
Czech
Hydrometeorological
Institute

General issues in the Czech Republic's GHG inventory

Eva Krtková

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Prague, November 2021

- Institutional arrangements
- Changes in the national inventory system
- Preparation of GHG inventory
- Emissions trends
- Cross-cutting issues
- Key categories
- Uncertainties
- Overview of recalculations
- Indirect emissions
- QA/QC
- Archiving

Institutional arrangements (MoE)

National entity and responsibilty for the national greenhouse gas inventory

Ministry of Environment (MoE)

Supervision of national inventory system, negotiation with UNFCCC, contact with relevant governmental bodies

Institutional arrangements (CHMI)

Coordinating and managing organization responsible for the compilatiom of the national GHG inventory and reporting submission:

Czech Hydrometeorological Institute

Designated and supervised by MoE

Eva Krtková, Markéta Klusáčková (deputy): GHG inventory coordination

Zuzana Rošková, Šimon Svoboda: IPPU sector

Risto Saarikivi: QA/QC manager

Zuzana Herrera: Projections of GHG

Institutional arrangements

Sectoral inventories are prepared by sectoral experts, which are coordinated and controlled by CHMI

Energy

Koneko marketing, Ltd., Prague: Vladimír Neužil and colleagues

Transport Research Centre, Brno: Leoš Pelikán

IPPU

CHMI, Prague: Zuzana Rošková, Šimon Svoboda

Institutional arrangements

Agriculture

Institute of Forest Ecosystem Research, Jílové u Prahy: Jana Beranová

Crop Research Institute, Praha: Jan Klír, Jana Wollnerová

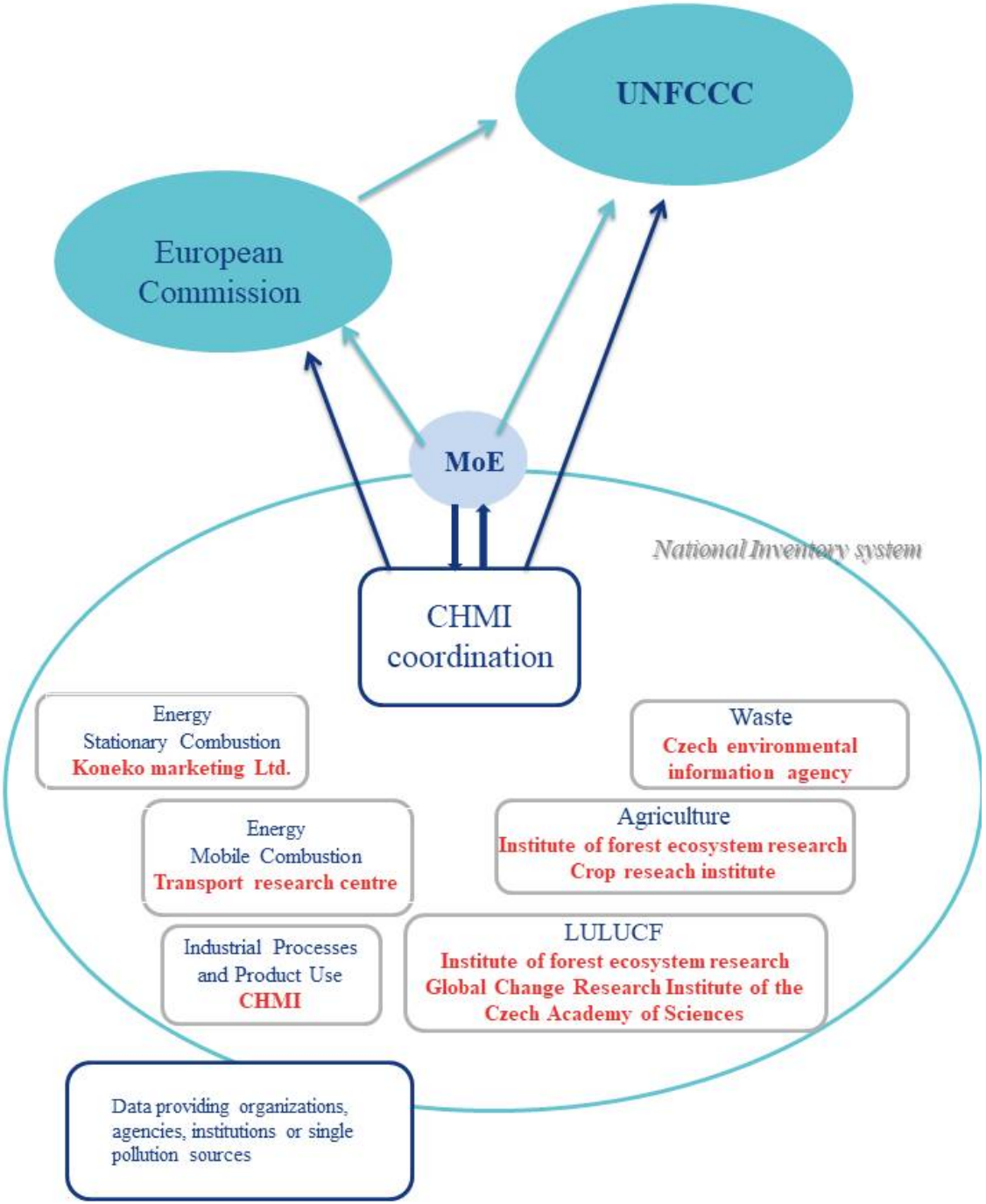
LULUCF

Institute of Forest Ecosystem Research, Jílové u Prahy: Emil Cienciala

CzechGlobe, Brno: Alexandr Ač

Waste

CENIA (Czech Environmental Information Agency), Prague: Jana Esterlová, Miroslav Havránek


UNFCCC
European Commission
MoE
National Inventory system
CHMI coordination
Energy
Stationary Combustion
Koneko marketing Ltd.
Waste
Czech environmental information agency
Energy
Mobile Combustion
Transport research centre
Agriculture
Institute of forest ecosystem research
Crop reseach institute
Industrial Processes and Product Use
CHMI
LULUCF
Institute of forest ecosystem research
Global Change Research Institute of the Czech Academy of Sciences
Data providing organizations, agencies, institutions or single pollution sources

