

ANNEXES TO THE NATIONAL INVENTORY REPORT

2018

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Annex 1 Key Categories

A1.1. Description of methodology used for identifying key sources and reference to the key source tables in the CRF

This annex describes the key category analysis conducted for the 2016 Hungarian inventory.

Generally, inventory uncertainty is lower when emissions are estimated using the available most rigorous methods, but due to finite resources this may not be feasible for every category. Therefore, it is good practice to identify those categories (key categories) that have the greatest contribution to overall inventory uncertainty in order to make the most efficient use of available resources. In that context, a "key category" is one that is prioritized within the national inventory system because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions (level assessment) or/and to the trend of emissions (trend assessment).

The 2006 IPCC Guidelines describes two Tier level for identification of key categories. The difference is that in Tier 2 approach assessments are weighted with the uncertainty values of each source category.

Both in Tier 1 and Tier 2 approaches key categories are identified from two perspectives.

The first analyzes the emission contribution that each category makes to the national total (with LULUCF). The second perspective analyzes the trend of emission contributions from each category to identify where the greatest absolute changes (either increases or reductions) have taken place over a given time (with LULUCF categories). The percent contributions to both levels and trends in emissions are calculated and sorted from greatest to least. A cumulative total is calculated for both approaches. IPCC has determined that a cumulative contribution threshold of 95% for both level and trend assessments. The 95% cumulative contribution threshold has been used in this analysis to define an upper boundary for key category identification. Therefore, when source and/or sink contributions are sorted in decreasing order of importance, those that integrate the group of categories that accumulate the upper 95% of national GHG emissions are considered quantitatively to be key. Results for these analyses are shown in *Table A1-2* and *Table A1-3*. Key categories are highlighted with bold characters.

The Equation 4.1 from 2006 IPCC Guidelines Vol.1 was used for level assessment and equation 4.2 from 2006 IPCC Guidelines Vol.1 was used for trend assessment.

Good practice first requires that source categories should be disaggregated into categories from which key sources and sinks may be identified. Several recommendations exist for the list of categories (aggregation/disaggregation level):

- 2006 IPCC Guidelines Table 4.1;
- EU list
- country specific list

In Hungary Tier 1 level and trend assessment was conducted on a list of categories that follow Table 4.1 from 2006 IPCC Guidelines in order to be consistent with CRF Table 7 Key categories. This list of Tier 1 analysis is shown in Table A1-1 below.

Table A1-1 Category list used in Tier 1 analysis

CRF code and category name	GHG
1A1 Energy Industries - Biomass	CH ₄
1A1 Energy Industries - Biomass	N ₂ O
1A1 Energy Industries - Gaseous fuels	CH ₄
1A1 Energy Industries - Gaseous fuels	CO ₂
1A1 Energy Industries - Gaseous fuels	N ₂ O
1A1 Energy Industries - Liquid fuels	CH ₄
1A1 Energy Industries - Liquid fuels	CO ₂
1A1 Energy Industries - Liquid fuels	N ₂ O
1A1 Energy Industries - Other fossil fuels	CH ₄
1A1 Energy Industries - Other fossil fuels	CO ₂
1A1 Energy Industries - Other fossil fuels	N ₂ O
1A1 Energy Industries - Peat	CH ₄
1A1 Energy Industries - Peat	N ₂ O
1A1 Energy Industries - Solid fuels	CH ₄
1A1 Energy Industries - Solid fuels	CO ₂
1A1 Energy Industries - Solid fuels	N ₂ O
1A2 Manufacturing industries - Biomass	CH ₄
1A2 Manufacturing industries - Biomass	N ₂ O
1A2 Manufacturing industries - Gaseous fuels	CH ₄
1A2 Manufacturing industries - Gaseous fuels	CO ₂
1A2 Manufacturing industries - Gaseous fuels	N ₂ O
1A2 Manufacturing industries - Liquid fuels	CH ₄
1A2 Manufacturing industries - Liquid fuels	CO ₂
1A2 Manufacturing industries - Liquid fuels	N ₂ O
1A2 Manufacturing industries - Other fossil fuels	CH ₄
1A2 Manufacturing industries - Other fossil fuels	CO ₂
1A2 Manufacturing industries - Other fossil fuels	N ₂ O
1A2 Manufacturing industries - Peat	CH ₄
1A2 Manufacturing industries - Peat	N ₂ O
1A2 Manufacturing industries - Solid fuels	CH ₄
1A2 Manufacturing industries - Solid fuels	CO ₂
1A2 Manufacturing industries - Solid fuels	N ₂ O
1A3a Domestic aviation - All fuels	CH ₄
1A3a Domestic aviation - All fuels	CO ₂
1A3a Domestic aviation - All fuels	N ₂ O
1A3b Road transport - All Fuels	CH ₄
1A3b Road transport - All Fuels	CO ₂
1A3b Road transport - All Fuels	N ₂ O

CRF code and category name	GHG
1A3c Railways - All Fuels	CH ₄
1A3c Railways - All Fuels	CO ₂
1A3c Railways - All Fuels	N ₂ O
1A3d Domestic navigation - Gaseous fuels	CH ₄
1A3d Domestic navigation - Gaseous fuels	CO ₂
1A3d Domestic navigation - Gaseous fuels	N ₂ O
1A3d Domestic navigation - All Liquid fuels	CH ₄
1A3d Domestic navigation - All Liquid fuels	CO ₂
1A3d Domestic navigation - All Liquid fuels	N ₂ O
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH ₄
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO ₂
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N ₂ O
1A4 Other sectors - Biomass	CH ₄
1A4 Other sectors - Biomass	N ₂ O
1A4 Other sectors - Gaseous fuels	CH ₄
1A4 Other sectors - Gaseous fuels	CO ₂
1A4 Other sectors - Gaseous fuels	N ₂ O
1A4 Other sectors - Liquid fuels	CH ₄
1A4 Other sectors - Liquid fuels	CO ₂
1A4 Other sectors - Liquid fuels	N ₂ O
1A4 Other sectors - Other Fossil Fuels	CH ₄
1A4 Other sectors - Other Fossil Fuels	CO ₂
1A4 Other sectors - Other Fossil Fuels	N ₂ O
1A4 Other sectors - Solid fuels	CH ₄
1A4 Other sectors - Solid fuels	CO ₂
1A4 Other sectors - Solid fuels	N ₂ O
1A5a Stationary	CH ₄
1A5a Stationary	CO ₂
1A5a Stationary	N ₂ O
1A5b Mobile	CH ₄
1A5b Mobile	CO ₂
1A5b Mobile	N ₂ O
1B1 Solid fuels	CH ₄
1B1 Solid fuels	CO ₂
1B2a Oil	CH ₄
1B2a Oil	CO ₂
1B2b Natural Gas	CH ₄
1B2b Natural Gas	CO ₂
1B2b Natural Gas	N ₂ O
1B2c Venting and flaring	CH ₄

CRF code and category name	GHG
1B2c Venting and flaring	CO ₂
1B2c Venting and flaring	N ₂ O
1B2d Other (Thermal water extraction + natural gas storage)	CH ₄
1B2d Other (Thermal water extraction + natural gas storage)	CO ₂
1B2d Other (Thermal water extraction + natural gas storage)	N ₂ O
2A1 Cement Production	CO ₂
2A2 Lime Production	CO ₂
2A3 Glass production	CO ₂
2A4 Other Process Uses of Carbonates	CO ₂
2B1 Ammonia Production	CH ₄
2B1 Ammonia Production	CO ₂
2B1 Ammonia Production	N ₂ O
2B2 Nitric Acid Production	N ₂ O
2B8 Petrochemical and carbon black production	CH ₄
2B8 Petrochemical and carbon black production	CO ₂
2B8 Petrochemical and carbon black production	N ₂ O
2C1 Iron and Steel Production	CH ₄
2C1 Iron and Steel Production	CO ₂
2C1 Iron and Steel Production	N ₂ O
2C2 Ferroalloys Production	CH ₄
2C2 Ferroalloys Production	CO ₂
2C2 Ferroalloys Production	N ₂ O
2C3 Aluminium Production	CH ₄
2C3 Aluminium Production	CO ₂
2C3 Aluminium Production	N ₂ O
2C3 Aluminium Production	PFC
2D Non-energy products from fuels and solvent use	CH ₄
2D Non-energy products from fuels and solvent use	CO ₂
2E Electronics industry	SF ₆
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggr. F-gases
2F2 Foam Blowing - HFC	Aggr. F-gases
2F3 Fire extinguishers - HFC	Aggr. F-gases
2F4 Aerosol + MDI - HFC	Aggr. F-gases
2F5 Solvent - HFC+PFC	Aggr. F-gases
2G Other Product Manufacture and Use - SF ₆	Aggr. F-gases
2G Other Product Manufacture and Use	N ₂ O
3A Enteric Fermentation	CH ₄
3B Manure Management	CH ₄
3B Manure Management	N ₂ O
3C Rice Cultivation	CH ₄

CRF code and category name	GHG
3D Agricultural Soils	CH ₄
3D1 Direct N ₂ O Emissions From Managed Soils	N ₂ O
3D2 Indirect N ₂ O Emissions From Managed Soils	N ₂ O
3F Field Burning of Agricultural Residues	CH ₄
3F Field Burning of Agricultural Residues	N ₂ O
3G Liming	CO ₂
3H Urea application	CO ₂
3I Other carboncontaining fertilizers	CO ₂
3J Other	CH ₄
3J Other	CO ₂
3J Other	N ₂ O
4(I) Direct N ₂ O emissions from N inputs to managed soils	N ₂ O
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils	CH ₄
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils	CO ₂
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils	N ₂ O
4(III) Direct N ₂ O emissions from N mineralization/immobilization	N ₂ O
4(IV) Indirect N ₂ O Emissions from Managed Soils	N ₂ O
4(V) Biomass Burning	CH ₄
4(V) Biomass Burning	CO ₂
4(V) Biomass Burning	N ₂ O
4A1 Forest Land Remaining Forest Land	CO ₂
4A2 Land Converted to Forest Land	CO ₂
4B1 Cropland Remaining Cropland	CO ₂
4B2 Land Converted to Cropland	CO ₂
4C1 Grassland Remaining Grassland	CO ₂
4C2 Land Converted to Grassland	CO ₂
4D11 Peat Extraction Remaining Peat Extraction	CO ₂
4D12 Flooded Land Remaining Flooded Land	CO ₂
4D13 Other Wetlands Remaining Other Wetlands	CO ₂
4D2 Land Converted to Wetlands	CO ₂
4E1 Settlements Remaining Settlements	CO ₂
4E2 Land Converted to Settlements	CO ₂
4F1 Other Land Remaining Other Land	CO ₂
4F2 Land Converted to Other Land	CO ₂
4G Harvested Wood Products	CO ₂
4H Other	CH ₄
4H Other	CO ₂
4H Other	N ₂ O

CRF code and category name	GHG
5A Solid waste disposal	CH ₄
5A Solid waste disposal	CO ₂
5A Solid waste disposal	N ₂ O
5B Biological Treatment of Solid Waste	CH ₄
5B Biological Treatment of Solid Waste	CO ₂
5B Biological Treatment of Solid Waste	N ₂ O
5C Incineration and open burning of waste	CH ₄
5C Incineration and open burning of waste	CO ₂
5C Incineration and open burning of waste	N ₂ O
5D Wastewater Treatment and Discharge	CH ₄
5D Wastewater Treatment and Discharge	CO ₂
5D Wastewater Treatment and Discharge	N ₂ O
5E Other	CH ₄
5E Other	CO ₂
5E Other	N ₂ O

A1.2. Results of the key category analysis

Table A1-2 Tier 1 level assessment

CRF code + note	Direct Greenhouse Gas	Current Year Emission	Emission in absolute value	Level Assessment	Cumulative Total%
CO ₂ -eq					
1A3b Road transport - All Fuels	CO ₂	12080,07	12080,07	17,87%	17,87%
1A4 Other sectors - Gaseous fuels	CO ₂	10099,51	10099,51	14,94%	32,80%
1A1 Energy Industries - Solid fuels	CO ₂	7487,085	7487,085	11,07%	43,87%
1A1 Energy Industries - Gaseous fuels	CO ₂	4733,421	4733,421	7,00%	50,87%
3.D.1 Direct N ₂ O Emissions From Managed Soils	N ₂ O	3210,749	3210,749	4,75%	55,62%
4A1 Forest Land Remaining Forest Land - CO ₂	CO ₂	-3141,39	3141,389	4,65%	60,27%
1A2 Manufacturing industries - Gaseous fuels	CO ₂	2990,343	2990,343	4,42%	64,69%
5A Solid waste disposal	CH ₄	2968,696	2968,696	4,39%	69,08%
3A Enteric Fermentation	CH ₄	2066,241	2066,241	3,06%	72,14%
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	1575,12	1575,12	2,33%	74,47%

4A2 Land Converted to Forest Land - CO2	CO2	-1441,44	1441,442	2,13%	76,60%
1A4 Other sectors - Liquid fuels	CO2	1428,078	1428,078	2,11%	78,71%
2B8 Petrochemical and carbon black production	CO2	1243,017	1243,017	1,84%	80,55%
2B1 Ammonia Production	CO2	1077,957	1077,957	1,59%	82,14%
1A1 Energy Industries - Liquid fuels	CO2	1034,434	1034,434	1,53%	83,67%
1A2 Manufacturing industries - Liquid fuels	CO2	1012,661	1012,661	1,50%	85,17%
2C1 Iron and Steel Production	CO2	866,8112	866,8112	1,28%	86,45%
2A1 Cement Production	CO2	705,228	705,228	1,04%	87,49%
3B Manure Management	CH4	655,9003	655,9003	0,97%	88,46%
1A4 Other sectors - Biomass	CH4	553,5449	553,5449	0,82%	89,28%
1A4 Other sectors - Solid fuels	CO2	528,4307	528,4307	0,78%	90,06%
1A2 Manufacturing industries - Solid fuels	CO2	500,9457	500,9457	0,74%	90,81%
1B2b Natural Gas	CH4	478,6406	478,6406	0,71%	91,51%
3B Manure Management	N2O	476,2953	476,2953	0,70%	92,22%
4B1 Cropland Remaining Cropland - CO2	CO2	-379,012	379,0116	0,56%	92,78%
4B2 Land Converted to Cropland - CO2	CO2	340,2714	340,2714	0,50%	93,28%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CO2	CO2	308,3975	308,3975	0,46%	93,74%
5D Wastewater Treatment and Discharge	CH4	279,9681	279,9681	0,41%	94,15%
2A4 Other Process Uses of Carbonates	CO2	275,8257	275,8257	0,41%	94,56%
3.D.2 Indirect N2O Emissions From Managed Soils	N2O	261,2327	261,2327	0,39%	94,95%
1A1 Energy Industries - Other fossil fuels	CO2	235,4041	235,4041	0,35%	95,29%
4E2 Land Converted to Settlements - CO2	CO2	213,2347	213,2347	0,32%	95,61%
1A2 Manufacturing industries - Other fossil fuels	CO2	196,6464	196,6464	0,29%	95,90%
1A4 Other sectors - Other Fossil Fuels	CO2	160,9246	160,9246	0,24%	96,14%
4C2 Land Converted to Grassland - CO2	CO2	-136,179	136,1794	0,20%	96,34%
1B2c Venting and flaring	CO2	132,4448	132,4448	0,20%	96,54%
2D Non-energy products from fuels and solvent use	CO2	129,1927	129,1927	0,19%	96,73%

1A3c Railways - All Fuels	CO2	127,452	127,452	0,19%	96,91%
2F2Foam Blowing - HFC	Aggregate F-gases	127,341	127,341	0,19%	97,10%
2G Other Product Manufacture and Use - SF6	Aggregate F-gases	126,5202	126,5202	0,19%	97,29%
2A2 Lime Production	CO2	126,2434	126,2434	0,19%	97,48%
1A3b Road transport - All Fuels	N2O	121,9809	121,9809	0,18%	97,66%
4G Harvested Wood Products - CO2	CO2	-112,221	112,2214	0,17%	97,82%
5B Biological Treatment of Solid Waste	CH4	106,1485	106,1485	0,16%	97,98%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO2	93,75993	93,75993	0,14%	98,12%
1A4 Other sectors - Biomass	N2O	87,97851	87,97851	0,13%	98,25%
3H Urea application	CO2	87,68146	87,68146	0,13%	98,38%
3I Other carboncontaining fertilizers	CO2	86,72701	86,72701	0,13%	98,51%
5D Wastewater Treatment and Discharge	N2O	76,01489	76,01489	0,11%	98,62%
1B2c Venting and flaring	CH4	69,10948	69,10948	0,10%	98,72%
1B2d Other (Thermal water extraction + NatGas storage)	CH4	63,87574	63,87574	0,09%	98,82%
2G Other Product Manufacture and Use - N2O	N2O	61,19838	61,19838	0,09%	98,91%
2A3 Glass production	CO2	55,8957	55,8957	0,08%	98,99%
1B1 Solid fuels	CH4	53,72561	53,72561	0,08%	99,07%
1B2aOil	CH4	43,15808	43,15808	0,06%	99,13%
2B8 Petrochemical and carbon black production	CH4	40,19319	40,19319	0,06%	99,19%
5B Biological Treatment of Solid Waste	N2O	39,22757	39,22757	0,06%	99,25%
4(III)Direct N2O emissions from N mineralization/immobilization - N2O	N2O	38,57866	38,57866	0,06%	99,31%
1A4 Other sectors - Solid fuels	CH4	38,02368	38,02368	0,06%	99,36%
2F4Aerosol + MDI - HFC	Aggregate F-gases	33,45845	33,45845	0,05%	99,41%
1A1 Energy Industries - Biomass	N2O	29,19184	29,19184	0,04%	99,46%
5C Incineration and open burning of waste	CO2	29,04554	29,04554	0,04%	99,50%
2B2 Nitric Acid Production	N2O	27,13585	27,13585	0,04%	99,54%
1A1 Energy Industries - Solid fuels	N2O	26,2649	26,2649	0,04%	99,58%
1A3b Road transport - All Fuels	CH4	25,35739	25,35739	0,04%	99,62%
1A4 Other sectors - Gaseous fuels	CH4	22,50338	22,50338	0,03%	99,65%

1A5b Mobile	CO2	21,66164	21,66164	0,03%	99,68%
3C Rice Cultivation	CH4	19,89945	19,89945	0,03%	99,71%
1A1 Energy Industries - Biomass	CH4	18,37841	18,37841	0,03%	99,74%
1A3c Railways - All Fuels	N2O	14,65922	14,65922	0,02%	99,76%
1A4 Other sectors - Liquid fuels	N2O	14,09882	14,09882	0,02%	99,78%
4C1 Grassland Remaining Grassland - CO2	CO2	14,0238	14,0238	0,02%	99,80%
3G Liming	CO2	13,15487	13,15487	0,02%	99,82%
1A3d Domestic navigation - All Liquid fuels	CO2	12,7452	12,7452	0,02%	99,84%
4(V) Biomass Burning - CH4	CH4	9,083737	9,083737	0,01%	99,85%
1A2 Manufacturing industries - Liquid fuels	N2O	7,899796	7,899796	0,01%	99,86%
2F3 Fire extinguishers - HFC	Aggregate F-gases	7,01039	7,01039	0,01%	99,87%
1A2 Manufacturing industries - Biomass	N2O	7,007646	7,007646	0,01%	99,88%
4(V) Biomass Burning - N2O	N2O	6,050668	6,050668	0,01%	99,89%
4(IV) Indirect N2O Emissions from Managed Soils - N2O	N2O	5,790769	5,790769	0,01%	99,90%
1A4 Other sectors - Other Fossil Fuels	CH4	5,6925	5,6925	0,01%	99,91%
1A4 Other sectors - Gaseous fuels	N2O	5,364805	5,364805	0,01%	99,92%
1A2 Manufacturing industries - Biomass	CH4	4,335271	4,335271	0,01%	99,92%
1A3a Domestic aviation - All fuels	CO2	4,004911	4,004911	0,01%	99,93%
1A2 Manufacturing industries - Other fossil fuels	N2O	3,898733	3,898733	0,01%	99,94%
2C1 Iron and Steel Production	CH4	3,691563	3,691563	0,01%	99,94%
1A1 Energy Industries - Other fossil fuels	N2O	3,244624	3,244624	0,00%	99,95%
4D12 Flooded Land Remaining Flooded Land - CO2	CO2	3,179962	3,179962	0,00%	99,95%
4D13 Other Wetlands Remaining Other Wetlands - CO2	CO2	3,179962	3,179962	0,00%	99,96%
1A4 Other sectors - Liquid fuels	CH4	2,552235	2,552235	0,00%	99,96%
1A1 Energy Industries - Gaseous fuels	N2O	2,51404	2,51404	0,00%	99,96%
1A2 Manufacturing industries - Other fossil fuels	CH4	2,453062	2,453062	0,00%	99,97%
1A4 Other sectors - Solid fuels	N2O	2,318487	2,318487	0,00%	99,97%
1A2 Manufacturing industries - Solid fuels	N2O	2,186479	2,186479	0,00%	99,97%

