

## ANNEXES TO THE NATIONAL INVENTORY REPORT

**2021**

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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 2019 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 <sub>4</sub>
1A1 Energy Industries - Biomass	N <sub>2</sub> O
1A1 Energy Industries - Gaseous fuels	CH <sub>4</sub>
1A1 Energy Industries - Gaseous fuels	CO <sub>2</sub>
1A1 Energy Industries - Gaseous fuels	N <sub>2</sub> O
1A1 Energy Industries - Liquid fuels	CH <sub>4</sub>
1A1 Energy Industries - Liquid fuels	CO <sub>2</sub>
1A1 Energy Industries - Liquid fuels	N <sub>2</sub> O
1A1 Energy Industries - Other fossil fuels	CH <sub>4</sub>
1A1 Energy Industries - Other fossil fuels	CO <sub>2</sub>
1A1 Energy Industries - Other fossil fuels	N <sub>2</sub> O
1A1 Energy Industries - Peat	CH <sub>4</sub>
1A1 Energy Industries - Peat	N <sub>2</sub> O
1A1 Energy Industries - Solid fuels	CH <sub>4</sub>
1A1 Energy Industries - Solid fuels	CO <sub>2</sub>
1A1 Energy Industries - Solid fuels	N <sub>2</sub> O
1A2 Manufacturing industries - Biomass	CH <sub>4</sub>
1A2 Manufacturing industries - Biomass	N <sub>2</sub> O
1A2 Manufacturing industries - Gaseous fuels	CH <sub>4</sub>
1A2 Manufacturing industries - Gaseous fuels	CO <sub>2</sub>
1A2 Manufacturing industries - Gaseous fuels	N <sub>2</sub> O
1A2 Manufacturing industries - Liquid fuels	CH <sub>4</sub>
1A2 Manufacturing industries - Liquid fuels	CO <sub>2</sub>
1A2 Manufacturing industries - Liquid fuels	N <sub>2</sub> O
1A2 Manufacturing industries - Other fossil fuels	CH <sub>4</sub>
1A2 Manufacturing industries - Other fossil fuels	CO <sub>2</sub>
1A2 Manufacturing industries - Other fossil fuels	N <sub>2</sub> O
1A2 Manufacturing industries - Peat	CH <sub>4</sub>
1A2 Manufacturing industries - Peat	N <sub>2</sub> O
1A2 Manufacturing industries - Solid fuels	CH <sub>4</sub>
1A2 Manufacturing industries - Solid fuels	CO <sub>2</sub>
1A2 Manufacturing industries - Solid fuels	N <sub>2</sub> O
1A3a Domestic aviation - All fuels	CH <sub>4</sub>
1A3a Domestic aviation - All fuels	CO <sub>2</sub>
1A3a Domestic aviation - All fuels	N <sub>2</sub> O
1A3b Road transport - All Fuels	CH <sub>4</sub>
1A3b Road transport - All Fuels	CO <sub>2</sub>
1A3b Road transport - All Fuels	N <sub>2</sub> O
1A3c Railways - All Fuels	CH <sub>4</sub>

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

CRF code and category name	GHG
1B2c Venting and flaring	N <sub>2</sub> O
1B2d Other (Thermal water extraction + natural gas storage)	CH <sub>4</sub>
1B2d Other (Thermal water extraction + natural gas storage)	CO <sub>2</sub>
1B2d Other (Thermal water extraction + natural gas storage)	N <sub>2</sub> O
2A1 Cement Production	CO <sub>2</sub>
2A2 Lime Production	CO <sub>2</sub>
2A3 Glass production	CO <sub>2</sub>
2A4 Other Process Uses of Carbonates	CO <sub>2</sub>
2B1 Ammonia Production	CH <sub>4</sub>
2B1 Ammonia Production	CO <sub>2</sub>
2B1 Ammonia Production	N <sub>2</sub> O
2B2 Nitric Acid Production	N <sub>2</sub> O
2B8 Petrochemical and carbon black production	CH <sub>4</sub>
2B8 Petrochemical and carbon black production	CO <sub>2</sub>
2B8 Petrochemical and carbon black production	N <sub>2</sub> O
2C1 Iron and Steel Production	CH <sub>4</sub>
2C1 Iron and Steel Production	CO <sub>2</sub>
2C1 Iron and Steel Production	N <sub>2</sub> O
2C2 Ferroalloys Production	CH <sub>4</sub>
2C2 Ferroalloys Production	CO <sub>2</sub>
2C2 Ferroalloys Production	N <sub>2</sub> O
2C3 Aluminium Production	CH <sub>4</sub>
2C3 Aluminium Production	CO <sub>2</sub>
2C3 Aluminium Production	N <sub>2</sub> O
2C3 Aluminium Production	PFC
2D Non-energy products from fuels and solvent use	CH <sub>4</sub>
2D Non-energy products from fuels and solvent use	CO <sub>2</sub>
2E Electronics industry	SF <sub>6</sub>
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 <sub>6</sub>	Aggr. F-gases
2G Other Product Manufacture and Use	N <sub>2</sub> O
3A Enteric Fermentation	CH <sub>4</sub>
3B Manure Management	CH <sub>4</sub>
3B Manure Management	N <sub>2</sub> O
3C Rice Cultivation	CH <sub>4</sub>
3D Agricultural Soils	CH <sub>4</sub>

CRF code and category name	GHG
3D1 Direct N <sub>2</sub> O Emissions from Managed Soils	N <sub>2</sub> O
3D2 Indirect N <sub>2</sub> O Emissions from Managed Soils	N <sub>2</sub> O
3F Field Burning of Agricultural Residues	CH <sub>4</sub>
3F Field Burning of Agricultural Residues	N <sub>2</sub> O
3G Liming	CO <sub>2</sub>
3H Urea application	CO <sub>2</sub>
3I Other carboncontaining fertilizers	CO <sub>2</sub>
3J Other	CH <sub>4</sub>
3J Other	CO <sub>2</sub>
3J Other	N <sub>2</sub> O
4(I) Direct N <sub>2</sub> O emissions from N inputs to managed soils	N <sub>2</sub> O
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils	CH <sub>4</sub>
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils	CO <sub>2</sub>
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils	N <sub>2</sub> O
4(III) Direct N <sub>2</sub> O emissions from N mineralization/immobilization	N <sub>2</sub> O
4(IV) Indirect N <sub>2</sub> O Emissions from Managed Soils	N <sub>2</sub> O
4(V) Biomass Burning	CH <sub>4</sub>
4(V) Biomass Burning	CO <sub>2</sub>
4(V) Biomass Burning	N <sub>2</sub> O
4A1 Forest Land Remaining Forest Land	CO <sub>2</sub>
4A2 Land Converted to Forest Land	CO <sub>2</sub>
4B1 Cropland Remaining Cropland	CO <sub>2</sub>
4B2 Land Converted to Cropland	CO <sub>2</sub>
4C1 Grassland Remaining Grassland	CO <sub>2</sub>
4C2 Land Converted to Grassland	CO <sub>2</sub>
4D11 Peat Extraction Remaining Peat Extraction	CO <sub>2</sub>
4D12 Flooded Land Remaining Flooded Land	CO <sub>2</sub>
4D13 Other Wetlands Remaining Other Wetlands	CO <sub>2</sub>
4D2 Land Converted to Wetlands	CO <sub>2</sub>
4E1 Settlements Remaining Settlements	CO <sub>2</sub>
4E2 Land Converted to Settlements	CO <sub>2</sub>
4F1 Other Land Remaining Other Land	CO <sub>2</sub>
4F2 Land Converted to Other Land	CO <sub>2</sub>
4G Harvested Wood Products	CO <sub>2</sub>
4H Other	CH <sub>4</sub>
4H Other	CO <sub>2</sub>
4H Other	N <sub>2</sub> O
5A Solid waste disposal	CH <sub>4</sub>
5A Solid waste disposal	CO <sub>2</sub>

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

## A1.2 Results of the key category analysis

**Table A1-2** Tier 1 level assessment including LULUCF (2019)

CRF code + note	Direct Greenhouse Gas	Base Year Emission [Gg CO <sub>2</sub> -eq]	Emission in absolute value [Gg CO <sub>2</sub> -eq]	Level Assessment	Cumulative Total%
<b>1A3b Road trasport - All Fuels</b>	CO <sub>2</sub>	14197.138	14197.138	19.82%	19.82%
<b>1A4 Other sectors - Gaseous fuels</b>	CO <sub>2</sub>	9415.307	9415.307	13.14%	32.97%
<b>1A1 Energy Industries - Solid fuels</b>	CO <sub>2</sub>	5760.113	5760.113	8.04%	41.01%
<b>1A1 Energy Industries - Gaseous fuels</b>	CO <sub>2</sub>	5435.092	5435.092	7.59%	48.60%
<b>4A1 Forest Land Remaining Forest Land - CO<sub>2</sub></b>	CO <sub>2</sub>	-4421.338	4421.338	6.17%	54.77%
<b>3.D.1 Direct N<sub>2</sub>O Emissions From Managed Soils</b>	N <sub>2</sub> O	3461.424	3461.424	4.83%	59.60%
<b>1A2 Manufacturing industries - Gaseous fuels</b>	CO <sub>2</sub>	3108.804	3108.804	4.34%	63.94%
<b>5A Solid waste disposal</b>	CH <sub>4</sub>	2926.557	2926.557	4.09%	68.03%
<b>3A Enteric Fermentation</b>	CH <sub>4</sub>	2048.341	2048.341	2.86%	70.89%
<b>2F1Refrigeration and Air Conditioning Equipment - HFC+PFC</b>	Aggregate F-gases	1965.572	1965.572	2.74%	73.63%
<b>1A4 Other sectors - Liquid fuels</b>	CO <sub>2</sub>	1560.836	1560.836	2.18%	75.81%
<b>1B2b Natural Gas</b>	CH <sub>4</sub>	1495.892	1495.892	2.09%	77.90%
<b>2B8 Petrochemical and carbon black production</b>	CO <sub>2</sub>	1306.629	1306.629	1.82%	79.72%
<b>2C1 Iron and Steel Production</b>	CO <sub>2</sub>	1218.101	1218.101	1.70%	81.42%
<b>4A2 Land Converted to Forest Land - CO<sub>2</sub></b>	CO <sub>2</sub>	-1196.593	1196.593	1.67%	83.09%
<b>1A2 Manufacturing industries - Liquid fuels</b>	CO <sub>2</sub>	1187.511	1187.511	1.66%	84.75%
<b>2B1 Ammonia Production</b>	CO <sub>2</sub>	1081.222	1081.222	1.51%	86.26%
<b>2A1 Cement Production</b>	CO <sub>2</sub>	1022.863	1022.863	1.43%	87.69%

CRF code + note	Direct Greenhouse Gas	Base Year Emission [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
1A1 Energy Industries - Liquid fuels	CO2	972.364	972.364	1.36%	89.05%
3B Manure Management	CH4	649.886	649.886	0.91%	89.95%
3B Manure Management	N2O	462.955	462.955	0.65%	90.60%
1A2 Manufacturing industries - Solid fuels	CO2	452.969	452.969	0.63%	91.23%
1A4 Other sectors - Biomass	CH4	409.735	409.735	0.57%	91.81%
4B1 Cropland Remaining Cropland - CO2	CO2	-397.073	397.073	0.55%	92.36%
1A2 Manufacturing industries - Other fossil fuels	CO2	366.460	366.460	0.51%	92.87%
1A4 Other sectors - Solid fuels	CO2	313.905	313.905	0.44%	93.31%
4B2 Land Converted to Cropland - CO2	CO2	288.721	288.721	0.40%	93.71%
4G Harvested Wood Products - CO2	CO2	-282.295	282.295	0.39%	94.11%
4E2 Land Converted to Settlements - CO2	CO2	280.585	280.585	0.39%	94.50%
3.D.2 Indirect N2O Emissions From Managed Soils	N2O	275.119	275.119	0.38%	94.88%
2A4 Other Process Uses of Carbonates	CO2	248.794	248.794	0.35%	95.23%
5D Wastewater Treatment and Discharge	CH4	238.001	238.001	0.33%	95.56%
1A1 Energy Industries - Other fossil fuels	CO2	218.121	218.121	0.30%	95.87%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CO2	CO2	182.214	182.214	0.25%	96.12%
2G Other Product Manufacture and Use - N2O	N2O	177.447	177.447	0.25%	96.37%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO2	172.154	172.154	0.24%	96.61%
1A4 Other sectors - Other Fossil Fuels	CO2	157.245	157.245	0.22%	96.83%
1A3b Road transport - All Fuels	N2O	150.502	150.502	0.21%	97.04%
2A2 Lime Production	CO2	144.621	144.621	0.20%	97.24%
2F2Foam Blowing - HFC	Aggregate F-gases	128.794	128.794	0.18%	97.42%
1B2c Venting and flaring	CO2	124.014	124.014	0.17%	97.59%
1A3c Railways - All Fuels	CO2	120.573	120.573	0.17%	97.76%
3H Urea application	CO2	115.944	115.944	0.16%	97.92%
5B Biological Treatment of Soild Waste	CH4	113.673	113.673	0.16%	98.08%
2G Other Product Manufacture and Use - SF6	Aggregate F-gases	101.138	101.138	0.14%	98.22%
2D Non-energy products from fuels and solvent use	CO2	99.533	99.533	0.14%	98.36%
3I Other carboncontaining fertilizers	CO2	92.625	92.625	0.13%	98.49%
5D Wastewater Treatment and Discharge	N2O	85.570	85.570	0.12%	98.61%
4C2 Land Converted to Grassland - CO2	CO2	-79.576	79.576	0.11%	98.72%
1B2d Other (Thermal water extraction + NatGas storage)	CH4	69.084	69.084	0.10%	98.82%
1A4 Other sectors - Biomass	N2O	65.131	65.131	0.09%	98.91%
1B2aOil	CH4	54.428	54.428	0.08%	98.99%
2A3 Glass production	CO2	49.340	49.340	0.07%	99.06%
2B8 Petrochemical and carbon black production	CH4	42.712	42.712	0.06%	99.11%
5B Biological Treatment of Soild Waste	N2O	41.603	41.603	0.06%	99.17%
1A5a Stationary	CO2	39.423	39.423	0.06%	99.23%

CRF code + note	Direct Greenhouse Gas	Base Year Emission [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
2F4Aerosol + MDI - HFC	Aggregate F-gases	35.017	35.017	0.05%	99.28%
2F3Fire extinguishers - HFC	Aggregate F-gases	7.197	7.197	0.01%	99.29%
2B2 Nitric Acid Production	N2O	32.114	32.114	0.04%	99.33%
1B1 Solid fuels	CH4	31.737	31.737	0.04%	99.38%
5C Incineration and open burning of waste	CO2	30.697	30.697	0.04%	99.42%
1A1 Energy Industries - Biomass	N2O	29.525	29.525	0.04%	99.46%
4(III)Direct N2O emissions from N mineralization/immobilization - N2O	N2O	28.848	28.848	0.04%	99.50%
1B2c Venting and flaring	CH4	25.204	25.204	0.04%	99.54%
1A5b Mobile	CO2	25.197	25.197	0.04%	99.57%
1A3b Road transport - All Fuels	CH4	23.665	23.665	0.03%	99.60%
1A4 Other sectors - Solid fuels	CH4	22.634	22.634	0.03%	99.64%
1A4 Other sectors - Gaseous fuels	CH4	21.177	21.177	0.03%	99.67%
1A1 Energy Industries - Biomass	CH4	18.586	18.586	0.03%	99.69%
1A1 Energy Industries - Solid fuels	N2O	18.396	18.396	0.03%	99.72%
3C Rice Cultivation	CH4	17.874	17.874	0.02%	99.74%
4(V) Biomass Burning - CH4	CH4	16.034	16.034	0.02%	99.76%
1A3d Domestic navigation - All Liquid fuels	CO2	15.858	15.858	0.02%	99.79%
1A4 Other sectors - Liquid fuels	N2O	15.666	15.666	0.02%	99.81%
1A3c Railways - All Fuels	N2O	13.842	13.842	0.02%	99.83%
1A2 Manufacturing industries - Biomass	N2O	12.098	12.098	0.02%	99.84%
4(V) Biomass Burning - N2O	N2O	11.285	11.285	0.02%	99.86%
1A2 Manufacturing industries - Liquid fuels	N2O	9.929	9.929	0.01%	99.87%
1B1 Solid fuels	CO2	9.019	9.019	0.01%	99.89%
1A3a Domestic aviation - All fuels	CO2	7.719	7.719	0.01%	99.90%
1A2 Manufacturing industries - Biomass	CH4	7.505	7.505	0.01%	99.91%
3G Liming	CO2	8.264	8.264	0.01%	99.92%
1A2 Manufacturing industries - Other fossil fuels	N2O	6.072	6.072	0.01%	99.93%
1A4 Other sectors - Gaseous fuels	N2O	5.049	5.049	0.01%	99.93%
2C1 Iron and Steel Production	CH4	4.714	4.714	0.01%	99.94%
4(IV) Indirect N2O Emissions from Managed Soils - N2O	N2O	4.307	4.307	0.01%	99.95%
1A2 Manufacturing industries - Other fossil fuels	CH4	3.821	3.821	0.01%	99.95%
1A1 Energy Industries - Other fossil fuels	N2O	3.090	3.090	0.00%	99.96%
1A2 Manufacturing industries - Gaseous fuels	CH4	1.393	1.393	0.00%	99.96%
1A1 Energy Industries - Gaseous fuels	N2O	2.903	2.903	0.00%	99.96%
1A4 Other sectors - Liquid fuels	CH4	2.544	2.544	0.00%	99.97%
1A1 Energy Industries - Gaseous fuels	CH4	2.436	2.436	0.00%	99.97%
1A4 Other sectors - Other Fossil Fuels	N2O	2.049	2.049	0.00%	99.97%
1A1 Energy Industries - Other fossil fuels	CH4	1.764	1.764	0.00%	99.98%
1A2 Manufacturing industries - Gaseous fuels	N2O	1.660	1.660	0.00%	99.98%
1A2 Manufacturing industries - Solid fuels	N2O	1.877	1.877	0.00%	99.98%
1A4 Other sectors - Solid fuels	N2O	1.376	1.376	0.00%	99.98%

CRF code + note	Direct Greenhouse Gas	Base Year Emission [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
1A2 Manufacturing industries - Solid fuels	CH4	0.427	0.427	0.00%	99.98%
1A4 Other sectors - Other Fossil Fuels	CH4	1.289	1.289	0.00%	99.98%
1A1 Energy Industries - Solid fuels	CH4	1.242	1.242	0.00%	99.99%
1A1 Energy Industries - Liquid fuels	N2O	0.941	0.941	0.00%	99.99%
1B2b Natural Gas	CO2	0.682	0.682	0.00%	99.99%
1B2aOil	CO2	0.563	0.563	0.00%	99.99%
1A1 Energy Industries - Liquid fuels	CH4	0.554	0.554	0.00%	99.99%
1A2 Manufacturing industries - Liquid fuels	CH4	0.503	0.503	0.00%	99.99%
5C Incineration and open burning of waste	N2O	0.457	0.457	0.00%	99.99%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - N2O	N2O	0.357	0.357	0.00%	99.99%
1B2c Venting and flaring	N2O	0.257	0.257	0.00%	99.99%
3F Field Burning of Agricultural Residues	CH4	0.235	0.235	0.00%	99.99%
1A5b Mobile	N2O	0.206	0.206	0.00%	99.99%
4D11 Peat Extraction Remaining Peat Extraction - CO2	CO2	0.193	0.193	0.00%	99.99%
1A3c Railways - All Fuels	CH4	0.169	0.169	0.00%	99.99%
1A3d Domestic navigation - All Liquid fuels	N2O	0.127	0.127	0.00%	99.99%
5C Incineration and open burning of waste	CH4	0.111	0.111	0.00%	99.99%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	0.092	0.092	0.00%	99.99%
1A5a Stationary	CH4	0.088	0.088	0.00%	99.99%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH4	0.077	0.077	0.00%	99.99%
3F Field Burning of Agricultural Residues	N2O	0.073	0.073	0.00%	99.99%
1A3a Domestic aviation - All fuels	N2O	0.065	0.065	0.00%	99.99%
1A3d Domestic navigation - All Liquid fuels	CH4	0.037	0.037	0.00%	99.99%
1A5a Stationary	N2O	0.021	0.021	0.00%	99.99%
1B2d Other (Thermal water extraction + NatGas storage)	CO2	0.013	0.013	0.00%	99.99%
1A5b Mobile	CH4	0.004	0.004	0.00%	99.99%
4F2 Land Converted to Other Land - CO2	CO2	0.002	0.002	0.00%	99.99%
1A3a Domestic aviation - All fuels	CH4	0.001	0.001	0.00%	99.99%
1A1 Energy Industries - Peat	CH4	0.000	0.000	0.00%	99.99%
1A1 Energy Industries - Peat	N2O	0.000	0.000	0.00%	99.99%
1A2 Manufacturing industries - Peat	CH4	0.000	0.000	0.00%	99.99%
1A2 Manufacturing industries - Peat	N2O	0.000	0.000	0.00%	99.99%
1A3d Domestic navigation - Gaseous fuels	CH4	0.000	0.000	0.00%	99.99%
1A3d Domestic navigation - Gaseous fuels	CO2	0.000	0.000	0.00%	99.99%
1A3d Domestic navigation - Gaseous fuels	N2O	0.000	0.000	0.00%	99.99%
1B2b Natural Gas	N2O	0.000	0.000	0.00%	99.99%
1B2d Other (Thermal water extraction + NatGas storage)	N2O	0.000	0.000	0.00%	99.99%
2B1 Ammonia Production	CH4	0.000	0.000	0.00%	99.99%
2B1 Ammonia Production	N2O	0.000	0.000	0.00%	99.99%
2B8 Petrochemical and carbon black production	N2O	0.000	0.000	0.00%	99.99%

CRF code + note	Direct Greenhouse Gas	Base Year Emission [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
2C1 Iron and Steel Production	N2O	0.000	0.000	0.00%	99.99%
2C2 Ferroalloys Production	CH4	0.000	0.000	0.00%	99.99%
2C2 Ferroalloys Production	CO2	0.000	0.000	0.00%	99.99%
2C2 Ferroalloys Production	N2O	0.000	0.000	0.00%	99.99%
2C3 Aluminium Production	CH4	0.000	0.000	0.00%	99.99%
2C3 Aluminium Production	CO2	0.000	0.000	0.00%	99.99%
2C3 Aluminium Production	N2O	0.000	0.000	0.00%	99.99%
2C3 Aluminium Production	PFC	0.000	0.000	0.00%	99.99%
2D Non-energy products from fuels and solvent use	CH4	0.000	0.000	0.00%	99.99%
2E Electronics industry - SF6	SF6	0.000	0.000	0.00%	99.99%
2F5Solvent - HFC+PFC	Aggregate F-gases	0.000	0.000	0.00%	99.99%
3D Agricultural Soils	CH4	0.000	0.000	0.00%	99.99%
3J Other (please specify)	CH4	0.000	0.000	0.00%	99.99%
3J Other (please specify)	CO2	0.000	0.000	0.00%	99.99%
3J Other (please specify)	N2O	0.000	0.000	0.00%	99.99%
4(I) Direct N2O emissions from N inputs to managed soils - N2O	N2O	0.000	0.000	0.00%	99.99%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CH4	CH4	0.000	0.000	0.00%	99.99%
4(V) Biomass Burning - CO2	CO2	0.000	0.000	0.00%	99.99%
4C1 Grassland Remaining Grassland - CO2	CO2	0.000	0.000	0.00%	99.99%
4D12 Flooded Land Remaining Flooded Land - CO2	CO2	0.000	0.000	0.00%	99.99%
4D13 Other Wetlands Remaining Other Wetlands - CO2	CO2	0.000	0.000	0.00%	99.99%
4D2 Land Converted to Wetlands - CO2	CO2	-3.998	3.998	0.01%	100.00%
4E1 Settlements Remaining Settlements - CO2	CO2	0.000	0.000	0.00%	100.00%
4F1 Other Land Remaining Other Land - CO2	CO2	0.000	0.000	0.00%	100.00%
4H Other - CH4	CH4	0.000	0.000	0.00%	100.00%
4H Other - CO2	CO2	0.000	0.000	0.00%	100.00%
4H Other - N2O	N2O	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	CO2	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	N2O	0.000	0.000	0.00%	100.00%
5B Biological Treatment of Solid Waste	CO2	0.000	0.000	0.00%	100.00%
5D Wastewater Treatment and Discharge	CO2	0.000	0.000	0.00%	100.00%
5E Other	CH4	0.000	0.000	0.00%	100.00%
5E Other	CO2	0.000	0.000	0.00%	100.00%
5E Other	<b>N2O</b>	0.000	0.000	0.00%	100.00%