Funding

Transfer of financial resources from MoE to CHMI

CHMI 4-year‘s contracts with sectoral institutions in order to fullfill as much as possible stable and experienced team

Additional resources in 2012 from project ‚Green for Savings‘

Research project (2019-2022)

Changes in NIS

By 1st January 2015 was established separate department of 4 experts at the CHMI specifically responsible for GHG inventories

Remaining close cooperation with Department of Emissions and Sources – usual pollutants

Additional capacity provided by the research project

Preparation of the inventory

- Inventory planning
- Inventory preparation
- Inventory management

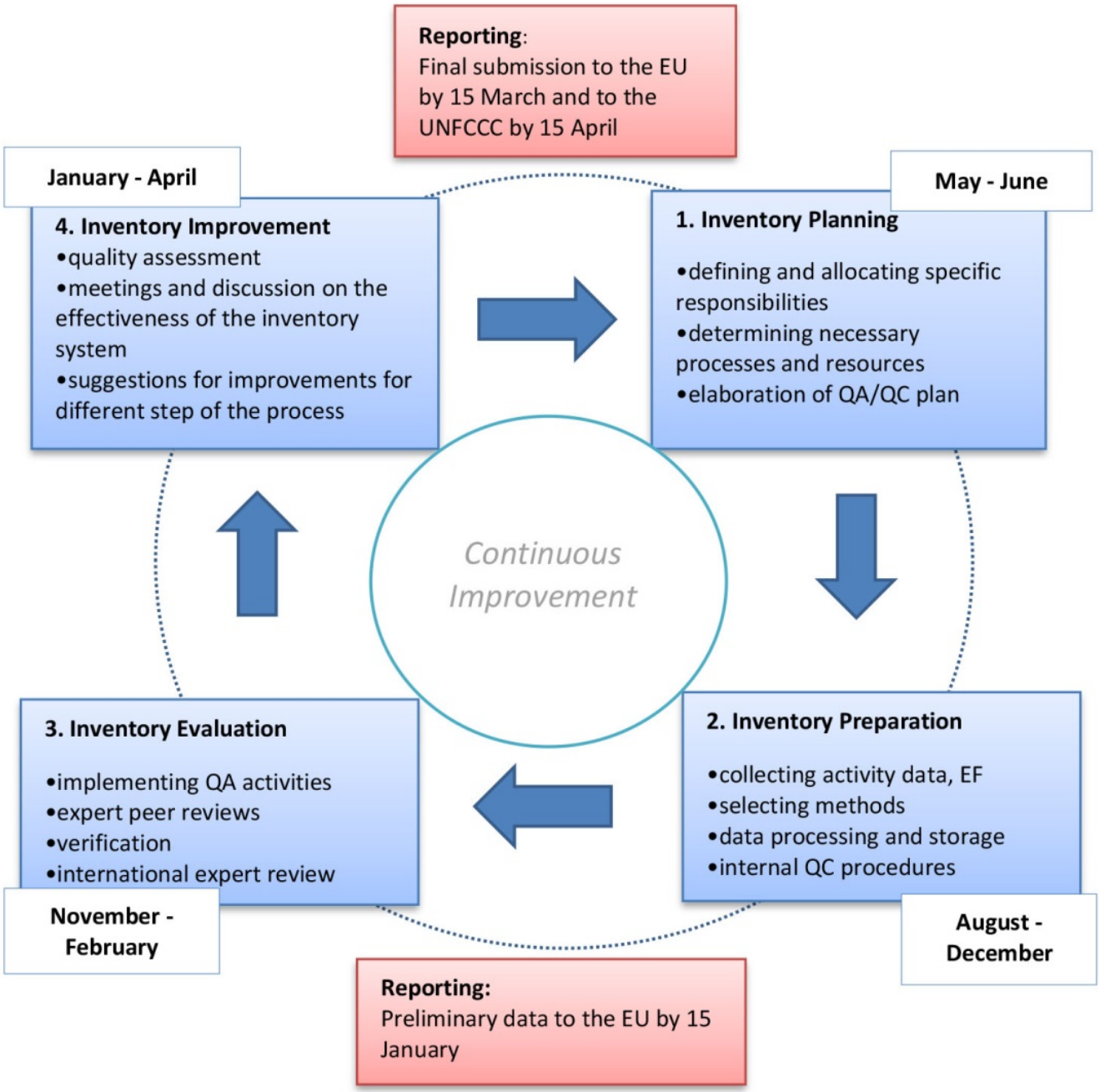
Activity data collection, selection of suitable methods, development of country specific emission factors, emission estimation, QA/QC proces, KC analysis, uncertainty analysis, reporting, archiving

Preparation of the inventory

Activity data:

– CzSO, EU ETS data, specific data from operators, different industrial associations, F-gas registry, other relevant research organisations, State Administration of Land Surveying and Cadastre, Integrated system of waste management…

Higher Tiers methods and country specific emission factors are preferred to use especially for the key categories. Constant efforts of development of new country specific emission factors is occuring.


Reporting:
Final submission to the EU by 15 March and to the UNFCCC by 15 April
January - April
May - June
4. Inventory Improvement
•quality assessment
•meetings and discussion on the effectiveness of the inventory system
•suggestions for improvements for different step of the process
1. Inventory Planning
•defining and allocating specific responsibilities
•determining necessary processes and resources
•elaboration of QA/QC plan
Continuous Improvement
3. Inventory Evaluation
•implementing QA activities
•expert peer reviews
•verification
•international expert review
2. Inventory Preparation
•collecting activity data, EF
•selecting methods
•data processing and storage
•internal QC procedures
November - February
August - December
Reporting:
Preliminary data to the EU by 15 January