1A1 Energy Industries - Gaseous fuels	CH4	2,109094	2,109094	0,00%	99,98%
1A1 Energy Industries - Other fossil fuels	CH4	2,0415	2,0415	0,00%	99,98%
1A1 Energy Industries - Solid fuels	CH4	1,668624	1,668624	0,00%	99,98%
1A2 Manufacturing industries - Gaseous fuels	N2O	1,588453	1,588453	0,00%	99,98%
1A2 Manufacturing industries - Gaseous fuels	CH4	1,332595	1,332595	0,00%	99,99%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - N2O	N2O	1,2669	1,2669	0,00%	99,99%
1A2 Manufacturing industries - Solid fuels	CH4	1,234262	1,234262	0,00%	99,99%
1A1 Energy Industries - Liquid fuels	N2O	0,984311	0,984311	0,00%	99,99%
1A4 Other sectors - Other Fossil Fuels	N2O	0,904728	0,904728	0,00%	99,99%
1B2b Natural Gas	CO2	0,864094	0,864094	0,00%	99,99%
4D2 Land Converted to Wetlands - CO2	CO2	-0,60254	0,602541	0,00%	100,00%
1A1 Energy Industries - Liquid fuels	CH4	0,572629	0,572629	0,00%	100,00%
1A2 Manufacturing industries - Liquid fuels	CH4	0,498167	0,498167	0,00%	100,00%
1B2aOil	CO2	0,497801	0,497801	0,00%	100,00%
5C Incineration and open burning of waste	N2O	0,382821	0,382821	0,00%	100,00%
1B2c Venting and flaring	N2O	0,257114	0,257114	0,00%	100,00%
1A5b Mobile	N2O	0,180564	0,180564	0,00%	100,00%
1A3c Railways - All Fuels	CH4	0,17845	0,17845	0,00%	100,00%
1A3d Domestic navigation - All Liquid fuels	N2O	0,102512	0,102512	0,00%	100,00%
5C Incineration and open burning of waste	CH4	0,092962	0,092962	0,00%	100,00%
4F2 Land Converted to Other Land - CO2	CO2	0,050246	0,050246	0,00%	100,00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	0,049805	0,049805	0,00%	100,00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH4	0,041783	0,041783	0,00%	100,00%
1A3a Domestic aviation - All fuels	N2O	0,033855	0,033855	0,00%	100,00%
1A3d Domestic navigation - All Liquid fuels	CH4	0,0301	0,0301	0,00%	100,00%
1B2d Other (Thermal water extraction + NatGas storage)	CO2	0,012147	0,012147	0,00%	100,00%

1A5b Mobile	CH4	0,003787	0,003787	0,00%	100,00%
1A3a Domestic aviation - All fuels	CH4	0,00071	0,00071	0,00%	100,00%
1A1 Energy Industries - Peat	CH4	0	0	0,00%	100,00%
1A1 Energy Industries - Peat	N2O	0	0	0,00%	100,00%
1A2 Manufacturing industries - Peat	CH4	0	0	0,00%	100,00%
1A2 Manufacturing industries - Peat	N2O	0	0	0,00%	100,00%
1A3d Domestic navigation - Gaseous fuels	CH4	0	0	0,00%	100,00%
1A3d Domestic navigation - Gaseous fuels	CO2	0	0	0,00%	100,00%
1A3d Domestic navigation - Gaseous fuels	N2O	0	0	0,00%	100,00%
1A5a Stationary	CH4	0	0	0,00%	100,00%
1A5a Stationary	CO2	0	0	0,00%	100,00%
1A5a Stationary	N2O	0	0	0,00%	100,00%
1B1 Solid fuels	CO2	0	0	0,00%	100,00%
1B2b Natural Gas	N2O	0	0	0,00%	100,00%
1B2d Other (Thermal water extraction + NatGas storage)	N2O	0	0	0,00%	100,00%
2B1 Ammonia Production	CH4	0	0	0,00%	100,00%
2B1 Ammonia Production	N2O	0	0	0,00%	100,00%
2B8 Petrochemical and carbon black production	N2O	0	0	0,00%	100,00%
2C1 Iron and Steel Production	N2O	0	0	0,00%	100,00%
2C2 Ferroalloys Production	CH4	0	0	0,00%	100,00%
2C2 Ferroalloys Production	CO2	0	0	0,00%	100,00%
2C2 Ferroalloys Production	N2O	0	0	0,00%	100,00%
2C3 Aluminium Production	CH4	0	0	0,00%	100,00%
2C3 Aluminium Production	CO2	0	0	0,00%	100,00%
2C3 Aluminium Production	N2O	0	0	0,00%	100,00%
2C3 Aluminium Production	PFC	0	0	0,00%	100,00%
2D Non-energy products from fuels and solvent use	CH4	0	0	0,00%	100,00%
2E Electronics industry - SF6	SF6	0	0	0,00%	100,00%
2F5Solvent - HFC+PFC	Aggregate F-gases	0	0	0,00%	100,00%
3D Agricultural Soils	CH4	0	0	0,00%	100,00%
3F Field Burning of Agricultural Residues	CH4	0	0	0,00%	100,00%
3F Field Burning of Agricultural Residues	N2O	0	0	0,00%	100,00%

3J Other (please specify)	CH4	0	0	0,00%	100,00%
3J Other (please specify)	CO2	0	0	0,00%	100,00%
3J Other (please specify)	N2O	0	0	0,00%	100,00%
4(I) Direct N2O emissions from N inputs to managed soils - N2O	N2O	0	0	0,00%	100,00%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CH4	CH4	0	0	0,00%	100,00%
4(V) Biomass Burning - CO2	CO2	0	0	0,00%	100,00%
4D11 Peat Extraction Remaining Peat Extraction - CO2	CO2	0	0	0,00%	100,00%
4E1 Settlements Remaining Settlements - CO2	CO2	0	0	0,00%	100,00%
4F1 Other Land Remaining Other Land - CO2	CO2	0	0	0,00%	100,00%
4H Other - CH4	CH4	0	0	0,00%	100,00%
4H Other - CO2	CO2	0	0	0,00%	100,00%
4H Other - N2O	N2O	0	0	0,00%	100,00%
5A Solid waste disposal	CO2	0	0	0,00%	100,00%
5A Solid waste disposal	N2O	0	0	0,00%	100,00%
5B Biological Treatment of Solid Waste	CO2	0	0	0,00%	100,00%
5D Wastewater Treatment and Discharge	CO2	0	0	0,00%	100,00%
5E Other	CH4	0	0	0,00%	100,00%
5E Other	CO2	0	0	0,00%	100,00%
5E Other	N2O	0	0	0,00%	100,00%

Table A1-3 Tier1 trend assessment

CRF code + note	Direct Greenhouse Gas	Base Years (1985-87) Emission	Current Year Emission	Trend Assessment	% Contribution to Trend	Cumulative Total%
Gg CO2-eq						
1A3b Road transport - All Fuels	CO2	7160,389	12080,07	0,071389	15,61%	15,61%
1A4 Other sectors - Gaseous fuels	CO2	4075,843	10099,51	0,06903	15,10%	30,71%
1A4 Other sectors - Solid fuels	CO2	12499,72	528,4307	0,056487	12,35%	43,06%
1A4 Other sectors - Liquid fuels	CO2	6947,588	1428,078	0,021404	4,68%	47,74%
2B2 Nitric Acid Production	N2O	4365,708	27,13585	0,021116	4,62%	52,36%
1A1 Energy Industries - Liquid fuels	CO2	5895,629	1034,434	0,019726	4,31%	56,68%
1A2 Manufacturing industries - Gaseous fuels	CO2	8853,819	2990,343	0,016966	3,71%	60,39%
5A Solid waste disposal	CH4	2210,269	2968,696	0,01534	3,35%	63,74%
2C1 Iron and Steel Production	CO2	4576,292	866,8112	0,014749	3,23%	66,97%
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	0	1575,12	0,013875	3,03%	70,00%
1A1 Energy Industries - Gaseous fuels	CO2	5777,861	4733,421	0,013435	2,94%	72,94%
4A2 Land Converted to Forest Land - CO2	CO2	-41,8045	-1441,44	0,012166	2,66%	75,60%
1A2 Manufacturing industries - Liquid fuels	CO2	4241,3	1012,661	0,011826	2,59%	78,19%
1A2 Manufacturing industries - Solid fuels	CO2	3318,741	500,9457	0,011821	2,59%	80,77%
2B8 Petrochemical and carbon black production	CO2	571,2592	1243,017	0,008155	1,78%	82,55%
3.D.1 Direct N2O Emissions From Managed Soils	N2O	4431,456	3210,749	0,006607	1,45%	84,00%
1B1 Solid fuels	CH4	1274,593	53,72561	0,005761	1,26%	85,26%
4G Harvested Wood Products - CO2	CO2	-463,449	-112,221	0,00491	1,07%	86,33%
1A4 Other sectors - Biomass	CH4	153,2	553,5449	0,004127	0,90%	87,24%
4B1 Cropland Remaining Cropland - CO2	CO2	155,7129	-379,012	0,0041	0,90%	88,13%
1A4 Other sectors - Solid fuels	CH4	870,7939	38,02368	0,003925	0,86%	88,99%
1A1 Energy Industries - Solid fuels	CO2	14174,18	7487,085	0,003378	0,74%	89,73%
4B2 Land Converted to Cropland - CO2	CO2	18,46652	340,2714	0,002907	0,64%	90,37%
4A1 Forest Land Remaining Forest Land - CO2	CO2	-2400,78	-3141,39	0,002881	0,63%	91,00%
1A3c Railways - All Fuels	CO2	758,9207	127,452	0,00259	0,57%	91,56%
3A Enteric Fermentation	CH4	4219,867	2066,241	0,00244	0,53%	92,10%

2A1 Cement Production	CO2	1744,645	705,228	0,002321	0,51%	92,60%
1A1 Energy Industries - Other fossil fuels	CO2	44,07509	235,4041	0,001858	0,41%	93,01%
2A2 Lime Production	CO2	606,7867	126,2434	0,001856	0,41%	93,42%
5D Wastewater Treatment and Discharge	CH4	880,0842	279,9681	0,001839	0,40%	93,82%
2C3 Aluminium Production	PFC	371,08	0	0,001815	0,40%	94,21%
1A2 Manufacturing industries - Other fossil fuels	CO2	0	196,6464	0,001732	0,38%	94,59%
1B2c Venting and flaring	CO2	571,0592	132,4448	0,001627	0,36%	94,95%
4E2 Land Converted to Settlements - CO2	CO2	62,63741	213,2347	0,001572	0,34%	95,29%
1A3d Domestic navigation - All Liquid fuels	CO2	341,2676	12,7452	0,001557	0,34%	95,63%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CO2	CO2	872,8194	308,3975	0,001553	0,34%	95,97%
1A4 Other sectors - Other Fossil Fuels	CO2	0	160,9246	0,001418	0,31%	96,28%
4C2 Land Converted to Grassland - CO2	CO2	2,543975	-136,179	0,001212	0,27%	96,55%
2F2Foam Blowing - HFC	Aggregate F-gases	0	127,341	0,001122	0,25%	96,79%
2G Other Product Manufacture and Use - SF6	Aggregate F-gases	6,146424	126,5202	0,001084	0,24%	97,03%
5B Biological Treatment of Soild Waste	CH4	5	106,1485	0,000911	0,20%	97,23%
1A3b Road trasport - All Fuels	N2O	56,58995	121,9809	0,000798	0,17%	97,40%
1B2c Venting and flaring	CH4	281,4212	69,10948	0,000768	0,17%	97,57%
2B1 Ammonia Production	CO2	1789,074	1077,957	0,000745	0,16%	97,73%
1A4 Other sectors - Biomass	N2O	24,34859	87,97851	0,000656	0,14%	97,88%
2C3 Aluminium Production	CO2	125,3716	0	0,000613	0,13%	98,01%
3B Manure Management	N2O	979,7942	476,2953	0,000597	0,13%	98,14%
1B2aOil	CH4	194,5615	43,15808	0,000572	0,12%	98,27%
3I Other carboncontaining fertilizers	CO2	48,10802	86,72701	0,000529	0,12%	98,38%
3G Liming	CO2	130,209	13,15487	0,000521	0,11%	98,50%
2G Other Product Manufacture and Use - N2O	N2O	186,4694	61,19838	0,000373	0,08%	98,58%
3H Urea application	CO2	229,0349	87,68146	0,000348	0,08%	98,65%
5C Incineration and open burning of waste	CO2	120,8684	29,04554	0,000335	0,07%	98,73%
5B Biological Treatment of Soild Waste	N2O	3,576	39,22757	0,000328	0,07%	98,80%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO2	103,3021	93,75993	0,000321	0,07%	98,87%

4(III) Direct N ₂ O emissions from N mineralization/immobilization - N ₂ O	N ₂ O	5,337245	38,57866	0,000314	0,07%	98,94%
3B Manure Management	CH ₄	1243,595	655,9003	0,000305	0,07%	99,01%
2F4 Aerosol + MDI - HFC	Aggregate F-gases	0	33,45845	0,000295	0,06%	99,07%
1A3c Railways - All Fuels	N ₂ O	84,01983	14,65922	0,000282	0,06%	99,13%
4C1 Grassland Remaining Grassland - CO ₂	CO ₂	-10,8701	14,0238	0,000262	0,06%	99,19%
1A4 Other sectors - Solid fuels	N ₂ O	57,48279	2,318487	0,000261	0,06%	99,25%
2B8 Petrochemical and carbon black production	CH ₄	20,39775	40,19319	0,000254	0,06%	99,30%
1A1 Energy Industries - Biomass	N ₂ O	0,936515	29,19184	0,000253	0,06%	99,36%
3F Field Burning of Agricultural Residues	CH ₄	45,52046	0	0,000223	0,05%	99,41%
3C Rice Cultivation	CH ₄	81,23132	19,89945	0,000222	0,05%	99,45%
2A4 Other Process Uses of Carbonates	CO ₂	453,29	275,8257	0,000213	0,05%	99,50%
2C2 Ferroalloys Production	CO ₂	40,24	0	0,000197	0,04%	99,54%
1A1 Energy Industries - Biomass	CH ₄	0,58925	18,37841	0,000159	0,03%	99,58%
1A4 Other sectors - Gaseous fuels	CH ₄	9,081646	22,50338	0,000154	0,03%	99,61%
3.D.2 Indirect N ₂ O Emissions From Managed Soils	N ₂ O	444,218	261,2327	0,000128	0,03%	99,64%
1A5b Mobile	CO ₂	14,26247	21,66164	0,000121	0,03%	99,67%
1B2b Natural Gas	CH ₄	841,7417	478,6406	9,9E-05	0,02%	99,69%
1B2d Other (Thermal water extraction + NatGas storage)	CH ₄	94,9107	63,87574	9,84E-05	0,02%	99,71%
5D Wastewater Treatment and Discharge	N ₂ O	154,8721	76,01489	8,79E-05	0,02%	99,73%
1A1 Energy Industries - Solid fuels	N ₂ O	63,36294	26,2649	7,86E-05	0,02%	99,75%
1A4 Other sectors - Liquid fuels	CH ₄	20,44032	2,552235	7,75E-05	0,02%	99,76%
2D Non-energy products from fuels and solvent use	CO ₂	248,0319	129,1927	7,52E-05	0,02%	99,78%
3F Field Burning of Agricultural Residues	N ₂ O	14,06751	0	6,88E-05	0,02%	99,79%
2F3 Fire extinguishers - HFC	Aggregate F-gases	0	7,01039	6,18E-05	0,01%	99,81%
1A2 Manufacturing industries - Biomass	N ₂ O	0,901947	7,007646	5,73E-05	0,01%	99,82%
4D13 Other Wetlands Remaining Other Wetlands - CO ₂	CO ₂	-2,16461	3,179962	5,56E-05	0,01%	99,83%
1A1 Energy Industries - Liquid fuels	N ₂ O	12,52665	0,984311	5,26E-05	0,01%	99,84%
1A4 Other sectors - Other Fossil Fuels	CH ₄	0	5,6925	5,01E-05	0,01%	99,86%
4(IV) Indirect N ₂ O Emissions from Managed Soils - N ₂ O	N ₂ O	0,821931	5,790769	4,7E-05	0,01%	99,87%

1A2 Manufacturing industries - Solid fuels	N2O	12,70087	2,186479	4,29E-05	0,01%	99,87%
4(V) Biomass Burning - CH4	CH4	24,87459	9,083737	4,17E-05	0,01%	99,88%
1A4 Other sectors - Gaseous fuels	N2O	2,165064	5,364805	3,67E-05	0,01%	99,89%
1A2 Manufacturing industries - Biomass	CH4	0,5675	4,335271	3,54E-05	0,01%	99,90%
1A2 Manufacturing industries - Other fossil fuels	N2O	0	3,898733	3,43E-05	0,01%	99,91%
2A3 Glass production	CO2	94,66214	55,8957	2,94E-05	0,01%	99,91%
4D12 Flooded Land Remaining Flooded Land - CO2	CO2	0	3,179962	2,8E-05	0,01%	99,92%
4(V) Biomass Burning - N2O	N2O	15,84272	6,050668	2,42E-05	0,01%	99,93%
1A2 Manufacturing industries - Solid fuels	CH4	7,16077	1,234262	2,42E-05	0,01%	99,93%
1A1 Energy Industries - Other fossil fuels	N2O	0,936515	3,244624	2,4E-05	0,01%	99,94%
1B2aOil	CO2	5,566347	0,497801	2,28E-05	0,00%	99,94%
1A2 Manufacturing industries - Other fossil fuels	CH4	0	2,453062	2,16E-05	0,00%	99,95%
1A1 Energy Industries - Liquid fuels	CH4	5,387088	0,572629	2,13E-05	0,00%	99,95%
2C1 Iron and Steel Production	CH4	10,88608	3,691563	2,07E-05	0,00%	99,95%
4D2 Land Converted to Wetlands - CO2	CO2	3,08533	-0,60254	2,04E-05	0,00%	99,96%
1A3b Road transport - All Fuels	CH4	49,58506	25,35739	1,92E-05	0,00%	99,96%
1A4 Other sectors - Liquid fuels	N2O	29,11461	14,09882	1,82E-05	0,00%	99,97%
1A3a Domestic aviation - All fuels	CO2	3,578078	4,004911	1,78E-05	0,00%	99,97%
1B1 Solid fuels	CO2	3,603417	0	1,76E-05	0,00%	99,97%
1A2 Manufacturing industries - Liquid fuels	CH4	4,340766	0,498167	1,68E-05	0,00%	99,98%
1A1 Energy Industries - Other fossil fuels	CH4	0,58925	2,0415	1,51E-05	0,00%	99,98%
1A3d Domestic navigation - All Liquid fuels	N2O	2,866561	0,102512	1,31E-05	0,00%	99,98%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - N2O	N2O	0,142722	1,2669	1,05E-05	0,00%	99,99%
1A2 Manufacturing industries - Gaseous fuels	N2O	4,703098	1,588453	9,01E-06	0,00%	99,99%
1A4 Other sectors - Other Fossil Fuels	N2O	0	0,904728	7,97E-06	0,00%	99,99%
1A2 Manufacturing industries - Gaseous fuels	CH4	3,945552	1,332595	7,56E-06	0,00%	99,99%
1A1 Energy Industries - Gaseous fuels	N2O	3,069167	2,51404	7,13E-06	0,00%	99,99%
1A1 Energy Industries - Gaseous fuels	CH4	2,574805	2,109094	5,98E-06	0,00%	100,00%

1A3d Domestic navigation - All Liquid fuels	CH4	0,841692	0,0301	3,85E-06	0,00%	100,00%
1A3c Railways - All Fuels	CH4	1,036365	0,17845	3,5E-06	0,00%	100,00%
1A1 Energy Industries - Solid fuels	CH4	3,591634	1,668624	2,87E-06	0,00%	100,00%
5C Incineration and open burning of waste	N2O	1,160832	0,382821	2,31E-06	0,00%	100,00%
1B2c Venting and flaring	N2O	0,892946	0,257114	2,1E-06	0,00%	100,00%
1B2b Natural Gas	CO2	1,978869	0,864094	2,07E-06	0,00%	100,00%
2C2 Ferroalloys Production	CH4	0,2515	0	1,23E-06	0,00%	100,00%
1A2 Manufacturing industries - Liquid fuels	N2O	13,9807	7,899796	1,2E-06	0,00%	100,00%
1A5b Mobile	N2O	0,118887	0,180564	1,01E-06	0,00%	100,00%
5C Incineration and open burning of waste	CH4	0,275318	0,092962	5,28E-07	0,00%	100,00%
4F2 Land Converted to Other Land - CO2	CO2	0	0,050246	4,43E-07	0,00%	100,00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	0,054873	0,049805	1,7E-07	0,00%	100,00%
1A3a Domestic aviation - All fuels	N2O	0,03029	0,033855	1,5E-07	0,00%	100,00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH4	0,046035	0,041783	1,43E-07	0,00%	100,00%
1B2d Other (Thermal water extraction + NatGas storage)	CO2	0,039067	0,012147	8,41E-08	0,00%	100,00%
1A5b Mobile	CH4	0,002493	0,003787	2,12E-08	0,00%	100,00%
1A3a Domestic aviation - All fuels	CH4	0,000635	0,00071	3,15E-09	0,00%	100,00%
1A1 Energy Industries - Peat	CH4	0	0	0	0,00%	100,00%
1A1 Energy Industries - Peat	N2O	0	0	0	0,00%	100,00%
1A2 Manufacturing industries - Peat	CH4	0	0	0	0,00%	100,00%
1A2 Manufacturing industries - Peat	N2O	0	0	0	0,00%	100,00%
1A3d Domestic navigation - Gaseous fuels	CH4	0	0	0	0,00%	100,00%
1A3d Domestic navigation - Gaseous fuels	CO2	0	0	0	0,00%	100,00%
1A3d Domestic navigation - Gaseous fuels	N2O	0	0	0	0,00%	100,00%
1A5a Stationary	CH4	0	0	0	0,00%	100,00%
1A5a Stationary	CO2	0	0	0	0,00%	100,00%
1A5a Stationary	N2O	0	0	0	0,00%	100,00%
1B2b Natural Gas	N2O	0	0	0	0,00%	100,00%
1B2d Other (Thermal water extraction + NatGas storage)	N2O	0	0	0	0,00%	100,00%
2B1 Ammonia Production	CH4	0	0	0	0,00%	100,00%
2B1 Ammonia Production	N2O	0	0	0	0,00%	100,00%

2B8 Petrochemical and carbon black production	N2O	0	0	0	0,00%	100,00%
2C1 Iron and Steel Production	N2O	0	0	0	0,00%	100,00%
2C2 Ferroalloys Production	N2O	0	0	0	0,00%	100,00%
2C3 Aluminium Production	CH4	0	0	0	0,00%	100,00%
2C3 Aluminium Production	N2O	0	0	0	0,00%	100,00%
2D Non-energy products from fuels and solvent use	CH4	0	0	0	0,00%	100,00%
2E Electronics industry - SF6	SF6	0	0	0	0,00%	100,00%
2F5Solvent - HFC+PFC	Aggregate F-gases	0	0	0	0,00%	100,00%
3D Agricultural Soils	CH4	0	0	0	0,00%	100,00%
3J Other (please specify)	CH4	0	0	0	0,00%	100,00%
3J Other (please specify)	CO2	0	0	0	0,00%	100,00%
3J Other (please specify)	N2O	0	0	0	0,00%	100,00%
4(I) Direct N2O emissions from N inputs to managed soils - N2O	N2O	0	0	0	0,00%	100,00%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CH4	CH4	0	0	0	0,00%	100,00%
4(V) Biomass Burning - CO2	CO2	0	0	0	0,00%	100,00%
4D11 Peat Extraction Remaining Peat Extraction - CO2	CO2	0	0	0	0,00%	100,00%
4E1 Settlements Remaining Settlements - CO2	CO2	0	0	0	0,00%	100,00%
4F1 Other Land Remaining Other Land - CO2	CO2	0	0	0	0,00%	100,00%
4H Other - CH4	CH4	0	0	0	0,00%	100,00%
4H Other - CO2	CO2	0	0	0	0,00%	100,00%
4H Other - N2O	N2O	0	0	0	0,00%	100,00%
5A Solid waste disposal	CO2	0	0	0	0,00%	100,00%
5A Solid waste disposal	N2O	0	0	0	0,00%	100,00%
5B Biological Treatment of Solid Waste	CO2	0	0	0	0,00%	100,00%
5D Wastewater Treatment and Discharge	CO2	0	0	0	0,00%	100,00%
5E Other	CH4	0	0	0	0,00%	100,00%
5E Other	CO2	0	0	0	0,00%	100,00%
5E Other	N2O	0	0	0	0,00%	100,00%

Annex 2 Assessment of uncertainty

A2.1 Description of methodology used for uncertainty calculation

The first uncertainty calculation for the Hungarian greenhouse gas inventory was reported in 2006 for the year 2004 to fulfill the IPCC requirements for a complete emission inventory. For the 2012 submission the full coverage of the emission sources and sinks has been achieved both in key category analysis and in uncertainty estimation. The disaggregation of the categories used in uncertainty analysis is the same as listed in Table A1-1 (currently without LULUCF).