**Table A1-3** Tier1 trend assessment including LULUCF

CRF code + note	Direct Greenhouse Gas	Base Year Emission	Current Year Emission	Trend Assessment	% Contribution to Trend	Cumulative Total %
		[Gg CO2-eq]	[Gg CO2-eq]			
1A3b Road transport - All Fuels	CO2	7153.758	14197.138	0.090	18.46%	18.46%
1A4 Other sectors - Gaseous fuels	CO2	3988.180	9415.307	0.063	12.97%	31.43%
1A4 Other sectors - Solid fuels	CO2	12499.719	313.905	0.056	11.56%	42.99%
2B2 Nitric Acid Production	N2O	4365.708	32.114	0.020	4.18%	47.16%
1A1 Energy Industries - Gaseous fuels	CO2	5731.212	5435.092	0.020	4.16%	51.33%
1A1 Energy Industries - Liquid fuels	CO2	5880.181	972.364	0.019	3.96%	55.29%
1A4 Other sectors - Liquid fuels	CO2	6947.452	1560.836	0.019	3.94%	59.24%
1A1 Energy Industries - Solid fuels	CO2	14335.744	5760.113	0.018	3.60%	62.83%
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	0.000	1965.572	0.017	3.52%	66.35%
5A Solid waste disposal	CH4	2094.363	2926.557	0.016	3.20%	69.55%
1A2 Manufacturing industries - Gaseous fuels	CO2	8774.225	3108.804	0.014	2.95%	72.50%
1A2 Manufacturing industries - Solid fuels	CO2	3318.741	452.969	0.012	2.41%	74.91%
2C1 Iron and Steel Production	CO2	4578.589	1218.101	0.011	2.26%	77.17%
4A2 Land Converted to Forest Land - CO2	CO2	-40.605	-1196.593	0.010	2.03%	79.20%
1A2 Manufacturing industries - Liquid fuels	CO2	4241.621	1187.511	0.010	1.99%	81.19%
2B8 Petrochemical and carbon black production	CO2	571.259	1306.629	0.009	1.78%	82.97%
3.D.1 Direct N2O Emissions From Managed Soils	N2O	4696.032	3461.424	0.008	1.64%	84.61%
1B1 Solid fuels	CH4	1598.878	31.737	0.007	1.49%	86.11%
4A1 Forest Land Remaining Forest Land - CO2	CO2	-2570.185	-4421.338	0.006	1.21%	87.31%
1B2b Natural Gas	CH4	1825.315	1495.892	0.004	0.91%	88.22%
4B1 Cropland Remaining Cropland - CO2	CO2	157.955	-397.073	0.004	0.86%	89.08%
1A4 Other sectors - Solid fuels	CH4	870.794	22.634	0.004	0.80%	89.89%
1A2 Manufacturing industries - Other fossil fuels	CO2	0.000	366.460	0.003	0.66%	90.54%
1A4 Other sectors - Biomass	CH4	153.200	409.735	0.003	0.58%	91.12%
4G Harvested Wood Products - CO2	CO2	-406.399	-282.295	0.003	0.55%	91.68%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CO2	CO2	872.819	182.214	0.003	0.52%	92.20%
1A3c Railways - All Fuels	CO2	753.734	120.573	0.003	0.52%	92.72%
4B2 Land Converted to Cropland - CO2	CO2	15.933	288.721	0.002	0.50%	93.22%
4E2 Land Converted to Settlements - CO2	CO2	62.115	280.585	0.002	0.44%	93.66%
5D Wastewater Treatment and Discharge	CH4	868.473	238.001	0.002	0.42%	94.07%
3A Enteric Fermentation	CH4	4151.358	2048.341	0.002	0.36%	94.44%
2C3 Aluminium Production	PFC	371.080	0.000	0.002	0.36%	94.80%
1A1 Energy Industries - Other fossil fuels	CO2	49.453	218.121	0.002	0.34%	95.14%
1B2c Venting and flaring	CO2	571.059	124.014	0.002	0.33%	95.47%
2A2 Lime Production	CO2	606.787	144.621	0.002	0.33%	95.80%
2G Other Product Manufacture and Use - N2O	N2O	7.292	177.447	0.002	0.31%	96.11%

CRF code + note	Direct Greenhouse Gas	Base Year Emission	Current Year Emission	Trend Assessment	% Contribution to Trend	Cumulative Total %
		[Gg CO <sub>2</sub> -eq]	[Gg CO <sub>2</sub> -eq]			
1A3d Domestic navigation - All Liquid fuels	CO2	340.566	15.858	0.001	0.30%	96.41%
1A4 Other sectors - Other Fossil Fuels	CO2	0.000	157.245	0.001	0.28%	96.69%
2B1 Ammonia Production	CO2	1714.647	1081.222	0.001	0.27%	96.96%
2F2Foam Blowing - HFC	Aggregate F-gases	0.000	128.794	0.001	0.23%	97.19%
1A3b Road transport - All Fuels	N2O	56.290	150.502	0.001	0.21%	97.41%
5B Biological Treatment of Solid Waste	CH4	5.000	113.673	0.001	0.20%	97.61%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO2	154.383	172.154	0.001	0.16%	97.77%
2A1 Cement Production	CO2	1744.645	1022.863	0.001	0.14%	97.90%
2C3 Aluminium Production	CO2	125.372	0.000	0.001	0.12%	98.03%
3I Other carboncontaining fertilizers	CO2	48.108	92.625	0.001	0.12%	98.14%
1B2c Venting and flaring	CH4	165.905	25.204	0.001	0.12%	98.26%
3G Liming	CO2	130.209	8.264	0.001	0.11%	98.37%
4C2 Land Converted to Grassland - CO2	CO2	-14.403	-79.576	0.001	0.10%	98.48%
1A4 Other sectors - Biomass	N2O	24.349	65.131	0.000	0.09%	98.57%
1B2aOil	CH4	194.562	54.428	0.000	0.09%	98.66%
3B Manure Management	N2O	929.092	462.955	0.000	0.07%	98.73%
5B Biological Treatment of Solid Waste	N2O	3.576	41.603	0.000	0.07%	98.80%
1A5a Stationary	CO2	0.000	39.423	0.000	0.07%	98.87%
2F4Aerosol + MDI - HFC	Aggregate F-gases	0.000	35.017	0.000	0.06%	98.94%
3.D.2 Indirect N2O Emissions From Managed Soils	N2O	448.973	275.119	0.000	0.06%	98.99%
1A3c Railways - All Fuels	N2O	84.020	13.842	0.000	0.06%	99.05%
2B8 Petrochemical and carbon black production	CH4	20.398	42.712	0.000	0.06%	99.11%
1A4 Other sectors - Solid fuels	N2O	57.483	1.376	0.000	0.05%	99.16%
1A1 Energy Industries - Biomass	N2O	0.937	29.525	0.000	0.05%	99.21%
4(III)Direct N2O emissions from N mineralization/immobilization - N2O	N2O	4.518	28.848	0.000	0.05%	99.26%
3C Rice Cultivation	CH4	81.231	17.874	0.000	0.05%	99.31%
3F Field Burning of Agricultural Residues	CH4	46.394	0.235	0.000	0.04%	99.35%
3B Manure Management	CH4	1243.246	649.886	0.000	0.04%	99.39%
4C1 Grassland Remaining Grassland - CO2	CO2	-15.462	0.000	0.000	0.04%	99.43%
5C Incineration and open burning of waste	CO2	96.879	30.697	0.000	0.04%	99.47%
2C2 Ferroalloys Production	CO2	40.240	0.000	0.000	0.04%	99.51%
2D Non-energy products from fuels and solvent use	CO2	221.821	99.533	0.000	0.04%	99.55%
1A1 Energy Industries - Biomass	CH4	0.589	18.586	0.000	0.03%	99.58%
1B2d Other (Thermal water extraction + NatGas storage)	CH4	94.911	69.084	0.000	0.03%	99.61%

CRF code + note	Direct Greenhouse Gas	Base Year Emission	Current Year Emission	Trend Assessment	% Contribution to Trend	Cumulative Total %
		[Gg CO2-eq]	[Gg CO2-eq]			
1A5b Mobile	CO2	14.501	25.197	0.000	0.03%	99.64%
2G Other Product Manufacture and Use - SF6	Aggregate F-gases	156.316	101.138	0.000	0.03%	99.67%
1A4 Other sectors - Gaseous fuels	CH4	8.966	21.177	0.000	0.03%	99.70%
1A1 Energy Industries - Solid fuels	N2O	63.363	18.396	0.000	0.03%	99.73%
1A2 Manufacturing industries - Biomass	N2O	0.902	12.098	0.000	0.02%	99.75%
1A4 Other sectors - Liquid fuels	CH4	20.383	2.544	0.000	0.02%	99.77%
3H Urea application	CO2	229.035	115.944	0.000	0.01%	99.78%
3F Field Burning of Agricultural Residues	N2O	14.337	0.073	0.000	0.01%	99.80%
1A2 Manufacturing industries - Biomass	CH4	0.568	7.505	0.000	0.01%	99.81%
2F3 Fire extinguishers - HFC	Aggregate F-gases	0.000	7.197	0.000	0.01%	99.82%
1B1 Solid fuels	CO2	3.603	9.019	0.000	0.01%	99.83%
1A2 Manufacturing industries - Other fossil fuels	N2O	0.000	6.072	0.000	0.01%	99.85%
1A1 Energy Industries - Liquid fuels	N2O	12.527	0.941	0.000	0.01%	99.86%
1A3a Domestic aviation - All fuels	CO2	3.594	7.719	0.000	0.01%	99.87%
4D2 Land Converted to Wetlands - CO2	CO2	3.092	-3.998	0.000	0.01%	99.88%
1A3b Road transport - All Fuels	CH4	54.056	23.665	0.000	0.01%	99.89%
1A2 Manufacturing industries - Solid fuels	N2O	12.701	1.877	0.000	0.01%	99.90%
4D13 Other Wetlands Remaining Other Wetlands - CO2	CO2	-3.079	0.000	0.000	0.01%	99.90%
1A4 Other sectors - Gaseous fuels	N2O	2.138	5.049	0.000	0.01%	99.91%
1A2 Manufacturing industries - Other fossil fuels	CH4	0.000	3.821	0.000	0.01%	99.92%
4(IV) Indirect N2O Emissions from Managed Soils - N2O	N2O	0.912	4.307	0.000	0.01%	99.92%
1A2 Manufacturing industries - Solid fuels	CH4	7.161	0.427	0.000	0.01%	99.93%
2A4 Other Process Uses of Carbonates	CO2	453.290	248.794	0.000	0.01%	99.94%
4(V) Biomass Burning - N2O	N2O	15.739	11.285	0.000	0.00%	99.94%
4(V) Biomass Burning - CH4	CH4	24.718	16.034	0.000	0.00%	99.95%
1A1 Energy Industries - Other fossil fuels	N2O	0.937	3.090	0.000	0.00%	99.95%
1B2a Oil	CO2	5.569	0.563	0.000	0.00%	99.95%
1A1 Energy Industries - Liquid fuels	CH4	5.387	0.554	0.000	0.00%	99.96%
1A2 Manufacturing industries - Liquid fuels	N2O	13.981	9.929	0.000	0.00%	99.96%
1A4 Other sectors - Other Fossil Fuels	N2O	0.000	2.049	0.000	0.00%	99.97%
1A2 Manufacturing industries - Liquid fuels	CH4	4.341	0.503	0.000	0.00%	99.97%
2A3 Glass production	CO2	87.625	49.340	0.000	0.00%	99.97%
5D Wastewater Treatment and Discharge	N2O	154.872	85.570	0.000	0.00%	99.98%
1A1 Energy Industries - Other fossil fuels	CH4	0.589	1.764	0.000	0.00%	99.98%
1A3d Domestic navigation - All Liquid fuels	N2O	2.867	0.127	0.000	0.00%	99.98%
1A4 Other sectors - Other Fossil Fuels	CH4	0.000	1.289	0.000	0.00%	99.98%

CRF code + note	Direct Greenhouse Gas	Base Year Emission [Gg CO2-eq]	Current Year Emission [Gg CO2-eq]	Trend Assessment	% Contribution to Trend	Cumulative Total %
1A1 Energy Industries - Gaseous fuels	N2O	3.069	2.903	0.000	0.00%	99.99%
2C1 Iron and Steel Production	CH4	10.886	4.714	0.000	0.00%	99.99%
1A1 Energy Industries - Gaseous fuels	CH4	2.575	2.436	0.000	0.00%	99.99%
1A2 Manufacturing industries - Gaseous fuels	N2O	4.703	1.660	0.000	0.00%	99.99%
1A2 Manufacturing industries - Gaseous fuels	CH4	3.945	1.393	0.000	0.00%	99.99%
1A1 Energy Industries - Solid fuels	CH4	3.592	1.242	0.000	0.00%	99.99%
1B2b Natural Gas	CO2	2.278	0.682	0.000	0.00%	99.99%
5C Incineration and open burning of waste	N2O	1.638	0.457	0.000	0.00%	100.00%
1A3d Domestic navigation - All Liquid fuels	CH4	0.842	0.037	0.000	0.00%	100.00%
1A3c Railways - All Fuels	CH4	1.036	0.169	0.000	0.00%	100.00%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - N2O	N2O	0.143	0.357	0.000	0.00%	100.00%
1B2c Venting and flaring	N2O	0.893	0.257	0.000	0.00%	100.00%
1A4 Other sectors - Liquid fuels	N2O	29.314	15.666	0.000	0.00%	100.00%
4D11 Peat Extraction Remaining Peat Extraction - CO2	CO2	0.000	0.193	0.000	0.00%	100.00%
1A5b Mobile	N2O	0.119	0.206	0.000	0.00%	100.00%
2C2 Ferroalloys Production	CH4	0.252	0.000	0.000	0.00%	100.00%
5C Incineration and open burning of waste	CH4	0.397	0.111	0.000	0.00%	100.00%
1A5a Stationary	CH4	0.000	0.088	0.000	0.00%	100.00%
1A3a Domestic aviation - All fuels	N2O	0.030	0.065	0.000	0.00%	100.00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	0.083	0.092	0.000	0.00%	100.00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH4	0.069	0.077	0.000	0.00%	100.00%
1A5a Stationary	N2O	0.000	0.021	0.000	0.00%	100.00%
1B2d Other (Thermal water extraction + NatGas storage)	CO2	0.039	0.013	0.000	0.00%	100.00%
1A5b Mobile	CH4	0.002	0.004	0.000	0.00%	100.00%
4F2 Land Converted to Other Land - CO2	CO2	0.000	0.002	0.000	0.00%	100.00%
1A3a Domestic aviation - All fuels	CH4	0.001	0.001	0.000	0.00%	100.00%
1A1 Energy Industries - Peat	CH4	0.000	0.000	0.000	0.00%	100.00%
1A1 Energy Industries - Peat	N2O	0.000	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Peat	CH4	0.000	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Peat	N2O	0.000	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	CH4	0.000	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	CO2	0.000	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	N2O	0.000	0.000	0.000	0.00%	100.00%
1B2b Natural Gas	N2O	0.000	0.000	0.000	0.00%	100.00%
1B2d Other (Thermal water extraction + NatGas storage)	N2O	0.000	0.000	0.000	0.00%	100.00%

CRF code + note	Direct Greenhouse Gas	Base Year Emission [Gg CO2-eq]	Current Year Emission [Gg CO2-eq]	Trend Assessment	% Contribution to Trend	Cumulative Total %
2B1 Ammonia Production	CH4	0.000	0.000	0.000	0.00%	100.00%
2B1 Ammonia Production	N2O	0.000	0.000	0.000	0.00%	100.00%
2B8 Petrochemical and carbon black production	N2O	0.000	0.000	0.000	0.00%	100.00%
2C1 Iron and Steel Production	N2O	0.000	0.000	0.000	0.00%	100.00%
2C2 Ferroalloys Production	N2O	0.000	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	CH4	0.000	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	N2O	0.000	0.000	0.000	0.00%	100.00%
2D Non-energy products from fuels and solvent use	CH4	0.000	0.000	0.000	0.00%	100.00%
2E Electronics industry - SF6	SF6	0.000	0.000	0.000	0.00%	100.00%
2F5 Solvent - HFC+PFC	Aggregate F-gases	0.000	0.000	0.000	0.00%	100.00%
3D Agricultural Soils	CH4	0.000	0.000	0.000	0.00%	100.00%
3J Other (please specify)	CH4	0.000	0.000	0.000	0.00%	100.00%
3J Other (please specify)	CO2	0.000	0.000	0.000	0.00%	100.00%
3J Other (please specify)	N2O	0.000	0.000	0.000	0.00%	100.00%
4(I) Direct N2O emissions from N inputs to managed soils - N2O	N2O	0.000	0.000	0.000	0.00%	100.00%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CH4	CH4	0.000	0.000	0.000	0.00%	100.00%
4(V) Biomass Burning - CO2	CO2	0.000	0.000	0.000	0.00%	100.00%
4D12 Flooded Land Remaining Flooded Land - CO2	CO2	0.000	0.000	0.000	0.00%	100.00%
4E1 Settlements Remaining Settlements - CO2	CO2	0.000	0.000	0.000	0.00%	100.00%
4F1 Other Land Remaining Other Land - CO2	CO2	0.000	0.000	0.000	0.00%	100.00%
4H Other - CH4	CH4	0.000	0.000	0.000	0.00%	100.00%
4H Other - CO2	CO2	0.000	0.000	0.000	0.00%	100.00%
4H Other - N2O	N2O	0.000	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	CO2	0.000	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	N2O	0.000	0.000	0.000	0.00%	100.00%
5B Biological Treatment of Solid Waste	CO2	0.000	0.000	0.000	0.00%	100.00%
5D Wastewater Treatment and Discharge	CO2	0.000	0.000	0.000	0.00%	100.00%
5E Other	CH4	0.000	0.000	0.000	0.00%	100.00%
5E Other	CO2	0.000	0.000	0.000	0.00%	100.00%
5E Other	N2O	0.000	0.000	0.000	0.00%	100.00%

**Table A1-4** Tier 1 level assessment excluding LULUCF (2019)

Category	Direct Greenhouse Gas	Base Year Emission excluding LULUCF [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
1A3b Road transport - All Fuels	CO2	14197.138	14197.138	22.03%	22.03%
1A4 Other sectors - Gaseous fuels	CO2	9415.307	9415.307	14.61%	36.65%
1A1 Energy Industries - Solid fuels	CO2	5760.113	5760.113	8.94%	45.59%
1A1 Energy Industries - Gaseous fuels	CO2	5435.092	5435.092	8.44%	54.02%
3.D.1 Direct N2O Emissions From Managed Soils	N2O	3461.424	3461.424	5.37%	59.39%
1A2 Manufacturing industries - Gaseous fuels	CO2	3108.804	3108.804	4.82%	64.22%
5A Solid waste disposal	CH4	2926.557	2926.557	4.54%	68.76%
3A Enteric Fermentation	CH4	2048.341	2048.341	3.18%	71.94%
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	1965.572	1965.572	3.05%	74.99%
1A4 Other sectors - Liquid fuels	CO2	1560.836	1560.836	2.42%	77.41%
1B2b Natural Gas	CH4	1495.892	1495.892	2.32%	79.73%
2B8 Petrochemical and carbon black production	CO2	1306.629	1306.629	2.03%	81.76%
2C1 Iron and Steel Production	CO2	1218.101	1218.101	1.89%	83.65%
1A2 Manufacturing industries - Liquid fuels	CO2	1187.511	1187.511	1.84%	85.50%
2B1 Ammonia Production	CO2	1081.222	1081.222	1.68%	87.17%
2A1 Cement Production	CO2	1022.863	1022.863	1.59%	88.76%
1A1 Energy Industries - Liquid fuels	CO2	972.364	972.364	1.51%	90.27%
3B Manure Management	CH4	649.886	649.886	1.01%	91.28%
3B Manure Management	N2O	462.955	462.955	0.72%	92.00%
1A2 Manufacturing industries - Solid fuels	CO2	452.969	452.969	0.70%	92.70%
1A4 Other sectors - Biomass	CH4	409.735	409.735	0.64%	93.34%
1A2 Manufacturing industries - Other fossil fuels	CO2	366.460	366.460	0.57%	93.90%
1A4 Other sectors - Solid fuels	CO2	313.905	313.905	0.49%	94.39%
3.D.2 Indirect N2O Emissions From Managed Soils	N2O	275.119	275.119	0.43%	94.82%
2A4 Other Process Uses of Carbonates	CO2	248.794	248.794	0.39%	95.20%
5D Wastewater Treatment and Discharge	CH4	238.001	238.001	0.37%	95.57%
1A1 Energy Industries - Other fossil fuels	CO2	218.121	218.121	0.34%	95.91%
2G Other Product Manufacture and Use - N2O	N2O	177.447	177.447	0.28%	96.19%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO2	172.154	172.154	0.27%	96.46%
1A4 Other sectors - Other Fossil Fuels	CO2	157.245	157.245	0.24%	96.70%
1A3b Road transport - All Fuels	N2O	150.502	150.502	0.23%	96.93%
2A2 Lime Production	CO2	144.621	144.621	0.22%	97.16%
2F2 Foam Blowing - HFC	Aggregate F-gases	128.794	128.794	0.20%	97.36%
1B2c Venting and flaring	CO2	124.014	124.014	0.19%	97.55%
1A3c Railways - All Fuels	CO2	120.573	120.573	0.19%	97.74%
3H Urea application	CO2	115.944	115.944	0.18%	97.92%

Category	Direct Greenhouse Gas	Base Year Emission excluding LULUCF [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
5B Biological Treatment of Soild Waste	CH4	113.673	113.673	0.18%	98.09%
2G Other Product Manufacture and Use - SF6	Aggregate F-gases	101.138	101.138	0.16%	98.25%
2D Non-energy products from fuels and solvent use	CO2	99.533	99.533	0.15%	98.40%
3I Other carboncontaining fertilizers	CO2	92.625	92.625	0.14%	98.55%
5D Wastewater Treatment and Discharge	N2O	85.570	85.570	0.13%	98.68%
1B2d Other (Thermal water extraction + NatGas storage)	CH4	69.084	69.084	0.11%	98.79%
1A4 Other sectors - Biomass	N2O	65.131	65.131	0.10%	98.89%
1B2aOil	CH4	54.428	54.428	0.08%	98.97%
2A3 Glass production	CO2	49.340	49.340	0.08%	99.05%
2B8 Petrochemical and carbon black production	CH4	42.712	42.712	0.07%	99.12%
5B Biological Treatment of Soild Waste	N2O	41.603	41.603	0.06%	99.18%
1A5a Stationary	CO2	39.423	39.423	0.06%	99.24%
2F4Aerosol + MDI - HFC	Aggregate F-gases	35.017	35.017	0.05%	99.30%
2F3Fire extinguishers - HFC	Aggregate F-gases	7.197	7.197	0.01%	99.31%
2B2 Nitric Acid Production	N2O	32.114	32.114	0.05%	99.36%
1B1 Solid fuels	CH4	31.737	31.737	0.05%	99.41%
5C Incineration and open burning of waste	CO2	30.697	30.697	0.05%	99.46%
1A1 Energy Industries - Biomass	N2O	29.525	29.525	0.05%	99.50%
1B2c Venting and flaring	CH4	25.204	25.204	0.04%	99.54%
1A5b Mobile	CO2	25.197	25.197	0.04%	99.58%
1A3b Road trasport - All Fuels	CH4	23.665	23.665	0.04%	99.62%
1A4 Other sectors - Solid fuels	CH4	22.634	22.634	0.04%	99.65%
1A4 Other sectors - Gaseous fuels	CH4	21.177	21.177	0.03%	99.68%
1A1 Energy Industries - Biomass	CH4	18.586	18.586	0.03%	99.71%
1A1 Energy Industries - Solid fuels	N2O	18.396	18.396	0.03%	99.74%
3C Rice Cultivation	CH4	17.874	17.874	0.03%	99.77%
1A3d Domestic navigation - All Liquid fuels	CO2	15.858	15.858	0.02%	99.79%
1A4 Other sectors - Liquid fuels	N2O	15.666	15.666	0.02%	99.82%
1A3c Railways - All Fuels	N2O	13.842	13.842	0.02%	99.84%
1A2 Manufacturing industries - Biomass	N2O	12.098	12.098	0.02%	99.86%
1A2 Manufacturing industries - Liquid fuels	N2O	9.929	9.929	0.02%	99.87%
1B1 Solid fuels	CO2	9.019	9.019	0.01%	99.89%
1A3a Domestic aviation - All fuels	CO2	7.719	7.719	0.01%	99.90%
1A2 Manufacturing industries - Biomass	CH4	7.505	7.505	0.01%	99.91%
3G Liming	CO2	8.264	8.264	0.01%	99.92%
1A2 Manufacturing industries - Other fossil fuels	N2O	6.072	6.072	0.01%	99.93%
1A4 Other sectors - Gaseous fuels	N2O	5.049	5.049	0.01%	99.94%
2C1 Iron and Steel Production	CH4	4.714	4.714	0.01%	99.95%
1A2 Manufacturing industries - Other fossil fuels	CH4	3.821	3.821	0.01%	99.95%