Emission trends

	CO_2[1]	CH_4[3]	N_2O[3]	HFCs	PFCs	NF_3	SF_6	Total emissions[4] excl. LULUCF	incl. LULUCF
1990	164202.71	23539.53	9340.00				84.24	198949.27	191988.50
1991	148892.39	21937.16	8000.23				84.08	180517.34	170781.67
1992	144616.94	20550.69	7169.13		NO		85.41	173928.37	163618.61
1993	138634.27	19653.38	6437.32				86.56	166270.92	155936.72
1994	132370.35	18500.03	6336.30				87.66	158696.03	150510.95
1995	131600.51	18077.42	6629.83	14.02	0.01	NO	88.68	157779.54	149222.72
1996	134954.56	17921.29	6398.48	71.18	0.68	NO	98.31	160764.05	152165.49
1997	130725.01	17503.23	6373.85	173.97	1.73	NO	96.10	156152.97	148627.55
1998	125308.97	16787.96	6253.33	242.68	1.66	NO	94.98	149946.54	142313.83
1999	116614.33	16045.38	6051.52	300.45	1.10	NO	95.94	140283.08	132390.81
2000	127127.42	15210.85	6474.73	419.40	4.69	NO	108.40	150462.91	141705.34
2001	127024.29	14960.82	6712.46	567.82	9.75	NO	98.82	150446.34	141425.59
2002	123940.09	14644.78	6314.46	700.24	16.39	NO	121.28	146761.65	138041.72
2003	127413.41	14591.13	5833.56	845.25	8.55	NO	144.69	149825.07	142309.84
2004	128169.22	14099.81	6497.90	953.47	12.81	NO	120.61	150812.97	143093.87
2005	125678.62	14588.41	6345.13	1074.99	14.89	NO	111.84	148824.81	140735.43
2006	126493.46	14845.72	6232.26	1351.49	31.09	NO	105.12	150095.25	144045.15
2007	128307.20	14412.90	6299.24	1765.73	29.00	NO	93.79	151870.14	147313.31
2008	122995.05	14456.52	6359.70	2053.81	39.76	NO	88.67	146954.17	139495.30
2009	115238.79	13934.57	5513.37	2122.80	45.44	NO	89.05	137831.16	129618.73
2010	117603.43	14150.47	5395.37	2421.38	48.06	0.15	82.76	140593.09	133183.23
2011	115167.62	14148.69	6016.72	2685.07	8.31	0.59	88.64	139036.89	130446.15
2012	111289.36	14129.46	5875.11	2796.37	6.31	0.89	92.44	135064.41	126186.80
2013	106525.80	13551.50	5645.69	2925.26	4.22	1.41	83.04	129519.07	121342.11
2014	104094.90	13593.60	5757.06	3084.23	3.17	2.37	79.90	127389.90	119315.25
2015	104864.60	13620.29	6155.41	3304.99	2.15	2.15	78.27	128771.06	121428.17
2016	106685.44	13008.46	6291.46	3541.21	1.82	2.15	78.63	130348.31	124184.39
2017	107612.79	12844.28	6220.53	3729.86	2.03	3.33	74.03	131181.78	127302.73
2018	106131.60	12756.79	5867.89	3762.15	2.13	3.11	70.56	129251.24	133370.07
2019	100812.34	12475.60	5576.40	3751.32	1.62	2.52	67.93	123297.56	136862.08
%[2)]	-38.60	-47.00	-40.30				-19.36	-38.03	-28.71

Note: Global warming potentials (GWPs) used (100 years time horizon): CH_4 = 25; N_2O = 298; SF_6 = 22 800; NF_3 = 17 200; HFCs and PFCs consist of different substances, therefore GWPs have to be calculated individually depending on substances