“Uncertainty estimates are an essential element of a complete emissions inventory. Uncertainty information is not intended to dispute the validity of the inventory estimates but to help prioritize efforts to improve the accuracy of inventories in the future and guide decisions on methodological choice.” (IPCC, 2000) There are two methods for the uncertainty estimation suggested by the 2006 IPCC Guidelines, a basic method (Tier 1) which is mandatory and an analytic one (Tier 2). The combination of uncertainties of the sectors “in order to arrive at the overall uncertainty in the national emissions and the trend” in the Hungarian inventory is carried out on the basis of Tier 1 method (error propagation rule). The uncertainty calculation was performed using the relevant Table of the 2006 IPCC Guidelines.

The calculations of the emissions estimates uncertainty are presented without LULUCF sectors, in the Table A2-1 below. Uncertainty calculation for each GHG (without LULUCF sector) is presented in Table A2-2. Calculation of the uncertainty with LULUCF is a planned improvement.

Table A2-1 Uncertainty calculation without LULUCF, Tier 1 method

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A1 Energy Industries - Biomass	CH4	<u>0,59</u>	<u>18,38</u>	5,00	100	100,12	0,030	0,000	0,000	0,016	0,001	0,017
1A1 Energy Industries - Biomass	N2O	<u>0,94</u>	<u>29,19</u>	5,00	200	200,06	0,095	0,000	0,000	0,052	0,002	0,052
1A1 Energy Industries - Gaseous fuels	CH4	<u>2,57</u>	<u>2,11</u>	1,00	100	100,00	0,003	0,000	0,000	0,001	0,000	0,001
1A1 Energy Industries - Gaseous fuels	CO2	<u>5 777,86</u>	<u>4 733,42</u>	1,00	3,00	3,16	0,244	0,014	0,043	0,041	0,061	0,074
1A1 Energy Industries - Gaseous fuels	N2O	<u>3,07</u>	<u>2,51</u>	1,00	200,00	200,00	0,008	0,000	0,000	0,001	0,000	0,001
1A1 Energy Industries - Liquid fuels	CH4	<u>5,39</u>	<u>0,57</u>	1,00	100,00	100,00	0,001	0,000	0,000	-0,002	0,000	0,002
1A1 Energy Industries - Liquid fuels	CO2	<u>5 895,63</u>	<u>1 034,43</u>	1,00	2,00	2,24	0,038	-0,021	0,009	-0,042	0,013	0,044
1A1 Energy Industries - Liquid fuels	N2O	<u>12,53</u>	<u>0,98</u>	1,00	200	200,00	0,003	0,000	0,000	-0,011	0,000	0,011
1A1 Energy Industries - Other fossil fuels	CH4	<u>0,59</u>	<u>2,04</u>	1,00	100	100,00	0,003	0,000	0,000	0,002	0,000	0,002

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A1 Energy Industries - Other fossil fuels	CO ₂	<u>44,08</u>	<u>235,40</u>	1,00	5	5,10	0,020	0,002	0,002	0,010	0,003	0,010
1A1 Energy Industries - Other fossil fuels	N ₂ O	<u>0,94</u>	<u>3,24</u>	1,00	200	200,00	0,011	0,000	0,000	0,005	0,000	0,005
1A1 Energy Industries - Solid fuels	CH ₄	<u>3,59</u>	<u>1,67</u>	1,00	100	100,00	0,003	0,000	0,000	0,000	0,000	0,000
1A1 Energy Industries - Solid fuels	CO ₂	<u>14 174,18</u>	<u>7 487,09</u>	1,00	2	2,24	0,272	-0,004	0,068	-0,009	0,097	0,097
1A1 Energy Industries - Solid fuels	N ₂ O	<u>63,36</u>	<u>26,26</u>	1,00	200	200,00	0,085	0,000	0,000	-0,017	0,000	0,017
1A2 Manufacturing industries - Biomass	CH ₄	<u>0,57</u>	<u>4,34</u>	5,00	100	100,12	0,007	0,000	0,000	0,004	0,000	0,004
1A2 Manufacturing industries - Biomass	N ₂ O	<u>0,90</u>	<u>7,01</u>	5,00	200	200,06	0,023	0,000	0,000	0,012	0,000	0,012
1A2 Manufacturing industries - Gaseous fuels	CH ₄	<u>3,95</u>	<u>1,33</u>	5,00	100	100,12	0,002	0,000	0,000	-0,001	0,000	0,001
1A2 Manufacturing industries - Gaseous fuels	CO ₂	<u>8 853,82</u>	<u>2 990,34</u>	5,00	5	7,07	0,344	-0,018	0,027	-0,090	0,193	0,213
1A2 Manufacturing industries - Gaseous fuels	N ₂ O	<u>4,70</u>	<u>1,59</u>	5,00	200	200,06	0,005	0,000	0,000	-0,002	0,000	0,002

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A2 Manufacturing industries - Liquid fuels	CH4	<u>4,34</u>	<u>0,50</u>	5,00	100	100,12	0,001	0,000	0,000	-0,002	0,000	0,002
1A2 Manufacturing industries - Liquid fuels	CO2	<u>4 241,30</u>	<u>1 012,66</u>	5,00	2	5,39	0,089	-0,013	0,009	-0,025	0,065	0,070
1A2 Manufacturing industries - Liquid fuels	N2O	<u>13,98</u>	<u>7,90</u>	5,00	200	200,06	0,026	0,000	0,000	0,000	0,001	0,001
1A2 Manufacturing industries - Other fossil fuels	CH4	<u>0,00</u>	<u>2,45</u>	5,00	100	100,12	0,004	0,000	0,000	0,002	0,000	0,002
1A2 Manufacturing industries - Other fossil fuels	CO2	<u>0,00</u>	<u>196,65</u>	5,00	5	7,07	0,023	0,002	0,002	0,009	0,013	0,016
1A2 Manufacturing industries - Other fossil fuels	N2O	<u>0,00</u>	<u>3,90</u>	5,00	200	200,06	0,013	0,000	0,000	0,007	0,000	0,007
1A2 Manufacturing industries - Solid fuels	CH4	<u>7,16</u>	<u>1,23</u>	5,00	100	100,12	0,002	0,000	0,000	-0,003	0,000	0,003
1A2 Manufacturing industries - Solid fuels	CO2	<u>3 318,74</u>	<u>500,95</u>	5,00	5	7,07	0,058	-0,012	0,005	-0,062	0,032	0,070
1A2 Manufacturing industries - Solid fuels	N2O	<u>12,70</u>	<u>2,19</u>	5,00	200	200,06	0,007	0,000	0,000	-0,009	0,000	0,009
1A3a Domestic aviation - SZUM	CH4	<u>0,00</u>	<u>0,00</u>	5,00	100	100,12	0,000	0,000	0,000	0,000	0,000	0,000

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
fuels												
1A3a Domestic aviation - SZUM fuels	CO ₂	<u>3,58</u>	<u>4,00</u>	5,00	5	7,07	0,000	0,000	0,000	0,000	0,000	0,000
1A3a Domestic aviation - SZUM fuels	N ₂ O	<u>0,03</u>	<u>0,03</u>	5,00	150	150,08	0,000	0,000	0,000	0,000	0,000	0,000
1A3b Road transport - SZUM Fuels	CH ₄	<u>49,59</u>	<u>25,36</u>	5,00	100	100,12	0,041	0,000	0,000	-0,002	0,002	0,003
1A3b Road transport - SZUM Fuels	CO ₂	<u>7 160,39</u>	<u>12 080,07</u>	5,00	1,5	5,22	1,026	0,074	0,110	0,110	0,781	0,788
1A3b Road transport - SZUM Fuels	N ₂ O	<u>56,59</u>	<u>121,98</u>	5,00	200	200,06	0,397	0,001	0,001	0,165	0,008	0,165
1A3c Railways - SZUM Fuels	CH ₄	<u>1,04</u>	<u>0,18</u>	5,00	250	250,05	0,001	0,000	0,000	-0,001	0,000	0,001
1A3c Railways - SZUM Fuels	CO ₂	<u>758,92</u>	<u>127,45</u>	5,00	1	5,10	0,011	-0,003	0,001	-0,003	0,008	0,009
1A3c Railways - SZUM Fuels	N ₂ O	<u>84,02</u>	<u>14,66</u>	5,00	300	300,04	0,072	0,000	0,000	-0,089	0,001	0,089
1A3d Domestic navigation - SZUM Liquid fuels	CH ₄	<u>0,84</u>	<u>0,03</u>	5,00	50	50,25	0,000	0,000	0,000	0,000	0,000	0,000
1A3d Domestic navigation - SZUM Liquid fuels	CO ₂	<u>341,27</u>	<u>12,75</u>	5,00	1,5	5,22	0,001	-0,002	0,000	-0,002	0,001	0,003
1A3d Domestic navigation - SZUM Liquid fuels	N ₂ O	<u>2,87</u>	<u>0,10</u>	5,00	140	140,09	0,000	0,000	0,000	-0,002	0,000	0,002

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH4	<u>0,046</u>	<u>0,042</u>	5,00	100	100,12	0,000	0,000	0,000	0,000	0,000	0,000
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO2	<u>103,30</u>	<u>93,76</u>	5,00	5	7,07	0,011	0,000	0,001	0,002	0,006	0,006
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	<u>0,05</u>	<u>0,05</u>	5,00	200	200,06	0,000	0,000	0,000	0,000	0,000	0,000
1A4 Other sectors - Biomass	CH4	<u>153,20</u>	<u>553,54</u>	20,00	100	101,98	0,918	0,004	0,005	0,427	0,143	0,450
1A4 Other sectors - Biomass	N2O	<u>24,35</u>	<u>87,98</u>	20,00	200	201,00	0,288	0,001	0,001	0,136	0,023	0,138
1A4 Other sectors - Gaseous fuels	CH4	<u>9,08</u>	<u>22,50</u>	5,00	100	100,12	0,037	0,000	0,000	0,016	0,001	0,016
1A4 Other sectors - Gaseous fuels	CO2	<u>4 075,84</u>	<u>10 099,51</u>	5,00	5	7,07	1,162	0,071	0,092	0,357	0,653	0,744
1A4 Other sectors - Gaseous fuels	N2O	<u>2,17</u>	<u>5,36</u>	5,00	200	200,06	0,017	0,000	0,000	0,008	0,000	0,008
1A4 Other sectors - Liquid fuels	CH4	<u>20,44</u>	<u>2,55</u>	5,00	100	100,12	0,004	0,000	0,000	-0,008	0,000	0,008

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A4 Other sectors - Liquid fuels	CO ₂	<u>6 947,59</u>	<u>1 428,08</u>	5,00	2	5,39	0,125	-0,023	0,013	-0,045	0,092	0,103
1A4 Other sectors - Liquid fuels	N ₂ O	<u>29,11</u>	<u>14,10</u>	5,00	200	200,06	0,046	0,000	0,000	-0,004	0,001	0,004
1A4 Other sectors - Other Fossil Fuels	CH ₄	<u>0,00</u>	<u>5,69</u>	5,00	100	100,12	0,009	0,000	0,000	0,005	0,000	0,005
1A4 Other sectors - Other Fossil Fuels	CO ₂	<u>0,00</u>	<u>160,92</u>	5,00	7	8,60	0,023	0,001	0,001	0,010	0,010	0,015
1A4 Other sectors - Other Fossil Fuels	N ₂ O	<u>0,00</u>	<u>0,90</u>	5,00	200	200,06	0,003	0,000	0,000	0,002	0,000	0,002
1A4 Other sectors - Solid fuels	CH ₄	<u>870,79</u>	<u>38,02</u>	5,00	100	100,12	0,062	-0,004	0,000	-0,412	0,002	0,412
1A4 Other sectors - Solid fuels	CO ₂	<u>12 499,72</u>	<u>528,43</u>	5,00	7	8,60	0,074	-0,059	0,005	-0,415	0,034	0,416
1A4 Other sectors - Solid fuels	N ₂ O	<u>57,48</u>	<u>2,32</u>	5,00	200	200,06	0,008	0,000	0,000	-0,055	0,000	0,055
1A5b Other - Mobile	CH ₄	<u>0,00</u>	<u>0,00</u>	25,00	100	103,08	0,000	0,000	0,000	0,000	0,000	0,000
1A5b Other - Mobile	CO ₂	<u>14,26</u>	<u>21,66</u>	25,00	5	25,50	0,009	0,000	0,000	0,001	0,007	0,007
1A5b Other - Mobile	N ₂ O	<u>0,12</u>	<u>0,18</u>	25,00	200	201,56	0,001	0,000	0,000	0,000	0,000	0,000
1B1 Solid fuels	CH ₄	<u>1 274,59</u>	<u>53,73</u>	5,00	200	200,06	0,175	-0,006	0,000	-1,210	0,003	1,210
1B1 Solid fuels	CO ₂	<u>3,60</u>	<u>NO,IE,NA</u>	5,00	200	200,06	0,000	0,000	0,000	0,000	0,000	0,000
1B2aOil	CH ₄	<u>194,56</u>	<u>43,16</u>	5,00	86	86,42	0,061	-0,001	0,000	-0,052	0,003	0,052
1B2aOil	CO ₂	<u>5,57</u>	<u>0,50</u>	5,00	44	44,45	0,000	0,000	0,000	-0,001	0,000	0,001
1B2b Natural Gas	CH ₄	<u>841,74</u>	<u>478,64</u>	5,00	277	276,81	2,156	0,000	0,004	0,015	0,031	0,034
1B2b Natural Gas	CO ₂	<u>1,98</u>	<u>0,86</u>	5,00	284	284,33	0,004	0,000	0,000	-0,001	0,000	0,001

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1B2c Venting and flaring	CH4	<u>281,42</u>	<u>69,11</u>	5,00	53	53,11	0,060	-0,001	0,001	-0,043	0,004	0,043
1B2c Venting and flaring	CO ₂	<u>571,06</u>	<u>132,44</u>	5,00	484	484,44	1,044	-0,002	0,001	-0,833	0,009	0,833
1B2c Venting and flaring	N ₂ O	<u>0,89</u>	<u>0,26</u>	5,00	584	584,23	0,002	0,000	0,000	-0,001	0,000	0,001
1B2d Other (Thermal water extraction + NatGas storage)	CH4	<u>94,91</u>	<u>63,88</u>	5,00	200	200,06	0,208	0,000	0,001	0,019	0,004	0,020
1B2d Other (Thermal water extraction + NatGas storage)	CO ₂	<u>0,04</u>	<u>0,01</u>	5,00	200	200,06	0,000	0,000	0,000	0,000	0,000	0,000
2A1 Cement Production	CO ₂	<u>1 744,64</u>	<u>705,23</u>	2,5		3,54	0,041	-0,003	0,006	-0,006	0,023	0,024
2A2 Lime Production	CO ₂	<u>606,79</u>	<u>126,24</u>	2,5	2,5	3,54	0,007	-0,002	0,001	-0,005	0,004	0,006
2A3 Glass production	CO ₂	<u>94,66</u>	<u>55,90</u>	2,5	2,5	3,54	0,003	0,000	0,001	0,000	0,002	0,002
2A4 Other Process Uses of Carbonates	CO ₂	<u>453,29</u>	<u>275,83</u>	2,5	2,5	3,54	0,016	0,000	0,003	0,000	0,009	0,009
2B1 Ammonia Production	CO ₂	<u>1 789,07</u>	<u>1 077,96</u>	5	5	7,07	0,124	0,001	0,010	0,003	0,070	0,070
2B2 Nitric Acid Production	N ₂ O	<u>4 365,71</u>	<u>27,14</u>	7,5	7,5	10,61	0,005	-0,022	0,000	-0,166	0,003	0,166
2B8 Petrochemical and carbon black production	CH4	<u>20,40</u>	<u>40,19</u>	3	10	10,44	0,007	0,000	0,000	0,003	0,002	0,003

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2B8 Petrochemical and carbon black production	CO ₂	<u>571,26</u>	<u>1 243,02</u>	7,5	7,5	10,61	0,215	0,008	0,011	0,063	0,120	0,136
2C1 Iron and Steel Production	CH ₄	<u>10,89</u>	<u>3,69</u>	10	10	14,14	0,001	0,000	0,000	0,000	0,000	0,001
2C1 Iron and Steel Production	CO ₂	<u>4 576,29</u>	<u>866,81</u>	7,5	5	9,01	0,127	-0,016	0,008	-0,078	0,084	0,114
2C2 Ferroalloys Production	CH ₄	<u>0,25</u>	<u>0,00</u>	5	37,5	37,83	0,000	0,000	0,000	0,000	0,000	0,000
2C2 Ferroalloys Production	CO ₂	<u>40,24</u>	<u>0,00</u>	5	37,5	37,83	0,000	0,000	0,000	-0,008	0,000	0,008
2C3 Aluminium Production	CO ₂	<u>125,37</u>	<u>0,00</u>	2	10	10,20	0,000	-0,001	0,000	-0,006	0,000	0,006
2C3 Aluminium Production	PFC	<u>371,08</u>	<u>0,00</u>	2	99	99,02	0,000	-0,002	0,000	-0,189	0,000	0,189
2D Non-energy products from fuels and solvent use	CO ₂	<u>248,03</u>	<u>129,19</u>	5	50	50,25	0,106	0,000	0,001	-0,005	0,008	0,010
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	<u>0,00</u>	<u>1575,12</u>	10	10	14,14	0,362	0,014	0,014	0,144	0,204	0,249
2F2 Foam Blowing - HFC	Aggregate F-gases	<u>0,00</u>	<u>127,34</u>	50	21	54,23	0,112	0,001	0,001	0,024	0,082	0,086
2F3 Fire extinguishers - HFC	Aggregate F-gases	<u>0,00</u>	<u>7,01</u>	15	2	15,13	0,002	0,000	0,000	0,000	0,001	0,001

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
	gase s											
2F4Aerosol + MDI - HFC	Agg rega te F- gase s	<u>0,00</u>	<u>33,46</u>	10	50	50,99	0,028	0,000	0,000	0,015	0,004	0,016
2G Other Product Manufacture and Use - SF6	Agg rega te F- gase s	<u>6,15</u>	<u>126,52</u>	3	40	40,11	0,083	0,001	0,001	0,045	0,005	0,045
2G Other Product Manufacture and Use - N2O	N2O	<u>186,47</u>	<u>61,20</u>	3	3	4,24	0,004	0,000	0,001	-0,001	0,002	0,003
Enteric Fermentation	CH4	<u>4 219,87</u>	<u>2 066,24</u>	0	12,45	12,45	0,419	-0,003	0,019	-0,035	0,000	0,035
Manure Management	CH4	<u>1 243,59</u>	<u>655,90</u>	0	14,67	14,67	0,157	0,000	0,006	-0,006	0,000	0,006
Manure Management	N2O	<u>979,79</u>	<u>476,30</u>	0	141,42	141,42	1,096	-0,001	0,004	-0,096	0,000	0,096
Rice Cultivation	CH4	<u>81,23</u>	<u>19,90</u>	5	75,44	75,61	0,024	0,000	0,000	-0,018	0,001	0,018
Agricultural Soils	N2O	<u>4 875,67</u>	<u>3 471,98</u>	0	186,33	186,33	10,525	0,007	0,032	1,248	0,000	1,248
Field Burning of Agricultural Residues	CH4	<u>45,52</u>	<u>NO</u>	0	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000
Field Burning of Agricultural Residues	N2O	<u>14,07</u>	<u>NO</u>	0	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000
Liming	CO2	<u>130,21</u>	<u>13,15</u>	10,00	20	22,36	0,005	-0,001	0,000	-0,011	0,002	0,011
Urea application	CO2	<u>229,03</u>	<u>87,68</u>	5,00	20	20,62	0,029	0,000	0,001	-0,007	0,006	0,009
Other	CO2	<u>48,11</u>	<u>86,73</u>	5,00	20	20,62	0,029	0,001	0,001	0,011	0,006	0,012