Category	Direct Greenhouse Gas	Base Year Emission excluding LULUCF [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
1A1 Energy Industries - Other fossil fuels	N2O	3.090	3.090	0.00%	99.96%
1A2 Manufacturing industries - Gaseous fuels	CH4	1.393	1.393	0.00%	99.96%
1A1 Energy Industries - Gaseous fuels	N2O	2.903	2.903	0.00%	99.97%
1A4 Other sectors - Liquid fuels	CH4	2.544	2.544	0.00%	99.97%
1A1 Energy Industries - Gaseous fuels	CH4	2.436	2.436	0.00%	99.97%
1A4 Other sectors - Other Fossil Fuels	N2O	2.049	2.049	0.00%	99.98%
1A1 Energy Industries - Other fossil fuels	CH4	1.764	1.764	0.00%	99.98%
1A2 Manufacturing industries - Gaseous fuels	N2O	1.660	1.660	0.00%	99.98%
1A2 Manufacturing industries - Solid fuels	N2O	1.877	1.877	0.00%	99.99%
1A4 Other sectors - Solid fuels	N2O	1.376	1.376	0.00%	99.99%
1A2 Manufacturing industries - Solid fuels	CH4	0.427	0.427	0.00%	99.99%
1A4 Other sectors - Other Fossil Fuels	CH4	1.289	1.289	0.00%	99.99%
1A1 Energy Industries - Solid fuels	CH4	1.242	1.242	0.00%	99.99%
1A1 Energy Industries - Liquid fuels	N2O	0.941	0.941	0.00%	99.99%
1B2b Natural Gas	CO2	0.682	0.682	0.00%	99.99%
1B2aOil	CO2	0.563	0.563	0.00%	100.00%
1A1 Energy Industries - Liquid fuels	CH4	0.554	0.554	0.00%	100.00%
1A2 Manufacturing industries - Liquid fuels	CH4	0.503	0.503	0.00%	100.00%
5C Incineration and open burning of waste	N2O	0.457	0.457	0.00%	100.00%
1B2c Venting and flaring	N2O	0.257	0.257	0.00%	100.00%
3F Field Burning of Agricultural Residues	CH4	0.235	0.235	0.00%	100.00%
1A5b Mobile	N2O	0.206	0.206	0.00%	100.00%
1A3c Railways - All Fuels	CH4	0.169	0.169	0.00%	100.00%
1A3d Domestic navigation - All Liquid fuels	N2O	0.127	0.127	0.00%	100.00%
5C Incineration and open burning of waste	CH4	0.111	0.111	0.00%	100.00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	0.092	0.092	0.00%	100.00%
1A5a Stationary	CH4	0.088	0.088	0.00%	100.00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH4	0.077	0.077	0.00%	100.00%
3F Field Burning of Agricultural Residues	N2O	0.073	0.073	0.00%	100.00%
1A3a Domestic aviation - All fuels	N2O	0.065	0.065	0.00%	100.00%
1A3d Domestic navigation - All Liquid fuels	CH4	0.037	0.037	0.00%	100.00%
1A5a Stationary	N2O	0.021	0.021	0.00%	100.00%
1B2d Other (Thermal water extraction + NatGas storage)	CO2	0.013	0.013	0.00%	100.00%
1A5b Mobile	CH4	0.004	0.004	0.00%	100.00%
1A3a Domestic aviation - All fuels	CH4	0.001	0.001	0.00%	100.00%
1A1 Energy Industries - Peat	CH4	0.000	0.000	0.00%	100.00%
1A1 Energy Industries - Peat	N2O	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Peat	CH4	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Peat	N2O	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	CH4	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	CO2	0.000	0.000	0.00%	100.00%

Category	Direct Greenhouse Gas	Base Year Emission excluding LULUCF [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
1A3d Domestic navigation - Gaseous fuels	N2O	0.000	0.000	0.00%	100.00%
1B2b Natural Gas	N2O	0.000	0.000	0.00%	100.00%
1B2d Other (Thermal water extraction + NatGas storage)	N2O	0.000	0.000	0.00%	100.00%
2B1 Ammonia Production	CH4	0.000	0.000	0.00%	100.00%
2B1 Ammonia Production	N2O	0.000	0.000	0.00%	100.00%
2B8 Petrochemical and carbon black production	N2O	0.000	0.000	0.00%	100.00%
2C1 Iron and Steel Production	N2O	0.000	0.000	0.00%	100.00%
2C2 Ferroalloys Production	CH4	0.000	0.000	0.00%	100.00%
2C2 Ferroalloys Production	CO2	0.000	0.000	0.00%	100.00%
2C2 Ferroalloys Production	N2O	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	CH4	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	CO2	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	N2O	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	PFC	0.000	0.000	0.00%	100.00%
2D Non-energy products from fuels and solvent use	CH4	0.000	0.000	0.00%	100.00%
2E Electronics industry - SF6	SF6	0.000	0.000	0.00%	100.00%
2F5Solvent - HFC+PFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%
3D Agricultural Soils	CH4	0.000	0.000	0.00%	100.00%
3J Other (please specify)	CH4	0.000	0.000	0.00%	100.00%
3J Other (please specify)	CO2	0.000	0.000	0.00%	100.00%
3J Other (please specify)	N2O	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	CO2	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	N2O	0.000	0.000	0.00%	100.00%
5B Biological Treatment of Soild Waste	CO2	0.000	0.000	0.00%	100.00%
5D Wastewater Treatment and Discharge	CO2	0.000	0.000	0.00%	100.00%
5E Other	CH4	0.000	0.000	0.00%	100.00%
5E Other	CO2	0.000	0.000	0.00%	100.00%
5E Other	N2O	0.000	0.000	0.00%	100.00%

**Table A1-5** Tier1 trend assessment excluding LULUCF

CRF code + note	Direct Greenhouse Gas	Base Years Emission [Gg CO <sub>2</sub> -eq]	Current Year Emission [Gg CO <sub>2</sub> -eq]	Trend Assesment	% Contribution to Trend	Cumulative Total %
1A3b Road transport - All Fuels	CO2	7153.758	14197.138	0.091	18.44%	18.44%
1A4 Other sectors - Gaseous fuels	CO2	3988.180	9415.307	0.064	13.04%	31.49%
1A4 Other sectors - Solid fuels	CO2	12499.719	313.905	0.063	12.83%	44.32%
1A1 Energy Industries - Solid fuels	CO2	14335.744	5760.113	0.024	4.78%	49.10%
2B2 Nitric Acid Production	N2O	4365.708	32.114	0.023	4.63%	53.73%
1A4 Other sectors - Liquid fuels	CO2	6947.452	1560.836	0.023	4.58%	58.31%
1A1 Energy Industries - Liquid fuels	CO2	5880.181	972.364	0.022	4.52%	62.83%
1A1 Energy Industries - Gaseous fuels	CO2	5731.212	5435.092	0.019	3.85%	66.68%
1A2 Manufacturing industries - Gaseous fuels	CO2	8774.225	3108.804	0.018	3.70%	70.38%
2F1Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	0.000	1965.572	0.018	3.62%	73.99%
5A Solid waste disposal	CH4	2094.363	2926.557	0.015	3.14%	77.13%
1A2 Manufacturing industries - Solid fuels	CO2	3318.741	452.969	0.013	2.73%	79.86%
2C1 Iron and Steel Production	CO2	4578.589	1218.101	0.013	2.67%	82.53%
1A2 Manufacturing industries - Liquid fuels	CO2	4241.621	1187.511	0.012	2.37%	84.90%
2B8 Petrochemical and carbon black production	CO2	571.259	1306.629	0.009	1.79%	86.69%
1B1 Solid fuels	CH4	1598.878	31.737	0.008	1.66%	88.34%
3.D.1 Direct N2O Emissions From Managed Soils	N2O	4696.032	3461.424	0.007	1.33%	89.67%
1A4 Other sectors - Solid fuels	CH4	870.794	22.634	0.004	0.89%	90.57%
1B2b Natural Gas	CH4	1825.315	1495.892	0.004	0.79%	91.36%
3A Enteric Fermentation	CH4	4151.358	2048.341	0.003	0.69%	92.05%
1A2 Manufacturing industries - Other fossil fuels	CO2	0.000	366.460	0.003	0.67%	92.72%
1A4 Other sectors - Biomass	CH4	153.200	409.735	0.003	0.59%	93.31%
1A3c Railways - All Fuels	CO2	753.734	120.573	0.003	0.59%	93.90%
5D Wastewater Treatment and Discharge	CH4	868.473	238.001	0.002	0.49%	94.39%
2C3 Aluminium Production	PFC	371.080	0.000	0.002	0.40%	94.79%
2A2 Lime Production	CO2	606.787	144.621	0.002	0.39%	95.17%
1B2c Venting and flaring	CO2	571.059	124.014	0.002	0.38%	95.56%
1A1 Energy Industries - Other fossil fuels	CO2	49.453	218.121	0.002	0.35%	95.91%
1A3d Domestic navigation - All Liquid fuels	CO2	340.566	15.858	0.002	0.34%	96.24%
2G Other Product Manufacture and Use - N2O	N2O	7.292	177.447	0.002	0.32%	96.56%
1A4 Other sectors - Other Fossil Fuels	CO2	0.000	157.245	0.001	0.29%	96.85%
2F2Foam Blowing - HFC	Aggregate F-gases	0.000	128.794	0.001	0.24%	97.09%
1A3b Road transport - All Fuels	N2O	56.290	150.502	0.001	0.22%	97.30%
5B Biological Treatment of Solid Waste	CH4	5.000	113.673	0.001	0.20%	97.51%

CRF code + note	Direct Greenhouse Gas	Base Years Emission [Gg CO <sub>2</sub> -eq]	Current Year Emission [Gg CO <sub>2</sub> -eq]	Trend Assessment	% Contribution to Trend	Cumulative Total %
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO <sub>2</sub>	154.383	172.154	0.001	0.15%	97.66%
2B1 Ammonia Production	CO <sub>2</sub>	1714.647	1081.222	0.001	0.15%	97.81%
3B Manure Management	N <sub>2</sub> O	929.092	462.955	0.001	0.15%	97.95%
3B Manure Management	CH <sub>4</sub>	1243.246	649.886	0.001	0.14%	98.09%
2C3 Aluminium Production	CO <sub>2</sub>	125.372	0.000	0.001	0.13%	98.23%
1B2c Venting and flaring	CH <sub>4</sub>	165.905	25.204	0.001	0.13%	98.36%
3G Liming	CO <sub>2</sub>	130.209	8.264	0.001	0.12%	98.48%
3I Other carboncontaining fertilizers	CO <sub>2</sub>	48.108	92.625	0.001	0.12%	98.60%
1B2aOil	CH <sub>4</sub>	194.562	54.428	0.001	0.11%	98.71%
1A4 Other sectors - Biomass	N <sub>2</sub> O	24.349	65.131	0.000	0.09%	98.80%
5B Biological Treatment of Soild Waste	N <sub>2</sub> O	3.576	41.603	0.000	0.07%	98.88%
1A5a Stationary	CO <sub>2</sub>	0.000	39.423	0.000	0.07%	98.95%
1A3c Railways - All Fuels	N <sub>2</sub> O	84.020	13.842	0.000	0.06%	99.01%
2F4Aerosol + MDI - HFC	Aggregate F-gases	0.000	35.017	0.000	0.06%	99.08%
1A4 Other sectors - Solid fuels	N <sub>2</sub> O	57.483	1.376	0.000	0.06%	99.14%
2B8 Petrochemical and carbon black production	CH <sub>4</sub>	20.398	42.712	0.000	0.06%	99.19%
2D Non-energy products from fuels and solvent use	CO <sub>2</sub>	221.821	99.533	0.000	0.05%	99.25%
3C Rice Cultivation	CH <sub>4</sub>	81.231	17.874	0.000	0.05%	99.30%
1A1 Energy Industries - Biomass	N <sub>2</sub> O	0.937	29.525	0.000	0.05%	99.36%
3F Field Burning of Agricultural Residues	CH <sub>4</sub>	46.394	0.235	0.000	0.05%	99.41%
5C Incineration and open burning of waste	CO <sub>2</sub>	96.879	30.697	0.000	0.05%	99.45%
2C2 Ferroalloys Production	CO <sub>2</sub>	40.240	0.000	0.000	0.04%	99.50%
1A1 Energy Industries - Solid fuels	N <sub>2</sub> O	63.363	18.396	0.000	0.03%	99.53%
1A1 Energy Industries - Biomass	CH <sub>4</sub>	0.589	18.586	0.000	0.03%	99.56%
3H Urea application	CO <sub>2</sub>	229.035	115.944	0.000	0.03%	99.60%
1A5b Mobile	CO <sub>2</sub>	14.501	25.197	0.000	0.03%	99.63%
1A4 Other sectors - Gaseous fuels	CH <sub>4</sub>	8.966	21.177	0.000	0.03%	99.66%
2A4 Other Process Uses of Carbonates	CO <sub>2</sub>	453.290	248.794	0.000	0.03%	99.69%
1B2d Other (Thermal water extraction + NatGas storage)	CH <sub>4</sub>	94.911	69.084	0.000	0.03%	99.71%
3.D.2 Indirect N <sub>2</sub> O Emissions From Managed Soils	N <sub>2</sub> O	448.973	275.119	0.000	0.02%	99.74%
1A2 Manufacturing industries - Biomass	N <sub>2</sub> O	0.902	12.098	0.000	0.02%	99.76%
2G Other Product Manufacture and Use - SF <sub>6</sub>	Aggregate F-gases	156.316	101.138	0.000	0.02%	99.77%
1A4 Other sectors - Liquid fuels	CH <sub>4</sub>	20.383	2.544	0.000	0.02%	99.79%
3F Field Burning of Agricultural Residues	N <sub>2</sub> O	14.337	0.073	0.000	0.02%	99.81%

CRF code + note	Direct Greenhouse Gas	Base Years Emission [Gg CO <sub>2</sub> -eq]	Current Year Emission [Gg CO <sub>2</sub> -eq]	Trend Assessment	% Contribution to Trend	Cumulative Total %
1A3b Road transport - All Fuels	CH4	54.056	23.665	0.000	0.01%	99.82%
2F3 Fire extinguishers - HFC	Aggregate F-gases	0.000	7.197	0.000	0.01%	99.83%
1A2 Manufacturing industries - Biomass	CH4	0.568	7.505	0.000	0.01%	99.85%
1B1 Solid fuels	CO2	3.603	9.019	0.000	0.01%	99.86%
1A1 Energy Industries - Liquid fuels	N2O	12.527	0.941	0.000	0.01%	99.87%
1A2 Manufacturing industries - Other fossil fuels	N2O	0.000	6.072	0.000	0.01%	99.88%
1A3a Domestic aviation - All fuels	CO2	3.594	7.719	0.000	0.01%	99.89%
1A2 Manufacturing industries - Solid fuels	N2O	12.701	1.877	0.000	0.01%	99.90%
2A1 Cement Production	CO2	1744.645	1022.863	0.000	0.01%	99.91%
5D Wastewater Treatment and Discharge	N2O	154.872	85.570	0.000	0.01%	99.92%
1A2 Manufacturing industries - Other fossil fuels	CH4	0.000	3.821	0.000	0.01%	99.93%
1A4 Other sectors - Gaseous fuels	N2O	2.138	5.049	0.000	0.01%	99.94%
1A2 Manufacturing industries - Solid fuels	CH4	7.161	0.427	0.000	0.01%	99.94%
1B2a Oil	CO2	5.569	0.563	0.000	0.00%	99.95%
1A1 Energy Industries - Liquid fuels	CH4	5.387	0.554	0.000	0.00%	99.95%
1A1 Energy Industries - Other fossil fuels	N2O	0.937	3.090	0.000	0.00%	99.96%
1A4 Other sectors - Other Fossil Fuels	N2O	0.000	2.049	0.000	0.00%	99.96%
1A2 Manufacturing industries - Liquid fuels	CH4	4.341	0.503	0.000	0.00%	99.97%
1A2 Manufacturing industries - Liquid fuels	N2O	13.981	9.929	0.000	0.00%	99.97%
2A3 Glass production	CO2	87.625	49.340	0.000	0.00%	99.97%
2C1 Iron and Steel Production	CH4	10.886	4.714	0.000	0.00%	99.98%
1A3d Domestic navigation - All Liquid fuels	N2O	2.867	0.127	0.000	0.00%	99.98%
1A4 Other sectors - Liquid fuels	N2O	29.314	15.666	0.000	0.00%	99.98%
1A1 Energy Industries - Other fossil fuels	CH4	0.589	1.764	0.000	0.00%	99.98%
1A4 Other sectors - Other Fossil Fuels	CH4	0.000	1.289	0.000	0.00%	99.99%
1A1 Energy Industries - Gaseous fuels	N2O	3.069	2.903	0.000	0.00%	99.99%
1A2 Manufacturing industries - Gaseous fuels	N2O	4.703	1.660	0.000	0.00%	99.99%
1A1 Energy Industries - Gaseous fuels	CH4	2.575	2.436	0.000	0.00%	99.99%
1A2 Manufacturing industries - Gaseous fuels	CH4	3.945	1.393	0.000	0.00%	99.99%
1A1 Energy Industries - Solid fuels	CH4	3.592	1.242	0.000	0.00%	99.99%
1B2b Natural Gas	CO2	2.278	0.682	0.000	0.00%	100.00%
5C Incineration and open burning of waste	N2O	1.638	0.457	0.000	0.00%	100.00%
1A3d Domestic navigation - All Liquid fuels	CH4	0.842	0.037	0.000	0.00%	100.00%
1A3c Railways - All Fuels	CH4	1.036	0.169	0.000	0.00%	100.00%
1B2c Venting and flaring	N2O	0.893	0.257	0.000	0.00%	100.00%

CRF code + note	Direct Greenhouse Gas	Base Years Emission [Gg CO2-eq]	Current Year Emission [Gg CO2-eq]	Trend Assessment	% Contribution to Trend	Cumulative Total %
2C2 Ferroalloys Production	CH4	0.252	0.000	0.000	0.00%	100.00%
1A5b Mobile	N2O	0.119	0.206	0.000	0.00%	100.00%
5C Incineration and open burning of waste	CH4	0.397	0.111	0.000	0.00%	100.00%
1A5a Stationary	CH4	0.000	0.088	0.000	0.00%	100.00%
1A3a Domestic aviation - All fuels	N2O	0.030	0.065	0.000	0.00%	100.00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	0.083	0.092	0.000	0.00%	100.00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH4	0.069	0.077	0.000	0.00%	100.00%
1A5a Stationary	N2O	0.000	0.021	0.000	0.00%	100.00%
1B2d Other (Thermal water extraction + NatGas storage)	CO2	0.039	0.013	0.000	0.00%	100.00%
1A5b Mobile	CH4	0.002	0.004	0.000	0.00%	100.00%
1A3a Domestic aviation - All fuels	CH4	0.001	0.001	0.000	0.00%	100.00%
1A1 Energy Industries - Peat	CH4	0.000	0.000	0.000	0.00%	100.00%
1A1 Energy Industries - Peat	N2O	0.000	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Peat	CH4	0.000	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Peat	N2O	0.000	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	CH4	0.000	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	CO2	0.000	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	N2O	0.000	0.000	0.000	0.00%	100.00%
1B2b Natural Gas	N2O	0.000	0.000	0.000	0.00%	100.00%
1B2d Other (Thermal water extraction + NatGas storage)	N2O	0.000	0.000	0.000	0.00%	100.00%
2B1 Ammonia Production	CH4	0.000	0.000	0.000	0.00%	100.00%
2B1 Ammonia Production	N2O	0.000	0.000	0.000	0.00%	100.00%
2B8 Petrochemical and carbon black production	N2O	0.000	0.000	0.000	0.00%	100.00%
2C1 Iron and Steel Production	N2O	0.000	0.000	0.000	0.00%	100.00%
2C2 Ferroalloys Production	N2O	0.000	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	CH4	0.000	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	N2O	0.000	0.000	0.000	0.00%	100.00%
2D Non-energy products from fuels and solvent use	CH4	0.000	0.000	0.000	0.00%	100.00%
2E Electronics industry - SF6	SF6	0.000	0.000	0.000	0.00%	100.00%
2F5Solvent - HFC+PFC	Aggregate F-gases	0.000	0.000	0.000	0.00%	100.00%
3D Agricultural Soils	CH4	0.000	0.000	0.000	0.00%	100.00%
3J Other (please specify)	CH4	0.000	0.000	0.000	0.00%	100.00%
3J Other (please specify)	CO2	0.000	0.000	0.000	0.00%	100.00%

CRF code + note	Direct Greenhouse Gas	Base Years Emission [Gg CO <sub>2</sub> -eq]	Current Year Emission [Gg CO <sub>2</sub> -eq]	Trend Assessment	% Contribution to Trend	Cumulative Total %
3J Other (please specify)	N <sub>2</sub> O	0.000	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	CO <sub>2</sub>	0.000	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	N <sub>2</sub> O	0.000	0.000	0.000	0.00%	100.00%
5B Biological Treatment of Solid Waste	CO <sub>2</sub>	0.000	0.000	0.000	0.00%	100.00%
5D Wastewater Treatment and Discharge	CO <sub>2</sub>	0.000	0.000	0.000	0.00%	100.00%
5E Other	CH <sub>4</sub>	0.000	0.000	0.000	0.00%	100.00%
5E Other	CO <sub>2</sub>	0.000	0.000	0.000	0.00%	100.00%
5E Other	N <sub>2</sub> O	0.000	0.000	0.000	0.00%	100.00%