[1]GHG emissions excluding emissions/removals from LULUCF

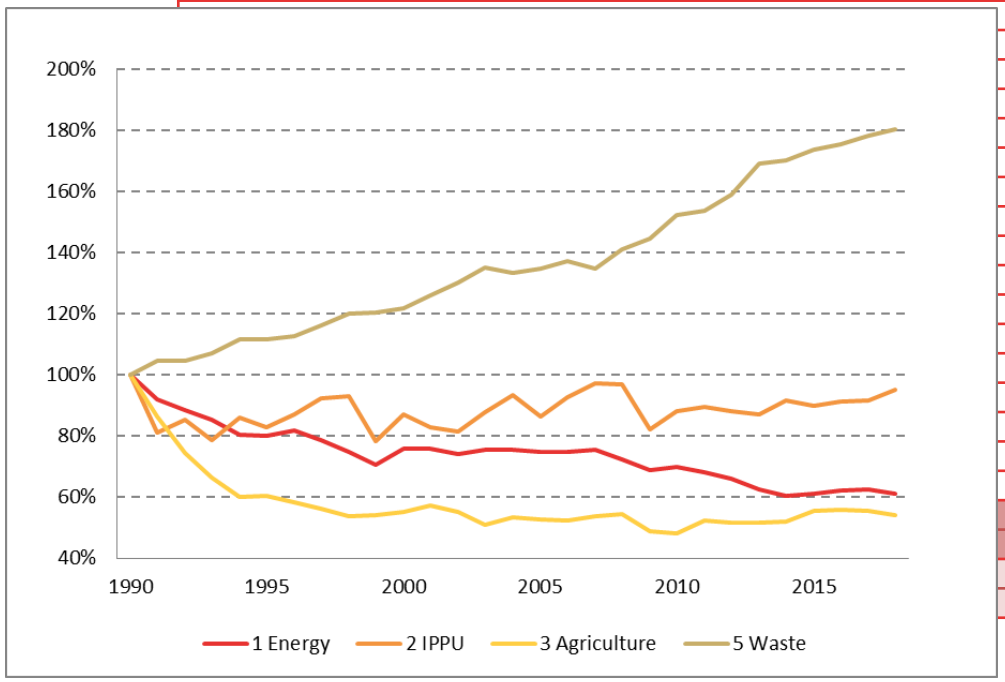
[2] relative to base year

[3]incl. LULUCF

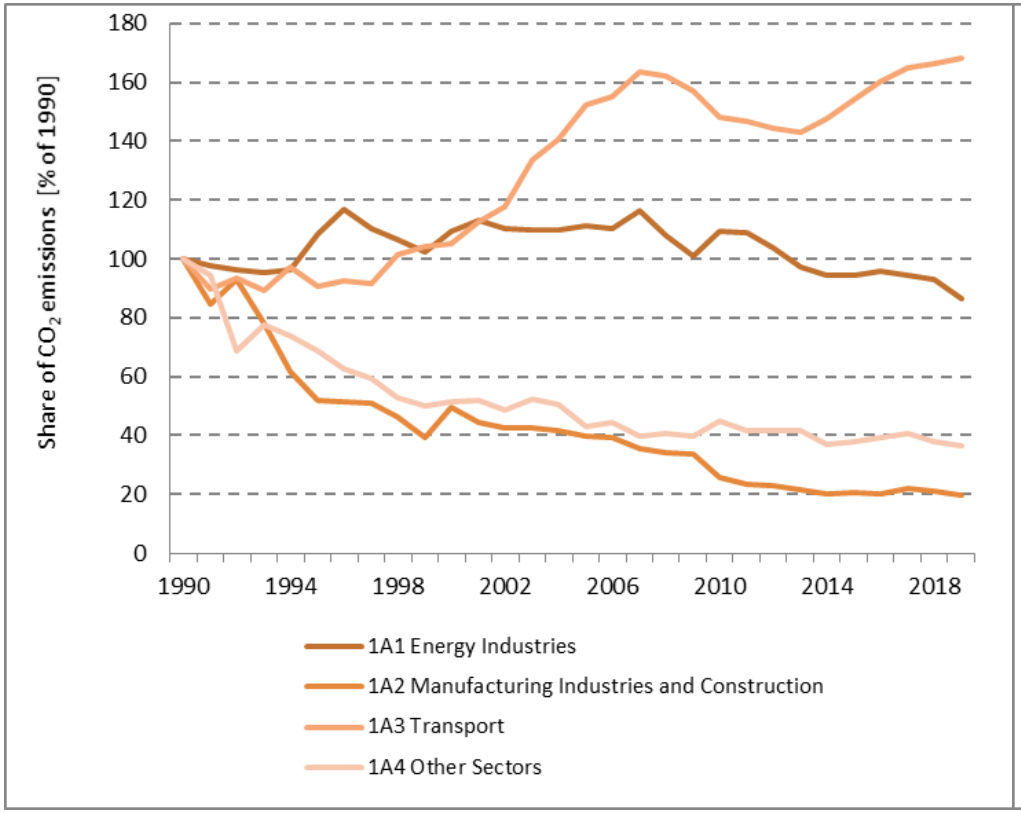
[4] incl.indirect emissions

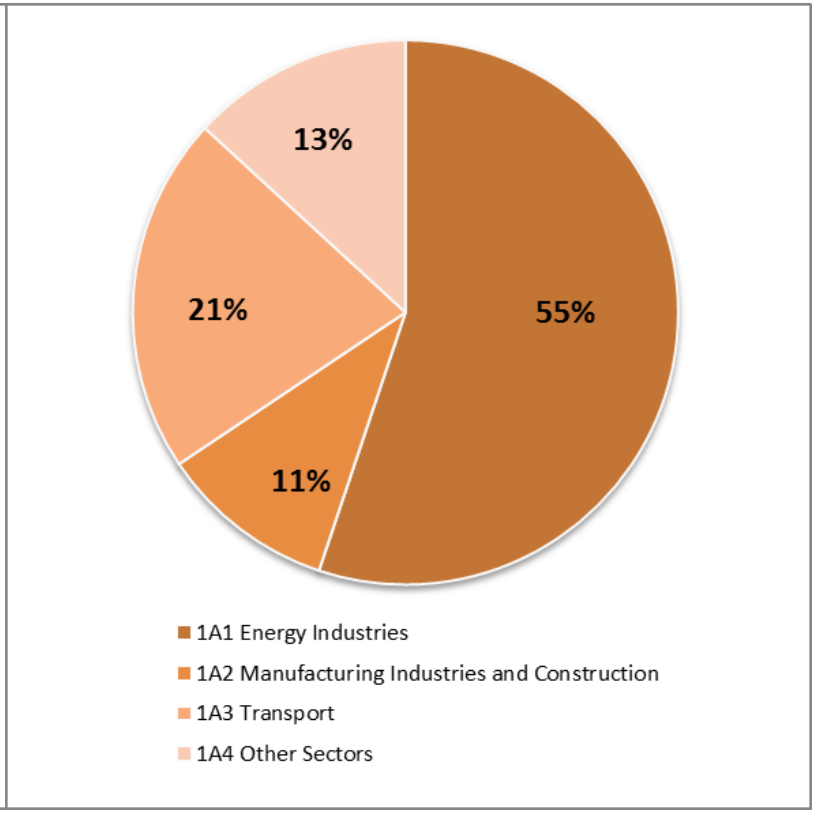
Emission trends

	1 Energy	2 IPPU	3 Agriculture	4 LULUCF	5 Waste
1990	161311.73	17110.56	15712.38	-6960.77	2937.16
1991	148331.58	13847.29	13594.28	-9735.66	3070.89
1992	142961.60	14609.91	11703.91	-10309.76	3071.81
1993	137684.13	13449.04	10445.09	-10334.20	3143.94
1994	129780.83	14689.95	9451.84	-8185.08	3281.33
1995	129382.78	14186.58	9479.75	-8556.81	3280.41
1996	131978.86	14886.24	9173.87	-8598.56	3308.31
1997	126746.54	15800.84	8801.40	-7525.42	3414.60
1998	120694.38	15926.56	8450.06	-7632.71	3530.59
1999	113605.60	13405.81	8484.06	-7892.27	3534.49
2000	122163.00	14890.92	8642.65	-8757.57	3575.74
2001	122452.09	14158.99	8984.65	-9020.75	3704.17
2002	119234.51	13955.51	8642.84	-8719.93	3825.13
				-7515.23	3970.80
				-7719.10	3912.21
				-8089.38	3963.13
				-6050.10	4027.72
				-4556.83	3959.37
				-7458.87	4145.11
				-8212.43	4243.42
				-7409.86	4473.41
				-8590.74	4519.56
				-8877.61	4674.43
				-8176.96	4967.38
				-8074.65	4994.99
				-7342.90	5103.38
				-6163.93	5158.67
				-3879.05	5237.20
				4118.82	5294.73
				13564.52	5319.12
				229.33	0.46
				-294.87	81.10