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
carboncontaining fertilizers												
5A Solid waste disposal	CH4	<u>2 210,27</u>	<u>2 968,70</u>	10	33	34,48	1,665	0,016	0,027	0,521	0,384	0,647
5B Biological Treatment of Soild Waste	CH4	<u>5,00</u>	<u>106,15</u>	10	140	140,36	0,242	0,001	0,001	0,132	0,014	0,133
5B Biological Treatment of Soild Waste	N2O	<u>3,58</u>	<u>39,23</u>	10	130	130,38	0,083	0,000	0,000	0,044	0,005	0,045
5C Incineration and open burning of waste	CH4	<u>0,28</u>	<u>0,09</u>	10	100	100,50	0,000	0,000	0,000	0,000	0,000	0,000
5C Incineration and open burning of waste	CO ₂	<u>120,87</u>	<u>29,05</u>	10	25	26,93	0,013	0,000	0,000	-0,009	0,004	0,010
5C Incineration and open burning of waste	N2O	<u>1,16</u>	<u>0,38</u>	10	100	100,50	0,001	0,000	0,000	0,000	0,000	0,000
5D Wastewater Treatment and Discharge	CH4	<u>880,08</u>	<u>279,97</u>	30	40	50,00	0,228	-0,002	0,003	-0,078	0,109	0,134
5D Wastewater Treatment and Discharge	CO ₂			0	0	0,00	0,000	0,000	0,000	0,000	0,000	0,000
5D Wastewater Treatment and Discharge	N2O	<u>154,87</u>	<u>76,01</u>	15	200	200,56	0,248	0,000	0,001	-0,020	0,015	0,025
		Σ C	Σ D					(ΣH2)1/2		(ΣM2)1/2		

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
TOTAL exc LULUCF		109 438,33	61 464,47				11,2			2,5		

Table A2-2 Uncertainty calculation for each GHG without LULUCF, Tier 1 method

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A1 Energy Industries - Gaseous fuels	CO ₂	<u>5 777,86</u>	<u>4 733,42</u>	1	3	3,16	0,315	0,018	0,055	0,053	0,078	0,095
1A1 Energy Industries - Liquid fuels	CO ₂	<u>5 895,63</u>	<u>1 034,43</u>	1	2	2,24	0,049	-0,026	0,012	-0,052	0,017	0,055
1A1 Energy Industries - Other fossil fuels	CO ₂	<u>44,08</u>	<u>235,40</u>	1	5	5,10	0,025	0,002	0,003	0,012	0,004	0,013
1A1 Energy Industries - Solid fuels	CO ₂	<u>14 174,18</u>	<u>7 487,09</u>	1	2	2,24	0,352	-0,005	0,087	-0,009	0,124	0,124

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A2 Manufacturing industries - Gaseous fuels	CO ₂	<u>8 853.82</u>	<u>2 990.34</u>	5	5	7,07	0,444	-0,023	0,035	-0,113	0,247	0,272
1A2 Manufacturing industries - Liquid fuels	CO ₂	<u>4 241.30</u>	<u>1 012.66</u>	5	2	5,39	0,115	-0,016	0,012	-0,031	0,084	0,089
1A2 Manufacturing industries - Other fossil fuels	CO ₂	<u>0.00</u>	<u>196.65</u>	5	5	7,07	0,029	0,002	0,002	0,011	0,016	0,020
1A2 Manufacturing industries - Solid fuels	CO ₂	<u>3 318.74</u>	<u>500.95</u>	5	5	7,07	0,074	-0,016	0,006	-0,079	0,041	0,089
1A3a Domestic aviation - SZUM fuels	CO ₂	<u>3.58</u>	<u>4.00</u>	5	5	7,07	0,001	0,000	0,000	0,000	0,000	0,000
1A3b Road transport - SZUM Fuels	CO ₂	<u>7 160.39</u>	<u>12 080.07</u>	5	2	5,22	1,325	0,095	0,141	0,142	0,998	1,008
1A3c Railways - SZUM Fuels	CO ₂	<u>758.92</u>	<u>127.45</u>	5	1	5,10	0,014	-0,003	0,001	-0,003	0,011	0,011
1A3d Domestic navigation - SZUM Liquid fuels	CO ₂	<u>341.27</u>	<u>12.75</u>	5	2	5,22	0,001	-0,002	0,000	-0,003	0,001	0,003
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO ₂	<u>103.30</u>	<u>93.76</u>	5	5	7,07	0,014	0,000	0,001	0,002	0,008	0,008
1A4 Other sectors - Gaseous fuels	CO ₂	<u>4 075.84</u>	<u>10 099.51</u>	5	5	7,07	1,501	0,091	0,118	0,457	0,835	0,952

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A4 Other sectors - Liquid fuels	CO ₂	<u>6 947,59</u>	<u>1 428,08</u>	5	2	5,39	0,162	-0,028	0,017	-0,057	0,118	0,131
1A4 Other sectors - Other Fossil Fuels	CO ₂	<u>0,00</u>	<u>160,92</u>	5	7	8,60	0,029	0,002	0,002	0,013	0,013	0,019
1A4 Other sectors - Solid fuels	CO ₂	<u>12 499,72</u>	<u>528,43</u>	5	7	8,60	0,096	-0,075	0,006	-0,525	0,044	0,526
1A5b Other - Mobile	CO ₂	<u>14,26</u>	<u>21,66</u>	5	200	200,06	0,091	0,000	0,000	0,032	0,002	0,032
1B1 Solid fuels	CO ₂	<u>3,60</u>	<u>NO,IE,NA</u>	5	200	200,06	0,000	0,000	0,000	0,000	0,000	0,000
1B2aOil	CO ₂	<u>5,57</u>	<u>0,50</u>	5	44	44,45	0,000	0,000	0,000	-0,001	0,000	0,001
1B2b Natural Gas	CO ₂	<u>1,98</u>	<u>0,86</u>	5	284	284,33	0,005	0,000	0,000	-0,001	0,000	0,001
1B2c Venting and flaring	CO ₂	<u>571,06</u>	<u>132,44</u>	5	484	484,44	1,349	-0,002	0,002	-1,048	0,011	1,048
1B2d Other (Thermal water extraction + NatGas storage)	CO ₂	<u>0,04</u>	<u>0,01</u>	5	200	200,06	0,000	0,000	0,000	0,000	0,000	0,000
2A1 Cement Production	CO ₂	<u>1 744,64</u>	<u>705,23</u>	3		3,54	0,052	-0,003	0,008	-0,008	0,029	0,030
2A2 Lime Production	CO ₂	<u>606,79</u>	<u>126,24</u>	3	3	3,54	0,009	-0,002	0,001	-0,006	0,005	0,008
2A3 Glass production	CO ₂	<u>94,66</u>	<u>55,90</u>	3	3	3,54	0,004	0,000	0,001	0,000	0,002	0,002
2A4 Other Process Uses of Carbonates	CO ₂	<u>453,29</u>	<u>275,83</u>	3	3	3,54	0,020	0,000	0,003	0,001	0,011	0,011
2B1 Ammonia Production	CO ₂	<u>1 789,07</u>	<u>1 077,96</u>	5	5	7,07	0,160	0,001	0,013	0,005	0,089	0,089
2B8 Petrochemical and carbon black	CO ₂	<u>571,26</u>	<u>1 243,02</u>	8	8	10,61	0,277	0,011	0,015	0,081	0,154	0,174

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
production												
2C1 Iron and Steel Production	CO ₂	<u>4 576,29</u>	<u>866,81</u>	8	5	9,01	0,164	-0,020	0,010	-0,098	0,107	0,145
2C2 Ferroalloys Production	CO ₂	<u>40,24</u>	<u>0,00</u>	5	38	37,83	0,000	0,000	0,000	-0,010	0,000	0,010
2C3 Aluminium Production	CO ₂	<u>125,37</u>	<u>0,00</u>	2	10	10,20	0,000	-0,001	0,000	-0,008	0,000	0,008
2D Non-energy products from fuels and solvent use	CO ₂	<u>248,03</u>	<u>129,19</u>	5	50	50,25	0,136	0,000	0,002	-0,005	0,011	0,012
Liming	CO ₂	<u>130,21</u>	<u>13,15</u>	10	20	22,36	0,006	-0,001	0,000	-0,014	0,002	0,014
Urea application	CO ₂	<u>229,03</u>	<u>87,68</u>	5	20	20,62	0,038	0,000	0,001	-0,009	0,007	0,012
Other carboncontaining fertilizers	CO ₂	<u>48,11</u>	<u>86,73</u>	5	20	20,62	0,038	0,001	0,001	0,014	0,007	0,016
5C Incineration and open burning of waste	CO ₂	<u>120,87</u>	<u>29,05</u>	10	25	26,93	0,016	0,000	0,000	-0,011	0,005	0,012
5D Wastewater Treatment and Discharge	CO ₂			0	0	0,00	0,000	0,000	0,000	0,000	0,000	0,000
		Σ C	Σ D	(ΣH2)1/2				(ΣM2)1/2				
TOTAL CO₂ excluding LULUCF		85 570,60	47 578,18	2.5				1.9				
1A1 Energy	CH ₄	<u>0,59</u>	<u>18,38</u>	5	100	100,12	0,244	0,001	0,001	0,144	0,010	0,144

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
Industries - Biomass												
1A1 Energy Industries - Gaseous fuels	CH4	<u>2.57</u>	<u>2.11</u>	1	100	100,00	0,028	0,000	0,000	0,004	0,000	0,004
1A1 Energy Industries - Liquid fuels	CH4	<u>5.39</u>	<u>0.57</u>	1	100	100,00	0,008	0,000	0,000	-0,021	0,000	0,021
1A1 Energy Industries - Other fossil fuels	CH4	<u>0.59</u>	<u>2.04</u>	1	100	100,00	0,027	0,000	0,000	0,013	0,000	0,013
1A1 Energy Industries - Solid fuels	CH4	<u>3.59</u>	<u>1.67</u>	1	100	100,00	0,022	0,000	0,000	-0,004	0,000	0,004
1A2 Manufacturing industries - Biomass	CH4	<u>0.57</u>	<u>4.34</u>	5	100	100,12	0,058	0,000	0,000	0,032	0,002	0,032
1A2 Manufacturing industries - Gaseous fuels	CH4	<u>3.95</u>	<u>1.33</u>	5	100	100,12	0,018	0,000	0,000	-0,008	0,001	0,008
1A2 Manufacturing industries - Liquid fuels	CH4	<u>4.34</u>	<u>0.50</u>	5	100	100,12	0,007	0,000	0,000	-0,017	0,000	0,017
1A2 Manufacturing industries - Other fossil fuels	CH4	<u>0.00</u>	<u>2.45</u>	5	100	100,12	0,033	0,000	0,000	0,020	0,001	0,020
1A2 Manufacturing industries - Solid fuels	CH4	<u>7.16</u>	<u>1.23</u>	5	100	100,12	0,016	0,000	0,000	-0,024	0,001	0,024
1A3a Domestic	CH4	<u>0.00</u>	<u>0.00</u>	5	100	100,12	0,000	0,000	0,000	0,000	0,000	0,000

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
aviation - SZUM fuels												
1A3b Road transport - SZUM Fuels	CH4	<u>49,59</u>	<u>25,36</u>	5	100	100,12	0,337	0,000	0,002	-0,035	0,014	0,038
1A3c Railways - SZUM Fuels	CH4	<u>1,04</u>	<u>0,18</u>	5	250	250,05	0,006	0,000	0,000	-0,009	0,000	0,009
1A3d Domestic navigation - SZUM Liquid fuels	CH4	<u>0,84</u>	<u>0,03</u>	5	50	50,25	0,000	0,000	0,000	-0,002	0,000	0,002
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH4	<u>0,046</u>	<u>0,042</u>	5	100	100,12	0,001	0,000	0,000	0,000	0,000	0,000
1A4 Other sectors - Biomass	CH4	<u>153,20</u>	<u>553,54</u>	20	100	101,98	7,495	0,037	0,044	3,680	1,249	3,886
1A4 Other sectors - Gaseous fuels	CH4	<u>9,08</u>	<u>22,50</u>	5	100	100,12	0,299	0,001	0,002	0,136	0,013	0,137
1A4 Other sectors - Liquid fuels	CH4	<u>20,44</u>	<u>2,55</u>	5	100	100,12	0,034	-0,001	0,000	-0,078	0,001	0,078
1A4 Other sectors - Other Fossil Fuels	CH4	<u>0,00</u>	<u>5,69</u>	5	100	100,12	0,076	0,000	0,000	0,045	0,003	0,046
1A4 Other sectors - Solid fuels	CH4	<u>870,79</u>	<u>38,02</u>	5	100	100,12	0,505	-0,039	0,003	-3,866	0,021	3,866
1A5b Other - Mobile	CH4	<u>0,00</u>	<u>0,00</u>	10	100	100,50	0,000	0,000	0,000	0,000	0,000	0,000
1B1 Solid fuels	CH4	<u>1 274,59</u>	<u>53,73</u>	5	200	200,06	1,427	-0,057	0,004	-11,345	0,030	11,345
1B2aOil	CH4	<u>194,56</u>	<u>43,16</u>	5	86	86,42	0,495	-0,006	0,003	-0,507	0,024	0,508

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1B2b Natural Gas	CH4	<u>841.74</u>	<u>478.64</u>	5	277	276,81	17,591	-0,002	0,038	-0,596	0,270	0,654
1B2c Venting and flaring	CH4	<u>281.42</u>	<u>69.11</u>	5	53	53,11	0,487	-0,008	0,006	-0,421	0,039	0,423
1B2d Other (Thermal water extraction + NatGas storage)	CH4	<u>94.91</u>	<u>63.88</u>	5	200	200,06	1,697	0,001	0,005	0,109	0,036	0,115
2B8 Petrochemical and carbon black production	CH4	<u>20.40</u>	<u>40.19</u>	3	10	10,44	0,056	0,002	0,003	0,022	0,014	0,026
2C1 Iron and Steel Production	CH4	<u>10.89</u>	<u>3.69</u>	10	10	14,14	0,007	0,000	0,000	-0,002	0,004	0,005
2C2 Ferroalloys Production	CH4	<u>0.25</u>	<u>0.00</u>	5	38	37,83	0,000	0,000	0,000	0,000	0,000	0,000
Enteric Fermentation	CH4	<u>4 219.87</u>	<u>2 066.24</u>	0	12	12,45	3,416	-0,037	0,165	-0,464	0,000	0,464
Manure Management	CH4	<u>1 243.59</u>	<u>655.90</u>	0	15	14,67	1,277	-0,007	0,052	-0,107	0,000	0,107
Rice Cultivation	CH4	<u>81.23</u>	<u>19.90</u>	5	75	75,61	0,200	-0,002	0,002	-0,174	0,011	0,174
Field Burning of Agricultural Residues	CH4	<u>45.52</u>	<u>NO</u>	0	0	0,00	0,000	0,000	0,000	0,000	0,000	0,000
5A Solid waste disposal	CH4	<u>2 210.27</u>	<u>2 968.70</u>	10	33	34,48	13,591	0,131	0,237	4,311	3,348	5,459
5B Biological Treatment of Soild Waste	CH4	<u>5.00</u>	<u>106.15</u>	10	140	140,36	1,978	0,008	0,008	1,152	0,120	1,158
5C Incineration and open burning of waste	CH4	<u>0.28</u>	<u>0.09</u>	10	100	100,50	0,001	0,000	0,000	-0,001	0,000	0,001

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
5D Wastewater Treatment and Discharge	CH4	<u>880,08</u>	<u>279,97</u>	30	40	50,00	1,859	-0,020	0,022	-0,793	0,947	1,235
		Σ C	Σ D	(ΣH2)1/2				(ΣM2)1/2				
TOTAL CH₄ excluding LULUCF		12 538,38	7 531,89	24.0				13.9				
1A1 Energy Industries - Biomass	N2O	<u>0,94</u>	<u>29,19</u>	5	200	200,06	1,302	0,003	0,003	0,526	0,019	0,526
1A1 Energy Industries - Gaseous fuels	N2O	<u>3,07</u>	<u>2,51</u>	1	200	200,00	0,112	0,000	0,000	0,023	0,000	0,023
1A1 Energy Industries - Liquid fuels	N2O	<u>12,53</u>	<u>0,98</u>	1	200	200,00	0,044	0,000	0,000	-0,076	0,000	0,076
1A1 Energy Industries - Other fossil fuels	N2O	<u>0,94</u>	<u>3,24</u>	1	200	200,00	0,145	0,000	0,000	0,052	0,000	0,052
1A1 Energy Industries - Solid fuels	N2O	<u>63,36</u>	<u>26,26</u>	1	200	200,00	1,171	0,000	0,002	0,006	0,003	0,007
1A2 Manufacturing industries - Biomass	N2O	<u>0,90</u>	<u>7,01</u>	5	200	200,06	0,313	0,001	0,001	0,121	0,005	0,121
1A2 Manufacturing industries - Gaseous fuels	N2O	<u>4,70</u>	<u>1,59</u>	5	200	200,06	0,071	0,000	0,000	-0,006	0,001	0,006

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A2 Manufacturing industries - Liquid fuels	N2O	<u>13.98</u>	<u>7.90</u>	5	200	200,06	0,352	0,000	0,001	0,040	0,005	0,040
1A2 Manufacturing industries - Other fossil fuels	N2O	<u>0.00</u>	<u>3.90</u>	5	200	200,06	0,174	0,000	0,000	0,071	0,003	0,071
1A2 Manufacturing industries - Solid fuels	N2O	<u>12.70</u>	<u>2.19</u>	5	200	200,06	0,098	0,000	0,000	-0,055	0,001	0,055
1A3a Domestic aviation - SZUM fuels	N2O	<u>0.03</u>	<u>0.03</u>	5	150	150,08	0,001	0,000	0,000	0,000	0,000	0,000
1A3b Road transport - SZUM Fuels	N2O	<u>56.59</u>	<u>121.98</u>	5	200	200,06	5,441	0,009	0,011	1,804	0,079	1,806
1A3c Railways - SZUM Fuels	N2O	<u>84.02</u>	<u>14.66</u>	5	300	300,04	0,981	-0,002	0,001	-0,541	0,009	0,541
1A3d Domestic navigation - SZUM Liquid fuels	N2O	<u>2.87</u>	<u>0.10</u>	5	140	140,09	0,003	0,000	0,000	-0,014	0,000	0,014
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	<u>0.05</u>	<u>0.05</u>	5	200	200,06	0,002	0,000	0,000	0,000	0,000	0,001
1A4 Other sectors - Biomass	N2O	<u>24.35</u>	<u>87.98</u>	20	200	201,00	3,943	0,007	0,008	1,424	0,227	1,442
1A4 Other sectors - Gaseous fuels	N2O	<u>2.17</u>	<u>5.36</u>	5	200	200,06	0,239	0,000	0,000	0,082	0,003	0,082
1A4 Other sectors -	N2O	<u>29.11</u>	<u>14.10</u>	5	200	200,06	0,629	0,000	0,001	0,040	0,009	0,041

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
Liquid fuels												
1A4 Other sectors - Other Fossil Fuels	N2O	<u>0,00</u>	<u>0,90</u>	5	200	200,06	0,040	0,000	0,000	0,017	0,001	0,017
1A4 Other sectors - Solid fuels	N2O	<u>57,48</u>	<u>2,32</u>	5	200	200,06	0,103	-0,002	0,000	-0,388	0,001	0,388
1A5b Other - Mobile	N2O	<u>0,12</u>	<u>0,18</u>	5	200	200,06	0,008	0,000	0,000	0,002	0,000	0,002
1B2c Venting and flaring	N2O	<u>0,89</u>	<u>0,26</u>	5	584	584,23	0,033	0,000	0,000	-0,006	0,000	0,006
2B2 Nitric Acid Production	N2O	<u>4 365,71</u>	<u>27,14</u>	8	8	10,61	0,064	-0,160	0,002	-1,201	0,026	1,201
2G Other Product Manufacture and Use - N2O	N2O	<u>186,47</u>	<u>61,20</u>	3	3	4,24	0,058	-0,001	0,006	-0,004	0,024	0,024
Manure Management	N2O	<u>979,79</u>	<u>476,30</u>	0	141	141,42	15,019	0,007	0,043	0,968	0,000	0,968
Agricultural Soils	N2O	<u>4 875,67</u>	<u>3 471,98</u>	0	186	186,33	144,242	0,134	0,317	24,989	0,000	24,989
Field Burning of Agricultural Residues	N2O	<u>14,07</u>	<u>NO</u>	0	0	0,00	0,000	0,000	0,000	0,000	0,000	0,000
5B Biological Treatment of Soil Waste	N2O	<u>3,58</u>	<u>39,23</u>	10	130	130,38	1,140	0,003	0,004	0,448	0,051	0,451
5C Incineration and open burning of waste	N2O	<u>1,16</u>	<u>0,38</u>	10	100	100,50	0,009	0,000	0,000	-0,001	0,000	0,001
5D Wastewater Treatment and Discharge	N2O	<u>154,87</u>	<u>76,01</u>	15	200	200,56	3,399	0,001	0,007	0,230	0,147	0,273

