovak Republic is covered by the inventory.

The Slovak Republic is enclosing as a part of the January 15, 2022 submission also preliminary sectoral Chapters of the SVK NIR 2022.

Key categories were assessed by Approach 1 by the level of emissions in years 1990 and 2020 and the trend in emissions for the year 2020 with and without LULUCF categories and those key

categories have been chosen, whose cumulative contribution is less than 95%. The identification includes all reported greenhouse gases CO₂, CH₄, N₂O, HFCs, PFCs and SF₆ and all IPCC source categories with LULUCF categories (in absolute values) performed with the detailed categorization. The detailed key categories will be included in the March 15, 2022 submission.

In 2020, the Slovak Republic determined using the Approach 1 by the level assessment, 33 key categories with LULUCF and 28 key categories without LULUCF.

In 2020, the Slovak Republic determined using the Approach 1 by the trend assessment, 33 key categories with LULUCF and 30 key categories without LULUCF.

List of key categories is almost identical for the base year 1990 and for the latest inventory year.

The most important key categories are fuel combustion in energy sector for CO₂, road transport, forest land, direct N₂O emissions from agricultural soil or methane emissions from SWDS.

The uncertainty assessment by Approach 1 will be updated on March 15, 2022 submission. Quantification of emissions uncertainty by level and trend assessment is calculated by using Approach 1 method published in the IPCC 2006 GL. The Approach 1 without LULUCF estimated the 3.66% level uncertainty and the 1.14% for the trend uncertainty in 2020 (12.31% and 3.81% with LULUCF).

The uncertainty assessment by using the more sophisticated Approach 2 Monte Carlo method was prepared in cooperation with the Faculty of Mathematics, Physics & Informatics. The Approach 2 uncertainty analyses for fuel combustion in energy sector (including transport) according to the fuels classification was estimated in the range of confidence interval (-2.38%; +3.12%) in 2015. The Approach 2 uncertainty analyses for industrial processes and product use sector including solvent and other product use sector according to the technological emissions was estimated in the range of confidence interval (-3.66%; +3.63%) in 2015. Results of the Monte Carlo method to estimate uncertainty were published^{4,5} and detailed description was in the Chapters 3 and Chapter 4 in the SVK NIR 2017 and 2018. This will be updated in 2022 March re-submission.

More information and calculations are included in the table "SVK_MMR-IR_Article_14_15-01-2022" what can slightly differ from the CRF tables. MMR table does not represent all categories that are counted in the national totals and Biomass Burning data are double counted, because these data occurred also in the categories Forest Land Remaining Forest Land and Land Converted to Forest Land.

⁴ J. Szemesova, M. Gera: Contributions to Geophysics & Geodesy, 37/3, 2007

⁵ Szemesová J., Gera M. Uncertainty analysis for estimation of landfill emissions and data sensitivity for the input variation, Climatic Change DOI 10.1007/s10584-010-9919-1, 2010