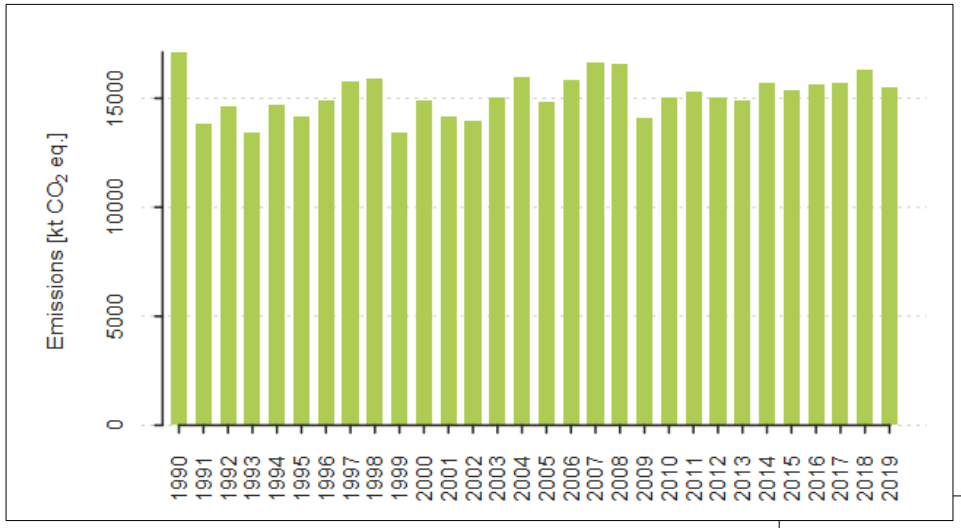


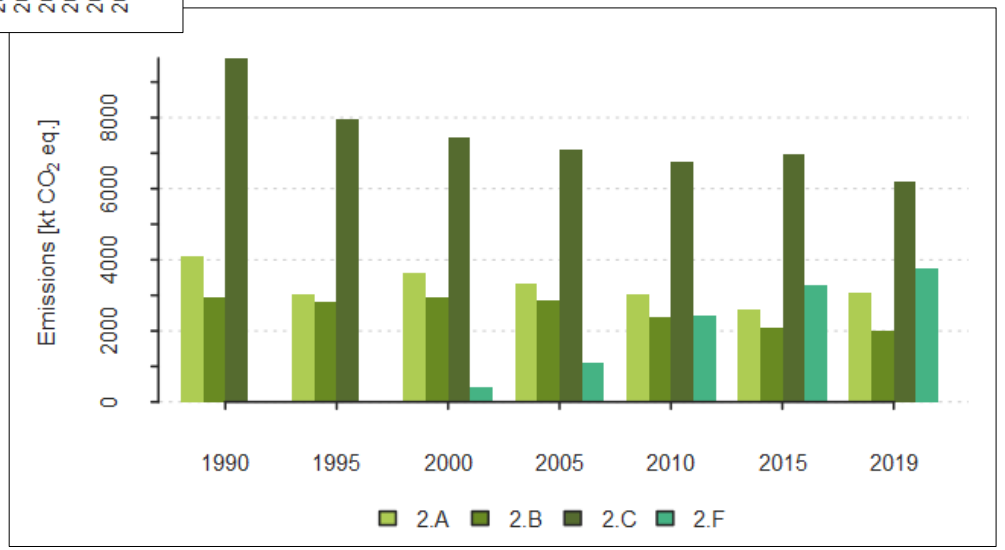
Emission trends - Energy



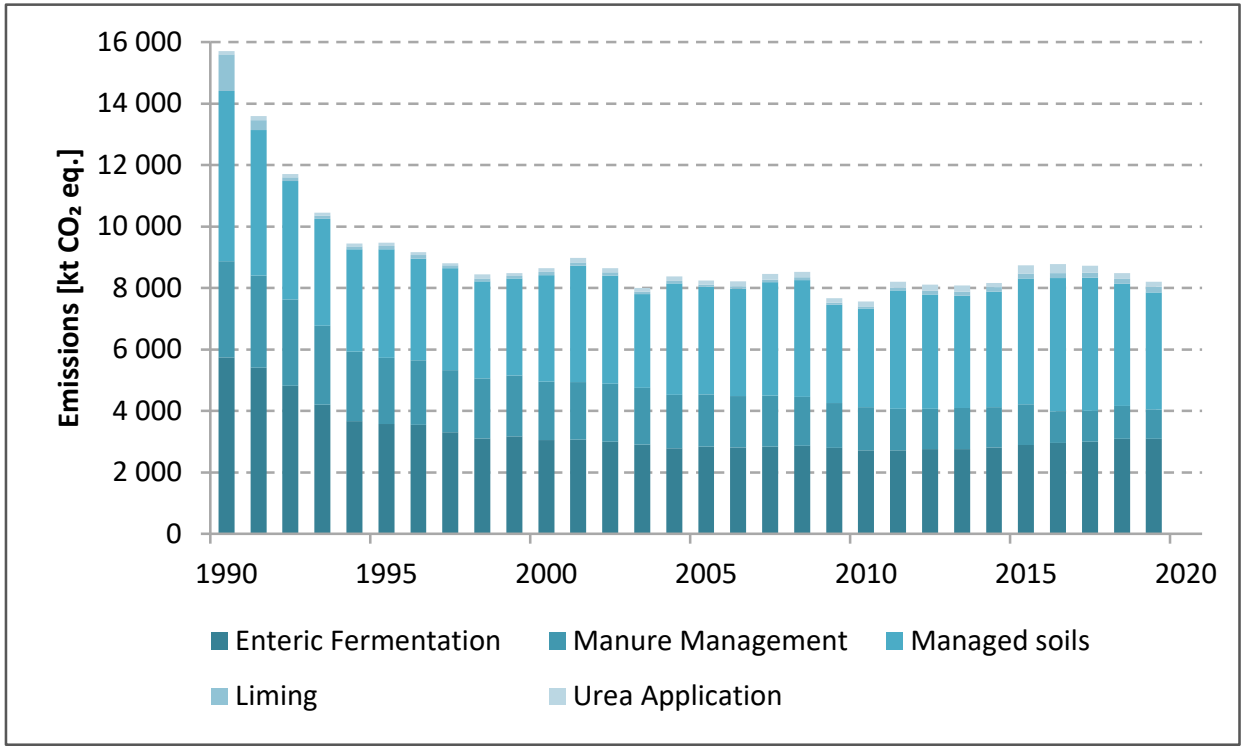


Emission trends - IPPU

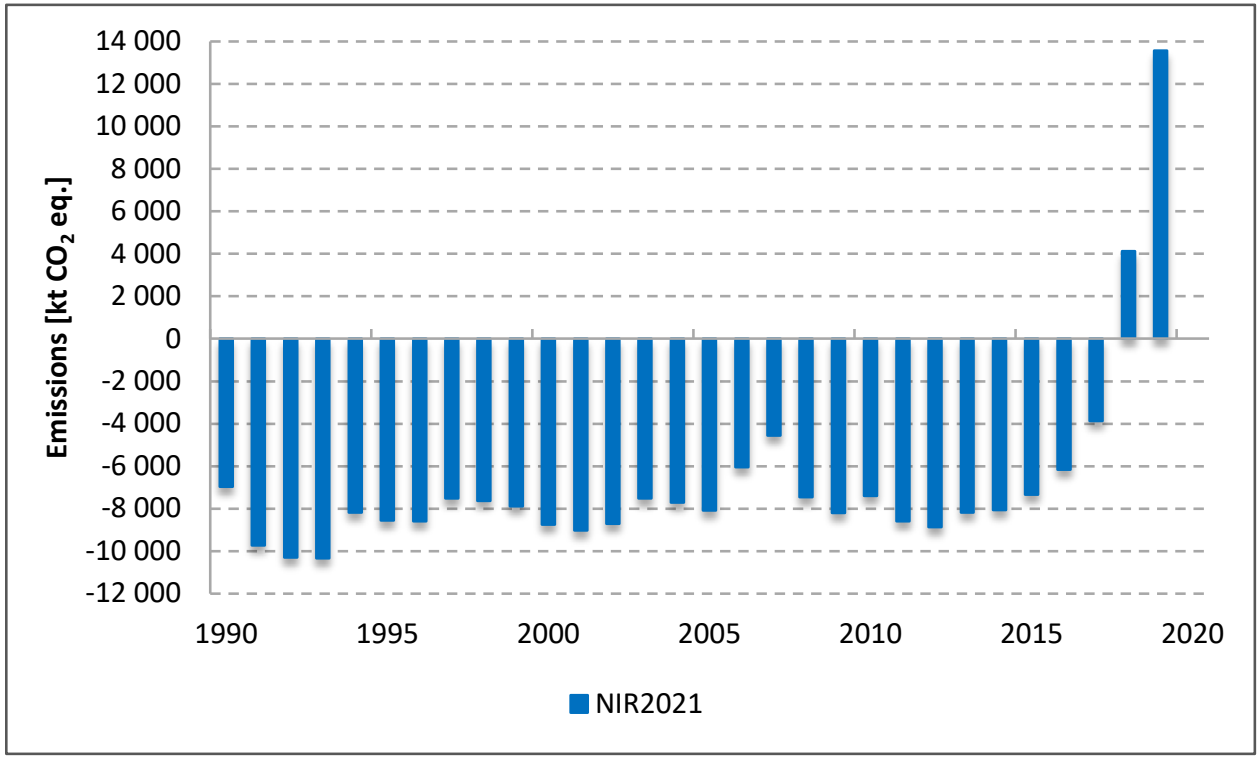




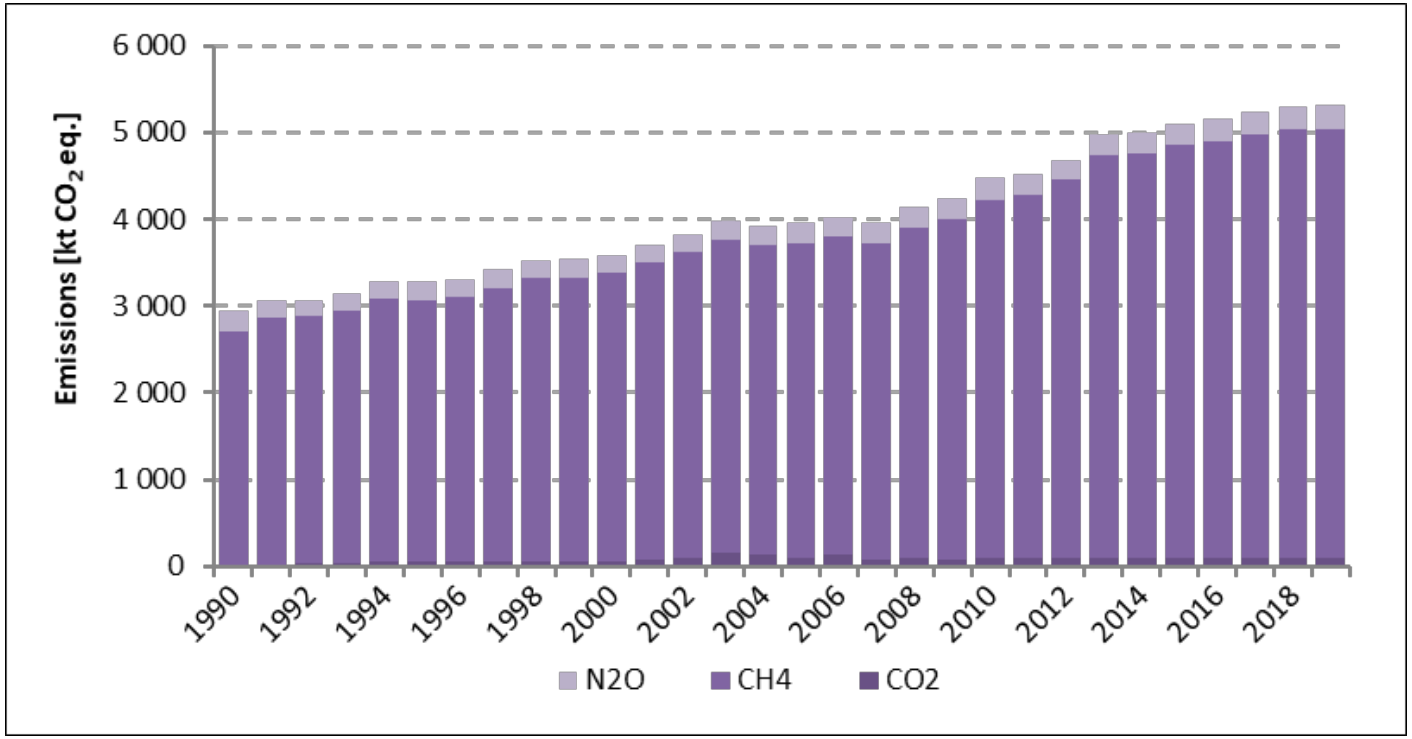
Emission trends - Agriculture



Emission trends - LULUCF



Emission trends - Waste



Key categories

IPCC 2006 Gls. **Approach 1** and **Approach 2** is used for KC analysis

Incl./excl. LULUCF

Details are presented in NIR, Annex 1

	Approach 1	Approach 2
Key categories (KC) with LULUCF	33	23
KC identified by LA	27	19
KC identified by TA	27	17
KC identified by LA + TA concurrently	21	13
KC identified by only LA	6	6
KC identified by only TA	6	4
Key Categories (KC) without LULUCF:	28	21
KC identified by LA	25	18
KC identified by TA	24	16
KC identified by LA + TA concurrently	21	13
KC identified by only LA	4	5
KC identified by only TA	**3**	3

Uncertainty analysis

IPCC 2006 Gls. **Tier 1**

Input uncertainties are updated every year – change of methodology, emission factors…

Improvement plan – application of Tier 2

Detailed spreadsheet is presented in NIR, Annex 2

Total uncertainty:

– Incl. LULUCF: 7.27 % (LA); 6.57 % (TA)
– Excl. LULUCF: 3.14 % (LA), 2.50 % (TA)

Assessment of completeness

CRF Table 9

CRF not fully reliable since 2015

CR developed own sheets used for completeness checks, filled in by QA/QC manager (please see Annex A5.6 in NIR)

Indirect emissions