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
		Σ C	Σ D				(ΣH2)1/2					(ΣM2)1/2
TOTAL N₂O excluding LULUCF		10 952,13	4 484,95				145.2					25.2
2C3 Aluminium Production	PFC	<u>371,08</u>	<u>0,00</u>	2	99	99,02	0,000	-4,828	0,000	-477,927	0,000	477,927
2F1Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	<u>0,00</u>	<u>1575,12</u>	10	10	14,14	11,916	4,176	4,176	41,755	59,051	72,322
2F2Foam Blowing - HFC	Aggregate F-gases	<u>0,00</u>	<u>127,34</u>	50	21	54,23	3,694	0,338	0,338	7,089	23,870	24,900
2F3Fire extinguishers - HFC	Aggregate F-gases	<u>0,00</u>	<u>7,01</u>	15	2	15,13	0,057	0,019	0,019	0,037	0,394	0,396
2F4Aerosol + MDI - HFC	Aggregate F-gases	<u>0,00</u>	<u>33,46</u>	10	50	50,99	0,913	0,089	0,089	4,435	1,254	4,609
2G Other Product Manufacture and Use - SF6	Aggregate F-gases	<u>6,15</u>	<u>126,52</u>	3	40	40,11	2,715	0,255	0,335	10,184	1,423	10,283
		Σ C	Σ D				(ΣH2)1/2					(ΣM2)1/2
TOTAL Aggregate F-gases excluding LULUCF		377,23	1 869,45				12.8					484.1

Annex 3 Detailed methodological descriptions for individual source or sink categories

A3.1 Fugitive emissions

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA			Source of EMISSION FACTORS		Recovery/Flaring ⁽²⁾
	Description	Unit	Source	CH ₄ ⁽¹⁾	CO ₂	-
1. B. 1. a. Coal mining and handling						
i. Underground mines ⁽⁴⁾	Underground coal production	kt	IEA	-	Recovery/flaring of Mecsek basin	Data from the Hungarian Office for Mining (2007)
Mining activities	Coal production in Mecsek basin - including surfaces mines	Mt	MBFH (Hungarian Office for Mining and Geology)	CS: Regional Centre for Energy Policy Research, 2005 (http://www.rekk.eu/images/stories/letoltheto/uhg-ag-vol2.pdf)	-	-
	Coal production from all other underground Mines	Mt	MBFH (Hungarian Office for Mining and Geology)	CS: Regional Centre for Energy Policy Research, 2005 (http://www.rekk.eu/images/stories/letoltheto/uhg-ag-vol2.pdf)	-	-
Post-mining activities	Underground coal production	kt	IEA	-	-	-
	Coal production in Mecsek basin - including surfaces mines	Mt	MBFH (Hungarian Office for Mining and Geology)	CS: 10% of the mining emission factor - like IPCC 2006 GLs T1 methodology	-	-
	Coal production from all other underground Mines	Mt	MBFH (Hungarian Office for Mining and Geology)	CS: 10% of the mining emission factor - like IPCC 2006 GLs T1 methodology	-	-
Abandoned underground mines	Expert estimate	number of closed mines in the given time interval	based on MBFH (Hungarian Office for Mining and Geology) publication	IPCC 2006 GLs, T1 emission factors	-	-
ii. Surface mines ⁽⁴⁾	Mined Hungarian lignite is relatively young in the coalification therefore - according to the research project conducted by Regional Centre for Energy Policy Research - mining activities do not cause emissions.			-	-	-
Mining activities				-	-	-
Post-mining activities				-	-	-
1. B. 1. b. Solid fuel transformation⁽⁵⁾	IE to 1A1c	-	-	-	-	IE to 1A1c
1. B. 1. c. Other (please specify)⁽⁶⁾	-	-	-			-

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA			Source of EMISSION FACTORS		
	Description	Unit	Source of data	CO ₂	CH ₄	N ₂ O
1. B. 2. a. Oil						
1. Exploration		NA	IE to 1B2c			
2. Production	Conventional oil production	1000 m3	IEA, data converted kt to thousand m ³	IPCC 2006 GLs, production	IPCC 2006 GLs, production	
3. Transport	Oil transported by pipeline	1000 m3	MOL Hungary	IPCC 2006 GLs, pipelines	IPCC 2006 GLs, pipelines	
	Oil transported by tanker trucks and rail cars	1000 m3	MOL Hungary	IPCC 2006 GLs, tanker trucks and rail cars	IPCC 2006 GLs, tanker trucks and rail cars	
	Condensate and Pentanes Plus transport	1000 m3	MOL Hungary	IPCC 2006 GLs, condensates	IPCC 2006 GLs, condensates	
	LPG	1000 m3	MOL Hungary	IPCC 2006 GLs, LPG		
4. Refining/storage	Oil refined	1000 m3	IEA, data converted kt to thousand m ³		IPCC 2006 GLs, refining	
5. Distribution of oil products		NA	NA			
6. Other		NO	NO			
1. B. 2. b. Natural gas						
1. Exploration		NA	IE			
2. Production	Gas production	million m3	IEA	IPCC 2006 GLs, gas production	IPCC 2006 GLs, gas production	
3. Processing	Sweet gas plants-raw gas feed	million m3	MOL Hungary	IPCC 2006 GLs, gas processing	IPCC 2006 GLs, gas processing	

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA			Source of EMISSION FACTORS		
	Description	Unit	Source of data	CO ₂	CH ₄	N ₂ O
	Sour Gas Plants - raw gas feed	million m3	MOL Hungary	IPCC 2006 GLs, gas processing	IPCC 2006 GLs, gas processing	
	Deep cut Plants - raw gas feed	million m3	MOL Hungary	IPCC 2006 GLs, gas processing	IPCC 2006 GLs, gas processing	
4. Transmission and storage	Marketable gas: import+production	million m3	IEA	IPCC 2006 GLs, transmission	IPCC 2006 GLs, transmission	
	Marketable gas: import+production	million m3	IEA	IPCC 2006 GLs, storage	IPCC 2006 GLs, storage	
5. Distribution	Utility sales: import + production + storage - export	million m3	IEA: import, export, production; FGSZ Ltd. (MOL Group): storage	IPCC 2006 GLs, gas distribution	IPCC 2006 GLs, gas distribution	
6. Other		NO	NO			
1. B. 2. c. Venting and flaring						
Venting						
i. Oil	Conventional oil production	1000 m3	IEA, data converted kt to thousand m ³	IPCC 2006 GLs, oil production venting	IPCC 2006 GLs, oil production venting	
ii. Gas	Sour gas plants-raw gas feed	million m3	MOL Hungary	IPCC 2006 GLs, gas production venting (raw CO ₂ venting)		
	Marketable gas: import+production	million m3	IEA	IPCC 2006 GLs, gas transmission venting	IPCC 2006 GLs, gas transmission venting	
iii. Combined		NO	IE to 1B2c1.Venting i. Oil			

Flaring						
i. Oil	Conventional oil production	1000 m3	IEA, data converted kt to thousand m ³	IPCC 2006 GLs, oil production flaring	IPCC 2006 GLs, oil production flaring	IPCC 2006 GLs, oil production flaring
	Conventional oil production	1000 m3	IEA, data converted kt to thousand m ³	IPCC 2006 GLs, wells drilling	IPCC 2006 GLs, wells drilling	
	Conventional oil production	1000 m3	IEA, data converted kt to thousand m ³	IPCC 2006 GLs, wells testing	IPCC 2006 GLs, wells testing	IPCC 2006 GLs, wells testing
	Conventional oil production	1000 m3	IEA, data converted kt to thousand m ³	IPCC 2006 GLs, wells servicing	IPCC 2006 GLs, wells servicing	IPCC 2006 GLs, wells servicing
	Gas flared	million m3	EU ETS: 2006-2014, extrapolation with IEA "refinery intake": 1985-2004	EU ETS: 2006-2014, extrapolation with IEA "refinery intake": 1985-2005	IPCC 2006 GLs, oil refinery flaring	IPCC 2006 GLs, oil refinery flaring
ii. Gas	Gas production	million m3	IEA	IPCC 2006 GLs, gas production flaring	IPCC 2006 GLs, gas production flaring	IPCC 2006 GLs, gas production flaring
	Sweet Gas Plants - raw gas feed	million m3	MOL Hungary	IPCC 2006 GLs, gas processing - sweet gas plants flaring	IPCC 2006 GLs, gas processing - sweet gas plants flaring	IPCC 2006 GLs, gas processing - sweet gas plants flaring
	Sour Gas Plants - raw gas feed	million m3	MOL Hungary	IPCC 2006 GLs, gas processing - sour gas plants flaring	IPCC 2006 GLs, gas processing - sour gas plants flaring	IPCC 2006 GLs, gas processing - sour gas plants flaring
	Deep cut Plants - raw gas feed	million m3	MOL Hungary	IPCC 2006 GLs, gas processing -deep-cut plants flaring	IPCC 2006 GLs, gas processing -deep-cut plants flaring	IPCC 2006 GLs, gas processing -deep-cut plants flaring
iii. Combined		NA	IE to 1B2c2. Flaring i. Oil			
1.B.2.d. Other						
Groundwater extraction and CO2 mining	Annual freshwater abstraction	million m3	EUROSTAT, HCSO		MFGI (Geological and Geophysical Institute of Hungary)	
	CO ₂ mined in HU	million m3	MBFH (Hungarian Office for Mining and Geology)	IPCC 2006 GLs, natural gas production CO ₂ EF		

A3.2 IPPU sector

				Unit	Solids					Liquids										Gas						
Year: __2016__					Coal	Coke	Coal tars	Coal oils	BF/OF gas	(CO gas) b)	Total solids	Naphtha	Gas oil	Fuel Oil	Ethane	LPG b)	Pet.coke	Other	Chem. gas	Lubricants	Waxes	Bitumen	Total liquids	Nat Gas	Total gas	
A: Declared NEU (from commodity balance)				TJ	0	14656	494	0	1612	0		39396	469	0	0	12648	0	1025	0	1711	573	5015		26234		
B: Carbon Content				kg C/GJ	25.8	29.2	22.0	29.1	70.8	70.8		20.0	20.2	21.1	16.8	17.2	26.6	20.0	20.0	20.0	20.0	22.0		15.3		
C: Total supplied for feedstock/non-energy	[C = A * B / 1000]			Gg C	0.0	428.0	10.9	0.0	114.2	0.0	553.0	787.9	9.5	0.0	0.0	217.5	0.0	20.5	0.0	34.2	11.5	110.3	1191.5	401.4	401.4	
D: Total supplied for feedstock/non-energy	[D = C * 44/12]			Gg CO ₂ -eq	0.0	1569.2	39.8	0.0	418.6	0.0	2027.6	2889.0	34.7	0.0	0.0	797.7	0.0	75.2	0.0	125.5	42.0	404.6	4368.7	1471.7	1471.7	
E: Implied carbon fraction oxidised	[E = F / D * 100]			%		1.0	0.0		1.0		0.0	0.0	0.0			0.0		0.0		0.2	0.2	0.0	0.2	0.9	0.0	
	Activity a)	CO ₂	IEF																							
	Emissions a			CO ₂																						
F: Total fossil IPPU CO ₂ reported		0		Gg CO ₂	0.0	1573.3	0.0	0.0	427.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.8	8.4	0.0	1034.8	1332.7	0.0	
2 INDUSTRIAL PROCESSES																										
2A: Mineral Industry		0		Gg CO ₂	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(Please specify the subcategory.)				Gg CO ₂																						
2B: Chemical Industry		0		Gg CO ₂	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1034.8	1286.2	0.0	
2B1: Ammonia Production				Gg CO ₂																					1078.0	
2B5: Carbide Production				Gg CO ₂																						
2B6: Titanium Dioxide Production				Gg CO ₂																						
2B8: Petrochemical and Carbon Black Production		0		Gg CO ₂	0.0	0.0	0.0	0.0	0.0	0.0	0.0												1034.8	208.2		
2B8a: Methanol				Gg CO ₂																						
2B8b: Ethylene				Gg CO ₂																						
2B8f: Carbon Black				Gg CO ₂																						
2B10: Other				Gg CO ₂																						
2C: Metal Industry		0		Gg CO ₂	0.0	1573.3	0.0	0.0	427.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.5	0.0	
2C1: Iron and Steel Production				Gg CO ₂		1573.3			427.1																46.5	
2C2: Ferroalloys Production				Gg CO ₂																						
2C3: Aluminium Production				Gg CO ₂																						
2C5: Lead Production				Gg CO ₂																						
2C6: Zinc Production				Gg CO ₂																						
2C7: Other				Gg CO ₂																						
2D: Non-Energy Products from Fuels and Solvent Use		0		Gg CO ₂	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.8	8.4	0.0	0.0	0.0	0.0	
2D1: Lubricant Use				Gg CO ₂																24.8						
2D2: Paraffin Wax Use				Gg CO ₂																	8.4					
2D3: Solvent Use				Gg CO ₂																						
2D4: Other				Gg CO ₂																						
2H: Other		0		Gg CO ₂	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2H1: Pulp and Paper Industry				Gg CO ₂																						
2H2: Food and Beverages Industry				Gg CO ₂																						
2F3: Other				Gg CO ₂																						
EXCEPTIONS REPORTED ELSEWHERE																										
1A FUEL COMBUSTION ACTIVITIES		0		Gg CO ₂	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1A1a: Main Activity Electricity and Heat Production				Gg CO ₂																						
1A1b: Petroleum Refining				Gg CO ₂																						
1A1c: Manufacture of Solid Fuels and Other Energy Industries				Gg CO ₂																						
1A2: Manufacturing Industries and Construction				Gg CO ₂																						

Annex 4 The national energy balance for the most recent inventory year

In the following page, the aggregated energy balance of Hungary is presented. This energy balance was produced by the energy statistics provider (i.e. Hungarian Energy and Public Utility Regulatory Authority) and was downloaded from their site:

(http://mekh.hu/download/5/11/50000/7_2_annual_national_energy_balance_TJ_ktoe_v3.xlsx)

In addition, the time series of the primary energy balance as published by the HCSO is presented in the table below.

(http://www.ksh.hu/docs/eng/xstadat/xstadat_annual/i_ge001.html)

3.8.1. Primary energy balance (1990–)

Year						(petajoule)
	Production ^a	Imports ^b	Exports ^c	Change in stocks (-) ^d	Energy consumption, total ^e	
1990	614.9	665.4	72.6	3.1	1 210.8	
1991	604.7	580.5	51.8	21.9	1 155.3	
1992	582.6	532.8	65.2	6.0	1 056.2	
1993	573.5	604.3	91.5	-4.0	1 082.3	
1994	556.2	594.1	103.2	4.8	1 051.9	
1995	581.6	623.7	103.5	-10.8	1 091.0	
1996	571.2	666.2	93.5	-24.8	1 119.1	
1997	557.9	658.4	96.0	-22.5	1 097.8	
1998	521.8	684.3	92.7	-29.9	1 083.5	
1999	499.0	672.5	97.8	2.6	1 076.3	
2000	486.4	685.2	104.6	-10.5	1 056.5	
2001	473.2	703.2	126.4	30.6	1 080.6	
2002	468.9	753.3	138.9	-2.7	1 080.6	
2003	435.9	816.2	131.8	-17.4	1 102.9	
2004	428.6	803.9	131.8	4.2	1 104.9	
2005	434.1	910.3	172.0	-6.4	1 166.0	
2006	432.7	911.2	185.5	-2.9	1 155.5	
2007	427.7	884.1	193.4	8.7	1 127.1	
2008	439.5	898.3	187.1	-31.5	1 119.2	
2009	460.8	749.9	127.9	-33.0	1 049.8	
2010	496.9	789.2	156.4	-9.9	1 119.8	
2011	493.1	732.5	185.1	55.2	1 095.7	
2012	492.1	720.8	201.8	30.2	1 041.3	
2013	480.4	721.3	220.3	25.8	1 007.2	
2014	464.1	806.1	210.2	-55.0	1 005.0	
2015	472.7	756.3	187.5	21.5	1 063.0	

7.2 Annual National Energy Balance, 2016											
											terajoule
Name	Coal and coal products	Oil and petroleum products	Natural gas	Combustible renewables and waste	Nuclear	Water	Wind	Other non-combustible renewables	Electricity	Heat	Total
Production	61,231	41,527	59,810	131,910	176,014	933	2,463	6,213		0	480,101
Import	47,726	386,287	302,450	10,970				0	64,635	0	812,068
Export	-15,634	-122,354	-37,373	-18,264				0	-18,867	0	-212,492
International aviation		-7,998	0	0				0	0		-7,998
Stocks changes	734	-11,373	11,152	487				0	0		1,000
Domestic supply	94,057	286,089	336,039	125,103	176,014	933	2,463	6,213	45,768	0	1,072,679
Interproduct transfers	0	306									306
Statistical difference	127	485	13,290	-1	0	0	0	0	-1,525	-151	12,225
Transformation sector	-78,497	-439	-82,908	-34,265	-176,014	-933	-2,463	-3,629	114,713	53,955	-210,480
Energy sector own use	-2,923	-14,842	-7,390	-613				0	-12,469	-5,228	-43,465
Network losses	-215	0	-3,961	0				0	-12,840	-4,017	-21,033
Final consumption	12,549	271,599	255,070	90,224				2,584	133,647	44,559	810,232
Industry	6,850	26,055	54,647	8,347				53	57,477	16,477	169,906
Iron and steel	4,746	43	2,249	3				0	2,207	997	10,245
Chemical and petrochemical	0	13,764	11,078	66				0	11,580	9,906	46,394
Non-ferrous metals	0	43	3,119	0				0	1,444	287	4,893
Non-metallic minerals	1,215	4,038	8,445	3,106				0	5,225	124	22,153
Transport equipment	0	89	3,002	6				0	5,959	434	9,490
Machinery	52	354	6,842	188				14	9,246	259	16,955
Mining and quarrying	0	511	131	3				0	346	0	991
Food, beverages and tobacco	60	538	11,436	2,381				21	8,591	1,462	24,489
Paper, pulp and printing	589	129	1,621	637				0	3,035	2,554	8,565
Wood and wood products	0	170	463	1,452				0	1,008	0	3,093
Construction	178	6,241	1,873	136				13	1,163	132	9,736
Textiles and leather	0	0	854	24				0	889	18	1,785
Not elsewhere specified (Industry)	10	135	3,534	345				5	6,784	304	11,117
Transport	0	167,009	2,009	7,835				0	4,238		181,091
Road		165,135	338	7,835				0	86		173,394
International aviation		0		0				0	0		0
Rail	0	1,704		0				0	4,112		5,816
Pipeline transport		0	1,671	0				0	40		1,711
Domestic navigation	0	170		0				0	0		170
Non-specified - transport	0	0	0	0				0	0		0
Other sectors	5,205	19,861	178,012	74,042				2,531	71,932	28,082	379,665
Residential	5,048	2,484	117,770	71,962				459	39,441	20,554	257,718
Commercial and public services	121	1,473	53,317	1,395				700	28,967	7,406	93,379
Agriculture/forestry/fishing	18	15,563	6,186	685				1,372	3,258	15	27,097
Not elsewhere specified (Other)	18	341	739	0				0	266	107	1,471
Non-energy use	494	58,674	20,402								79,570

Annex 5 Additional information

Quality Assurance and Quality Control

QA/QC activities are explained in Chapter 1.6. The update of the QC Plan entered into force on 4th January 2013 (HMS ISO document n.: ELFO 401.01), which was updated several times due to the changes of the Guidebook and legislation. Please see below the English translation of the QA/QC Plan.

HUNGARIAN METEOROLOGICAL SERVICE



Q A - Q C P L A N

ÉLFO/NELO 401

Preparation of Emission Inventories required by United Nations Framework Convention on Climate Change (UNFCCC) and Convention on Long-range, Transboundary Air Pollution (CLRTAP)

Name	signature
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OBJECTIVE

The Unit of National Emission Inventories (hereafter NEI) of Hungarian Meteorological Service (HMS) has been assigned by the Ministry of Agriculture as the ministry responsible for environmental protection to compile GHG inventory required by United Nations Framework Convention on Climate Change and the Air Pollutants Emission Inventory required by Convention on Long-range, Transboundary Air Pollution (CLRTAP). Several parts of the inventories, such as transport and Land use, land-use change and forestry (LULUCF) are delegated to other institutions by law.

The NEI of the HMS is appointed as Inventory Compiler within the National System by Act LX of 2007 on the implementation of United Nations Framework Convention on Climate Change and the Govt. Decree 278/2014. (XI.14.) on the content and preparation of national reports concerning greenhouse gas emissions and climate change, on the rules of data provision, and on the penalty for violation of the reporting obligations

HMS is indicated as compiler of the inventory of air pollutants (required by the Convention on Long-range, Transboundary Air Pollution) by Govt. Decree 277/2005 (XII.20.) on the Hungarian Meteorological Service, which lists this task in addition to the task of preparation of reporting on air quality data required by any international reporting obligation.

Present ISO document (hereinafter QA-QC Plan) aims to fulfill both the requirements of quality management system ISO 9001:2008 and the QA-QC requirements of the Conventions mentioned above. Therefore, the relevant parts of the former annual QA-QC Plans and the former Documentation and Archiving Manual are integrated into this single document. The former QA-QC Plan was the ÉLFO/ÜHG 401.02 document.

TASKS AND RESPONSIBILITIES

Tasks and responsibilities connected to the implementation of activities defined within this QA-QC Plan:

- | | |
|--|---|
| • preparation of QA-QC Plan: | expert appointed by the Head of the NEI |
| • implementation of the QA-QC Plan: | expert(s) appointed by the Head of the NEI, |
| • supervision of the implementation of QA-QC Plan: | Head of the NEI, |
| • internal audit of the implementation of activities defined within this QA-QC Plan: | QA/QC manager of HMS. |

The names of sectoral experts, QA-QC coordinator, archiving manager and inventory compiler are specified in the quality record NELO 04.