**Table A1-6** Tier 1 level assessment including LULUCF (Base year)

Category	Direct Greenhouse Gas	Base Year Emission [Gg CO <sub>2</sub> -eq]	Emission in absolute value [Gg CO <sub>2</sub> -eq]	Level Assessment	Cumulative Total%
1A1 Energy Industries - Solid fuels	CO <sub>2</sub>	14335.744	14335.744	12.50%	12.50%
1A4 Other sectors - Solid fuels	CO <sub>2</sub>	12499.719	12499.719	10.90%	23.40%
1A2 Manufacturing industries - Gaseous fuels	CO <sub>2</sub>	8774.225	8774.225	7.65%	31.05%
1A3b Road transport - All Fuels	CO <sub>2</sub>	7153.758	7153.758	6.24%	37.29%
1A4 Other sectors - Liquid fuels	CO <sub>2</sub>	6947.452	6947.452	6.06%	43.35%
1A1 Energy Industries - Liquid fuels	CO <sub>2</sub>	5880.181	5880.181	5.13%	48.47%
1A1 Energy Industries - Gaseous fuels	CO <sub>2</sub>	5731.212	5731.212	5.00%	53.47%
3.D.1 Direct N <sub>2</sub> O Emissions From Managed Soils	N <sub>2</sub> O	4696.032	4696.032	4.09%	57.56%
2C1 Iron and Steel Production	CO <sub>2</sub>	4578.589	4578.589	3.99%	61.56%
2B2 Nitric Acid Production	N <sub>2</sub> O	4365.708	4365.708	3.81%	65.36%
1A2 Manufacturing industries - Liquid fuels	CO <sub>2</sub>	4241.621	4241.621	3.70%	69.06%
3A Enteric Fermentation	CH <sub>4</sub>	4151.358	4151.358	3.62%	72.68%
1A4 Other sectors - Gaseous fuels	CO <sub>2</sub>	3988.180	3988.180	3.48%	76.16%
1A2 Manufacturing industries - Solid fuels	CO <sub>2</sub>	3318.741	3318.741	2.89%	79.05%
4A1 Forest Land Remaining Forest Land - CO <sub>2</sub>	CO <sub>2</sub>	-2570.185	2570.185	2.24%	81.29%
5A Solid waste disposal	CH <sub>4</sub>	2094.363	2094.363	1.83%	83.12%
1B2b Natural Gas	CH <sub>4</sub>	1825.315	1825.315	1.59%	84.71%
2A1 Cement Production	CO <sub>2</sub>	1744.645	1744.645	1.52%	86.23%
2B1 Ammonia Production	CO <sub>2</sub>	1714.647	1714.647	1.50%	87.73%
1B1 Solid fuels	CH <sub>4</sub>	1598.878	1598.878	1.39%	89.12%
3B Manure Management	CH <sub>4</sub>	1243.246	1243.246	1.08%	90.21%
3B Manure Management	N <sub>2</sub> O	929.092	929.092	0.81%	91.02%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CO <sub>2</sub>	CO <sub>2</sub>	872.819	872.819	0.76%	91.78%
1A4 Other sectors - Solid fuels	CH <sub>4</sub>	870.794	870.794	0.76%	92.54%
5D Wastewater Treatment and Discharge	CH <sub>4</sub>	868.473	868.473	0.76%	93.29%
1A3c Railways - All Fuels	CO <sub>2</sub>	753.734	753.734	0.66%	93.95%
2A2 Lime Production	CO <sub>2</sub>	606.787	606.787	0.53%	94.48%
2B8 Petrochemical and carbon black production	CO <sub>2</sub>	571.259	571.259	0.50%	94.98%
1B2c Venting and flaring	CO <sub>2</sub>	571.059	571.059	0.50%	95.48%
2A4 Other Process Uses of Carbonates	CO <sub>2</sub>	453.290	453.290	0.40%	95.87%
3.D.2 Indirect N <sub>2</sub> O Emissions From Managed Soils	N <sub>2</sub> O	448.973	448.973	0.39%	96.26%
4G Harvested Wood Products - CO <sub>2</sub>	CO <sub>2</sub>	-406.399	406.399	0.35%	96.62%
2C3 Aluminium Production	PFC	371.080	371.080	0.32%	96.94%
1A3d Domestic navigation - All Liquid fuels	CO <sub>2</sub>	340.566	340.566	0.30%	97.24%
2D Non-energy products from fuels and solvent use	CO <sub>2</sub>	221.821	221.821	0.19%	97.43%
3H Urea application	CO <sub>2</sub>	229.035	229.035	0.20%	97.63%
1B2aOil	CH <sub>4</sub>	194.562	194.562	0.17%	97.80%

Category	Direct Greenhouse Gas	Base Year Emission [Gg CO <sub>2</sub> -eq]	Emission in absolute value [Gg CO <sub>2</sub> -eq]	Level Assessment	Cumulative Total%
1B2c Venting and flaring	CH <sub>4</sub>	165.905	165.905	0.14%	97.95%
4B1 Cropland Remaining Cropland - CO <sub>2</sub>	CO <sub>2</sub>	157.955	157.955	0.14%	98.08%
2G Other Product Manufacture and Use - N <sub>2</sub> O	N <sub>2</sub> O	156.316	156.316	0.14%	98.22%
5D Wastewater Treatment and Discharge	N <sub>2</sub> O	154.872	154.872	0.14%	98.35%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO <sub>2</sub>	154.383	154.383	0.13%	98.49%
1A4 Other sectors - Biomass	CH <sub>4</sub>	153.200	153.200	0.13%	98.62%
3G Liming	CO <sub>2</sub>	130.209	130.209	0.11%	98.74%
2C3 Aluminium Production	CO <sub>2</sub>	125.372	125.372	0.11%	98.85%
5C Incineration and open burning of waste	CO <sub>2</sub>	96.879	96.879	0.08%	98.93%
1B2d Other (Thermal water extraction + NatGas storage)	CH <sub>4</sub>	94.911	94.911	0.08%	99.01%
2A3 Glass production	CO <sub>2</sub>	87.625	87.625	0.08%	99.09%
1A3c Railways - All Fuels	N <sub>2</sub> O	84.020	84.020	0.07%	99.16%
3C Rice Cultivation	CH <sub>4</sub>	81.231	81.231	0.07%	99.23%
1A1 Energy Industries - Solid fuels	N <sub>2</sub> O	63.363	63.363	0.06%	99.29%
4E2 Land Converted to Settlements - CO <sub>2</sub>	CO <sub>2</sub>	62.115	62.115	0.05%	99.34%
1A4 Other sectors - Solid fuels	N <sub>2</sub> O	57.483	57.483	0.05%	99.39%
1A3b Road transport - All Fuels	N <sub>2</sub> O	56.290	56.290	0.05%	99.44%
1A3b Road transport - All Fuels	CH <sub>4</sub>	54.056	54.056	0.05%	99.49%
1A1 Energy Industries - Other fossil fuels	CO <sub>2</sub>	49.453	49.453	0.04%	99.53%
3I Other carboncontaining fertilizers	CO <sub>2</sub>	48.108	48.108	0.04%	99.57%
3F Field Burning of Agricultural Residues	CH <sub>4</sub>	46.394	46.394	0.04%	99.61%
4A2 Land Converted to Forest Land - CO <sub>2</sub>	CO <sub>2</sub>	-40.605	40.605	0.04%	99.65%
2C2 Ferroalloys Production	CO <sub>2</sub>	40.240	40.240	0.04%	99.69%
1A4 Other sectors - Liquid fuels	N <sub>2</sub> O	29.314	29.314	0.03%	99.71%
4(V) Biomass Burning - CH <sub>4</sub>	CH <sub>4</sub>	24.718	24.718	0.02%	99.73%
1A4 Other sectors - Biomass	N <sub>2</sub> O	24.349	24.349	0.02%	99.75%
2B8 Petrochemical and carbon black production	CH <sub>4</sub>	20.398	20.398	0.02%	99.77%
1A4 Other sectors - Liquid fuels	CH <sub>4</sub>	20.383	20.383	0.02%	99.79%
4B2 Land Converted to Cropland - CO <sub>2</sub>	CO <sub>2</sub>	15.933	15.933	0.01%	99.80%
4(V) Biomass Burning - N <sub>2</sub> O	N <sub>2</sub> O	15.739	15.739	0.01%	99.82%
4C1 Grassland Remaining Grassland - CO <sub>2</sub>	CO <sub>2</sub>	-15.462	15.462	0.01%	99.83%
1A5b Mobile	CO <sub>2</sub>	14.501	14.501	0.01%	99.84%
4C2 Land Converted to Grassland - CO <sub>2</sub>	CO <sub>2</sub>	-14.403	14.403	0.01%	99.86%
3F Field Burning of Agricultural Residues	N <sub>2</sub> O	14.337	14.337	0.01%	99.87%
1A2 Manufacturing industries - Liquid fuels	N <sub>2</sub> O	13.981	13.981	0.01%	99.88%
1A2 Manufacturing industries - Solid fuels	N <sub>2</sub> O	12.701	12.701	0.01%	99.89%
1A1 Energy Industries - Liquid fuels	N <sub>2</sub> O	12.527	12.527	0.01%	99.90%
2C1 Iron and Steel Production	CH <sub>4</sub>	10.886	10.886	0.01%	99.91%
1A4 Other sectors - Gaseous fuels	CH <sub>4</sub>	8.966	8.966	0.01%	99.92%
2G Other Product Manufacture and Use - SF <sub>6</sub>	Aggregate F-gases	7.292	7.292	0.01%	99.93%
1A2 Manufacturing industries - Solid fuels	CH <sub>4</sub>	7.161	7.161	0.01%	99.93%

Category	Direct Greenhouse Gas	Base Year Emission [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
1B2aOil	CO2	5.569	5.569	0.00%	99.94%
1A1 Energy Industries - Liquid fuels	CH4	5.387	5.387	0.00%	99.94%
5B Biological Treatment of Soild Waste	CH4	5.000	5.000	0.00%	99.95%
1A2 Manufacturing industries - Gaseous fuels	N2O	4.703	4.703	0.00%	99.95%
4(III)Direct N2O emissions from N mineralization/immobilization - N2O	N2O	4.518	4.518	0.00%	99.95%
1A2 Manufacturing industries - Liquid fuels	CH4	4.341	4.341	0.00%	99.96%
1A2 Manufacturing industries - Gaseous fuels	CH4	3.945	3.945	0.00%	99.96%
1B1 Solid fuels	CO2	3.603	3.603	0.00%	99.96%
1A3a Domestic aviation - All fuels	CO2	3.594	3.594	0.00%	99.97%
1A1 Energy Industries - Solid fuels	CH4	3.592	3.592	0.00%	99.97%
5B Biological Treatment of Soild Waste	N2O	3.576	3.576	0.00%	99.97%
4D2 Land Converted to Wetlands - CO2	CO2	3.092	3.092	0.00%	99.98%
4D13 Other Wetlands Remaining Other Wetlands - CO2	CO2	-3.079	3.079	0.00%	99.98%
1A1 Energy Industries - Gaseous fuels	N2O	3.069	3.069	0.00%	99.98%
1A3d Domestic navigation - All Liquid fuels	N2O	2.867	2.867	0.00%	99.98%
1A1 Energy Industries - Gaseous fuels	CH4	2.575	2.575	0.00%	99.99%
1B2b Natural Gas	CO2	2.278	2.278	0.00%	99.99%
1A4 Other sectors - Gaseous fuels	N2O	2.138	2.138	0.00%	99.99%
5C Incineration and open burning of waste	N2O	1.638	1.638	0.00%	99.99%
1A3c Railways - All Fuels	CH4	1.036	1.036	0.00%	99.99%
1A1 Energy Industries - Biomass	N2O	0.937	0.937	0.00%	99.99%
1A1 Energy Industries - Other fossil fuels	N2O	0.937	0.937	0.00%	99.99%
4(IV) Indirect N2O Emissions from Managed Soils - N2O	N2O	0.912	0.912	0.00%	100.00%
1A2 Manufacturing industries - Biomass	N2O	0.902	0.902	0.00%	100.00%
1B2c Venting and flaring	N2O	0.893	0.893	0.00%	100.00%
1A3d Domestic navigation - All Liquid fuels	CH4	0.842	0.842	0.00%	100.00%
1A1 Energy Industries - Biomass	CH4	0.589	0.589	0.00%	100.00%
1A1 Energy Industries - Other fossil fuels	CH4	0.589	0.589	0.00%	100.00%
1A2 Manufacturing industries - Biomass	CH4	0.568	0.568	0.00%	100.00%
5C Incineration and open burning of waste	CH4	0.397	0.397	0.00%	100.00%
2C2 Ferroalloys Production	CH4	0.252	0.252	0.00%	100.00%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - N2O	N2O	0.143	0.143	0.00%	100.00%
1A5b Mobile	N2O	0.119	0.119	0.00%	100.00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	0.083	0.083	0.00%	100.00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH4	0.069	0.069	0.00%	100.00%
1B2d Other (Thermal water extraction + NatGas storage)	CO2	0.039	0.039	0.00%	100.00%
1A3a Domestic aviation - All fuels	N2O	0.030	0.030	0.00%	100.00%
1A5b Mobile	CH4	0.002	0.002	0.00%	100.00%
1A3a Domestic aviation - All fuels	CH4	0.001	0.001	0.00%	100.00%

Category	Direct Greenhouse Gas	Base Year Emission [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
1A1 Energy Industries - Peat	CH4	0.000	0.000	0.00%	100.00%
1A1 Energy Industries - Peat	N2O	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Other fossil fuels	CH4	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Other fossil fuels	CO2	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Other fossil fuels	N2O	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Peat	CH4	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Peat	N2O	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	CH4	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	CO2	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	N2O	0.000	0.000	0.00%	100.00%
1A4 Other sectors - Other Fossil Fuels	CH4	0.000	0.000	0.00%	100.00%
1A4 Other sectors - Other Fossil Fuels	CO2	0.000	0.000	0.00%	100.00%
1A4 Other sectors - Other Fossil Fuels	N2O	0.000	0.000	0.00%	100.00%
1A5a Stationary	CH4	0.000	0.000	0.00%	100.00%
1A5a Stationary	CO2	0.000	0.000	0.00%	100.00%
1A5a Stationary	N2O	0.000	0.000	0.00%	100.00%
1B2b Natural Gas	N2O	0.000	0.000	0.00%	100.00%
1B2d Other (Thermal water extraction + NatGas storage)	N2O	0.000	0.000	0.00%	100.00%
2B1 Ammonia Production	CH4	0.000	0.000	0.00%	100.00%
2B1 Ammonia Production	N2O	0.000	0.000	0.00%	100.00%
2B8 Petrochemical and carbon black production	N2O	0.000	0.000	0.00%	100.00%
2C1 Iron and Steel Production	N2O	0.000	0.000	0.00%	100.00%
2C2 Ferroalloys Production	N2O	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	CH4	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	N2O	0.000	0.000	0.00%	100.00%
2D Non-energy products from fuels and solvent use	CH4	0.000	0.000	0.00%	100.00%
2E Electronics industry - SF6	SF6	0.000	0.000	0.00%	100.00%
2F1Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%
2F2Foam Blowing - HFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%
2F3Fire extinguishers - HFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%
2F4Aerosol + MDI - HFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%
2F5Solvent - HFC+PFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%
3D Agricultural Soils	CH4	0.000	0.000	0.00%	100.00%
3J Other (please specify)	CH4	0.000	0.000	0.00%	100.00%
3J Other (please specify)	CO2	0.000	0.000	0.00%	100.00%
3J Other (please specify)	N2O	0.000	0.000	0.00%	100.00%
4(l) Direct N2O emissions from N inputs to managed soils - N2O	N2O	0.000	0.000	0.00%	100.00%

Category	Direct Greenhouse Gas	Base Year Emission [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CH4	CH4	0.000	0.000	0.00%	100.00%
4(V) Biomass Burning - CO2	CO2	0.000	0.000	0.00%	100.00%
4D11 Peat Extraction Remaining Peat Extraction - CO2	CO2	0.000	0.000	0.00%	100.00%
4D12 Flooded Land Remaining Flooded Land - CO2	CO2	0.000	0.000	0.00%	100.00%
4E1 Settlements Remaining Settlements - CO2	CO2	0.000	0.000	0.00%	100.00%
4F1 Other Land Remaining Other Land - CO2	CO2	0.000	0.000	0.00%	100.00%
4F2 Land Converted to Other Land - CO2	CO2	0.000	0.000	0.00%	100.00%
4H Other - CH4	CH4	0.000	0.000	0.00%	100.00%
4H Other - CO2	CO2	0.000	0.000	0.00%	100.00%
4H Other - N2O	N2O	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	CO2	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	N2O	0.000	0.000	0.00%	100.00%
5B Biological Treatment of Solid Waste	CO2	0.000	0.000	0.00%	100.00%
5D Wastewater Treatment and Discharge	CO2	0.000	0.000	0.00%	100.00%
5E Other	CH4	0.000	0.000	0.00%	100.00%
5E Other	CO2	0.000	0.000	0.00%	100.00%
5E Other	N2O	0.000	0.000	0.00%	100.00%

Table A1-7 Tier 1 level assessment excluding LULUCF (Base year)

Category	Direct Greenhouse Gas	Base Year Emission excluding LULUCF [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
1A1 Energy Industries - Solid fuels	CO2	14335.744	14335.744	12.98%	12.98%
1A4 Other sectors - Solid fuels	CO2	12499.719	12499.719	11.31%	24.29%
1A2 Manufacturing industries - Gaseous fuels	CO2	8774.225	8774.225	7.94%	32.23%
1A3b Road transport - All Fuels	CO2	7153.758	7153.758	6.48%	38.71%
1A4 Other sectors - Liquid fuels	CO2	6947.452	6947.452	6.29%	45.00%
1A1 Energy Industries - Liquid fuels	CO2	5880.181	5880.181	5.32%	50.32%
1A1 Energy Industries - Gaseous fuels	CO2	5731.212	5731.212	5.19%	55.51%
3.D.1 Direct N2O Emissions From Managed Soils	N2O	4696.032	4696.032	4.25%	59.76%
2C1 Iron and Steel Production	CO2	4578.589	4578.589	4.14%	63.90%
2B2 Nitric Acid Production	N2O	4365.708	4365.708	3.95%	67.85%
1A2 Manufacturing industries - Liquid fuels	CO2	4241.621	4241.621	3.84%	71.69%
3A Enteric Fermentation	CH4	4151.358	4151.358	3.76%	75.45%
1A4 Other sectors - Gaseous fuels	CO2	3988.180	3988.180	3.61%	79.06%
1A2 Manufacturing industries - Solid fuels	CO2	3318.741	3318.741	3.00%	82.06%

Category	Direct Greenhouse Gas	Base Year Emission excluding LULUCF [Gg CO <sub>2</sub> -eq]	Emission in absolute value [Gg CO <sub>2</sub> -eq]	Level Assessment	Cumulative Total%
5A Solid waste disposal	CH <sub>4</sub>	2094.363	2094.363	1.90%	83.96%
1B2b Natural Gas	CH <sub>4</sub>	1825.315	1825.315	1.65%	85.61%
2A1 Cement Production	CO <sub>2</sub>	1744.645	1744.645	1.58%	87.19%
2B1 Ammonia Production	CO <sub>2</sub>	1714.647	1714.647	1.55%	88.74%
1B1 Solid fuels	CH <sub>4</sub>	1598.878	1598.878	1.45%	90.19%
3B Manure Management	CH <sub>4</sub>	1243.246	1243.246	1.13%	91.32%
3B Manure Management	N <sub>2</sub> O	929.092	929.092	0.84%	92.16%
1A4 Other sectors - Solid fuels	CH <sub>4</sub>	870.794	870.794	0.79%	92.95%
5D Wastewater Treatment and Discharge	CH <sub>4</sub>	868.473	868.473	0.79%	93.73%
1A3c Railways - All Fuels	CO <sub>2</sub>	753.734	753.734	0.68%	94.41%
2A2 Lime Production	CO <sub>2</sub>	606.787	606.787	0.55%	94.96%
2B8 Petrochemical and carbon black production	CO <sub>2</sub>	571.259	571.259	0.52%	95.48%
1B2c Venting and flaring	CO <sub>2</sub>	571.059	571.059	0.52%	96.00%
2A4 Other Process Uses of Carbonates	CO <sub>2</sub>	453.290	453.290	0.41%	96.41%
3.D.2 Indirect N <sub>2</sub> O Emissions From Managed Soils	N <sub>2</sub> O	448.973	448.973	0.41%	96.81%
2C3 Aluminium Production	PFC	371.080	371.080	0.34%	97.15%
1A3d Domestic navigation - All Liquid fuels	CO <sub>2</sub>	340.566	340.566	0.31%	97.46%
2D Non-energy products from fuels and solvent use	CO <sub>2</sub>	221.821	221.821	0.20%	97.66%
3H Urea application	CO <sub>2</sub>	229.035	229.035	0.21%	97.87%
1B2a Oil	CH <sub>4</sub>	194.562	194.562	0.18%	98.04%
1B2c Venting and flaring	CH <sub>4</sub>	165.905	165.905	0.15%	98.19%
2G Other Product Manufacture and Use - N <sub>2</sub> O	N <sub>2</sub> O	156.316	156.316	0.14%	98.33%
5D Wastewater Treatment and Discharge	N <sub>2</sub> O	154.872	154.872	0.14%	98.47%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CO <sub>2</sub>	154.383	154.383	0.14%	98.61%
1A4 Other sectors - Biomass	CH <sub>4</sub>	153.200	153.200	0.14%	98.75%
3G Liming	CO <sub>2</sub>	130.209	130.209	0.12%	98.87%
2C3 Aluminium Production	CO <sub>2</sub>	125.372	125.372	0.11%	98.98%
5C Incineration and open burning of waste	CO <sub>2</sub>	96.879	96.879	0.09%	99.07%
1B2d Other (Thermal water extraction + NatGas storage)	CH <sub>4</sub>	94.911	94.911	0.09%	99.16%
2A3 Glass production	CO <sub>2</sub>	87.625	87.625	0.08%	99.24%
1A3c Railways - All Fuels	N <sub>2</sub> O	84.020	84.020	0.08%	99.31%
3C Rice Cultivation	CH <sub>4</sub>	81.231	81.231	0.07%	99.39%
1A1 Energy Industries - Solid fuels	N <sub>2</sub> O	63.363	63.363	0.06%	99.44%
1A4 Other sectors - Solid fuels	N <sub>2</sub> O	57.483	57.483	0.05%	99.50%
1A3b Road transport - All Fuels	N <sub>2</sub> O	56.290	56.290	0.05%	99.55%
1A3b Road transport - All Fuels	CH <sub>4</sub>	54.056	54.056	0.05%	99.60%
1A1 Energy Industries - Other fossil fuels	CO <sub>2</sub>	49.453	49.453	0.04%	99.64%
3I Other carboncontaining fertilizers	CO <sub>2</sub>	48.108	48.108	0.04%	99.68%
3F Field Burning of Agricultural Residues	CH <sub>4</sub>	46.394	46.394	0.04%	99.73%
2C2 Ferroalloys Production	CO <sub>2</sub>	40.240	40.240	0.04%	99.76%

Category	Direct Greenhouse Gas	Base Year Emission excluding LULUCF [Gg CO <sub>2</sub> -eq]	Emission in absolute value [Gg CO <sub>2</sub> -eq]	Level Assessment	Cumulative Total%
1A4 Other sectors - Liquid fuels	N <sub>2</sub> O	29.314	29.314	0.03%	99.79%
1A4 Other sectors - Biomass	N <sub>2</sub> O	24.349	24.349	0.02%	99.81%
2B8 Petrochemical and carbon black production	CH <sub>4</sub>	20.398	20.398	0.02%	99.83%
1A4 Other sectors - Liquid fuels	CH <sub>4</sub>	20.383	20.383	0.02%	99.85%
1A5b Mobile	CO <sub>2</sub>	14.501	14.501	0.01%	99.86%
3F Field Burning of Agricultural Residues	N <sub>2</sub> O	14.337	14.337	0.01%	99.87%
1A2 Manufacturing industries - Liquid fuels	N <sub>2</sub> O	13.981	13.981	0.01%	99.89%
1A2 Manufacturing industries - Solid fuels	N <sub>2</sub> O	12.701	12.701	0.01%	99.90%
1A1 Energy Industries - Liquid fuels	N <sub>2</sub> O	12.527	12.527	0.01%	99.91%
2C1 Iron and Steel Production	CH <sub>4</sub>	10.886	10.886	0.01%	99.92%
1A4 Other sectors - Gaseous fuels	CH <sub>4</sub>	8.966	8.966	0.01%	99.93%
2G Other Product Manufacture and Use - SF <sub>6</sub>	Aggregate F-gases	7.292	7.292	0.01%	99.93%
1A2 Manufacturing industries - Solid fuels	CH <sub>4</sub>	7.161	7.161	0.01%	99.94%
1B2aOil	CO <sub>2</sub>	5.569	5.569	0.01%	99.95%
1A1 Energy Industries - Liquid fuels	CH <sub>4</sub>	5.387	5.387	0.00%	99.95%
5B Biological Treatment of Solid Waste	CH <sub>4</sub>	5.000	5.000	0.00%	99.95%
1A2 Manufacturing industries - Gaseous fuels	N <sub>2</sub> O	4.703	4.703	0.00%	99.96%
1A2 Manufacturing industries - Liquid fuels	CH <sub>4</sub>	4.341	4.341	0.00%	99.96%
1A2 Manufacturing industries - Gaseous fuels	CH <sub>4</sub>	3.945	3.945	0.00%	99.97%
1B1 Solid fuels	CO <sub>2</sub>	3.603	3.603	0.00%	99.97%
1A3a Domestic aviation - All fuels	CO <sub>2</sub>	3.594	3.594	0.00%	99.97%
1A1 Energy Industries - Solid fuels	CH <sub>4</sub>	3.592	3.592	0.00%	99.98%
5B Biological Treatment of Solid Waste	N <sub>2</sub> O	3.576	3.576	0.00%	99.98%
1A1 Energy Industries - Gaseous fuels	N <sub>2</sub> O	3.069	3.069	0.00%	99.98%
1A3d Domestic navigation - All Liquid fuels	N <sub>2</sub> O	2.867	2.867	0.00%	99.98%
1A1 Energy Industries - Gaseous fuels	CH <sub>4</sub>	2.575	2.575	0.00%	99.99%
1B2b Natural Gas	CO <sub>2</sub>	2.278	2.278	0.00%	99.99%
1A4 Other sectors - Gaseous fuels	N <sub>2</sub> O	2.138	2.138	0.00%	99.99%
5C Incineration and open burning of waste	N <sub>2</sub> O	1.638	1.638	0.00%	99.99%
1A3c Railways - All Fuels	CH <sub>4</sub>	1.036	1.036	0.00%	99.99%
1A1 Energy Industries - Biomass	N <sub>2</sub> O	0.937	0.937	0.00%	99.99%
1A1 Energy Industries - Other fossil fuels	N <sub>2</sub> O	0.937	0.937	0.00%	100.00%
1A2 Manufacturing industries - Biomass	N <sub>2</sub> O	0.902	0.902	0.00%	100.00%
1B2c Venting and flaring	N <sub>2</sub> O	0.893	0.893	0.00%	100.00%
1A3d Domestic navigation - All Liquid fuels	CH <sub>4</sub>	0.842	0.842	0.00%	100.00%
1A1 Energy Industries - Biomass	CH <sub>4</sub>	0.589	0.589	0.00%	100.00%
1A1 Energy Industries - Other fossil fuels	CH <sub>4</sub>	0.589	0.589	0.00%	100.00%
1A2 Manufacturing industries - Biomass	CH <sub>4</sub>	0.568	0.568	0.00%	100.00%
5C Incineration and open burning of waste	CH <sub>4</sub>	0.397	0.397	0.00%	100.00%
2C2 Ferroalloys Production	CH <sub>4</sub>	0.252	0.252	0.00%	100.00%
1A5b Mobile	N <sub>2</sub> O	0.119	0.119	0.00%	100.00%