The estimation of indirect CO_2 and N_2O emissions is based on the official Czech inventories for the precursor gases (CO, NMVOC, NH_3 and NOx) reported under the United Nations Economic Commission for Europe (UNECE) Convention on Long-Range Transboundary Air Pollution (CLRTAP) and the CH_4 emissions reported to the UNFCCC

Precursor GHG emissions in sectors of origin for 2019	NO_X [kt]	CO [kt]	NMVOC [kt]	SO_X [kt]	NH_3 [kt]
Total emissions	**152.70**	**818.61**	**183.02**	**79.88**	**7.33**
1. Energy	150.18	777.89	106.97	78.48	6.85
1.A Fuel combustion	149.76	777.81	100.75	75.06	6.85
1.A.1 Energy Industries	38.46	11.19	5.09	40.07	0.05
1.A.2 Manufacturing industries and construction	21.07	110.69	1.32	14.80	0.33
1.A.3 Transport	55.74	75.00	13.77	0.15	0.95
1.A.4 Other sectors	34.46	580.81	80.55	20.04	5.51
1.A.5 Other	0.03	0.12	0.01	0.00	0.00
1.B Fugitive emissions from fuels	0.42	0.08	6.23	3.42	0.00
2. Industrial processes and product use	2.03	32.81	73.67	1.39	0.24
2.A Mineral industry	-	-	0.07	0.10	0.09
2.B Chemical industry	1.19	0.10	0.90	0.87	0.02
2.C Metal industry	0.73	31.42	1.18	0.39	0.00
2.D Non-energy products from fuels and solvent use	-	-	67.45	-	0.00
2.G Other product manufacture and use	0.11	1.30	4.08	0.03	0.12
3. Agriculture	-	-	-	-	-
4. LULUCF	0.57	20.21	-	-	-
5.Waste	0.49	7.91	2.37	0.02	0.25

Indirect emissions

Production of indirect CO_2 and N_2O emissions from source categories

	Energy		IPPU		Waste		Total	
	CO_2 [kt]	N_2O [kt]	CO_2 [kt]	N_2O [kt]	CO_2 [kt]	N_2O [kt]	CO_2 [kt]	N_2O [kt]
1990	1303.53	3.53	462.66	0.09	111.25	0.002	1877.45	3.63
1991	1176.41	3.36	377.22	0.09	119.65	0.002	1673.29	3.45
1992	1114.74	3.16	353.68	0.09	112.72	0.002	1581.13	3.25