DESCRIPTION OF THE ACTIVITIES / ANNUAL INVENTORY CYCLE

Principles

All domestic and international reporting obligations in connection to the inventory of greenhouse gases and air pollutants to be submitted to any local or international organizations are meant as „Report” hereinafter. Guidelines and Guidebooks specified by the Conventions or Protocols have to be applied for the preparation of the reports

	UNFCCC	CLRTAP+ NEC
Guidelines	UNFCCC: 24/CP.19, 3/CMP.11 Decisions EU Regulation No 525/2013 and Commission Regulation No. 79/2014	ECE/EB.AIR/125 + 81/2001/EC directive
updated Guidelines since 2015	2006 IPCC Guidelines (See References)	2013 EMEP/EEA Guidebook (See References)

The format and content of the reports are determined by CRF (Common Reporting Form) in the case of UNFCCC and NFR (Nomenclature For Reporting) in the case of CLRTAP. Both are detailed in the Guidelines and Guidebooks mentioned above. The reports consist of tables (hereinafter: CRF/NFR Table) and text documents (hereinafter: NIR/IIR) containing descriptions specified in the Guidelines as well. The names, content, deadlines, process of the submission, public availability of the reports are summarized in Annex 1.

Inventory principles (TCCCA) included in Annex 4 as defined by the Conventions should always be taken into account during the inventory process:

- Transparency,
- Completeness,
- Comparability,
- Consistency,
- Accuracy,
- *in addition to timeliness and improvement.*

Main steps of the annual inventory cycle

- data collection and choice of estimation method;
- calculations i.e. estimation of emissions and removal by sinks;
- uncertainty analysis;
- QA/QC activities;
- compilation of the report;
- submission of the report;
- documentation and archiving;
- reviews;
- compilation of a development plan.

The outline of the process is included in Annex 3.

Tasks and responsibilities of persons involved in the inventory preparation

Sectoral experts:

- choice of emission estimation methods;

- collection, documentation and archiving of data needed for the calculations as detailed below and in chapter 2 and in Documentation and Archiving Regulation of HMS;
- data quality check using quality record NELO 02 (Data quality check) relating to the sector;
- communication with external experts;
- calculation and documentation and archiving of calculation files as detailed below and in chapter 2;
- compilation of QC checklists using quality record NELO 01 (QA/QC checklist);
- compilation of CRF Reporter Program relating to the sector use of QA/QC functions of the CRF Reporter and the implementation of the required corrections;
- providing input into the NIR/IIR relating to the sector;
- providing input for the responses of the review questions relating to the sector;
- providing input into the Development Plan.

Sectoral experts regarding documentation and archiving:

- all the incoming documents containing data used during the preparation of the inventory should be registered in the central register of the HMS as required by the Documentation and Archiving Regulation of HMS;
- all the data used during the preparation of the inventory and information on the source of these data should be documented and archived as detailed in chapter 2;
- all the calculation files and compiled reports should be archived ensuring tracking of changes (due to checks and reviews);
- continuous update of the documentation of all subsectors assigned, archiving of data and other documentation;
- recording, organizing, archiving and removing the files relating to their sector;

Head of NEI:

- check of input provided by sectoral experts;
- compilation, finalization of reports, forwarding for approval and submission in the case of UNFCCC;
- communication and finalization of responses to be sent during the international reviews;
- finalization of Development Plan.

QA/QC coordinator:

- updating present QA/QC Plan and the quality records;
- documentation and archiving relating to QA/QC activities.

QA/QC coordinator regarding documentation and archiving:

- recording, organizing, archiving and removing files relating to QC/QC activities,
- control of QA/QC folder within directory of NEI as included in Annex 2.

Archiving coordinator:

- development of archiving processes and tasks, and making proposals on it;
- support for the sectoral experts and the head of unit relating to archiving problems,
- follow-up of the requirements relating to archiving and incorporation of new elements into the QA/QC Plan if needed

Main steps of the annual inventory cycle

Choice of estimation method

Sectoral experts are required to choose the appropriate estimation method or to coordinate it with external experts and to document it. Methods are to be improved continuously and to be amended or corrected if needed. Methods might be chosen from different tier methods (i.e. methods with different level of complexity) presented in the Guidebooks depending on the results of key source category analysis of the previous year or performed preliminary (as higher tier methods are suggested for key categories), the issues included in the Development Plan and the review results especially regarding recommended changes of methods.

The choice of the estimation method means in fact the choice of activity data set and emission factors to be applied for the calculations. Those methods are appropriate where the whole set of activity data is available and consistent or at least it is possible to apply an extrapolation technique and transparent, documented emission factors are available. Even if country specific emission factors and/or plant specific data (higher tier methods) might result in more realistic estimations, these are only applicable if consistency, comparability and transparency principles are also fulfilled.

The need for change of method might arise anytime during the preparation of the inventory (e.g. new data available, recommendations of the review, etc.), which causes the recalculation of the whole time series. Recalculations should be documented in CRF Table8 and in the appropriate chapter of the NIR/IIR.

The methods applied by subsector have to be documented transparently in the sector-specific chapters of the NIR/IIR, in the CRF and in the calculation files (at least activity data and its source + emission factor and its source).

It is necessary to consider the consistency of activity data, emission factors (and the results) among international reporting obligation (e.g. UNFCCC, CLRTAP, IEA, NAMEA) and the comparability of results with reports of other countries (and the EU).

Sectoral experts consult all general and sector specific issues including choice of method with the Head of NEI either during division meetings or individually. Head of NEI informs all the other experts eventually concerned regarding changes of methods.

In addition, NIR/IIR chapters might be amended by sectoral experts only using “track change” mode. Head of NEI accepts the changes before submission.

Data collection

Sectoral experts/institutions are required to ensure the appropriate quantity, quality, format and timeliness of the data needed for the estimation method. Data might be collected from public databases, based on authorization by law or by data provision agreements with institutions or organizations.

The Act and Govt. Decree 278/2014. (XII.14.) authorizes HMS to collect data needed for the preparation of the inventory, even for the collection of confidential data and to expose penalty in the case of non-compliance.

Special care is needed in the case where the number of data providers is less than three as *Govt. Decree 170/1993 (XII.3.) on the implementation of Act XLVI of 1993 on statistics* (hereafter Statistical Law) requires the Hungarian Statistical Office not to publish data - not even in an aggregated way- in such cases¹.

¹ With the exception of article (2) of Section 18 and Section 16 of Statistical Law

Section 18

(2) Individual data on the activities of organs, social organizations and state budget organs performing activities of public interest, may be made public also without prior written consent of the data supplier if the respective data relates to the activities of public interest of the organs above.

Section 16

(1) Collections of statistical data based on voluntary data supply may be performed without permission.

(2) The attention of those requested to supply data shall be called to the voluntary character of the supply of the data.

Sectoral experts may communicate also via e-mail, phone and mail with external experts, data providers and other persons involved in the National System.

Incoming documents that contain data used by the preparation of the inventory are to be registered in the central register of the HMS as required by the HMS Regulation on documentation and archiving where special provisions are included regarding the NEI.

Any data base, reference or document relating to the preparation of the inventory either hard copies or electronically should be documented and archived as described in chapter 2.7 in order to ensure replicability and transparency of the reports. It is needed to document (e.g. in form of „minutes of meeting/phone call/etc __IPCCcode_date_doc”) verbal information as well if it is used by the preparation of the inventory.

Check of the quality of incoming data might be documented using checklist included in quality record NELO 02. Separate quality records should be created preferably for every data provider which should be saved within the directory used by the NEI as described in chapter 2.7.

Information regarding the sources of data should be documented on quality record *NELO05 Data source logbook*. This record should be completed by year and by sector with information on data sources (date of enquiry and receipt, contact person, Reg. No. etc.) in the case of mails, e-mails arriving thank to Govt. Decree 278/2014. and with information on the download (e.g. url, website, date, etc.) in the case the data source is on-line.

Calculations i.e. estimation of emissions and removal by sinks

Compilation of the inventory is the task of sectoral experts or external experts contracted by the HMS. Sectoral experts work in calculation files (separate for every year) which are saved in a specific place in the directory used by the NEI and treated as it is described in 2.7. Calculation files should contain in a transparent way the estimation method, activity data together with their source, emission factors together with their source and uncertainty together with their source (in addition to NIR/IIR and CRF/NFR Tables to be compiled in a later stage). This will ensure the reproducibility of emission estimates and enables substitution or replacement of sectoral experts when necessary.

Further QA/QC recommendations regarding the content of the calculation files:

- it is favorable to include notes and/or to apply different coloring for the cells of the table that contain data from different sources;
- possibility automatic checks should be included in the calculation files (e.g. conditional formatting, crosschecks, references, macro, etc.) in order to minimize calculation or mistype errors;
- summary tables in the calculation files should possibly follow exactly the outline of the appropriate CRF Table in order to enable the final crosscheck with the compiled CRF
- the year to which the data relates should always be indicated clearly (e.g. above/next to the data set)
- activity data, emission factors, conversion factors, other parameters, units should be indicated separately, unit conversions should be presented step by step;
- the tables should be compiled in a way that makes possible to track the steps of the calculation based on the formulas or references (in the case the formula is on other worksheet or work file);
- data from external source should be clearly separated from elaborated data (i.e. unit conversions, after calculation steps, etc.);

- emission factors, conversion factors and other parameters should not be built in the formulas, but in a separate cell referenced by the formula;
- units of the dataset should be noted in the beginning of all the rows;
- special attention is needed for the update of conversion factors and temporary coefficients if necessary.

Beyond the above recommendations, calculations should be checked.

The quality record NELO 01 contains QC checklists based on recommendation of IPCC Guidelines. Consequently, use of it ensures the execution of the required QC procedures. The check should be performed annually using the QC checklist, on as many categories as possible, and in line with the recommendation of the 2006 IPCC Guidelines, key categories and recalculated categories due to methodological changes should be checked with the utmost care. In the course of planning of annual QC procedures, it should take into account that every category should be checked within 5 years. Errors, differences and the corrective measures have to be registered on the quality record NELO 01.

The quality record NELO 01 might be included in the calculation sheets or might be handled separately.

All errors discovered during the inventory cycle (even for earlier years) might be indicated on the appropriate section of the quality record NELO 01 together with the results of reviews. These notes are the rationales of recalculations in the case the correction has been executed before compilation of the current inventory report. In the case it was not possible to perform the correction in the same year, they are to be copied into quality record NELO 03 Development Plan together with the planned improvements.

It is also favorable to perform possible verification, using external data such as NIR/IIR of EU and other countries and to document the results in the appropriate section of the quality record NELO 01.

Recalculations

In the case estimation method has been changed (either activity data or emission factor) the whole time-series need to be recalculated. Correction of data of earlier years is regarded as recalculation as well. The reasons for recalculations have to be presented in the appropriate chapter of the NIR/IIR. While the sectoral experts are encouraged to present comparison table including the old and the new time series together with their difference in the NIR/IIR. It is recommended to clearly note (e.g. different coloring) the old and the new time series also in the calculation files. In addition, the new time series should be copied possibly from the final (before submission) state of the compiled CRF.

Uncertainty and key category analysis

Uncertainty analysis has to be performed using the sector list suggested by 2006 IPCC Guidelines. Sectoral experts either copy the uncertainties associated to the sectors into one common file which has the format determined in quality record NELO 06 and/or revise the table compiled by the expert responsible for the uncertainty analysis. The responsible expert calculates the aggregated uncertainty, the aggregated uncertainty by gas and uncertainty by main sectors. These results are to be included in the NIR. The responsible expert updates the relevant chapter of the NIR and the Annex containing the full calculation table.

Possibly any deviation from the sector list for key category analysis suggested by 2006 IPCC Guidelines should be explained. Obviously, the Tier2 key category analysis can be performed only on the sector list of uncertainty analysis.

The expert responsible for key category analysis updates the references in the common file which have the format determined in quality record NELO 07 and performs the analysis using both Tier1 and Tier2 (with uncertainty) methods. Full tables are to be included in Annex of the NIR and summary tables are to be included in CRF Table7 and appropriate chapter of the NIR/IIR where also the comparison with results of last year should be indicated.

Compilation, approval and submission of the report

Sectoral experts export the time series developed in the calculation files (and checked using the quality record UHG01) into the CRF Reporter program and run the available automatic control functions, and they subsequently make the corrections needed.

In the case of NECD and CLRTAP, the sectoral experts copy the sectoral data from the calculation files into a specified common file.

In the same time the sectoral experts update the chapters of the NIR/IIR assigned to them and include also the descriptions and comparison tables of recalculations into the appropriate chapters. The treatment and archiving of NIR/IIR working files is described in chapter 2.7.4. Head of Division checks and finalizes the reports.

The process of approval and submission of the reports is determined by the Act and the implementing Govt. Decree 278/2014. In the case of UNFCCC reporting, the Head of NEI submits the reports to UNFCCC secretariat and the EU Commission. In the case of CLRTAP reporting, HMS sends the report to the Ministry of Agriculture (responsible for the environment) for submission.

Comments or opinions eventually arrived from the authorizing ministries, or other external experts, committees, institutions before submission of the reports should be documented on the quality record NELO 08 QA Activities logbook.

International reviews

During international reviews (as detailed in Annex1) all the communication is managed by the Head of NEI. Questionnaires are saved in the assigned GHG directory. After the sectoral experts prepare the concerning answers, the head of unit checks and finalizes the official response. Responses prepared by sectoral experts should be sent only after the approval of the Head of Division in the case of on-line review as well.

Documentation and archiving

All the data, information and documents arising during the processes and activities of the NEI should be collected, treated, documented and archived in a way that the reports remain transparent and reproducible.

HMS Regulations regarding documentation and archiving

Documents and data of the NEI are registered, processed, treated, stored and archived within the central register and IT network of the HSM. Therefore, central regulations are valid for the NEI as well. The HMS Regulation on documentation and archiving in force includes special provisions regarding the data collected by the NEI for the compilation of the inventory. Present QA/QC Plan includes only provisions not included in the general HMS Regulations mainly regarding sectoral experts and emission inventorying.

Collection, processing and storage of data and documents

Hard copies of documents and any hardware containing data are to be ordered by sector and located in the premises of the HMS. It is suggested to store an electronic version of the hard copies too (by scanning). Sectoral experts are required to store the electronic version of such documents together with other electronic data described later.

Electronic documents should be saved in the directory of the server of the NEI as described in Annex 2. and the following chapters. Sectoral experts are responsible for the organization, archiving and cancellation of the documents within their folders.

Electronic documents are collected, stored and archived in a password protected server accessible only for sectoral experts working for the NEI. Within the directory of the server of the NEI every expert and the Head of Unit have the same access (both for writing and reading) in order that experts might be substituted or replaced if needed. However additional security measures might be applied by the Head of Unit for the documents archived in the OFFICIAL ARCHIVE section of the directory especially where the submitted documents are archived in order to avoid any unintentional modification.

General principles for managing files and other recommendations

Names

Consistency, unambiguity and the inclusion of CRF/NFR sector codes should be aimed by naming the files and folders. Either the name of the file or the name of the folder should contain the CRF/NFR code. (In the case of incoming data files, it is suggested to name the folder rather than change the original name of the file while in the case of calculation files CRF/NFR codes should be included in the filename.) Abbreviations of CRF/NFR codes and names should be consistent and homogenous. Different versions of the file might be distinguished by adding „v” and/or month of the submission within the filename (obviously in addition to the year within the name of the file or folder). Older versions of the calculation files should be stored temporarily at least within the annual inventory cycle. The storage of different versions and the names including the version number and/or month of submission allows tracking changes within the year. In the case the calculation file contains more sub-sectors, it is suggested to use the name/code of the lowest obvious level of sector. Calculation files should be distinguished from original data files by using „Calc_xxx” within the filename.

Capital letters might be used for name of a folder, while the rules of English grammar for writing titles might be followed for filenames. Separation of words might be noted with the character „_”. Based on the above, it is suggested to name the folders and (calculation files*):
Topic_CRF/NFRcode_year_(version/submission month*)

It is suggested to include into the name of a draft NIR/IIR together with name of the report, date of planned submission and version number (or month of planned submission).

Allocation of files within the directory of the server of the NEI

Files relating data collection

However, data provision is a legally binding obligation, HMS is usually sending reminder letters. The documents regarding mailing should be stored in the GHG directory. Incoming documents containing data and databases directly used in the inventory should be stored in

folder A. OFFICIAL ARCHIVE\ DATABASE\1-7. SECTORS.

Calculation files and text files

Sectoral experts work within the folders D. WORKING FOLDER\1-7. SECTORS folders. Files for uncertainty analysis and key category analysis are to be located within the folder D. WORKING\0. GENERAL folder as well as draft text files of NIR/IIR.

QA/QC documents

QA/QC documents including blank versions of quality records and documents relating to internal and external audits, etc. are stored within the folder E. QA-QC\A. GHG QA/QC PLAN. folder. Compiled quality records are to be located in a place clearly noted in the file *Quality_records_logbook.xls* within this folder.

Archiving of data and background documents and submissions at the end of the annual inventory cycle

Data and documents to be archived should be provided by the sectoral experts, while the appropriate execution is monitored by the archiving coordinator. It should be possible to reproduce the reports fully from the archived files. Towards reproducibility worksheets and interim calculation used in the production of the inventory have to be archived by the sectoral experts in their own working folders or in the folders used for storage of background documents (U:\GHG\A. OFFICIAL ARCHIVE\B. BACKGROUND DOCUMENTS). The final, submitted CRF/NFR Tables and NIR/IIR files have to be stored within A. OFFICIAL ARCHIVE\C. SUBMISSIONS

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Development Plan

Planned improvements and corrections might be collected and noted on sector specific quality records NELO01 throughout the year, especially regarding:

- recommendations, encouragements and suggestions received during the reviews,
- errors discovered during the previous year,
- results of key-category analysis,
- lessons learned during previous inventory cycle,
- new data available (e.g. new data provisions, new international obligation)
- follow-up of regulatory changes affecting the inventory,
- continuous improvement.

All the mid-term and long-term planned improvements and the necessary corrections that had not been possible to perform in a given inventory cycle (collected on NELO 01) should be included into the quality record NELO 03 Development Plan by the sectoral experts and into the „Planned improvements” chapter of the NIR/IIR after the approval of the Head of NEI. Sectoral experts should update the quality record NELO 03 Development Plan with further planned improvements and corrections (eventually collected on NELO 01) emerged after the submission regarding their sector. Development Plan should reflect the review results (especially EU and UNFCCC). Planned improvements and corrections should be categorized as mid-term or long-term.

Further notes on CLRTAP reporting

Activities described above should be applied in the case of CLRTAP reporting too, evidently except for CRF Reporter program, uncertainty analysis and quality records.

For the preparation of reports to be submitted under CLRTAP and NEC, sectoral experts include the most up-to-date (eventually recalculated) time series into the worksheets of the appropriate pollutant within the Excel workbook to be found in folder D. WORKING FOLDER\0. GENERAL.

This file is referenced by the file in order to convert the time series into NFR Table format as required by Annex IV Table 1 of ECE/EB.AIR/97 and 81/2001/EC Directive too.

During compilation of record NELO 05 Data source logbook, sectoral experts are encouraged to include additional data sources needed for CLRTAP reporting or to note if the data is used for both purposes.

Sectoral experts are also encouraged to apply the appropriate sections of the following records too:

- NELO 01 QA/QC checklist
- NELO 02 Data quality check

By the time being, key category and uncertainty analysis are performed without application of quality records in the case of CLRTAP reporting.

Requirements relating to external experts

Contracts with external experts providing input into the inventory should possibly include the following:

- external experts should deliver all the documentation (background documents and calculations) and transparency is to be taken into account also for external experts;
- external experts should be available during international reviews;
- inclusion of indemnity in the case of non-keeping the deadline.

Legal background:

- HMS Regulation on organizational structure and operation;
- Govt. Decree 277/2005. (XII.20.) on the Hungarian Meteorological Service;
- Act LX of 2007 on the implementation of United Nations Framework Convention on Climate Change;
- Govt. Decree 528278/20132014. (XII.3014.) on the content and preparation of national reports concerning greenhouse gas emissions and climate change, on the rules of data provision, and on the penalty for violation of the reporting obligations;
- 525/2013/EC Regulation and implementing regulations;
- Commission Implementing Regulation (Eu) No 749/2014

Documents created as output of the activities described above:

- working files containing all the details of the calculations;..Excel files generated by CRF Reporter, annually, (official inventory data);

- national inventory report (HU_NIR_MonthSubmissionYear.pdf files);
- annexes to the national inventory report (HU_NIR_ANNEXES_MonthSubmissionYear.pdf files);
- Executive summary in Hungarian);
- Reports required by the above mentioned rules and regulations;
- Approximated GHG inventory for the EU submitted until 31th of July;
- Air pollutant emission inventories (NFR files);
- Informative Inventory Reports on emissions of air pollutants (IIR_HU_InventoryYear_version.doc);
- files containing tables or text required by international reviews.

Responsible: experts working at NEI as it is specified in their contract

Deadline: As included in Annex1.

Check points, monitoring, quality control points:

Accessibility checks: only experts assigned by the Head of NEI have access

Operational checks: checks built-in the processes, self-checking, checks of the activities and data.

Hierarchical checks: Experts report on progress to the Head of NEI during meetings of the NEI. Inputs provided by sectoral experts are controlled by the Head of Division.