Category	Direct Greenhouse Gas	Base Year Emission excluding LULUCF [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	0.083	0.083	0.00%	100.00%
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH4	0.069	0.069	0.00%	100.00%
1B2d Other (Thermal water extraction + NatGas storage)	CO2	0.039	0.039	0.00%	100.00%
1A3a Domestic aviation - All fuels	N2O	0.030	0.030	0.00%	100.00%
1A5b Mobile	CH4	0.002	0.002	0.00%	100.00%
1A3a Domestic aviation - All fuels	CH4	0.001	0.001	0.00%	100.00%
1A1 Energy Industries - Peat	CH4	0.000	0.000	0.00%	100.00%
1A1 Energy Industries - Peat	N2O	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Other fossil fuels	CH4	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Other fossil fuels	CO2	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Other fossil fuels	N2O	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Peat	CH4	0.000	0.000	0.00%	100.00%
1A2 Manufacturing industries - Peat	N2O	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	CH4	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	CO2	0.000	0.000	0.00%	100.00%
1A3d Domestic navigation - Gaseous fuels	N2O	0.000	0.000	0.00%	100.00%
1A4 Other sectors - Other Fossil Fuels	CH4	0.000	0.000	0.00%	100.00%
1A4 Other sectors - Other Fossil Fuels	CO2	0.000	0.000	0.00%	100.00%
1A4 Other sectors - Other Fossil Fuels	N2O	0.000	0.000	0.00%	100.00%
1A5a Stationary	CH4	0.000	0.000	0.00%	100.00%
1A5a Stationary	CO2	0.000	0.000	0.00%	100.00%
1A5a Stationary	N2O	0.000	0.000	0.00%	100.00%
1B2b Natural Gas	N2O	0.000	0.000	0.00%	100.00%
1B2d Other (Thermal water extraction + NatGas storage)	N2O	0.000	0.000	0.00%	100.00%
2B1 Ammonia Production	CH4	0.000	0.000	0.00%	100.00%
2B1 Ammonia Production	N2O	0.000	0.000	0.00%	100.00%
2B8 Petrochemical and carbon black production	N2O	0.000	0.000	0.00%	100.00%
2C1 Iron and Steel Production	N2O	0.000	0.000	0.00%	100.00%
2C2 Ferroalloys Production	N2O	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	CH4	0.000	0.000	0.00%	100.00%
2C3 Aluminium Production	N2O	0.000	0.000	0.00%	100.00%
2D Non-energy products from fuels and solvent use	CH4	0.000	0.000	0.00%	100.00%
2E Electronics industry - SF6	SF6	0.000	0.000	0.00%	100.00%
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%
2F2 Foam Blowing - HFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%
2F3 Fire extinguishers - HFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%
2F4 Aerosol + MDI - HFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%

Category	Direct Greenhouse Gas	Base Year Emission excluding LULUCF [Gg CO2-eq]	Emission in absolute value [Gg CO2-eq]	Level Assessment	Cumulative Total%
2F5Solvent - HFC+PFC	Aggregate F-gases	0.000	0.000	0.00%	100.00%
3D Agricultural Soils	CH4	0.000	0.000	0.00%	100.00%
3J Other (please specify)	CH4	0.000	0.000	0.00%	100.00%
3J Other (please specify)	CO2	0.000	0.000	0.00%	100.00%
3J Other (please specify)	N2O	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	CO2	0.000	0.000	0.00%	100.00%
5A Solid waste disposal	N2O	0.000	0.000	0.00%	100.00%
5B Biological Treatment of Solid Waste	CO2	0.000	0.000	0.00%	100.00%
5D Wastewater Treatment and Discharge	CO2	0.000	0.000	0.00%	100.00%
5E Other	CH4	0.000	0.000	0.00%	100.00%
5E Other	CO2	0.000	0.000	0.00%	100.00%
5E Other	<b>N2O</b>	0.000	0.000	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	Pollutant	Base year emissions Gg CO2 eq	Year t emissions Gg CO2 eq	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	0.59	18.59	5	100	100.12	0.029	0.000	0.000	0.017	0.001	0.017
1A1 Energy Industries - Biomass	N2O	0.94	29.53	5	200	200.06	0.092	0.000	0.000	0.052	0.002	0.052
1A1 Energy Industries - Gaseous fuels	CH4	2.57	2.44	1	100	100.00	0.004	0.000	0.000	0.001	0.000	0.001
1A1 Energy Industries - Gaseous fuels	CO2	5731.21	5435.09	1	3	3.16	0.267	0.019	0.049	0.057	0.070	0.090
1A1 Energy Industries - Gaseous fuels	N2O	3.07	2.90	1	200	200.00	0.009	0.000	0.000	0.002	0.000	0.002
1A1 Energy Industries - Liquid fuels	CH4	5.39	0.55	1	100	100.00	0.001	0.000	0.000	-0.002	0.000	0.002
1A1 Energy Industries - Liquid fuels	CO2	5880.18	972.36	1	2	2.24	0.034	-0.022	0.009	-0.044	0.012	0.046
1A1 Energy Industries - Liquid fuels	N2O	12.53	0.94	1	200	200.00	0.003	0.000	0.000	-0.012	0.000	0.012
1A1 Energy Industries - Other fossil fuels	CH4	0.59	1.76	1	100	100.00	0.003	0.000	0.000	0.001	0.000	0.001
1A1 Energy Industries - Other fossil fuels	CO2	49.45	218.12	1	5	5.10	0.017	0.002	0.002	0.009	0.003	0.009
1A1 Energy Industries - Other fossil fuels	N2O	0.94	3.09	1	200	200.00	0.010	0.000	0.000	0.005	0.000	0.005
1A1 Energy Industries - Solid fuels	CH4	3.59	1.24	1	100	100.00	0.002	0.000	0.000	-0.001	0.000	0.001
1A1 Energy Industries - Solid fuels	CO2	14335.74	5760.11	1	2	2.24	0.200	-0.024	0.052	-0.047	0.074	0.087

CRF	Pollutant	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 - Solid fuels	N2O	63.36	18.40	1	200	200.00	0.057	0.000	0.000	-0.034	0.000	0.034
1A2 Manufacturing industries - Biomass	CH4	0.57	7.51	5	100	100.12	0.012	0.000	0.000	0.006	0.000	0.007
1A2 Manufacturing industries - Biomass	N2O	0.90	12.10	5	200	200.06	0.038	0.000	0.000	0.021	0.001	0.021
1A2 Manufacturing industries - Gaseous fuels	CH4	3.95	1.39	5	100	100.12	0.002	0.000	0.000	-0.001	0.000	0.001
1A2 Manufacturing industries - Gaseous fuels	CO2	8774.22	3108.80	5	5	7.07	0.341	-0.018	0.028	-0.091	0.199	0.219
1A2 Manufacturing industries - Gaseous fuels	N2O	4.70	1.66	5	200	200.06	0.005	0.000	0.000	-0.002	0.000	0.002
1A2 Manufacturing industries - Liquid fuels	CH4	4.34	0.50	5	100	100.12	0.001	0.000	0.000	-0.002	0.000	0.002
1A2 Manufacturing industries - Liquid fuels	CO2	4241.62	1187.51	5	2	5.39	0.099	-0.012	0.011	-0.023	0.076	0.079
1A2 Manufacturing industries - Liquid fuels	N2O	13.98	9.93	5	200	200.06	0.031	0.000	0.000	0.003	0.001	0.003
1A2 Manufacturing industries - Other fossil fuels	CH4	0.00	3.82	5	100	100.12	0.006	0.000	0.000	0.003	0.000	0.003
1A2 Manufacturing industries - Other fossil fuels	CO2	0.00	366.46	5	5	7.07	0.040	0.003	0.003	0.017	0.023	0.029
1A2 Manufacturing industries - Other fossil fuels	N2O	0.00	6.07	5	200	200.06	0.019	0.000	0.000	0.011	0.000	0.011

CRF	Pollutant	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 - Solid fuels	CH4	7.16	0.43	5	100	100.12	0.001	0.000	0.000	-0.003	0.000	0.003
1A2 Manufacturing industries - Solid fuels	CO2	3318.74	452.97	5	5	7.07	0.050	-0.013	0.004	-0.067	0.029	0.073
1A2 Manufacturing industries - Solid fuels	N2O	12.70	1.88	5	200	200.06	0.006	0.000	0.000	-0.010	0.000	0.010
1A3a Domestic aviation - All fuels	CH4	0.00	0.00	5	100	100.12	0.000	0.000	0.000	0.000	0.000	0.000
1A3a Domestic aviation - All fuels	CO2	3.59	7.72	5	5	7.07	0.001	0.000	0.000	0.000	0.000	0.001
1A3a Domestic aviation - All fuels	N2O	0.03	0.07	5	150	150.08	0.000	0.000	0.000	0.000	0.000	0.000
1A3b Road transport - All Fuels	CH4	54.06	23.66	5	100	100.12	0.037	0.000	0.000	-0.007	0.002	0.007
1A3b Road transport - All Fuels	CO2	7153.76	14197.14	5	2	5.22	1.150	0.091	0.129	0.136	0.909	0.919
1A3b Road transport - All Fuels	N2O	56.29	150.50	5	200	200.06	0.467	0.001	0.001	0.213	0.010	0.213
1A3c Railways - All Fuels	CH4	1.04	0.17	5	250	250.05	0.001	0.000	0.000	-0.001	0.000	0.001
1A3c Railways - All Fuels	CO2	753.73	120.57	5	1	5.10	0.010	-0.003	0.001	-0.003	0.008	0.008
1A3c Railways - All Fuels	N2O	84.02	13.84	5	300	300.04	0.064	0.000	0.000	-0.095	0.001	0.095
1A3d Domestic navigation - All Liquid fuels	CH4	0.84	0.04	5	50	50.25	0.000	0.000	0.000	0.000	0.000	0.000
1A3d Domestic navigation - All Liquid fuels	CO2	340.57	15.86	5	2	5.22	0.001	-0.002	0.000	-0.002	0.001	0.003
1A3d Domestic navigation - All Liquid fuels	N2O	2.87	0.13	5	140	140.09	0.000	0.000	0.000	-0.002	0.000	0.002

CRF	Pollutant	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	0.07	0.08	5	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	154.38	172.15	5	5	7.07	0.019	0.001	0.002	0.004	0.011	0.012
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N2O	0.08	0.09	5	200	200.06	0.000	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Biomass	CH4	153.20	409.73	20	100	101.98	0.648	0.003	0.004	0.290	0.105	0.308
1A4 Other sectors - Biomass	N2O	24.35	65.13	20	200	201.00	0.203	0.000	0.001	0.092	0.017	0.094
1A4 Other sectors - Gaseous fuels	CH4	8.97	21.18	5	100	100.12	0.033	0.000	0.000	0.014	0.001	0.014
1A4 Other sectors - Gaseous fuels	CO2	3988.18	9415.31	5	5	7.07	1.033	0.064	0.085	0.321	0.603	0.683
1A4 Other sectors - Gaseous fuels	N2O	2.14	5.05	5	200	200.06	0.016	0.000	0.000	0.007	0.000	0.007
1A4 Other sectors - Liquid fuels	CH4	20.38	2.54	5	100	100.12	0.004	0.000	0.000	-0.008	0.000	0.008
1A4 Other sectors - Liquid fuels	CO2	6947.45	1560.84	5	2	5.39	0.130	-0.023	0.014	-0.045	0.100	0.110
1A4 Other sectors - Liquid fuels	N2O	29.31	15.67	5	200	200.06	0.049	0.000	0.000	-0.003	0.001	0.003

CRF	Pollutant	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 - Other Fossil Fuels	CH4	0.00	1.29	5	100	100.12	0.002	0.000	0.000	0.001	0.000	0.001
1A4 Other sectors - Other Fossil Fuels	CO2	0.00	157.24	5	7	8.60	0.021	0.001	0.001	0.010	0.010	0.014
1A4 Other sectors - Other Fossil Fuels	N2O	0.00	2.05	5	200	200.06	0.006	0.000	0.000	0.004	0.000	0.004
1A4 Other sectors - Solid fuels	CH4	870.79	22.63	5	100	100.12	0.035	-0.004	0.000	-0.439	0.001	0.439
1A4 Other sectors - Solid fuels	CO2	12499.72	313.91	5	7	8.60	0.042	-0.063	0.003	-0.442	0.020	0.442
1A4 Other sectors - Solid fuels	N2O	57.48	1.38	5	200	200.06	0.004	0.000	0.000	-0.058	0.000	0.058
1A5b Other	CH4	0.00	0.09	10	100	100.50	0.000	0.000	0.000	0.000	0.000	0.000
1A5b Other	CO2	14.50	64.62	10	5	11.18	0.011	0.001	0.001	0.003	0.008	0.009
1A5b Other	N2O	0.12	0.23	10	200	200.25	0.001	0.000	0.000	0.000	0.000	0.000
1B1 Solid fuels	CH4	1598.88	31.74	5	200	200.06	0.099	-0.008	0.000	-1.630	0.002	1.630
1B1 Solid fuels	CO2	3.60	9.02	5	200	200.06	0.028	0.000	0.000	0.013	0.001	0.013
1B2a Oil	CH4	194.56	54.43	0	89	88.75	0.075	-0.001	0.000	-0.047	0.000	0.047
1B2a Oil	CO2	5.57	0.56	0	45	44.70	0.000	0.000	0.000	-0.001	0.000	0.001
1B2b Natural Gas	CH4	1825.32	1495.89	0	379	379.38	8.808	0.004	0.014	1.481	0.000	1.481
1B2b Natural Gas	CO2	2.28	0.68	0	266	266.30	0.003	0.000	0.000	-0.002	0.000	0.002
1B2c Venting and flaring	CH4	165.91	25.20	0	39	39.08	0.015	-0.001	0.000	-0.025	0.000	0.025
1B2c Venting and flaring	CO2	571.06	124.01	0	465	465.27	0.896	-0.002	0.001	-0.880	0.000	0.880
1B2c Venting and flaring	N2O	0.89	0.26	0	573	573.28	0.002	0.000	0.000	-0.001	0.000	0.001
1B2d Other (Thermal water extraction + NatGas storage)	CH4	94.91	69.08	5	200	200.06	0.215	0.000	0.001	0.025	0.004	0.025

CRF	Pollutant	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
1B2d Other (Thermal water extraction + NatGas storage)	CO2	0.04	0.01	5	200	200.06	0.000	0.000	0.000	0.000	0.000	0.000
2A1 Cement Production	CO2	1744.64	1022.86	3	3	3.54	0.056	0.000	0.009	0.000	0.033	0.033
2A2 Lime Production	CO2	606.79	144.62	3	3	3.54	0.008	-0.002	0.001	-0.005	0.005	0.007
2A3 Glass production	CO2	87.63	49.34	3	3	3.54	0.003	0.000	0.000	0.000	0.002	0.002
2A4 Other Process Uses of Carbonates	CO2	453.29	248.79	3	3	3.54	0.014	0.000	0.002	0.000	0.008	0.008
2B1 Ammonia Production	CO2	1714.65	1081.22	5	5	7.07	0.119	0.001	0.010	0.004	0.069	0.069
2B2 Nitric Acid Production	N2O	4365.71	32.11	8	8	10.61	0.005	-0.023	0.000	-0.171	0.003	0.171
2B8 Petrochemical and carbon black production	CH4	20.40	42.71	3	10	10.44	0.007	0.000	0.000	0.003	0.002	0.003
2B8 Petrochemical and carbon black production	CO2	571.26	1306.63	8	8	10.61	0.215	0.009	0.012	0.066	0.125	0.142
2C1 Iron and Steel Production	CH4	10.89	4.71	10	10	14.14	0.001	0.000	0.000	0.000	0.001	0.001
2C1 Iron and Steel Production	CO2	4578.59	1218.10	8	5	9.01	0.170	-0.013	0.011	-0.066	0.117	0.134
2C2 Ferroalloys Production	CH4	0.25	0.00	5	38	37.83	0.000	0.000	0.000	0.000	0.000	0.000
2C2 Ferroalloys Production	CO2	40.24	0.00	5	38	37.83	0.000	0.000	0.000	-0.008	0.000	0.008
2C3 Aluminium Production	CO2	125.37	0.00	2	10	10.20	0.000	-0.001	0.000	-0.007	0.000	0.007
2C3 Aluminium Production	PFC	371.08	0.00	2	99	99.02	0.000	-0.002	0.000	-0.194	0.000	0.194

CRF	Pollutant	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
2D Non-energy products from fuels and solvent use	CO2	221.82	99.53	5	50	50.25	0.078	0.000	0.001	-0.014	0.006	0.015
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	0.00	1965.57	10	10	14.14	0.431	0.018	0.018	0.178	0.252	0.308
2F2 Foam Blowing - HFC	Aggregate F-gases	0.00	128.79	50	21	54.23	0.108	0.001	0.001	0.024	0.082	0.086
2F3 Fire extinguishers - HFC	Aggregate F-gases	0.00	7.20	15	2	15.13	0.002	0.000	0.000	0.000	0.001	0.001
2F4 Aerosol + MDI - HFC	Aggregate F-gases	0.00	35.02	10	50	50.99	0.028	0.000	0.000	0.016	0.004	0.016
2G Other Product Manufacture and Use - SF6	Aggregate F-gases	7.29	101.14	3	40	40.11	0.063	0.001	0.001	0.035	0.004	0.035
2G Other Product Manufacture and Use	N2O	156.32	177.45	3	3	4.24	0.012	0.001	0.002	0.002	0.007	0.007
3A Enteric Fermentation	CH4	4151.36	2048.34	0	13	12.64	0.402	-0.003	0.019	-0.043	0.000	0.043
3B Manure Management	CH4	1243.25	649.89	0	14	14.21	0.143	-0.001	0.006	-0.010	0.000	0.010
3B Manure Management	N2O	929.09	462.95	0	130	130.46	0.937	-0.001	0.004	-0.093	0.000	0.093
3C Rice Cultivation	CH4	81.23	17.87	5	75	75.61	0.021	0.000	0.000	-0.020	0.001	0.020
3D Agricultural Soils	N2O	5145.00	3736.54	0	187	186.57	10.819	0.007	0.034	1.242	0.000	1.242
3F Field Burning of Agricultural Residues	CH4	46.39	0.23	40	50	64.03	0.000	0.000	0.000	-0.012	0.000	0.012
3F Field Burning of Agricultural Residues	N2O	14.34	0.07	40	50	64.03	0.000	0.000	0.000	-0.004	0.000	0.004
3G Liming	CO2	130.21	8.26	10	20	22.36	0.003	-0.001	0.000	-0.012	0.001	0.012
3H Urea application	CO2	229.03	115.94	5	20	20.62	0.037	0.000	0.001	-0.003	0.007	0.008

CRF	Pollutant	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
3I Other carboncontaining fertilizers	CO2	48.11	92.63	5	20	20.62	0.030	0.001	0.001	0.012	0.006	0.013
5A Solid waste disposal	CH4	2094.36	2926.56	10	33	34.48	1.566	0.015	0.026	0.509	0.375	0.632
5B Biological Treatment of Soil Waste	CH4	5.00	113.67	10	140	140.36	0.248	0.001	0.001	0.140	0.015	0.141
5B Biological Treatment of Soil Waste	N2O	3.58	41.60	10	130	130.38	0.084	0.000	0.000	0.047	0.005	0.047
5C Incineration and open burning of waste	CH4	0.40	0.11	10	100	100.50	0.000	0.000	0.000	0.000	0.000	0.000
5C Incineration and open burning of waste	CO2	96.88	30.70	10	25	26.93	0.013	0.000	0.000	-0.006	0.004	0.007
5C Incineration and open burning of waste	N2O	1.64	0.46	10	100	100.50	0.001	0.000	0.000	0.000	0.000	0.000
5D Wastewater Treatment and Discharge	CH4	868.47	238.00	30	40	50.00	0.185	-0.002	0.002	-0.097	0.091	0.133
5D Wastewater Treatment and Discharge	N2O	154.87	85.57	15	200	200.56	0.266	0.000	0.001	-0.009	0.016	0.019
	$\Sigma C$		$\Sigma D$				$(\Sigma H^2)^{1/2}$					$(\Sigma M^2)^{1/2}$
<b>TOTAL excluding LULUCF</b>		<b>110477.401</b>	<b>64433.168</b>				<b>14.243</b>					<b>3.130</b>

**Table A2-2** Uncertainty calculation for CO<sub>2</sub> without LULUCF, Tier 1 method

CRF	Pollutant	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 activity data	Uncertainty introduced in trend in national emissions introduced by emission factor	Uncertainty introduced in trend in national emissions
		Gg CO2 eq	Gg CO2 eq					%				
1A1 Energy Industries - Gaseous fuels	CO2	5.731.21	5.435.09	1	3	3.16	0.350	0.025	0.064	0.075	0.090	0.117
1A1 Energy Industries - Liquid fuels	CO2	5.880.18	972.36	1	2	2.24	0.044	-0.028	0.011	-0.056	0.016	0.059
1A1 Energy Industries - Other fossil fuels	CO2	49.45	218.12	1	5	5.10	0.023	0.002	0.003	0.011	0.004	0.012
1A1 Energy Industries - Solid fuels	CO2	14.335.74	5.760.11	1	2	2.24	0.262	-0.029	0.067	-0.058	0.095	0.112
1A2 Manufacturing industries - Gaseous fuels	CO2	8.774.22	3.108.80	5	5	7.07	0.448	-0.023	0.036	-0.113	0.257	0.281
1A2 Manufacturing industries - Liquid fuels	CO2	4.241.62	1.187.51	5	2	5.39	0.130	-0.015	0.014	-0.029	0.098	0.103
1A2 Manufacturing industries - Other fossil fuels	CO2	0.00	366.46	5	5	7.07	0.053	0.004	0.004	0.021	0.030	0.037
1A2 Manufacturing industries - Solid fuels	CO2	3.318.74	452.97	5	5	7.07	0.065	-0.017	0.005	-0.085	0.037	0.093
1A3a Domestic aviation - All fuels	CO2	3.59	7.72	5	5	7.07	0.001	0.000	0.000	0.000	0.001	0.001
1A3b Road transport - All Fuels	CO2	7.153.76	14.197.14	5	2	5.22	1.510	0.118	0.166	0.177	1.175	1.189
1A3c Railways - All Fuels	CO2	753.73	120.57	5	1	5.10	0.013	-0.004	0.001	-0.004	0.010	0.011
1A3d Domestic navigation - All Liquid fuels	CO2	340.57	15.86	5	2	5.22	0.002	-0.002	0.000	-0.003	0.001	0.003
1A3e Other Transportation (as	CO2	154.38	172.15	5	5	7.07	0.025	0.001	0.002	0.005	0.014	0.015