1993	1101.35	2.57	337.94	0.08	109.42	0.002	1548.72	2.66
1994	1047.29	2.12	329.62	0.08	115.16	0.002	1492.07	2.21
1995	1028.86	1.79	316.06	0.05	105.09	0.002	1450.01	1.84
1996	1014.72	1.70	299.04	0.03	103.02	0.002	1416.78	1.73
1997	992.53	1.58	291.36	0.02	105.71	0.002	1389.60	1.61
1998	950.43	1.49	285.94	0.02	108.57	0.002	1344.94	1.51
1999	864.36	1.37	287.55	0.02	101.21	0.002	1253.12	1.40
2000	783.32	1.38	306.32	0.02	100.96	0.002	1190.60	1.40
2001	740.65	1.40	301.14	0.02	104.64	0.002	1146.44	1.42
2002	703.73	1.37	292.99	0.02	106.95	0.002	1103.67	1.38
2003	695.76	1.37	287.33	0.02	107.51	0.002	1090.60	1.39
2004	664.57	1.37	279.43	0.02	105.75	0.002	1049.74	1.39
2005	716.32	1.35	276.18	0.02	104.78	0.003	1097.27	1.37
2006	739.10	1.33	296.31	0.02	106.27	0.003	1141.67	1.35
2007	692.18	1.32	296.94	0.02	104.43	0.003	1093.55	1.34
2008	681.35	1.25	279.07	0.02	104.75	0.004	1065.17	1.27
2009	620.98	1.19	251.81	0.01	105.00	0.003	977.78	1.21
2010	628.85	1.16	250.73	0.02	107.61	0.004	987.19	1.18
2011	625.57	1.11	236.62	0.01	105.82	0.003	968.01	1.12
2012	600.95	1.05	220.11	0.02	104.69	0.004	925.75	1.07
2013	498.86	0.98	223.87	0.01	104.45	0.004	827.18	1.00
2014	496.16	0.96	225.15	0.01	105.35	0.004	826.66	0.98
2015	478.53	0.93	212.82	0.01	107.50	0.004	798.86	0.95
2016	430.57	0.89	224.71	0.02	108.07	0.005	763.36	0.91
2017	391.06	0.88	220.41	0.01	110.23	0.005	721.70	0.90
2018	360.81	0.85	223.84	0.01	111.97	0.005	696.62	0.87
2019	326.17	0.81	220.54	0.01	112.35	0.006	659.06	0.83
Trend %	**-74.98**	**-77.15**	**-52.33**	**-86.18**	**0.99**	**135.42**	**-64.90**	**-77.25**