Financial or accounting issues: n/a

LIST OF QUALITY RECORDS

- NELO 01 QA/QC checklist
- NELO 02 Data quality check
- NELO 03 Development Plan
- NELO 04 Responsibility
- NELO 05 Data source logbook
- NELO 06 Uncertainty
- NELO 07 Key category analysis
- NELO 08 QA activities logbook

REFERENCES

- HMS Regulation on procedures of the departments and the presidency of HSM
- HMS Regulation on documentation and archiving
- HMS QA/QC Manual
<http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html>
- Intergovernmental Panel on Climate Change (IPCC), 2006: 2006 IPCC Guidelines for National Greenhouse Gas Inventories,
<http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>
- EMEP/EEA air pollutant emission inventory guidebook -2013 (Technical report No 12/2013, European Environmental Agency) <http://www.eea.europa.eu/publications/emep-eea-guidebook-2013>
- Elements of the union system for policies and measures and projections and the quality assurance and control (QA/QC) Programme as required under regulation (EU) No.25/2013;
http://ec.europa.eu/clima/policies/strategies/progress/monitoring/docs/union_pams_projections_en.pdf

ANNEXES**Annex 1: Summary table**

Documents, deadlines and QA/QC activities in connection with reporting to UNFCCC and Kyoto Protocol, CLRTAP and its Protocols and NEC directive						
Deadline	Task	QC	Document /Report			QA
			name	route of submission	availability	
May - Nov	search for new data available; data collection, documentation	Quality record: NELO 02 (Data quality); Legal authorization- Govt.Decree 345/2009. (XII.20.) ; Documentation and archiving;	n.a.(data input)	n.a. (internal)	A. OFFICIAL ARCHIVE\ A. DATABASE and/or hard copies	
Sept - Dec (- April)	methodological changes (if needed) ; calculation, recalculation;	NELO 01 (T1, T2 chacklists, verifications); Division meetings; documentation	n.a.(calculation files)	n.a. (internal)	D. WORKING FOLDER ...	possibly review by third parties, external experts
Sept - Dec (- April)	final results and calculations from external experts	HMS quality record ME-06 (Evaluation of contractors); documentation	n.a.(incoming files)	n.a. (internal)	A. OFFICIAL ARCHIVE\ A. DATABASE ...	checks performed by sectoral expert
31.Dec.	compilation and submission of <i>NECD</i> report	documentation	NECD report - Main pollutants (NO_x, NMVOC, SO₂, NH₃) NFR Table	Ministry of Agriculture → EU Commission (DG Environment)	http://rod.eionet.europa.eu/obligations/141/deliveries	<i>EEA Report on NECD - CLRTAP</i>
Jan-April	compilation of CRF compilation of CollectER	Completeness check Recalculation check incorporated into CRF Reporter; possibly cross-check among <i>CALC files and sectoral experts; checks using EU's sectoral cheking tools</i>				

Documents, deadlines and QA/QC activities in connection with reporting to UNFCCC and Kyoto Protocol, CLRTAP and its Protocols and NEC directive						
Deadline	Task	QC	Document /Report			QA
			name	route of submission	availability	
15.Jan.	compilation and submission of preliminary report required by 525/2013/EC	Documentation and archiving Consistency checks in accordance with Article 7 (1) of Regulation 525/2013/ and the Regulation EU No 749/2014 (MMR Implementing Regulation) Completeness check of the LULUCF sector	preliminary report required by 525/2013/EC (CRF table, preliminary NIR, indicators, SEF and MMR tables required by the MMR Implementing Regulations)	Ministry of National Development → EU Commission (DG Climate Action)	http://cdr.eionet.europa.eu/hu/eu/ghgmm	
15.Febr.	<i>compilation and submission of CLRTAP report</i>	<i>Documentation and archiving; RepDab check</i>	CLRTAP NFR Table	Ministry of Agriculture → EMEP Centre on Emission Inventories and Projections (CEIP) + letter to UNECE Secretariat	http://www.ceip.at/overview-of-submissions-under-clrtap/	<i>CLRTAP review process: 1. Status + 2. Synthesis and Assessment (Reports: http://www.ceip.at/review-results/ (password protected)) (3. Centralized review in every 5 years)</i>
15. Jan-28. Febr	<i>EU Team QA/QC checks (STEP 1 and initial cheks)</i>	Checks in accordance with the Art. 29 of the MMR Implementing Regulation	EU ESD Review Report	EEA→HMS using the EEA Emission Review Tool (EMRT)	https://emrt-esd.eionet.europa.eu/ (password protected)	Checks in accordance with the Art. 29 of the MMR Implementing Regulation
15. Jan-15. March	<i>Providing responses to the EU Team; Correction actions based on the observations made by the EU team during the STEP 1 and initial checks</i>	Identification and elimination of causes of problems identified by the EU team; actions to prevent their recurrence in the future.	EU ESD Review Report	HMS→EEA using the EEA Emission Review Tool (EMRT)	https://emrt-esd.eionet.europa.eu/ (password protected)	
15.March	<i>compilation and submission of CLRTAP report</i>	Documentation and archiving	CLRTAP IIR (+grid+LPS every 5 years)	Ministry of Agriculture → EMEP Centre on Emission Inventories	http://www.ceip.at/overview-of-submissions-under-clrtap/	

Documents, deadlines and QA/QC activities in connection with reporting to UNFCCC and Kyoto Protocol, CLRTAP and its Protocols and NEC directive						
Deadline	Task	QC	Document /Report			QA
			name	route of submission	availability	
				<i>and Projections (CEIP) -nek + letter to UNECE Secretariat</i>		
15.March	compilation and submission of report required by 525/2013/EC	Documentation and archiving Consistency checks in accordance with Article 7 (1) of Regulation 525/2013/	report required by 525/2013/EC(CRF Tables, NIR, indicators, SEF and MMR tables required by the MMR Implementing Regulations)	Ministry of National Development → EU Commission DG Climate Action)	http://cdr.eionet.europa.eu/hu/eu/mmr/art07_inventory	
15 March-19 April	EU Team checks		<i>EU ESD Review Report</i>	EEA→HMS using the EMRT	https://emrt-esd.eionet.europa.eu/ (password protected)	EU Team identifies Potential Significant Issues (PSI); prepares estimates for data missing from the national inventory (gap filling); QA experts send follow up questions to HU.
31 March-7 April	Providing responses and comments to the EU Team	Correction actions based on the observations made by the EU team; Check of the EEA/Commission estimates for missing data (Gap filling) or providing revised estimate;	<i>EU ESD Review Report</i>	HMS→EEA using the EMRT; supervision by the Ministry of National Development	https://emrt-esd.eionet.europa.eu/ (password protected)	

Documents, deadlines and QA/QC activities in connection with reporting to UNFCCC and Kyoto Protocol, CLRTAP and its Protocols and NEC directive						
Deadline	Task	QC	Document /Report			QA
			name	route of submission	availability	
15.April	compilation and submission of UNFCCC report	Documentation and archiving	UNFCCC report (CRF Tables, NIR, SEF)	Ministry of National Development → UNFCCC Secretariat	http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/492.php	Before submission: Approval by Ministry of Agriculture, National Development and National Economy After submission: UNFCCC review process: 1. Status (Reports: http://unfccc.int/national_reports/annex_i_ghg_inventories/inventory_review_reports/items/8109.php 2. Synthesis and Assessment (Reports: http://unfccc.int/documentation/documents/advanced_search/items/6911.php?preref=600008003#beg
15 April – end of April	EU ESD step 2 review, if applicable;	Providing responses to the EU ESD Step 2 team and calculating revised estimate or providing comments on potential technical corrections	EU ESD Review Report	Communication between the EEA and the HMS using the EMRT and supervised by the Ministry of National Development	https://emrt-esd.eionet.europa.eu/ (password protected)	Step 2 team identifies and calculates technical corrections and send questions to HU

Documents, deadlines and QA/QC activities in connection with reporting to UNFCCC and Kyoto Protocol, CLRTAP and its Protocols and NEC directive						
Deadline	Task	QC	Document /Report			QA
			name	route of submission	availability	
8 May	compilation and resubmission of GHG inventory to the EU and the UNFCCC, if applicable)	Documentation and archiving	UNFCCC report (CRF Tables, NIR, SEF)	Ministry of National Development → UNFCCC Secretariat and EU Commission (DG Climate Action)	http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/492.php http://cdr.eionet.europa.eu/hu/eu/mmr/art07_inventory	
30-31 May	Quattro-lateral QA/QC meeting on GHG-inventory		MINUTES FROM QUATTRO-LATERAL MEETING	Organizing country → Other countries	u:\GHG\E. QA-QC\C. INTERNATIONAL REVIEWS\Quattro Lateral Meeting\	review of chapters of the GHG-inventory by members of the GHG.inventory team of Slovakia, Czech Republic and Poland

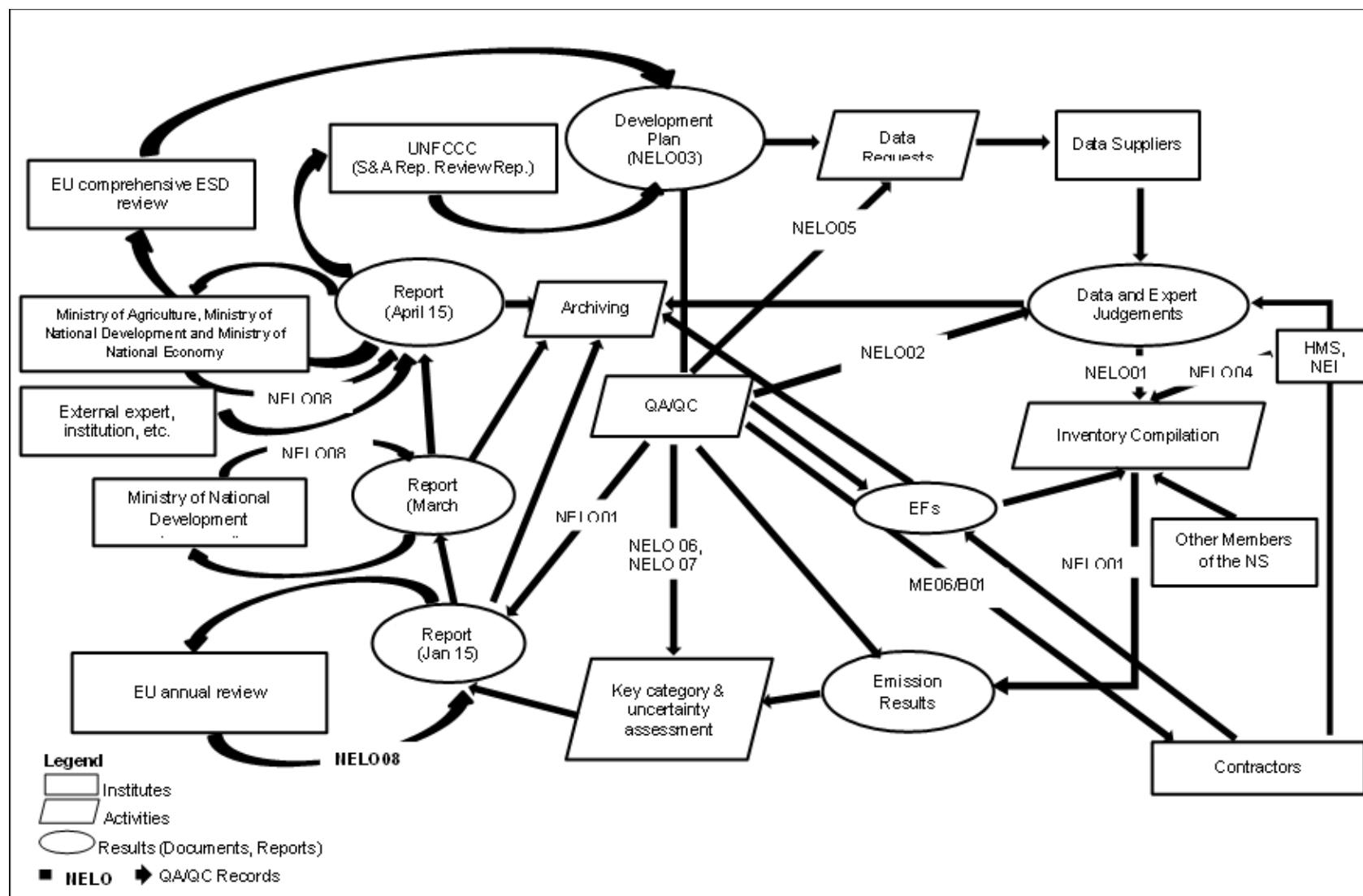
Documents, deadlines and QA/QC activities in connection with reporting to UNFCCC and Kyoto Protocol, CLRTAP and its Protocols and NEC directive						
Deadline	Task	QC	Document /Report			QA
			name	route of submission	availability	
31.July	Compilation and submission of preliminary report required by Art 8. of 525/2013/EC	Documentation and archiving Consistency checks in accordance with Article 7 (1) of Regulation 525/2013/ (if it is relevant)	preliminary report required by Art 8. of 525/2013/EC for year x-1	Ministry of National Development → EU Commission DG Climate Action)	http://cdr.eionet.europa.eu/hu/eu/mmr/art08_proxy	
May-August-Oct	evaluation, corrective actions and planned improvements (incorporating results of annual review processes); update of QA/QC documents if needed	Additional cheks based on the lessons learned during the UNFCCC, EU review processes and Quattro Lateral meeting;	NELO 01 quality record – corrective actions and planned improvements; NELO 03 Development Plan; ÉLFO_UHG_401.02		E. QA-QC	
March-Sept.	HCSO data exchange		GHG - UNFCCC - CRF Tables; Air Pollutants - CLRTAP - NFR Tables; Climate data	Hungarian Central Statistical Office (HCSO)	HCSO Statistical Yearbook and Handbook + http://www.ksh.hu/stadat_eves_5 + NAMEA	crosscheck with NAMEA
Sept-Oct	responses to be sent during the UNFCCC review; recalculations and resubmission if needed	Division meetings; documentation	responses sent electronically	UNFCCC Secretariat	E. QA-QC\C. INTERNATIONAL REVIEWS\UNFCCC	UNFCCC review process: 3. Annual centralized/in-country review (Reports: http://unfccc.int/national_reports/annex_i_ghg_inventories/inventory_review_reports/items/8452.php)
before the beginning of the new	archiving	archiving of all documents and data not yet archived on the server				

Documents, deadlines and QA/QC activities in connection with reporting to UNFCCC and Kyoto Protocol, CLRTAP and its Protocols and NEC directive						
Deadline	Task	QC	Document /Report			QA
			name	route of submission	availability	
inventory cycle		of NEI				
annually	Quality objectives of NEI for the HMS level quality objectives				E. QA-QC\B. HMS ISO\QUALITY PROGRAMME http://www.met.hu/en/omsz/minosegiranyitas/	
1-2 years	External audits within the ISO quality management system				Result of the audit http://www.met.hu/doc/minosegiranyitas/OMSZ_ISO-9001_tanusitvany_2012-15_en.pdf	external audit
1-2 years	Internal audits within ISO quality management system				n.a.	internal audit

For abbreviations see Annex 4.

Annex 2 : Structure of directory used by the NEI**A. OFFICIAL ARCHIVE****A DATABASE****0. GENERAL****1-7.SECTORS****B BACKGROUND DOCUMENTS****0. GENERAL****1-7.SECTORS****C SUBMISSIONS****D. WORKING FOLDER****0. GENERAL****G. NFR Total****1-7.SECTORS E. QA/QC****E. QA/QC****A. GHG QA/QC PLAN****B. HMS ISO****C. INTERNATIONAL REVIEWS****D. NATIONAL AUDITS REVIEWS****E. WORKING****F. ARCHIVE****F. MANAGEMENT****A. DATA REQUESTS****G. OTHERS**

Annex 3: Outline of the process



Annex 4: Abbreviations and inventory principles

CRF	Common reporting format = table (UNFCCC)
NIR	National Inventory Report = text (UNFCCC)
SEF	Standard electronic format = table on the Registry (UNFCCC) (it is NOT a HMS task)
NEI	Unit of National Emission Inventories
NFR	Nomenclature for reporting = table (CLRTAP)
IIR	Informative Inventory Reports = text (CLRTAP)
NEC	National Emission Ceiling Directive - 2001/81/EC of The European Parliament And Of The Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants
UNFCCC	United Nations Framework Convention on Climate Change (1992)
CLRTAP	Convention on Long-range, Transboundary Air Pollution (1979, Geneva)
GHG	greenhouse gas

CLRTAP (EMEP/EEA 2009.)	UNFCCC (18/CP.8)
Transparency means that Parties should provide clear documentation and report a level of disaggregation that sufficiently allows individuals or groups other than the designated emission expert or the compiler of the inventory to understand how the inventory was compiled and assure it meets good practice requirements. The transparency of emission reporting is fundamental to the effective use, review and continuous improvement of the inventory.	<i>Transparency</i> means that the assumptions and methodologies used for an inventory should be clearly explained to facilitate replication and assessment of the inventory by users of the reported information. The transparency of inventories is fundamental to the success of the process for the communication and consideration of information;
Consistency means that estimates for any different inventory years, pollutants (2) and source categories are made in such a way that differences in the results between years and source categories reflect real differences in emissions. Annual emissions, as far as possible, should be calculated using the same method, and data sources for all years, and resultant trends should reflect real fluctuations in emissions and not the changes resulting from methodological differences. Consistency also means that, as far as practicable and appropriate, the same data are reported under different international reporting obligations.	<i>Consistency</i> means that an inventory should be internally consistent in all its elements with inventories of other years. An inventory is consistent if the same methodologies are used for the base and all subsequent years and if consistent data sets are used to estimate emissions or removals from sources or sinks. Under certain circumstances referred to in paragraphs 15 and 16, an inventory using different methodologies for different years can be considered to be consistent if it has been recalculated in a transparent manner, in accordance with the Intergovernmental Panel on Climate Change (IPCC) <i>Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories and Good Practice Guidance for Land Use, Land-Use Change and Forestry</i> ; ¹
Comparability means that the national inventory is reported in such a way that allows it to be compared with national inventories of other Parties. This can be	<i>Comparability</i> means that estimates of emissions and removals reported by Annex I Parties in inventories should be comparable

<p>achieved by using accepted methodologies as elaborated in the Reporting Guidelines by using the reporting templates and through the use of the harmonized Nomenclature For Reporting (NFR), as specified in Annex IV of the Reporting Guidelines.</p>	<p>among Annex I Parties. For this purpose, Annex I Parties should use the methodologies and formats agreed by the COP for estimating and reporting inventories. The allocation of different source/sink categories should follow the split of the <i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>,² and the <i>IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>, at the level of its summary and sectoral tables;</p>
<p>Completeness means that estimates are reported for all pollutants, all relevant source categories and all years and for the entire territorial areas of the Parties covered by the reporting requirements set forth in the provisions of the Convention and its protocols. Where numerical information on emissions under any source category is not provided, the appropriate notation key defined in Annex I of the Reporting Guidelines should be used when filling in the reporting template and their absence should be documented.</p>	<p><i>Completeness</i> means that an inventory covers all sources and sinks, as well as all gases, included in the IPCC Guidelines as well as other existing relevant source/sink categories which are specific to individual Annex I Parties and, therefore, may not be included in the IPCC Guidelines. <i>Completeness</i> also means full geographic coverage of sources and sinks of an Annex I Party.</p>
<p>Accuracy means that emissions are neither systematically overestimated nor underestimated, as far as can be judged. This implies that Parties will endeavour to remove bias from the inventory estimates and minimize uncertainty.</p>	<p><i>Accuracy</i> is a relative measure of the exactness of an emission or removal estimate. Estimates should be accurate in the sense that they are systematically neither over nor under true emissions or removals, as far as can be judged, and that uncertainties are reduced as far as practicable. Appropriate methodologies should be used, in accordance with the IPCC good practice guidance, to promote <i>accuracy</i> in inventories.</p>

List of quality records used for documentation of QA/QC activities as required by QC Plan of the GHG Division (HMS ISO document n.: ELFO 401.01):

NELO 01**QA/QC checklist**

T1 QC checklist					
QC Sector:	checklist	Y (no problem identified) /N /n.a	Notes, explanation, supporting documents, further details...		
	Check that AD is properly recorded, archived and referenced				
	Check that EF is properly recorded, archived and referenced				
	Check for transcription errors				
	Check units and conversion factors				
	Check integrity of database files (e.g.: processing steps are correct and represented in the calculation file)				
	Check data consistency between source categories (e.g.: subtractions to avoid double counts)		Other sector(s) where the data is used:		
	Check movement of data between steps correct (e.g. calculation file consistency with CRF?)				
	Check uncertainties are estimated correctly				
	Undertake review of documentation (e.g. replicability is assured?)				
	Check recalculations (e.g. time-series consistency is assured? comparison table created, difference is explained, included in NIR?)				
	Check the completeness (e.g.: Every year, every element of the sub-source is included? Base year correct? Data gaps are documented?)				
	Compare estimates to previous ones (e.g.: differences from expected trends are explainable?)				

Corrective actions and improvements - OPTIONAL						
ERRATA (errors noticed by sectoral experts?)	date	Years affected	Included in "Development plan" for year...	Actions/resources/data input needed for the correction	Correction date	If it causes recalculation, it is included in NIR submission year...

Change required by review report (both UNFCCC and EU?)	date	Years affected	Included in "Development plan" for year...	Actions/resources/data input needed for the correction	Correction date	If it causes recalculation, it is included in NIR submission year...
Other (expert peer reviews, audits, non-binding improvements, etc.)	date	Years affected	Included in "Development plan" for year...	Actions/resources/data input needed for the correction	Correction date	If it causes recalculation, it is included in NIR submission year...