CRF	Pollutant	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 activity data	Uncertainty introduced in trend in national emissions introduced by emission factor	Uncertainty introduced in trend in national emissions
specified in table 1A(a) sheet 3) - Pipeline, only gaseous												
1A4 Other sectors - Gaseous fuels	CO2	3.988.18	9.415.31	5	5	7.07	1.356	0.083	0.110	0.417	0.779	0.884
1A4 Other sectors - Liquid fuels	CO2	6.947.45	1.560.84	5	2	5.39	0.171	-0.028	0.018	-0.057	0.129	0.141
1A4 Other sectors - Other Fossil Fuels	CO2	0.00	157.24	5	7	8.60	0.028	0.002	0.002	0.013	0.013	0.018
1A4 Other sectors - Solid fuels	CO2	12.499.72	313.91	5	7	8.60	0.055	-0.080	0.004	-0.562	0.026	0.563
1A5b Other - Mobile	CO2	14.50	64.62	10	5	11.18	0.015	0.001	0.001	0.003	0.011	0.011
1B1 Solid fuels	CO2	3.60	9.02	5	200	200.06	0.037	0.000	0.000	0.016	0.001	0.016
1B2a Oil	CO2	5.57	0.56	0	45	44.70	0.001	0.000	0.000	-0.001	0.000	0.001
1B2b Natural Gas	CO2	2.28	0.68	0	266	266.30	0.004	0.000	0.000	-0.002	0.000	0.002
1B2c Venting and flaring	CO2	571.06	124.01	0	465	465.27	1.176	-0.002	0.001	-1.112	0.000	1.112
1B2d Other (Thermal water extraction + NatGas storage)	CO2	0.04	0.01	5	200	200.06	0.000	0.000	0.000	0.000	0.000	0.000
2A1 Cement Production	CO2	1.744.64	1.022.86	3	3	3.54	0.074	0.000	0.012	0.001	0.042	0.042
2A2 Lime Production	CO2	606.79	144.62	3	3	3.54	0.010	-0.002	0.002	-0.006	0.006	0.008
2A3 Glass production	CO2	87.63	49.34	3	3	3.54	0.004	0.000	0.001	0.000	0.002	0.002
2A4 Other Process Uses of Carbonates	CO2	453.29	248.79	3	3	3.54	0.018	0.000	0.003	0.000	0.010	0.010
2B1 Ammonia Production	CO2	1.714.65	1.081.22	5	5	7.07	0.156	0.001	0.013	0.006	0.090	0.090
2B8 Petrochemical and carbon black production	CO2	571.26	1.306.63	8	8	10.61	0.282	0.011	0.015	0.086	0.162	0.184
2C1 Iron and Steel Production	CO2	4.578.59	1.218.10	8	5	9.01	0.224	-0.017	0.014	-0.083	0.151	0.172

CRF	Pollutant	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 activity data	Uncertainty introduced in trend in national emissions introduced by emission factor	Uncertainty introduced in trend in national emissions
2C2 Ferroalloys Production	CO2	40.24	0.00	5	38	37.83	0.000	0.000	0.000	-0.010	0.000	0.010
2C3 Aluminium Production	CO2	125.37	0.00	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	CO2	221.82	99.53	5	50	50.25	0.102	0.000	0.001	-0.016	0.008	0.018
3G Liming	CO2	130.21	8.26	10	20	22.36	0.004	-0.001	0.000	-0.016	0.001	0.016
3H Urea application	CO2	229.03	115.94	5	20	20.62	0.049	0.000	0.001	-0.004	0.010	0.010
3I Other carboncontaining fertilizers	CO2	48.11	92.63	5	20	20.62	0.039	0.001	0.001	0.015	0.008	0.017
5C Incineration and open burning of waste	CO2	96.88	30.70	10	25	26.93	0.017	0.000	0.000	-0.007	0.005	0.009
		<b>Σ C</b>	<b>Σ D</b>				<b>(ΣH<sup>2</sup>)<sup>1/2</sup></b>					<b>(ΣM<sup>2</sup>)<sup>1/2</sup></b>
TOTAL excluding LULUCF		<b>85.418.12</b>	<b>49.079.71</b>				<b>2.5</b>					<b>2.0</b>

**Table A2-3** Uncertainty calculation for CH<sub>4</sub> without LULUCF, Tier 1 method

CRF	Pollutant	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
		Gg CO2 eq	Gg CO2 eq					%				
1A1 Energy Industries - Biomass	CH4	0.59	18.59	5	100	100.12	0.226	0.001	0.001	0.135	0.010	0.135
1A1 Energy Industries - Gaseous fuels	CH4	2.57	2.44	1	100	100.00	0.030	0.000	0.000	0.006	0.000	0.006
1A1 Energy Industries - Liquid fuels	CH4	5.39	0.55	1	100	100.00	0.007	0.000	0.000	-0.020	0.000	0.020
1A1 Energy Industries - Other fossil fuels	CH4	0.59	1.76	1	100	100.00	0.021	0.000	0.000	0.010	0.000	0.010
1A1 Energy Industries - Solid fuels	CH4	3.59	1.24	1	100	100.00	0.015	0.000	0.000	-0.007	0.000	0.007
1A2 Manufacturing industries - Biomass	CH4	0.57	7.51	5	100	100.12	0.091	0.001	0.001	0.053	0.004	0.053
1A2 Manufacturing industries - Gaseous fuels	CH4	3.95	1.39	5	100	100.12	0.017	0.000	0.000	-0.007	0.001	0.007
1A2 Manufacturing industries - Liquid fuels	CH4	4.34	0.50	5	100	100.12	0.006	0.000	0.000	-0.016	0.000	0.016
1A2 Manufacturing industries - Other fossil fuels	CH4	0.00	3.82	5	100	100.12	0.046	0.000	0.000	0.028	0.002	0.028
1A2 Manufacturing industries - Solid fuels	CH4	7.16	0.43	5	100	100.12	0.005	0.000	0.000	-0.029	0.000	0.029
1A3a Domestic aviation - All fuels	CH4	0.00	0.00	5	100	100.12	0.000	0.000	0.000	0.000	0.000	0.000
1A3b Road transport - All Fuels	CH4	54.06	23.66	5	100	100.12	0.288	-0.001	0.002	-0.068	0.012	0.069
1A3c Railways - All Fuels	CH4	1.04	0.17	5	250	250.05	0.005	0.000	0.000	-0.009	0.000	0.009
1A3d Domestic navigation - All Liquid fuels	CH4	0.84	0.04	5	50	50.25	0.000	0.000	0.000	-0.002	0.000	0.002

CRF	Pollutant	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	0.07	0.08	5	100	100.12	0.001	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Biomass	CH4	153.20	409.73	20	100	101.98	5.072	0.023	0.030	2.337	0.856	2.489
1A4 Other sectors - Gaseous fuels	CH4	8.97	21.18	5	100	100.12	0.257	0.001	0.002	0.116	0.011	0.117
1A4 Other sectors - Liquid fuels	CH4	20.38	2.54	5	100	100.12	0.031	-0.001	0.000	-0.073	0.001	0.073
1A4 Other sectors - Other Fossil Fuels	CH4	0.00	1.29	5	100	100.12	0.016	0.000	0.000	0.010	0.001	0.010
1A4 Other sectors - Solid fuels	CH4	870.79	22.63	5	100	100.12	0.275	-0.037	0.002	-3.744	0.012	3.744
1A5b Other - Mobile	CH4	0.00	0.09	10	100	100.50	0.001	0.000	0.000	0.001	0.000	0.001
1B1 Solid fuels	CH4	1598.88	31.74	5	200	200.06	0.771	-0.069	0.002	-13.885	0.017	13.885
1B2a Oil	CH4	194.56	54.43	0	89	88.75	0.586	-0.005	0.004	-0.419	0.000	0.419
1B2b Natural Gas	CH4	1825.32	1495.89	0	379	379.38	68.889	0.028	0.110	10.781	0.000	10.781
1B2c Venting and flaring	CH4	165.91	25.20	0	39	39.08	0.120	-0.006	0.002	-0.219	0.000	0.219
1B2d Other (Thermal water extraction + NatGas storage)	CH4	94.91	69.08	5	200	200.06	1.678	0.001	0.005	0.167	0.036	0.171
2B8 Petrochemical and carbon black production	CH4	20.40	42.71	3	10	10.44	0.054	0.002	0.003	0.022	0.013	0.026
2C1 Iron and Steel Production	CH4	10.89	4.71	10	10	14.14	0.008	0.000	0.000	-0.001	0.005	0.005
2C2 Ferroalloys Production	CH4	0.25	0.00	5	38	37.83	0.000	0.000	0.000	0.000	0.000	0.000
3A Enteric Fermentation	CH4	4151.36	2048.34	0	13	12.64	3.144	-0.035	0.151	-0.445	0.000	0.445
3B Manure Management	CH4	1243.25	649.89	0	14	14.21	1.121	-0.008	0.048	-0.112	0.000	0.112
3C Rice Cultivation	CH4	81.23	17.87	5	75	75.61	0.164	-0.002	0.001	-0.176	0.009	0.176
3F Field Burning of Agricultural Residues	CH4	46.39	0.23	40	50	64.03	0.002	-0.002	0.000	-0.103	0.001	0.103
5A Solid waste disposal	CH4	2094.36	2926.56	10	33	34.48	12.250	0.122	0.216	4.021	3.057	5.051

CRF	Pollutant	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
5B Biological Treatment of Solid Waste	CH4	5.00	113.67	10	140	140.36	1.937	0.008	0.008	1.144	0.119	1.150
5C Incineration and open burning of waste	CH4	0.40	0.11	10	100	100.50	0.001	0.000	0.000	-0.001	0.000	0.001
5D Wastewater Treatment and Discharge	CH4	868.47	238.00	30	40	50.00	1.445	-0.021	0.018	-0.857	0.746	1.136
		$\Sigma C$	$\Sigma D$				$(\Sigma H^2)^{1/2}$					$(\Sigma M^2)^{1/2}$
<b>TOTAL excluding LULUCF</b>		<b>13539.665</b>	<b>8238.101</b>				<b>70.303</b>					<b>18.919</b>

**Table A2-4** Uncertainty calculation for N<sub>2</sub>O without LULUCF, Tier 1 method

CRF	Pollutant	Base year emissions Gg CO <sub>2</sub> eq	Year t emissions Gg CO <sub>2</sub> eq	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	N2O	0.94	29.53	5	200	200.062	1.211	0.003	0.003	0.523	0.019	0.523
1A1 Energy Industries - Gaseous fuels	N2O	3.07	2.90	1	200	200.002	0.119	0.000	0.000	0.028	0.000	0.028
1A1 Energy Industries - Liquid fuels	N2O	12.53	0.94	1	200	200.002	0.039	0.000	0.000	-0.082	0.000	0.082
1A1 Energy Industries - Other fossil fuels	N2O	0.94	3.09	1	200	200.002	0.127	0.000	0.000	0.048	0.000	0.048
1A1 Energy Industries - Solid fuels	N2O	63.36	18.40	1	200	200.002	0.754	-0.001	0.002	-0.168	0.002	0.168
1A2 Manufacturing industries - Biomass	N2O	0.90	12.10	5	200	200.062	0.496	0.001	0.001	0.210	0.008	0.210
1A2 Manufacturing industries - Gaseous fuels	N2O	4.70	1.66	5	200	200.062	0.068	0.000	0.000	-0.007	0.001	0.007
1A2 Manufacturing industries - Liquid fuels	N2O	13.98	9.93	5	200	200.062	0.407	0.000	0.001	0.068	0.006	0.069
1A2 Manufacturing industries - Other fossil fuels	N2O	0.00	6.07	5	200	200.062	0.249	0.001	0.001	0.109	0.004	0.109
1A2 Manufacturing industries - Solid fuels	N2O	12.70	1.88	5	200	200.062	0.077	0.000	0.000	-0.066	0.001	0.066
1A3a Domestic aviation - All fuels	N2O	0.03	0.07	5	150	150.083	0.002	0.000	0.000	0.001	0.000	0.001
1A3b Road transport - All Fuels	N2O	56.29	150.50	5	200	200.062	6.173	0.011	0.014	2.259	0.096	2.261
1A3c Railways - All Fuels	N2O	84.02	13.84	5	300	300.042	0.851	-0.002	0.001	-0.618	0.009	0.618
1A3d Domestic navigation - All Liquid fuels	N2O	2.87	0.13	5	140	140.089	0.004	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	0.08	0.09	5	200	200.062	0.004	0.000	0.000	0.001	0.000	0.001
1A4 Other sectors - Biomass	N2O	24.35	65.13	20	200	200.998	2.684	0.005	0.006	0.978	0.165	0.992
1A4 Other sectors - Gaseous fuels	N2O	2.14	5.05	5	200	200.062	0.207	0.000	0.000	0.074	0.003	0.074

CRF	Pollutant	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	N2O	29.31	15.67	5	200	200.062	0.643	0.000	0.001	0.051	0.010	0.052
1A4 Other sectors - Other Fossil Fuels	N2O	0.00	2.05	5	200	200.062	0.084	0.000	0.000	0.037	0.001	0.037
1A4 Other sectors - Solid fuels	N2O	57.48	1.38	5	200	200.062	0.056	-0.002	0.000	-0.427	0.001	0.427
1A5b Other - Mobile	N2O	0.12	0.23	10	200	200.250	0.009	0.000	0.000	0.003	0.000	0.003
1B2c Venting and flaring	N2O	0.89	0.26	0	573	573.281	0.030	0.000	0.000	-0.007	0.000	0.007
2B2 Nitric Acid Production	N2O	4365.71	32.11	7.5	8	10.607	0.070	-0.168	0.003	-1.260	0.031	1.260
2G Other Product Manufacture and Use	N2O	156.32	177.45	3	3	4.243	0.154	0.010	0.016	0.029	0.068	0.074
3B Manure Management	N2O	929.09	462.95	0	130	130.458	12.382	0.005	0.042	0.658	0.000	0.658
3D Agricultural Soils	N2O	5145.00	3736.54	0	187	186.569	142.923	0.133	0.335	24.738	0.000	24.738
3F Field Burning of Agricultural Residues	N2O	14.34	0.07	40	50	64.031	0.001	-0.001	0.000	-0.028	0.000	0.028
5B Biological Treatment of Soild Waste	N2O	3.58	41.60	10	130	130.384	1.112	0.004	0.004	0.467	0.053	0.470
5C Incineration and open burning of waste	N2O	1.64	0.46	10	100	100.499	0.009	0.000	0.000	-0.002	0.001	0.002
5D Wastewater Treatment and Discharge	N2O	154.87	85.57	15	200	200.562	3.519	0.002	0.008	0.319	0.163	0.358
		$\Sigma C$	$\Sigma D$				$(\Sigma H^2)^{1/2}$					$(\Sigma M^2)^{1/2}$
<b>TOTAL excluding LULUCF</b>		<b>11141.2472</b>	<b>4877.636259</b>				<b>143.676</b>					<b>24.927</b>

## 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 <sup>(2)</sup>
	Description	Unit	Source	CH <sub>4</sub> <sup>(1)</sup>	CO <sub>2</sub>	-
<b>1. B. 1. a. Coal mining and handling</b>						
i. Underground mines <sup>(4)</sup>	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 - <b>including surfaces mines</b>	Mt	MBFH (Hungarian Office for Mining and Geology)	CS: Regional Centre for Energy Policy Research, 2005 ( <a href="http://www.rekk.eu/images/stories/letoltheto/uhg-ag-vol2.pdf">http://www.rekk.eu/images/stories/letoltheto/uhg-ag-vol2.pdf</a> )	-	-
	Coal production from all other underground Mines	Mt	MBFH (Hungarian Office for Mining and Geology)	CS: Regional Centre for Energy Policy Research, 2005 ( <a href="http://www.rekk.eu/images/stories/letoltheto/uhg-ag-vol2.pdf">http://www.rekk.eu/images/stories/letoltheto/uhg-ag-vol2.pdf</a> )	-	-
Post-mining activities	Underground coal production	kt	IEA	-	-	-
	Coal production in Mecsek basin - <b>including surfaces mines</b>	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	Abandoned and still unflooded mines	number of abandoned and unflooded mines year by year	Mecsek Mining Resources and Extraction Nonprofit Ltd.	IPCC 2006 GLs, T1 emission factors (extended with the 2019 Refinement)	-	-
ii. Surface mines <sup>(4)</sup>	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 <sup>(5)</sup>	Coke production	Mt	IEA	Refinement Table 4.3.7	ETS	ETS
1. B. 1. c. Other (please specify) <sup>(6)</sup>	-	-	-			-

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA			Source of EMISSION FACTORS		
	Description	Unit	Source of data	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> 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 <sup>3</sup>	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, mpipelines	
	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	

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA			Source of EMISSION FACTORS		
	Description	Unit	Source of data	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
	LPG	1000 m3	MOL Hungary	IPCC 2006 GLs, LPG		
4. Refining/storage	Oil refined	1000 m3	IEA, data converted kt to thousand m <sup>3</sup>		IPCC 2006 GLs, refining	
5. Distribution of oil products		NA	NA			
6. Other		NO	NO			
<b>1. B. 2. b. Natural gas</b>						
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	
	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	Inland consumption	million m3	IEA/ Hungarian Energy and Public Utility Regulatory Authority	IPCC 2006 GLs, transmission	CS + 2019 Refinement: transmission	
	Inland consumption	million m3	IEA/ Hungarian Energy and Public Utility Regulatory Authority	IPCC 2006 GLs, storage	CS + 2019 Refinement: storage	

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA			Source of EMISSION FACTORS		
	Description	Unit	Source of data	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
5. Distribution	Pipeline length	km	Mining and Geological Survey of Hungary	IPCC 2006 GLs, gas distribution	CS + 2019 Refinement: gas distribution	
6. Other		NO	NO			
<b>1. B. 2. c. Venting and flaring</b>						
<b>Venting</b>						
i. Oil	Conventional oil production	1000 m <sup>3</sup>	IEA, data converted kt to thousand m <sup>3</sup>	IPCC 2006 GLs, oil production venting	IPCC 2006 GLs, oil production venting	
ii. Gas	Sour gas plants-raw gas feed	million m <sup>3</sup>	MOL Hungary	IPCC 2006 GLs, gas production venting (raw CO <sub>2</sub> venting)		
iii. Combined		NO	IE to 1B2c1.Venting i. Oil			

<b>Flaring</b>						
i. Oil	Conventional oil production	1000 m3	IEA, data converted kt to thousand m <sup>3</sup>	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 <sup>3</sup>	IPCC 2006 GLs, wells drilling	IPCC 2006 GLs, wells drilling	
	Conventional oil production	1000 m3	IEA, data converted kt to thousand m <sup>3</sup>	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 <sup>3</sup>	IPCC 2006 GLs, wells servicing	IPCC 2006 GLs, wells servicing	IPCC 2006 GLs, wells servicing
	Gas flared	million m3	EU ETS: 2006-2018, extrapolation with IEA "refinery intake": 1985-2004	EU ETS: 2006-2018, 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			
<b>1.B.2.d. Other</b>						

Groundwater extraction and CO <sub>2</sub> mining	Annual freshwater abstraction	million m <sup>3</sup>	EUROSTAT, HCSO		MFGI (Geological and Geophysical Institute of Hungary)	
	CO <sub>2</sub> mined in HU	million m <sup>3</sup>	MBFH (Hungarian Office for Mining and Geology)	IPCC 2006 GLs, natural gas production CO <sub>2</sub> EF		

A3.2 IPPU sector

Year: 2019		Solids							Liquids							Gas					
Unit		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	Lubricant	Waxes	Bitumen	Total liquids	Nat Gas	Total gas
A: Declared NEU (from commodity balance)		TJ	0,0	18616,3	456,0	0,0	0,0	0,0	42798,0	0,0	0,0	15226,2	0,0	12257,6	0,0	1532,0	501,2	8447,0	26475,5	0,0	0,0
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	22,0	15,3	15,3	0,0
C: Total supplied for feedstock/non-energy		[C = A * B / 1000] Gg C	0,0	543,6	10,0	0,0	0,0	563,6	856,0	0,0	0,0	261,9	0,0	245,2	0,0	30,6	10,0	185,8	1589,5	405,1	405,1
D: Total supplied for feedstock/non-energy		[D = C * 44/12] Gg CO <sub>2</sub> -eq	0,0	1993,2	36,8	0,0	0,0	2030,0	3138,5	0,0	0,0	960,3	0,0	898,9	0,0	112,3	36,8	681,4	5828,2	1485,3	1485,3
E: Implied carbon fraction oxidised		[E = F / D * 100] %		0,5	0,0		1,0	0,0				0,0		0,0		0,2	0,2	0,0	0,2	1,0	1,0
Activity a)		CO <sub>2</sub>	IEF																		
Emissions a)		CO <sub>2</sub>	CO <sub>2</sub>																		
F: Total fossil IPPU CO <sub>2</sub> reported		Gg CO <sub>2</sub>	4618,0		0,0	954,9	0,0	0,0	1089,5	0,0	2044,4	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1109,9	1463,6	1463,6
<b>2 INDUSTRIAL PROCESSES</b>																					
<b>2A: Mineral Industry</b>																					
(Please specify the subcategory.)																					
<b>2B: Chemical Industry</b>																					
2B1: Ammonia Production		Gg CO <sub>2</sub>	1150,5																	1150,5	1150,5
2B5: Carbide Production		Gg CO <sub>2</sub>																			
2B6: Titanium Dioxide Production		Gg CO <sub>2</sub>																			
2B8: Petrochemical and Carbon Black Production		Gg CO <sub>2</sub>	1300,3		0,0	0,0	0,0	0,0	0,0	0,0									1080,1	220,2	220,2
2B8a: Methanol		Gg CO <sub>2</sub>																			
2B8b: Ethylene		Gg CO <sub>2</sub>																			
2B8f: Carbon Black		Gg CO <sub>2</sub>																			
2B10: Other		Gg CO <sub>2</sub>																			
<b>2C: Metal Industry</b>																					
2C1: Iron and Steel Production		Gg CO <sub>2</sub>	1047,8		954,9	0,0	0,0	0,0	954,9	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	92,9	92,9
2C2: Ferroalloys Production		Gg CO <sub>2</sub>																			
2C3: Aluminium Production		Gg CO <sub>2</sub>																			
2C5: Lead Production		Gg CO <sub>2</sub>																			
2C6: Zinc Production		Gg CO <sub>2</sub>																			
2C7: Other		Gg CO <sub>2</sub>																			
<b>2D: Non-Energy Products from Fuels and Solvent Use</b>																					
2D1: Lubricant Use		Gg CO <sub>2</sub>	22,5													22,5				22,5	0,0
2D2: Paraffin Wax Use		Gg CO <sub>2</sub>	7,4														7,4			7,4	0,0
2D3: Solvent Use		Gg CO <sub>2</sub>																			0,0
2D4: Other		Gg CO <sub>2</sub>																			0,0
<b>2H: Other</b>																					
2H1: Pulp and Paper Industry		Gg CO <sub>2</sub>																			
2H2: Food and Beverages Industry		Gg CO <sub>2</sub>																			
2H3: Other		Gg CO <sub>2</sub>																			
<b>EXCEPTIONS REPORTED ELSEWHERE</b>																					
<b>1A FULL COMBUSTION ACTIVITIES</b>																					
1A1a: Main Activity Electricity and Heat Production		Gg CO <sub>2</sub>	1089,5					1089,5	1089,5												0,0
1A1b: Petroleum Refining		Gg CO <sub>2</sub>																			
1A1c: Manufacture of Solid Fuels and Other Energy Industries		Gg CO <sub>2</sub>																			
1A2: Manufacturing Industries and Construction		Gg CO <sub>2</sub>																			

### A3.3 WASTE sector

Activity data used in the IPCC Waste model and the resulting methane emissions are summarized in the table below.