Indirect emissions

CO_2

$$Emissions_{CO2} = Emissions_{CO} \cdot \frac{44}{28}$$

$$Emissions_{CO2} = Emissions_{CH4} \cdot \frac{44}{16}$$

$$Emissions_{CO2} = Emissions_{NMVOC} \cdot Percent\ carbon\ in\ NMVOC\ by\ mass \cdot \frac{44}{12}$$

N_2O

estimated based on the amount of nitrogen emitted in the country multiplied with an emission factor, assuming 1% (default) of the nitrogen in the emissions to be converted to N_2O

IPCC default Tier 1, equation 7.1 (IPCC 2006, Vol. 1, section 7.3.1.)

Archiving

All activity data, calculations sheets and results of the inventory and other relevant documents are archived

Data since 2008 (submission 2010) are archived

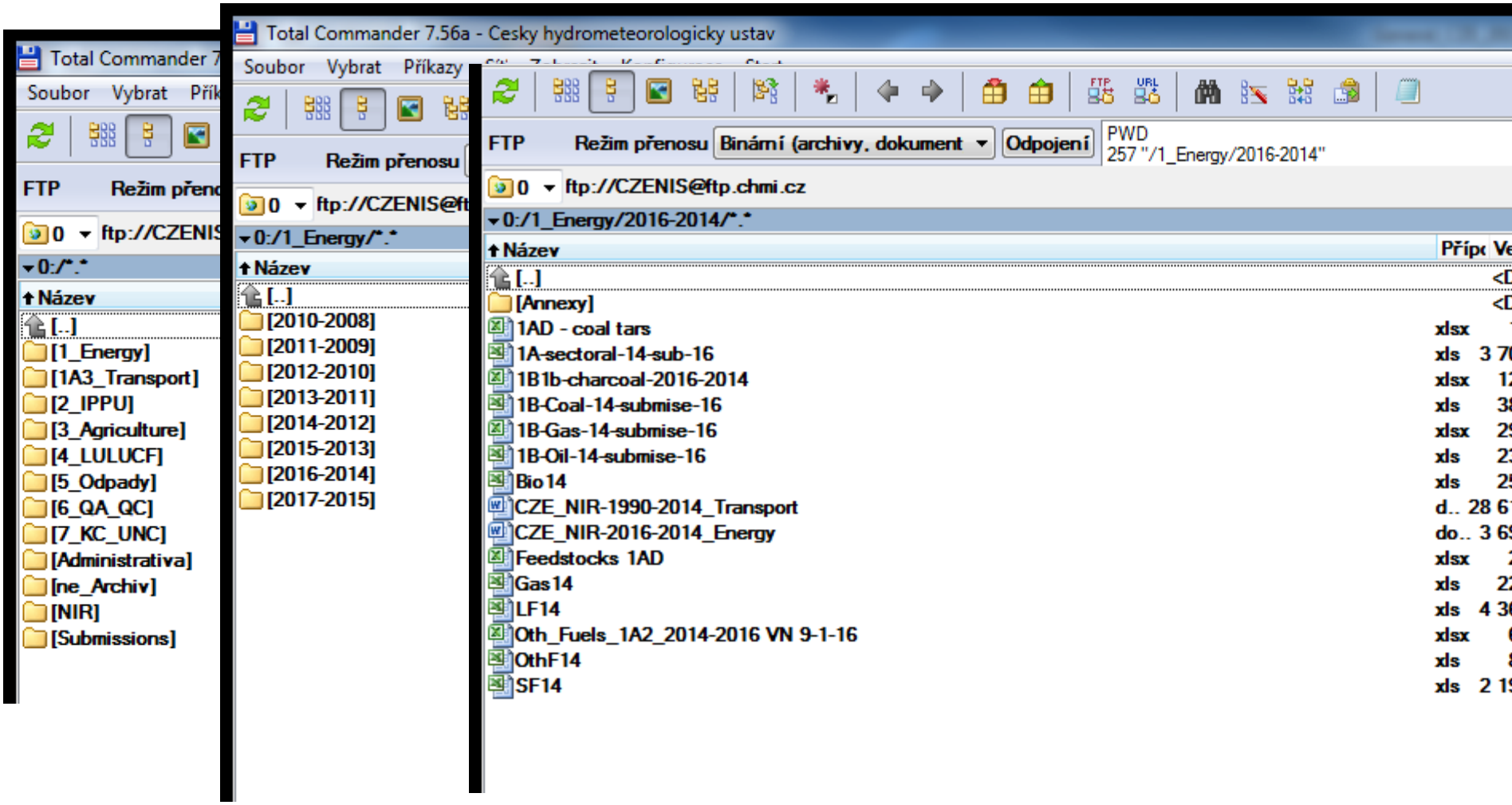
Archive – separate ftp server of CHMI, access only by NIS Coordinator and CHMI IT administrators

Mirror of the Archive on ftp server, where sectoral experts have access through user name and password

Copy of the ftp archive is also saved on the computer of NIS Coordinator

After official submission the files are archived

Archiving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1B-Gas-14-submise-16
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[NIR]
[Submissions]

Cross-sectoral issues

Energy – IPPU

- 1AD please see specific presentation
- 2C/1A2a
- 2B/1A2c
- 2D/1A
- All data are reported directly by CzSO in specific sectors, in specific cases EU ETS

Energy – Waste

- 1A1ai, 1A2f

IPPU – Agriculture

- Urea production transferred to Agriculture till 2012
- Since 2013 no production of urea in CR, please see IPPU presentation

Agriculture – Waste

- 3.(II).D.A.2, reporting of sludge coordinated with Waste sector
- Urea
- LULUCF

LULUCF – Waste

- Annual change in total long-term C storage in HWP waste (Table 5)
- Coordinated together

Thank you for your attention