Verification - OPTIONAL

	AD	EF	Emission	Allocation	Other
NFR consistency?					
ETS consistency?					
E-PRTR consistency?					
EU preliminary GHG?					
NIRs of other countries					

T2 QC checklist - OPTIONAL				
A2. CATEGORY-SPECIFIC QC CHECKLIST (CHECKS TO BE DESIGNED FOR EACH CATEGORY)	Y (no problem identified) /N /n.a	Notes, explanation, supporting documents, further details...	Date of the check	Correction date
Category-specific checklist - Part A: Data gathering and selection				
EMISSION DATA QUALITY CHECKS				
1. Emission comparisons: historical data for source, significant sub-source categories				
2. Checks against independent estimates or estimates based on alternative methods				
3. Reference calculations				
4. Completeness				
5. Other (detailed checks)				
EMISSION FACTOR QUALITY CHECK				
6. Assess representativeness of emission factors, given national circumstances and analogous emissions data				
7. Compare to alternative factors (e.g., IPCC default, cross-country, literature)				
8. Search for options for more representative data				
9. Other (detailed checks)				
ACTIVITY DATA QUALITY CHECK: NATIONAL LEVEL ACTIVITY DATA				
10. Check historical trends				
11. Compare multiple reference sources				
12. Check applicability of data				
13. Check methodology for filling in time series for data that are not available annually				
14. Other (detailed checks)				
ACTIVITY DATA QUALITY CHECK: SITE-SPECIFIC ACTIVITY DATA				
15. Check for inconsistencies across sites				
16. Compare aggregated and national data				
17. Other (detailed checks)				
Category-specific checklist - Part B: Secondary data and direct emission measurement				
SECONDARY DATA: SAMPLE QUESTIONS REGARDING THE QUALITY OF INPUT DATA				
1. Are QC activities conducted during the original preparation of the data (either as reported in published literature or as indicated by personal communications) consistent with and adequate when compared against (as a minimum), general QC activities?				
2. Does the statistical agency have a QA/QC plan that covers the preparation of the data?				
3. For surveys, what sampling protocols were used and how recently were they reviewed?				
4. For site-specific activity data, are any national or international standards applicable to the measurement				

of the data? If so, have they been employed?				
5. Have uncertainties in the data been estimated and documented?				
6. Have any limitations of the secondary data been identified and documented, such as biases or incomplete estimates? Have errors been found?				
7. Have the secondary data undergone peer review and, if so, of what nature?				
8. Other (detailed checks)				
DIRECT EMISSION MEASUREMENT: CHECKS ON PROCEDURES TO MEASURE EMISSIONS				
9. Identify which variables rely on direct emission measurement				
10. Check procedures used to measure emissions, including sampling procedures, equipment calibration and maintenance.				
11. Identify whether standard procedures have been used, where they exist (such as IPCC methods or ISO standards).				
12. Other (detailed checks)				

NELO 02**Data quality check**

Kérdőív adatminőség ellenőrzéshez és bizonytalanság becsléshez/ Questionnaire for quality check of secondary data and direct measurements	
Adat/ adatkör megnevezése / Revised data or dataset:	
I. Adat minőség/ Data quality	
1	Ellenőrzik-e valamilyen módon a szolgáltatott adatokat? Is the quality of your data checked somehow?
2	Verifikálják-e az adatokat?/ Is the data verified?
3	Van-e az adatszolgáltatónak olyan minőségbiztosítási rendszere, amely kiterjed az adat gyűjtésére és feldolgozására? / Does the data supplier have a QA/QC procedure that covers the collection and processing of data?
4	Az adatgyűjtés hazai vagy nemzetközi szabvány/ jogszabály alapján történt-e? / Are there any national or international rules and regulations relating to the data collection?
5	Az adat gyűjtéséhez létezik-e módszertani előírás / rendszeresített kérdő ív? Ha igen, milyen gyakran vizsgálják azt felül? / Is there any methodological description or questionnaire relating to the data collection? If yes, how often is it revised?
6	Tapasztaltak-e valamilyen hibát az adatgyűjtéskor, feldolgozáskor?/ Have errors or limitations been found relating to the data collection and the data processing?
II. Megbízhatóság/ Uncertainty	
1	Történik-e számszerű becslés az adat megbízhatóságára vonatkozóan?/ Is there any quantitative analysis relating to the uncertainty of the data?
2	Végeznek-e statisztikai elemzést az adat megbízhatóságára vonatkozóan? (Konfidencia intervallum, hibahatárok)/ Have the data undergone on statistical analysis to estimate the uncertainty?
3	Ha nem, az adat bizonytalansága összehasonlítható-e/ összefüggésbe hozható-e más ismert bizonytalanságú adattal? Melyik adat az, és milyen kapcsolat ismert?/ If no, is there any other correlating data, which uncertainty is known? Which one and what

	is the correlation between them?	
4	Mekkora az adatszolgáltató szerint a közölt adat megbízhatósági tartománya? (Lehetőség szerint 95%-os konfidencia intervallum határait kérjük megadni.)/ What is the confidence range of the data in the opinion of the data supplier? (Please, provide the range from lower to upper 95% confidence limits, if it is possible.)	
A következő részt a szektorfelelős tölti ki! / The follows are filled by the expert of the sector		
A szektorfelelős szerint az adat minősége alapján a leltárkészítésre az adat felhasználható (I/N):/ Is the data usable for making inventory? (Y/N)		
Az adat alapértelmezett bizonytalansága: / Default uncertainty of the data in accordance with the IPCC guidelines		
A számított/becsült ország-specifikus érték: / Calculated or estimated value of the uncertainty		
Az alapértelmezett bizonytalanságtól való eltérés indoklása: / Reasons for the difference between the country-specific value of the uncertainty and the default one		
Dátum: / Date:		Aláí rá Sig n

NELO 03

Development Plan (Fejlesztési terv)

					Updated:	
SHORT TERM (WITHIN ONE INVENTORY CYCLE)						
GENERAL		Who		Deadline	Compl.	Cause of non-compliance
ENERGY	Category	Who	Key	Deadline	Compl.	Cause of non-compliance
INDUSTRIAL PROCESSES	Category	Who	Key	Deadline	Compl.	Cause of non-compliance
AGRICULTURE	Category	Who	Key	Deadline	Compl.	Cause of non-compliance
LULUCF	Category	Who	Key	Deadline	Compl.	Cause of non-compliance
WASTE	Category	Who	Key	Deadline	Compl.	Cause of non-compliance
LONG TERM						

GENERAL	Category	Who	Key	Timeline	Status	Remarks
ENERGY	Category	Who	Key	Timeline	Status	Remarks
INDUSTRIAL PROCESSES	Category	Who	Key	Timeline	Status	Remarks
AGRICULTURE	Category	Who	Key	Timeline	Status	Remarks
LULUCF	Category	Who	Key	Timeline	Status	Remarks
WASTE	Category	Who	Key	Timeline	Status	Remarks

NELO 04**Responsibilities**

Task	Name	Date
Compiler		
QA/QC		
Archiving		
Sector experts		
Energy		
Industry, solvents		
Agriculture		
LULUCF		
Waste		
Uncertainty, key category analysis		

NELO 05**Data source logbook**

Data	Email/Letter <i>/Internet</i>	Institution/ Database, stb.	Officer	Contact details/ exact source of downloaded data	Date of enquiry	Date of receipt/ <i>download</i>	Reg. n.	Name of file received/ <i>downloaded</i>

NELO 06 Uncertainty – As Tables in Annex 2

NELO 07 Key category analysis – As Tables in Annex 1**NELO 08 QA Activities logbook**

Document name	Document sent to (name of the person/authority/institution/commette, etc.)	Comments arrived / No comments	Action needed / No action needed
NIR 201x XXXMONTH submission			
NIR 201x XXXMONTH submission ES.			
IIR 201x submission			
IIR 201x submission ES.			

Annex 6 Responses to the review of the 2017 inventory submission

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
General	Estimate and report the carbon stock changes and emissions/removals from all mandatory categories in the LULUCF sector	G.1	Hungary included the developed estimates in the recent submission.	
General	Include in the NIR all relevant information on QA activities carried out for the annual submission	G.2	Supplementary information is added to the NIR and the QA/QC Plan (included in the NIR Annexes)	Chapter 1.7 of the NIR and summary table of the QA/QC Plan in Annex 5
General	Include in the NIR a summary of the results of the QA activities carried out each year	G.3	Supplementary information is added to the NIR and the QA/QC Plan (included in the NIR Annexes)	Chapter 1.7 of the NIR and summary table of the QA/QC Plan in Annex 5
General	Revise the QA/QC plan in order to clearly distinguish between QC checks (e.g. LULUCF sector checks, EU completeness checks) and QA procedures	G.4	Summary Table of the QA/QC Plan contains all QC and QA activities separated into different columns to distinguish clearly the QC and QA activities.	Summary table of the QA/QC Plan in Annex 5
1.A. Energy	treating emissions from agriculture and forestry separately	E.2	In this submission, non-CO2 emissions are calculated separately for agriculture and forestry.	
Energy - 1.A.3.b	Recalculate the non-CO2 emissions from road transport using the same version of the COPERT model for the entire time series, while also resolving the remaining inconsistencies in the underlying databases.	E.4	Resolved. We have switched to the COPERT version 5.1 (December 2017), and made recalculations for the whole time series.	Chapter 3.2.7.2

IPPU	Make efforts to collect relevant data from companies and develop a country-specific value for recovery efficiency for refrigeration and air-conditioning equipment, and include all the information related to the estimation of disposal emissions in the NIR	I.7	Not resolved.	
Waste - 5.D.1	Include the share (per cent) of untreated wastewater in table 7.5.3 of the NIR.	W.5	It is addressed in the NIR.	Figure 7.5.1
5.D Wastewater treatment and discharge – CH4 and N2O	The ERT recommends that Hungary provide detailed information on any recalculations performed since the previous submission, including all reasons and justification(s) for the recalculations and the impact of the changes	W.6	We will do our best in future submissions	
5.D Wastewater treatment and discharge – CH4 and N2O	the ERT recommends that the Party update its method ensure a consistent time series, taking into account the methods contained in volume 1, chapter 5 of the 2006 IPCC Guidelines.	W.7	We have addressed this issue by using the same data source for the share of the volume of wastewater treated in different ways.	

QA/QC and verification	The ERT recommends that Hungary improve the transparency of the NIR by including information on: how external QA results are taken into consideration in the national inventory development plan, for example, what measures are included in the EU review and how its results relating to Hungary are used to improve the inventory; and current as well as planned regional QA activities (expert peer review)	G.6	Supplementary information is added to the NIR and the QA/QC Plan (included in the NIR Annexes)	Chapter 1.7 of the NIR and summary table of the QA/QC Plan in Annex 5
1.A.1 Energy industries – gaseous fuels – CO2	The ERT recommends that Hungary provide the country-specific CO2 EFs used to calculate natural gas consumption for the entire time series with a description of how time-series consistency is ensured in future NIRs.	E.7	Time series consistency due to small changes in CO2 EF for natural gas has not been analysed yet.	
1.A.2.g Other (manufacturing industries and construction) – all fuels – CO2, CH4 and N2O	The ERT recommends that Hungary use the results of the information gathered from autoproducers, including the information on the proportion of fuel consumed by autoproducers, and allocate the emissions from autoproducers under the sector where they were generated, in accordance with the methods in the 2006 IPCC Guidelines.	E.8	Addressing. We did the recommended allocation in all cases where information was available (esp. Iron and steel, and paper industry. Also, all industrial waste incineration is allocated accordingly.) However, we have concerns that a full reallocation will be possible for the whole time series.	
1.A.3.c Railways – solid and liquid fuels –CO2, CH4 and	The ERT recommends that the Party report the EFs used to estimate the emissions from railways in the NIR	E.9	The required information is provided in the NIR	Table 3.2.9

N2O				
1.A.3.c Railways – solid and liquid fuels –CO2	the ERT recommends that the Party develop country-specific EFs for all fuels to estimate CO2 emissions from this category	E.10	Not addressed yet	
2.A.4 Other process uses of carbonates – CO2	Carry out the planned investigation regarding the assumption underpinning the addition of 10% to the data reported under the EU ETS for 2005 and onwards, as well as the use of the 10% higher EF for the period 1985– 2004 to account for bricks and ceramics manufacturers not included in the EU ETS and improve the estimates accordingly to ensure time-series consistency.	I.4	Preliminary results are presented in this submission.	Chapter 4.3.4.5.
2.A.3 Glass production – CO2	The ERT recommends that the Party complete its research and obtain correct AD for the latest years to calculate the estimates of CO2 emissions from glass production, if appropriate.	I.10	Research is in progress	

2.B.1 Ammonia production – CO2	The ERT recommends that the Party transparently explain in the NIR why the emissions from hydrogen production are reported under the category ammonia production	I.11	More information is added to the NIR.	Chapter 4.4.1.1
2.F.1 Refrigeration and air conditioning – HFC and PFCs	The ERT therefore recommends that the Party implement a tier 2 method to estimate the emissions of F-gases from refrigeration and air conditioning	I.12	Partially resolved. For the 2.F.1.b and 2.F.1.e sub-categories a 'bottom-up' approach has been applied relying on statistics and expert estimations, so data are collected at the application level. It is also planned to Hungary collects data for the other four sub-category.	Chapter 4.9.1.2.
2.F.1 Refrigeration and air conditioning – HFCs and PFCs	The ERT recommends that Hungary include emissions from F-gases imported and exported in bulk and imported and exported contained in equipment for the subcategories commercial refrigeration, domestic refrigeration, industrial refrigeration, transport refrigeration, mobile air conditioning and stationary air conditioning, providing all necessary explanations of the methodologies EFs and assumptions used	I.13	More information is added to the NIR.	Chapter 4.9.1.2.

2.G.1 Electrical equipment – SF6	The ERT recommends that Hungary obtain annual sales data for 2014 to replace the interpolated data for 2014 if the data of that year is still not available for the next submission.	I.14	Resolved	Chapter 4.10.1.4.
2.G.2 SF6 and PFCs from other product use – SF6	The ERT recommends that the Party obtain data on existing stocks of soundproof windows, and estimate and report the SF6 emissions from soundproof windows separately under this category	I.15	Not resolved.	
3.B.5 Indirect N2O emissions – N2O	The ERT recommends that the Party include more detailed information in the NIR on how FracGasMS was developed.	A.13	More information is added to the NIR.	Section 5.3.2.5
3.D.a.4 Crop residues – N2O	The ERT recommends that the Party justify its application of FracRemove by documenting the data source and explaining how the data were obtained for the estimates of FracRemove and provide a time series of FracRemove values in the NIR.	A.14	More information is added to the NIR.	Section 5.5.2
3.D.a.5 Mineralization /immobilization associated with loss/gain of soil organic matter – N2O	The ERT recommends that the Party provide the source of the AD for N mineralization associated with loss of SOM and the tier of the methodology used in the NIR	A.15	More information is added to the NIR	Section 5.5.2

4. General (LULUCF) – CO ₂ , CH ₄ and N ₂ O	the ERT recommends that the Party include the following improvements in the NIR: correct the incorrect values for the non-set-aside grassland area in the land-use matrix table (table 6.3.6 in the 2017 NIR); and correct the description of how the BBEFORE value used for the biomass carbon stock change estimate for land converted to settlements was derived	L.5	More information is added to the NIR	Section 6.3.2, Section 6.9.3.2.1
4. General (LULUCF) – CO ₂ , CH ₄ and N ₂ O	The ERT recommends that Hungary provide justification in the NIR, both qualitatively and quantitatively (for example in the form of a table), that the total national aggregate of estimated emissions for all gases and categories considered insignificant shall remain below 0.1 per cent of the national total GHG emissions, in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	L.6	Not resolved yet.	

4.A.2 Land converted to forest land – CO	The ERT recommends that Hungary either include the estimate of the carbon stock changes in litter and dead wood in wetlands converted to forest land and dead wood in settlements converted to forest land or provide information in the NIR confirming that these removals meet the threshold of insignificant in line with the procedure set out in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	L.7	Information is provided in the NIR.	Section 6.5.4.2.
4.C.1 Grassland remaining grassland– CO2	The ERT recommends that the Party modify the notation key of this pool as “NA”.	L.8	We use the notation key „NO”.	

4.D.1 Wetlands remaining wetlands – CO2	The ERT recommends that, if Hungary estimates the country-specific carbon stock changes for its lands for which the standard land-use categories based on the 2006 IPCC Guidelines (e.g. peat extraction and flooded land remaining flooded land) are not applicable, for instance the mineral soil carbon stock changes under wetlands remaining wetlands with grass vegetation, the Party examine the way to report the carbon stock changes in such lands under “other wetlands” with a notification in the documentation box or in the comment box in the CRF tables, together with a clear explanation in the relevant section of the NIR of where in the CRF tables the emissions from those lands are reported.	L.9	This issue is under review. We have coordinated with the MBFSZ and the values are correct.	
4.D.1.1 Peat extraction remaining peat extraction – CO2, CH4 and N2O	The ERT recommends that the Party provide information on the method used, along with the AD and EF’s applied, to estimate nutrient-rich and nutrient-poor organic soils under peat extraction.	L.11	More information is added to the NIR	Section 6.8.2.1
4 (II) Emissions and removals from drainage and rewetting and	The ERT recommends that the Party correct its reporting of CO2 emissions from peat extraction in CRF table 4(II) and provide correct figure or notation key.	L.13	Resolved.	

other management of organic/mineral soils – CO ₂				
4(IV) Indirect N ₂ O emissions from managed soils – N ₂ O	The ERT recommends that Hungary include the estimate of indirect N ₂ O emissions from leaching and run-off relating to N mineralization associated with loss of SOM resulting from land converted to forest land, land converted to cropland and land converted to settlements.	L.14	We have developed these estimates, and they are included in the NIR.	Section 6.4.2, Section 6.5.5.3.2
4(V) Biomass burning – CH ₄ and N ₂ O	The ERT recommends that the Party provide category-specific information on the following parameters used for the estimates of biomass burning in cropland (Cf and Gef) and grassland (MB, Cf and Gef), as appropriate based on the information provided by the Party during the review.	L.15	More information is provided in the NIR	Section 6.6.2.4, Section 6.7.2.4
5.A Solid waste disposal on land – CH ₄	The ERT recommends that Hungary include information on the amount of sludge disposed in the landfill sites in the NIR in order to ensure the consistency between the data provided in the NIR and the emissions reported in CRF table 5.A	W.8	The required information is provided in the NIR	Figure 7.2.2

5.A.1 Managed waste disposal sites – CH4	The ERT recommends that Hungary provide, in the NIR, information on how Hungary uses information contained in the Waste Management Information System to determine the amount of waste by type and by treatment for purposes of the GHG inventory calculations and the assumptions used in the procedure.	W.9	The required information is provided in the NIR	Chapter 7.2.2
5.A.2 Unmanaged waste disposal sites – CH4	The ERT recommends that Hungary clarify both the reason for choosing the notation key “IE” to report unmanaged waste disposal sites and where the emissions are reported, for the whole time series.	W.10	The required information is provided in the NIR	Chapter 7.2.2
5.C.1 Waste incineration – CO2	The ERT recommends that Hungary include in the NIR an explanation of how it determined the amount of nonbiogenic waste incinerated, in order to make the information in the NIR and the CRF tables consistent.	W.11	We have changed our approach, and report all waste incineration under "Non-biogenic". In addition, five waste types are reported separately.	Chapter 7.4.5

Harvested wood products – CO2	<p>The ERT recommends that Hungary improve its explanation of the methods for estimating and accounting HWP, taking into account the following points:</p> <p>(a) Provide accurate information on the treatment of emissions from HWP originating from forests prior to the start of the second commitment period and describe how these emissions are included in the accounting (see decision 2/CMP.8, annex II, paragraph 2(g)(iii));</p> <p>(b) Provide further methodological information on how the emissions from HWP already accounted for during the first commitment period on the basis of instantaneous oxidation were excluded. The emissions estimated based on the first-order decay methods occurred on wood harvested in previous years and so explaining that emissions occurred only in the second commitment period does not prove the exclusion of emissions that are already accounted as instantaneous oxidation during the first commitment period (see decision 2/CMP.8, annex II, paragraph 2(g)(iv)).</p>	KL.5	More information is added to the NIR	Section 6.5.4.2.4, Section 11.5.2.5, Section 11.4.5
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N2O emissions from N mineralization /immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils – N2O	The ERT recommends that Hungary include the estimates of indirect N2O emissions from leaching and run-off relating to N mineralization associated with loss of SOM resulting from activities under Article 3, paragraph 3, of the Kyoto Protocol	KL.6	We have developed these estimates, and they are included in the recent submission.	Section 6.4.2, Section 11.3.1.6

ANNEX 7 List of abbreviations and units

Abbreviations

AED	anode effect duration in minutes
AEF	number of anode effects per cellday
Aggr.	aggregate
BOF	basic oxygen furnace
CE	current efficiency
CLRTAP	Convention on Long-range Transboundary Air Pollution
CORINAIR	CORe INventory of AIR emissions
CKD	cement kiln dust
CRF	common reporting format
EAF	electric arc furnace
EF	emission factor
ERT	expert review team
EU	European Union
ETS	Emission Trading Scheme
GDP	gross domestic product
GHG	greenhouse gas
HCSO	Hungarian Central Statistical Office
HKVSZ	Association of Cooling and Air Conditioning Businesses (Hűtő- és Klimatechnikai Vállalkozások Szövetsége)
HMBC	Hungarian Monitoring Body for Certification
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
KTI	Institute for Transport Sciences (Közlekedéstudományi Intézet Kht.)
LULUCF	land use, land-use change and forestry
LPG	liquified petroleum gas
MVM Rt.	Hungarian Power Companies Ltd.
NCV	net calorific value
NFI	National Forest Inventory
OHF	open hearth furnace
QA	quality assurance
QC	quality control
UNFCCC	United Nations Framework Convention on Climate Change

Chemical formulas

C	carbon
CH ₄	methane
CO	carbon monoxide
CO ₂	carbon dioxide
HFCs	hydrofluorocarbons
NMVOC	non-methane volatile organic compound
N ₂ O	nitrous oxide
NO _x	nitrogen oxide
PFCs	perfluorocarbons
SF ₆	sulphur hexafluoride
SO ₂	sulphur dioxide
CaCO ₃	calcium carbonate, limestone
MgCO ₃	magnesium carbonate

CaO	calcium oxide, quicklime
Ca(OH) ₂	slack lime
NH ₃	ammonia
HNO ₃	nitric acid
CF ₄	tetrafluoromethane
C ₂ F ₆	hexafluoroethane

Units

PJ	petajoule (10 ¹⁵ J)
TJ	terajoule (10 ¹² J)
Gg	gigagram (10 ⁹ g)
kt	kilotonnes (1000 t)