Year	Food	Garden	Paper	Wood	Textile	Nappies/ Clinical	Sludge	C&D	Total	CH4 Emission
1950	366	37	270	95	61	1	25	364	NE	-
1960	429	43	307	93	78	1	25	364	NE	-
1970	532	51	355	90	102	1	42	611	NE	-
1980	951	90	611	121	196	1	69	993	NE	-
1985-87	1272	121	807	131	275	1	77	1109	19351	83.8
1990	1265	119	787	110	279	1	77	993	19414	93.1
1991	1240	100	608	94	113	15	68	843	18524	97.5
1992	1309	105	658	97	159	29	65	803	16935	101.3
1993	1124	102	591	94	233	42	65	784	17354	105.1
1994	1131	107	659	98	198	58	67	835	16866	107.3
1995	1167	104	601	97	158	71	59	711	17493	110.0
1996	1135	111	711	102	135	112	61	751	17944	112.0
1997	1043	118	764	108	237	138	69	805	17602	114.4
1998	1161	118	730	108	261	119	70	900	17373	116.3
1999	1157	121	822	110	214	122	60	953	17257	118.6
2000	1452	112	521	103	139	50	76	998	16940	121.3
2001	1429	111	601	102	101	75	83	1062	16188	124.2
2002	1108	115	635	105	124	89	77	1198	15436	127.2
2003	1104	119	629	109	128	100	88	1269	14685	128.0
2004	1111	116	596	106	121	86	35	1337	13933	132.1
2005	1157	81	575	93	126	94	67	1526	11151	135.5
2006	962	74	567	97	134	101	51	1842	10970	136.6
2007	856	63	397	93	131	90	53	1784	10898	138.1
2008	828	55	452	86	145	118	48	1932	9864	137.5
2009	814	57	419	67	150	147	39	1373	8912	137.9
2010	659	20	380	53	135	127	27	939	7549	136.8
2011	645	20	360	50	132	127	25	755	8639	137.8
2012	623	16	356	42	126	126	22	491	6952	136.5
2013	672	3	350	33	120	135	22	144	5942	130.5
2014	599	3	440	31	113	122	21	82	5161	133.3
2015	454	2	320	41	97	109	20	37	5078	126.1
2016	430	2	304	51	100	121	14	37	4796	122.6
2017	438	1	322	61	98	126	17	47	4155	121.1
2018	509	1	377	67	113	139	9	40	4159	117.4
2019	495	2	387	76	134	138	8	77	4046	117.5
Trend 1990-2019	-61%	-98%	-51%	-30%	-52%	11694%	-89%	-92%	-79%	26%
Trend 2005-2019	-57%	-97%	-33%	-18%	7%	47%	-88%	-95%	-64%	-13%

## 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/c/c7/e0000/7\\_2\\_annual\\_national\\_energy\\_balance\\_2014\\_2019.xlsx](http://mekh.hu/download/c/c7/e0000/7_2_annual_national_energy_balance_2014_2019.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\\_qe001.html](http://www.ksh.hu/docs/eng/xstadat/xstadat_annual/i_qe001.html)

### 3.8.1. Primary energy balance (1990–)

Year	Production <sup>a</sup>	Imports <sup>b</sup>	Exports <sup>c</sup>	Change in stocks (-) <sup>d</sup>	Energy consumption, total <sup>e</sup>
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	455.1	910.4	172.0	-7.9	1 185.6
2006	452.5	911.6	185.8	-3.0	1 175.3
2007	449.3	885.3	192.3	8.5	1 150.8
2008	456.2	897.3	186.0	-31.0	1 136.5
2009	490.3	750.0	127.9	-33.1	1 079.3
2010	496.9	789.2	156.4	-9.9	1 119.8
2011	493.2	732.5	185.1	55.2	1 095.8
2012	492.1	720.8	201.8	30.2	1 041.3
2013	480.4	721.4	220.3	25.8	1 007.3
2014	464.1	806.1	210.2	-55.0	1 005.1
2015	472.9	757.2	189.4	21.5	1 062.2
2016	480.2	809.8	212.5	1.0	1 070.5
2017	474.8	1 011.1	311.7	-48.6	1 125.7
2018	462.2	1 028.7	379.6	13.6	1 124.9
2019	446.5	1 204.0	435.5	-107.4	1 107.6

Name	7.2 Annual National Energy Balance, 2019										
	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	41,596	48,709	55,607	120,722	178,272	788	2,624	12,560	0	0	460,878
Import	44,734	437,453	652,307	13,917	0	0	0	0	71,471	0	1,219,882
Export	-9,759	-141,149	-244,033	-19,726	0	0	0	0	-26,168	0	-440,835
International aviation	0	-11,610	0	0	0	0	0	0	0	0	-11,610
Stocks changes	476	-2,772	-109,497	-486	0	0	0	0	0	0	-112,279
Domestic supply	77,047	330,631	354,384	114,427	178,272	788	2,624	12,560	45,303	0	1,116,036
Interproduct transfers	0	177	0	0	0	0	0	0	0	0	177
Statistical difference	-171	345	2,912	-28	0	0	0	0	701	5	3,764
Transformation sector	-60,929	303	-93,861	-35,555	-178,272	-788	-2,624	-9,168	122,872	48,453	-209,569
Energy sector own use	-5,784	-16,154	-8,864	-591	0	0	0	0	-11,887	-4,768	-48,048
Network losses	-781	0	-4,092	0	0	0	0	0	-11,851	-3,292	-20,016
Final consumption	9,382	315,302	250,479	78,253	0	0	0	3,392	145,138	40,398	842,344
Industry	5,835	28,420	58,824	14,930	0	0	0	63	63,997	14,444	186,513
Iron and steel	2,738	43	2,596	6	0	0	0	0	2,538	813	8,734
Chemical and petrochemical	0	13,741	10,978	27	0	0	0	0	12,215	10,854	47,815
Non-ferrous metals	0	43	3,232	0	0	0	0	0	1,516	91	4,882
Non-metallic minerals	973	4,283	8,754	5,674	0	0	0	11	5,332	113	25,140
Transport equipment	0	46	2,970	19	0	0	0	6	6,311	478	9,830
Machinery	17	443	7,592	130	0	0	0	8	10,346	270	18,806
Mining and quarrying	0	937	136	1	0	0	0	0	403	0	1,477
Food, beverages and tobacco	59	581	13,100	3,518	0	0	0	17	9,835	696	27,806
Paper, pulp and printing	1,871	89	2,098	2,209	0	0	0	0	3,276	693	10,236
Wood and wood products	0	344	311	2,939	0	0	0	0	1,519	0	5,113
Construction	160	7,650	2,134	178	0	0	0	9	1,904	138	12,173
Textiles and leather	0	0	815	11	0	0	0	0	850	14	1,690
Not elsewhere specified (Industry)	17	220	4,108	218	0	0	0	12	7,952	284	12,811
Transport	0	195,013	3,471	8,478	0	0	0	0	4,281	0	211,243
Road	0	193,093	386	8,478	0	0	0	0	115	0	202,072
International aviation	0	88	0	0	0	0	0	0	0	0	88
Rail	0	1,619	0	0	0	0	0	0	4,126	0	5,745
Pipeline transport	0	0	3,085	0	0	0	0	0	40	0	3,125
Domestic navigation	0	213	0	0	0	0	0	0	0	0	213
Non-specified - transport	0	0	0	0	0	0	0	0	0	0	0
Other sectors	3,091	21,635	167,421	54,845	0	0	0	3,329	76,860	25,954	353,135
Residential	2,955	3,082	116,933	52,887	0	0	0	549	41,825	19,050	237,281
Commercial and public services	62	1,398	44,358	1,395	0	0	0	1,018	31,072	6,785	86,088
Agriculture/forestry/fishing	61	16,771	5,423	563	0	0	0	1,762	3,697	16	28,293
Not elsewhere specified (Other)	13	384	707	0	0	0	0	0	266	103	1,473
Non-energy use	456	70,234	20,763	0	0	0	0	0	0	0	91,453

## 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



## QA - QC PLAN

### 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)**

	<b>Name</b>	<b>signature</b>
<b>Prepared (and translated) by:</b>	Katalin Lovas	expert
<b>Reviewed by:</b>	Gábor Kis-Kovács	Head of Unit
<b>Approved by:</b>	Gyula Horváth	Head of Department
<b>Version:</b>	<b>02</b>	
<b>Pages:</b>	<b>22</b>	

**11 February 2020**

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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 A1.1A1.1 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 QA/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 cases<sup>1</sup>.

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.

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<sup>1</sup> 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.

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/gpplulucf/gpplulucf.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](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 checklists, 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
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</i> ; <i>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.	<b>compilation and submission of preliminary report required by 525/2013/EC</b>	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	<b>preliminary report required by 525/2013/EC (CRF table, preliminary NIR, indicators, SEF and MMR tables required by the MMR Implementing Regulations)</b>	Ministry of National Development →  EU Commission (DG Climate Action)	<a href="http://cdr.eionet.europa.eu/hu/eu/ghgmm">http://cdr.eionet.europa.eu/hu/eu/ghgmm</a>	
15.Febr.	<i>compilation and submission of CLRTAP report</i>	<i>Documentation and archiving;  RepDab check</i>	<b>CLRTAP NFR Table</b>	<i>Ministry of Agriculture →  EMEP Centre on Emission Inventories and Projections (CEIP) + letter to UNECE Secretariat</i>	<a href="http://www.ceip.at/overview-of-submissions-under-clrtap/">http://www.ceip.at/overview-of-submissions-under-clrtap/</a>	<i>CLRTAP review process:  1. Status + 2. Synthesis and Assessment (Reports: <a href="http://www.ceip.at/review-results/">http://www.ceip.at/review-results/</a> (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	<b>EU ESD Review Report</b>	<b>EEA→HMS using the EEA Emission Review Tool (EMRT)</b>	<a href="https://emrt-esd.eionet.europa.eu/">https://emrt-esd.eionet.europa.eu/</a> (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</i>	Identification and elimination of causes of problems identified by the EU team; actions to prevent their recurrence in the future.	<b>EU ESD Review Report</b>	<b>HMS→EEA using the EEA Emission Review Tool (EMRT)</b>	<a href="https://emrt-esd.eionet.europa.eu/">https://emrt-esd.eionet.europa.eu/</a> (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	
	<i>the EU team during the STEP 1 and initial checks</i>					
15.March	<i>compilation and submission of CLRTAP report</i>	Documentation and archiving	<b>CLRTAP IIR (+grid+LPS every 5 years)</b>	<b>Ministry of Agriculture → EMEP Centre on Emission Inventories and Projections (CEIP) - nek + letter to UNECE Secretariat</b>	<b><a href="http://www.ceip.at/overview-of-submissions-under-clrtap/">http://www.ceip.at/overview-of-submissions-under-clrtap/</a></b>	
15.March	<b>compilation and submission of report required by 525/2013/EC</b>	Documentation and archiving Consistency checks in accordance with Article 7 (1) of Regulation 525/2013/	<b>report required by 525/2013/EC(CRF Tables, NIR, indicators, SEF and MMR tables required by the MMR Implementing Regulations )</b>	<b>Ministry of National Development → EU Commission DG Climate Action)</b>	<a href="http://cdr.eionet.europa.eu/hu/eu/mmr/art07_inventory">http://cdr.eionet.europa.eu/hu/eu/mmr/art07_inventory</a>	
15 March- 19 April	<b>EU Team checks</b>		<b>EU ESD Review Report</b>	<b>EEA→HMS using the EMRT</b>	<a href="https://emrt-esd.eionet.europa.eu/">https://emrt-esd.eionet.europa.eu/</a> (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	<b>Providing responses and comments to the EU Team</b>	Correction actions based on the observations made by the EU team;	<b>EU ESD Review Report</b>	<b>HMS→EEA using the EMRT;</b>	<a href="https://emrt-esd.eionet.europa.eu/">https://emrt-esd.eionet.europa.eu/</a> (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	
		Check of the EEA/Comission estimates for missing data (Gap filling) or providing revised estimate;		supervision by the Ministry of National Development		
15.April	compilation and submission of UNFCCC report	Documentation and archiving	UNFCCC report (CRF Tables, NIR, SEF)	Ministry of National Development → UNFCCC Secretariat	<a href="http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/492.php">http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/492.php</a>	<p>Before submission:</p> <p>Approval by Ministry of Agriculture, National Development and National Economy</p> <p>After submission: <b>UNFCCC review process:</b></p> <p>1. Status (Reports: <a href="http://unfccc.int/national_reports/annex_i_ghg_inventories/inventory_review_reports/items/8109.php">http://unfccc.int/national_reports/annex_i_ghg_inventories/inventory_review_reports/items/8109.php</a>)</p> <p>2. Synthesis and Assessment (Reports: <a href="http://unfccc.int/documentation/documents/advanced_search/items/6911.php?piref=600008003#beg">http://unfccc.int/documentation/documents/advanced_search/items/6911.php?piref=600008003#beg</a>)</p>

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 – end of April	<b>EU ESD step 2 review, if applicable;</b>	Providing responses to the EU ESD Step 2 team and calculating revised estimate or providing comments on potential technical corrections	<b>EU ESD Review Report</b>	<b>Communication between the EEA and the HMS using the EMRT and supervised by the Ministry of National Development</b>	<b><a href="https://emrt-esd.eionet.europa.eu/">https://emrt-esd.eionet.europa.eu/</a> (password protected)</b>	Step 2 team identifies and calculates technical corrections and send questions to HU
8 May	<b>compilation and resubmission of GHG inventory to the EU and the UNFCCC, if applicable)</b>	Documentation and archiving	<b>UNFCCC report (CRF Tables, NIR, SEF)</b>	<b>Ministry of National Development → UNFCCC Secretariat and EU Commission (DG Climate Action)</b>	<b><a href="http://unfccc.int/national-reports/annex_i_ghg_inventories/national_inventories_submissions/items/492.php">http://unfccc.int/national-reports/annex_i_ghg_inventories/national_inventories_submissions/items/492.php</a>  <a href="http://cdr.eionet.europa.eu/hu/eu/mmr/art07_inventory">http://cdr.eionet.europa.eu/hu/eu/mmr/art07_inventory</a></b>	

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	
30-31 May	<b>Quattro-lateral QA/QC meeting on GHG-inventory</b>		<b>MINUTES FROM QUATTRO-LATERAL MEETING</b>	<b>Organizing country → Other countries</b>	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
31.July	<b>Compilation and submission of preliminary report required by Art 8. of 525/2013/EC</b>	Documentation and archiving  Consistency checks in accordance with Article 7 (1) of Regulation 525/2013/ (if it is relevant)	<b>preliminary report required by Art 8. of 525/2013/EC for year x-1</b>	<b>Ministry of National Development → EU Commission DG Climate Action)</b>	<a href="http://cdr.eionet.europa.eu/hu/eu/mmr/art08_proxy">http://cdr.eionet.europa.eu/hu/eu/mmr/art08_proxy</a>	
May-August-Oct	evaluation, corrective actions and planned improvements (incorporating results of	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;		E. QA-QC	

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	
	annual review processes); update of QA/QC documents if needed		ÉLFO_UHG_401.02			
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 + <a href="http://www.ksh.hu/stadat_eves_5">http://www.ksh.hu/stadat_eves_5</a> + 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	<b>UNFCCC review process:</b>  3. Annual centralized/in-country review (Reports: <a href="http://unfccc.int/national_reports/annex_i_ghg_inventories/inventory_review_reports/items/8452.php">http://unfccc.int/national_reports/annex_i_ghg_inventories/inventory_review_reports/items/8452.php</a> )
before the beginning of the new inventory cycle	archiving	archiving of all documents and data not yet archived on the server of NEI				
annually	Quality objectives of NEI for the HMS level quality objectives				E. QA-QC\B. HMS ISO\QUALITY PROGRAMME	

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	
					<a href="http://www.met.hu/en/omsz/minosegiranyitas/">http://www.met.hu/en/omsz/minosegiranyitas/</a>	
1-2 years	External audits within the ISO quality management system				Result of the audit <a href="http://www.met.hu/doc/minosegiranyitas/OMSZ_I_SO-9001_tanusitvany_2012-15_en.pdf">http://www.met.hu/doc/minosegiranyitas/OMSZ_I_SO-9001_tanusitvany_2012-15_en.pdf</a>	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 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 )
<b>Transparency</b> 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;

<p><b>Consistency</b> 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.</p>	<p><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>;<sup>1</sup></p>
<p><b>Comparability</b> 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 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><i>Comparability</i> means that estimates of emissions and removals reported by Annex I Parties in inventories should be comparable 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>,<sup>2</sup> and the IPCC <i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>, at the level of its summary and sectoral tables;</p>
<p><b>Completeness</b> 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. <b>Completeness</b> also means full geographic coverage of sources and sinks of an Annex I Party.</p>

<p><b>Accuracy</b> 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 checklist Sector:	Y (no problem identified) /N /n.a	Notes, explanation, supporting documents, further details...	Date of the check	Correction date
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:		Aláírás Sign

## 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/committee, 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 2020 inventory submission

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
1.A.1 Energy industries–gaseous fuels –CO2 Consistency	Provide in future NIRs the country-specific CO2EFs used to calculate emissions from natural gas consumption for the entire time series with a description of how time-series consistency is ensured	E.1	Implemented	Section 3.2.4
1.A.2.g Other (manufacturing industries and construction)–all fuels –CO2, CH4 and N2O-Comparability	Use the results of the information gathered from ‘auto producers’, including the information on the proportion of fuel consumed by ‘auto producers’, and allocate the emissions from ‘auto producers’ under the sector where they were generated, in accordance with the methods in the 2006 IPCC Guidelines. The ERT considers that the Party has the data available to resolve this issue for 2013 onward and suggests that the Party investigate whether it could reconstruct the data for the years prior to 2013 using the gap-filling methodologies (e.g. or overlap techniques) from the 2006 IPCC Guidelines (vol. 1, chap. 5, section 5.3.3).	E.2	Complete reallocation of autoproducers were done for the period 2013-2019	
1.A.4.b Residential – liquid fuels – CO2, CH4 and N2O (E.11, 2019) - Accuracy	Review the assumption that the number of households in Hungary is constant across the time series. If this assumption cannot be justified, either revise the estimates or the assumption based on which the emissions are estimated to be constant, and provide the result of the key category analysis for this subcategory that can justify the proposed approach.	E.9	Has not been addressed in this submission.	

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
2.A.4 Other process uses of carbonates – CO2 (I.12, 2019) Consistency	Resolve the time-series inconsistency related to AD for manufacturers of bricks and ceramics not included in the EU ETS using appropriate methods as described in the 2006 IPCC Guidelines.	I.3	Not addressed yet	
2.E.1 Integrated circuit or semiconductor – HFCs, PFCs, SF6 and NF3 (I.13, 2019) Transparency	Include an explanation as to how it is determined that there were no other companies in this category with relevant F-gas emissions in the NIR, referring, for example, to the 2006 IPCC Guidelines (vol. 3, sections 6.2.3 and 6.2.4), to justify that completeness had been ensured.	I.4	Required information is provided in the NIR.	Ch.4.8.
2.F.1 Refrigeration and air conditioning– HFCs and PFCs - Accuracy	Implement a tier 2 method to estimate the emissions of F-gases from refrigeration and air conditioning.	I.6	Required information is provided in the NIR.	Ch.4.9.2.
3.A.1 Cattle – CH4 (A.6, 2019) Convention reporting adherence	Correct the error identified in the NIR regarding the number of equations used to estimate the net energy for activity when estimating gross energy intake for dairy cattle.	A.2	Errors have been corrected in the NIR.	NIR Section 5.2.2.2
3.B Manure management – CH4 and N2O (A.10, 2019) Transparency	Explain in the NIR the reason for reporting “NO” for some years of the time series for cattle, poultry and swine manure allocated to anaerobic digesters. The Party did not clearly specify the year in which a biogas plant was first set up to explain the historical reporting of “NO”. The ERT also noted that CRF table 3.B(a)s2 is incorrectly referred to twice on this NIR page as table 3.B(s)s2 instead of 3.B(a)s2.	A.6	The incorrect references of the CRF Table 3.B(a)s2 are corrected.	NIR Section 5.3.2.2

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
4. General (LULUCF) – CO2 (L.11, 2019) Accuracy	Review the calculation which results in zero emissions/removals for C stock changes in mineral soils for grassland remaining grassland and flooded land remaining flooded land in 2017, and, if appropriate, revise and report a proper value or notation key in CRF tables 4.C and 4.D. During the review, the Party clarified that the relevant information was provided in NIR sections 6.7.6 and 6.8.5, however the ERT noted that this information did not provide a rationale for the reporting of a zero value for 2017 for C stock changes in mineral soils for grassland remaining grassland.	L.3		
4. General (LULUCF) – CO2 (L.18, 2019) Accuracy	Recalculate the figures for the area of forest land converted to other lands by using transition periods of 20 years, rather than the area accumulated since 1985, in CRF tables 4.B, 4.C and 4.E, and then recalculate all the related emissions and removals accordingly. The ERT considers that the recommendation has not yet been addressed because the Party has not yet adopted a 20-year transition period since the base year/period and that takes into account areas converted before 1985	L.4	Hungary provided additional information in the documentation boxes of the relevant CRF tables to provide more clarifications about the applied areas used by the estimations and the reported areas.	
4.A Forest land – CO2 (L.14, 2019) Accuracy	Recalculate the area of forest land for the entire time series for the portion of “found forest” established by conversion, and for the portion of “found forest” established by natural expansion or by geodesic remeasurements, separately.	L.7	Currently Hungary only has expert judgement about the origin of FF. The available data do not allow to make a proper distinction of the FF areas (and related emissions) of different origins, and we don't see the requirement for this in the, but this issue is planned to be managed by 2023 at the latest.	NIR Section 6.5.2.

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
4.A Forest land – CO2 (L.14, 2019) Consistency	Recalculate, for the entire time series, C stock changes in all pools under forest land remaining forest land (4.A.1) and land converted to forest land (4.A.2).	L.8	See above	
4.A.1 Forest land remaining forest land – CO2 (L.15, 2019) Convention reporting adherence	Change the notation key from “NO” to “NE” for the DOM and mineral soil pools for forest land remaining forest land in CRF table 4.A. The ERT considers that the recommendation has not been fully addressed because, while quantitative information on the deadwood C stock is reported in the NIR (figure 6.5.4) and in CRF table 4.A, the Party did not report C stock changes in the litter pool.	L.9	Hungary corrected the notation keys.	
4.A.2 Land converted to forest land – CO2 (L.17, 2019) Convention reporting adherence	Correct the figures for land converted to forest land in NIR tables 6.5.3 and 6.5.11 so that the figures are consistent in tables 6.5.3 and 6.5.11 and CRF table 4.A for category 4.A.2 and address the problem that occurred in the underlying database for inventory year 2017 (i.e. which resulted in some figures for 2017 in NIR table 6.5.11 showing a slight increase from the figures in the previous year).	L.10	Hungary removed inconsistencies in the reporting data and various tables of the NIR.	
4.D.1 Wetlands remaining wetlands – CO2 (L.5, 2019) (L.9, 2017) Accuracy	If Hungary estimates the country-specific C 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 C stock changes under wetlands remaining wetlands with grass vegetation, examine the ways to report C 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.13	Hungary will manage. this issue in a proper way by 2023 at the latest	

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO <sub>2</sub> (L.7, 2019) (L.13, 2017) Accuracy	Correct the reporting of CO <sub>2</sub> emissions from peat extraction in CRF table 4(II) and provide the correct value or a notation key. The ERT considers that the recommendation has not yet been addressed because the Party has not yet explained the disproportionately high values of CO <sub>2</sub> emissions from peat extraction reported in CRF table 4(II).	L.14	Hungary will provide proper information about the peats later.	
4(II) Emissions/removals from drainage and rewetting and other management of organic/mineral soils – CO <sub>2</sub> (L.16, 2019) Accuracy	Provide justification for the high value used to convert from wet peat to air-dry peat (0.8 t/m <sup>3</sup> ) and, if the value cannot be justified, try to obtain a more accurate value and recalculate the emissions from off-site emissions from managed peatlands accordingly.	L.15	Hungary will provide further information about the value used to convert from wet peat to air dry peat later.	
5.C.2 Open burning of waste – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (W.15, 2019) Transparency	Include additional information to justify the reporting of emissions from open burning using the notation key “NO” in the NIR. The ERT considers that this issue would be resolved by Hungary providing information on this legislation in the NIR (e.g. title, year of implementation and a brief summary as provided during the review).	W.7	Information on legislation has been included in the NIR	Section 7.4.1
5.D Wastewater treatment and discharge – CH <sub>4</sub> (W.16, 2019) Transparency	Include in the NIR the tables that indicate the main AD and parameters used in the calculations for CH <sub>4</sub> emissions from both domestic and industrial wastewater treatment. The Party restructured NIR section 7.5.2 to enhance transparency by including relevant tables with AD and parameters, but did not specify the fraction of the population connected to sewers.	W.8	Information on the fraction of the population connected to sewers has been added.	See para above Figure 7.5.4.

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
5.D.2 Industrial wastewater – CH4 (W.18, 2019) Transparency	Provide an explanation of the EFs for industrial wastewater treatment, including a reason for adopting the CH4 correction factors applied, in the NIR.	W.12	Has not been addressed further yet.	
Key category analysis	The Party reported in NIR section 1.6 the results of the approach 1 key category analysis. It included the sentence “In Trend assessment: Including and excluding LULUCF (the same changes)”, but did not explain what was meant by “the same changes”. The ERT recommends that Hungary enhances the transparency of the NIR by replacing “the same changes” with an exact description of the changes made as a result of the key category analysis for each category.	G.1	It will be specified in the NIR.	Ch. 1.6
Key category analysis	The Party reported in NIR annex 1 (pp.A3–A18) the results of the approach 1 key category analysis, specifically the level and trend assessment including LULUCF, but did not provide the results of the analyses excluding LULUCF. The latter results were provided to the ERT during the review. The ERT recommends that Hungary enhance the transparency of its NIR by presenting the results of the approach 1 level and trend key category analyses including and excluding LULUCF.	G.3	Required information is provided in the NIR ANNEX.	ANNEX 1

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
Key category analysis	In NIR annex I Hungary documented the approach 1 level assessment for 2018 only (pp.A3–A18). The 2006 IPCC Guidelines (vol. 1, chap. 4.3.1, p.4.14) indicate that the level assessment should be performed for the inventory base year and the latest inventory year, with the base year analysis updated if estimates for the base year change or are recalculated. During the review, the Party provided the ERT with the key category analysis for the base year with and without LULUCF. The ERT recommends that Hungary enhance the transparency of its NIR by including the results of the approach 1 key category analysis for the base year, with and without LULUCF, in annex 1.	G.4	Required information is provided in the NIR ANNEX.	ANNEX 1
Key category analysis	The Party did not report in NIR section 1.6 the results of the KP-LULUCF key category analysis. During the review, it provided these results and stated that it will report them in the next annual submission. The ERT recommends that Hungary include the results of the KP-LULUCF key category analysis in section 1.6.	G.5	The required information has been added to the NIR.	Section 1.6
Uncertainty analysis	In its uncertainty analyses reported in the NIR (annex A2.1) Hungary stated that the uncertainty calculation for each GHG without LULUCF is presented in table A2-2, reporting that calculating the uncertainty with LULUCF is a planned improvement. During the review the Party informed the ERT that this is still a planned improvement. For a further discussion of the state of the uncertainty analysis with LULUCF, and the ERT's recommendation thereon, see ID# L.16 below.	G.6	See L.16.	

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
1.A.2 Manufacturing industries and construction – liquid, solid, gaseous and other fossil fuels – CO <sub>2</sub>	The Party reported in the NIR (p.70) that it predominantly uses default CO <sub>2</sub> EFs for subcategories under category 1.A.2, with some exceptions, such as non-metallic minerals. During the review, the ERT asked whether the Party plans to apply country-specific CO <sub>2</sub> EFs to further industrial subcategories, in line with the decision tree in the 2006 IPCC Guidelines (vol. 2, chap. 2, figure 2.1). Hungary explained that it already uses a country-specific EF (tier 3 method) for the pulp and paper subcategory and is examining the possibility of using more facility-level information for other industries. The ERT welcomes the Party's efforts. The ERT recommends that Hungary further investigate the possibility of using country-specific CO <sub>2</sub> EFs in industrial subcategories other than non-metallic minerals and pulp and paper.	E.11	Country-specific emission factors for natural gas has been introduced	See NIR section 3.2.6.2
1.B.2 Oil, natural gas and other emissions from energy production – liquid and gaseous fuels – CO <sub>2</sub> and CH <sub>4</sub>	The ERT recommends that the Party identify the most appropriate method for ensuring a smooth transition in the time series between the 2006 IPCC Guidelines default EFs (vol. 2 chap. 4, section 4.2.2.3) for developing countries and economies in transition applied in the early 1990s and from 1995 onward (e.g. by taking into account the splicing techniques from the 2006 IPCC Guidelines (vol. 1, chap. 5.3.3)).	E.13	Major recalculation was done in relation to natural gas transmission, storage, and distribution which addressed this issue too.	See NIR section 3.3.2.5
2.A.1 Cement production – CO <sub>2</sub>	NIR table 4.3.1 includes data on the amount of raw flour used to produce cement, but does not specify which carbonates are consumed and assumed for CO <sub>2</sub> emission estimates. During the review, the Party clarified that under the EU ETS directive (directive 2003/87/EC) cement-producing factories are required to report CO <sub>2</sub> emissions for 2005 onward, calculated on the basis of the	I.11	Required information is provided in the NIR	Ch.4.3.1.1.

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
	<p>amount and CO2 content of all raw materials used and the amount of non-recycled CKD filtered by dust collectors. In this calculation, the CO2 content of raw flour is multiplied by the amount of raw flour minus the CO2 content of filtered dust multiplied by the amount of filtered dust. The CO2 content is analysed by a certified laboratory. The Party commented, and the ERT acknowledged that detailed data on the carbonate composition are not necessary for this method. The ERT recommends that the Party include information on the type of carbonate inputs at the aggregated level in its NIR.</p>			
2.A.2 Lime production – CO2	<p>The Party reported in its NIR (p.114) that a tier 2 method was used to estimate emissions for this category for 1985–2004 and a tier 3 method for 2015–2016, but did not specify which methods were applied for 2005–2014, 2017 or 2018. The ERT noted that this is not in accordance with the UNFCCC Annex I inventory reporting guidelines, which require information on methods applied for the whole reporting period. During the review, Hungary clarified that the tier 3 method was used for 2005 onward and stated that it will provide the relevant information in the next annual submission. The ERT recommends that the Party specify in the NIR that the tier 3 method was applied for 2005 onward.</p>	I.12	Required information is provided in the NIR.	Ch.4.3.2.2.

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
2.A.4 Other process uses of carbonates – CO <sub>2</sub>	The Party reported in its NIR (p.120) that it applied a tier 3 method for estimating emissions for this category for 2005 onward and used plant-specific data, but did not report the type of plant-specific data used. The ERT noted that this is not in accordance with the UNFCCC Annex I inventory reporting guidelines because the carbonates contained in the raw materials used were not described in the NIR. Given that the Party uses a tier 3 method for reporting emissions from brick and ceramics production, the ERT recommends that it report on the carbonates contained in the raw materials used.	I.13	Required information is provided in the NIR	Ch.4.3.4.2.
2.B.8 Petrochemical and carbon black production – CO <sub>2</sub>	The ERT recommends that the Party describes in its NIR the production processes for ethylene, ethylene dichloride and vinyl chloride monomer, and C black, as well as the method, including EF development, for calculating CO <sub>2</sub> emissions.	I.15	Required information is provided in the NIR	Ch.4.4.3.2.
3. General (agriculture) – CH <sub>4</sub> and N <sub>2</sub> O	The ERT recommends that the Party correct the editorial issues and errors in measurement units in section 5.1 (reference to category 3.E), figures 5.1.3 and 5.1.4 (color coding), figure 5.2.2 (units of measurement for milk production), and in tables 5.2.1 (units for population) and 5.3.16–5.3.18 (kg DM/head/day) of the NIR.	A.10		See NIR section 5.1., 5.2 and 5.3
3.B Manure management – CH <sub>4</sub> and N <sub>2</sub> O	The ERT recommends that the Party finalize a procedure for reporting manure processed in anaerobic digesters, estimate the corresponding CH <sub>4</sub> and N <sub>2</sub> O emissions using the most appropriate methods from the 2006 IPCC Guidelines (vol. 4, chap. 10) (if necessary applying the splicing techniques set out in vol. 1, chap. 5, to ensure timeseries consistency) and replace “IE” in CRF tables 3.B(a)s2 and 3.B(b) with the appropriate figures when	A.11	The required information regarding the notation keys 'IE' are provided in the documentation boxes of CRF Tables 3.B(a)s1 and 3.B(b) in the 2021 submission .	NIR Section 5.3.2.2

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
	<p>data on biodigesters become available. If this is not possible for the next annual submission, the ERT recommends that Hungary use the documentation boxes in CRF tables 3.B(a)s1 and 3.B(b) to explain that “IE” in the column for digesters refers to the allocation of the corresponding amounts under other MMS (liquid and solid) owing to lack of information on the amount of manure diverted to digesters. Lastly, the ERT encourages Hungary, as it updates its methodology and reporting on the amount of manure processed in anaerobic digesters, to ensure consistency among the different sectors (agriculture, waste and energy) and report consistent values (manure to biodigesters and use of biogas as a fuel for heat and power production).</p>			
3.B.4 Other livestock – N2O	<p>The ERT recommends that the Party include in its NIR appropriate references for equations 5.4–5.7, which are used to estimate the N excretion rate for broilers, laying hens and sows.</p>	A.12	References are included in the NIR	See NIR section 5.3.2.2.3
4. General (LULUCF)	<p>The ERT recommends that the Party conduct a quantitative assessment of the emissions and removals for each LULUCF category for at least the base year and the latest inventory year and a trend uncertainty assessment between these two years using at least an approach 1 and report the results in the uncertainties discussion for each land-use category in the NIR as well as in NIR table A2-2.</p>	L.16	Hungary started to implement the UA, we can provide the new calculation in the next submission.	See NIR section 6.11 and NIR table A2-2

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
Land representation – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	The Party reported initial and final land-use category areas in CRF table 4.1. However, the final areas reported in this table are not always consistent with the land-use areas reported in the CRF background tables (i.e. CRF table 4.A, 4.B, 4.C, 4.D, 4.E, column C). For example, in 2018, final cropland area in CRF table 4.1 was reported as 5,201.23 ha, whereas in CRF table 4.B the total area given was 5,201.63 kha. For grassland, the corresponding values in CRF table 4.1 and CRF table 4.C were 1,196.73 kha and 1,196.93 kha, and for settlements these values were 584.06 kha and 584.30 kha. During the review, the Party clarified that an error had occurred when filling in the data. The ERT recommends that Hungary correct the data to ensure that the total area reported in CRF tables 4.B, 4.C, 4.E match that reported in CRF table 4.1, performing QA/QC checks to ensure correctness of the reported data.	L.18	Hungary eliminated some of these inconsistencies, and continued to develop the automatization of our calculations. There are some minor discrepancies, which we will manage in the next submission.	
Land representation – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	The ERT recommends that the Party (1) develop a consistent time series for all IPCC land-use categories for 1966 onward, on the basis of available national country data and following the 2006 IPCC Guidelines to ensure timeseries consistency; (2) adopt a 20-year transition period, as per the 2006 IPCC Guidelines, for all IPCC categories; and (3) report GHG emissions and removals on the basis of the recalculated time series of land-use category areas.	L.19	Hungary do not have reliable data about the conversions before 1985, but we are planning to manage this issue by 2023 at the latest.	

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
4.C.1 Grassland remaining grassland – CO <sub>2</sub>	The ERT recommends that the Party explain in the NIR how the distribution of the area of various grassland subcategories is assessed and used as a basis to determine changes in management practices and encourages it to include in the annual NIR a summary table, for grassland remaining grassland, containing the annual area and the annual percentage of management practices applied in the same area.	L.20	Hungary will provide further explanations in the next submission.	
4(IV).2 N leaching and run-off – N <sub>2</sub> O	The Party reported N <sub>2</sub> O emissions from N leaching and run-off in CRF table 4(IV) (0.02 kt N <sub>2</sub> O for 2018), but reported the AD as “NE”. During the review, it clarified that it reported annual emissions from mineral soils associated with loss of soil C from soil organic matter as a result of changes to land use or management using equation 11.10 from the 2006 IPCC Guidelines (vol. 4, chap. 11), which does not require any AD directly rather, the quantity FSOM. It acknowledged, however, that the amount of N fertilizer is a potential source of emissions under this category and could be used as AD. Hungary believed that reporting the annual amount of N mineralized in mineral soils associated with loss of soil C (i.e. FSOM) was not meaningful in this case, which is why such data were not reported. However, the ERT noted that this information must be reported as AD, in kg N/year, to ensure transparency, accuracy and comparability. The Party agreed with the ERT and indicated that the relevant AD will be provided in the next annual submission. The ERT recommends that the	L.21	Hungary provided the calculated values in the CRF	

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
	Party provide the relevant AD (i.e. FSOM, in kg N per year) in CRF table 4(IV) in the next annual submission.			
5.A Solid waste disposal on land – CH4	The ERT recommends that Hungary improve its description of its assumptions about landfill covers for D1 landfills in the NIR, explaining that these landfills are covered, but not necessarily immediately after the waste is deposited. The ERT also recommends that Hungary improve its time series of covers and CH4 oxidation for 2007–2016 to take into account the conclusions of the 2009 report on the implementation of the EU landfill directive that from 2007–2009 onwards all managed landfills met the requirements from the EU landfill directive and were therefore covered.	W.13	Implemented	Section 7.2.2
General (KP-LULUCF)	The ERT recommends that the Party correct the value reported in NIR table 11.8 for “Land under AR” and enhance the transparency of the NIR by clearly explaining the transition period applied for KP-LULUCF activities.	KL.2	Hungary provided detailed information about the applied areas by the relevant categories in the documentation boxes of the NIR.	
Deforestation – CO2, CH4 and N2O	The ERT recommends that Hungary revise its methodological description in the NIR to reflect how it determined the appropriate areas of deforestation for forest subcompartments and other subcompartments, and ensure consistency between the areas and emissions and removals reported in the NIR and in CRF table 4(KP-I)A.2.	KL.3	The required description is given in the NIR section 11.1.3.2.	
FM – CO2, CH4 and N2O	The ERT recommends that the Party correct the values for the FM areas reported in NIR table 6.5.1 for 2008–2018 The ERT further recommends that Hungary enhance the transparency of the NIR by including a detailed	KL.4	Hungary corrected areas under FM in the CRF and provided additional information in the documentation boxes.	

CRF category / issue	Review recommendation	Review report / paragraph	MS response / status of implementation	Chapter/section in the NIR
	section on “found forest” as applied to KP-LULUCF reporting, reporting a time series of the areas, as well as the parameters and C factors used in the estimation process.			
FM – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	The ERT recommends that the Party transparently explain in the NIR all factors leading to the technical correction and the updated FMRLcorr (e.g. following the checklist in table 2.7.1 of the Kyoto Protocol Supplement), including the rationale for calculating the technical correction, the methods used for the calculation and the results, as well a discussion of the differences between FMRLcorr and the original FMRL.	KL.5	Explanation and update of FMRLcorr are given in the NIR section 11.5.2.3.	
FM – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	The ERT notes the recommendation in KL.5 above; no further recommendation is needed here.	KL.6		
FM – CO <sub>2</sub>	The ERT recommends that the Party enhance the transparency of its NIR by including transparent and verifiable information demonstrating that the litter pool is not a source, following the guidance provided by the Kyoto Protocol Supplement (section 2.3.1).	KL.7	Hungary will provide further information about this topic by 2023 at the latest.	
FM – CO <sub>2</sub>	The ERT recommends that the Party enhance the transparency of its NIR by including transparent and verifiable information demonstrating that the soil pool is not a net source on the basis of the ongoing analysis of the Hungarian Soil Protection and Monitoring System measurements.	KL.8	Hungary will provide further information about this topic later.	See NIR Section 11.3.1.2.

## ANNEX 7 Summary of the results of the QA activities carried out by the EU

In the following tables, results of the quality checks and reviews of national emission inventories under the Monitoring Mechanism Regulation are summarized for the last years.

Sector	Detail	Review Year	Status
5A Solid waste disposal	HUN : for 2016 CH4 emissions from 5A decreased of 137 kt CO2eq (-4,6%) between the previous and the latest submission which is higher than the 2016 threshold of significance. An short explanation is provided ("Change in AD (revised extrapolation")in annex III for Article 8 of the MMR BUT the 2016 values in the MMR recalculation file are different than the values reported in the CRF table	2019	closed (Resolved)
1A1a Public electricity and heat production	1A1a Solid CO2 IEF	2019	closed (Resolved)
1A2c Chemicals	Identical values for 2016 and 2017 under subcategory 1.A.2.c	2019	closed (Resolved)
1AB Reference approach	Inconsistency found for carbon emission factor in the reference approach	2019	closed (Resolved)
2F1 Refrigeration and air conditioning	2.F.1 increase of emissions in 2017	2019	closed (Resolved)
1AB Reference approach	Inconsistency found for carbon emission factor in the reference approach	2019	closed (Resolved)
0 Cross cutting	Information on MMR IR Art. 8-10 (Annex III-V) is missing from your submission.	2019	closed (Resolved)
4 Land use, land-use change and forestry	Variation of total country area reported under the Convention	2019	closed (Resolved)
4E Settlements	Lack of information on activity data for the category 4.E.1	2019	closed (Resolved)
7 KP LULUCF	Lack of information in the accounting table for non-elected KP activities in the base year.	2019	closed (Resolved)
7 KP LULUCF	Carbon stock changes in HWP under Deforestation	2019	closed (Resolved)
4 Land use, land-use change and forestry	2018 Reference number: HU-4-2018-0001. For the year 2017, inconsistencies between final area of Cropland, Grassland and Settlements in CRF table 4.1 and total area in CRF table 4.B, 4.C and 4.D	2019	closed (Unresolved)
7 KP LULUCF	Harvest from remaining lands reported in the cell D24 of the CRF table 4(KP-I)C	2019	closed (Resolved)
1A3b Road transportation	Calculation of fossil fuels from biofuels	2019	open
2C1 Iron and steel production	Hungary has fluctuating IEFs for 2C1d, sinter production.	2019	closed (Resolved)
2B1 Ammonia production	2.B.1 Ammonia production – CO2. UNFCCC 2017 Review – allocation of emissions from hydrogen production used for the production of ammonia	2019	closed (Resolved)
2A3 Glass production	2.A.3 Glass production – CO2 UNFCCC 2017 Review: country-specific method is used to estimate CO2 emissions from glass production	2019	closed (Resolved)

Sector	Detail	Review Year	Status
7 KP LULUCF	Inconsistency between total areas at the end of the current inventory year in CRF table NIR-2 and this reported in tables 4(KP-I)A.1, 4(KP-I)A.2 and 4(KP-I)B.1	2018	closed (Unresolved)
4 Land use, land-use change and forestry	Inconsistency between total land use areas reported in CRF table 4.1 and those reported in tables 4A – 4F Ref. HU-4-2017-0002	2018	closed (Unresolved)
2A1 Cement production	2.A.1 Cement production – CO2 IEF for 2005 used to extrapolate for earlier years	2018	closed (Resolved)
1A2a Iron and steel	1A2a - solid fuels CO2 IEF 1998-2016 is much lower than for previous years.	2018	closed (Resolved)
3D1 Direct N2O emissions from managed soils	3.D.1.1 - N input from application of inorganic fertilizers to cropland and grassland (AD, Direct N2O Emissions From Managed Soils): Irregularities in the time series have been identified. Years flagged: 1990	2018	closed (Resolved)
7 KP LULUCF	Blank cells for information on base year of non-elected activities in CRF table Accounting	2018	closed (Partly resolved)
7 KP LULUCF	Blank cells under the KP CRF tables 4 (KP-I) C and 4 (KP-II)4	2018	closed (Resolved)
2C1 Iron and steel production	2017 reference number: HU-2C1-2017-0003. Under 2.C.1, recovery of CO2 from pig iron production is reported.	2018	closed (Resolved)
7 KP LULUCF	Inconsistency between total areas at the end of current inventory years and total areas at the end of the previous inventory year reported in CRF table NIR-2	2018	closed (Resolved)
4 Land use, land-use change and forestry	Inconsistencies between total country area at the end of the current inventory year reported in table NIR-2 and final area reported in table 4.1	2018	closed (Resolved)
4B2 Land converted to cropland	Potential error in areas for subcategory 4B 2.1 in 1996, 1997, 1999 and 2000	2018	closed (Resolved)
5B Biological treatment of solid waste	N2O emissions from 5.B.2 anaerobic digestion are reported as NE.	2018	closed (Resolved)
1AB Reference approach	Intransparent reporting in CRF table 1A(d)	2018	closed (Resolved)
5B Biological treatment of solid waste	Activity data used to calculate CH4 and N2O emissions from 5.B biological treatment of waste lower than reported activity data under Eurostat.	2018	closed (Resolved)
2G Other product manufacture and use	Activities and N2O emissions from category "2G3a Medical Applications" are reported as IE.	2018	closed (Resolved)
2F1 Refrigeration and air conditioning	2.F.1 Completeness: Data for 2014?	2018	closed (Resolved)
2F1 Refrigeration and air conditioning	2.F.1 Decrease of emissions in 2016	2018	closed (Resolved)

Sector	Detail	Review Year	Status
3D1 Direct N2O emissions from managed soils	3.D.1.2.a (Animal Manure Applied to Soils): The amount of N applied with animal manure in 3.D.1.2.a is large as compared to N managed in MMS minus N lost as NH3+NOx or leaching (inverse ratio val:0.9). Years: all	2017	closed (Partly resolved)
3B Manure management	3.B.1.4.7 - Methane conversion factor (MCF): Irregularities in the time series have been identified. Years flagged: 2014	2017	closed (Partly resolved)
1B1 Fugitive emissions from solid fuels	Implied Emission factor for CH4 emissions in 1.B.1.a.1.i (Underground mining - Mining activities)	2017	closed (Resolved)
1B1 Fugitive emissions from solid fuels	Implied Emission factor for CH4 emissions in 1.B.1.a.1.ii (Underground mining - post mining activities)	2017	closed (Resolved)
3H Urea application	3.G.2 - Amount applied (AD): Irregularities in the time series have been identified. Years flagged: 2009	2017	closed (Resolved)
3D2 Indirect N2O emissions from managed soils	Recalculations in category 3.D.2.1 indirect N2O emissions from atmospheric deposition	2017	closed (Resolved)
3D1 Direct N2O emissions from managed soils	3.D.1.5 - N in mineral soils that is mineralized in association with loss of soil C (AD): Irregularities in the time series have been identified. Years flagged: 2005 2012	2017	closed (Resolved)
3A Enteric fermentation	3.A.4.6 - Population (POP): Irregularities in the time series have been identified. Years flagged: 2010	2017	closed (Resolved)
3A Enteric fermentation	3.A.4.1 - Population (POP): Irregularities in the time series have been identified. Years flagged: 1995 2010	2017	closed (Resolved)
0 Cross cutting	CRF Tables have not been submitted for the 15 March submission.	2017	closed (Resolved)
4B2 Land converted to cropland	Empty cells in CRF table 4(B)	2017	closed (Partly resolved)
4 Land use, land-use change and forestry	Potential typo error in reported areas	2017	closed (Partly resolved)
4 Land use, land-use change and forestry	Blank cells under the CRF tables	2017	closed (Partly resolved)
4 Land use, land-use change and forestry	Inconsistency between total land use areas reported in CRF table 4.1 and those reported in tables 4B, 4C and 4E.	2017	closed (Partly resolved)
1A3 Transport	Consumption and emissions from lubricants used in 2-stroke engines	2017	closed (Resolved)
1A3b Road transportation	Increase in the value of CH4 IEF	2017	closed (Partly resolved)
1A3a Domestic aviation	Recalculation and recommendation from TERT on military aviation	2017	closed (Resolved)
1A3b Road transportation	Recalculation of emissions	2017	closed (Resolved)
1B1 Fugitive emissions from solid fuels	Implied Emission factor for CH4 emissions in 1.B.1.a.1.iii (Underground mining - Abandoned coal mines)	2017	closed (Resolved)

Sector	Detail	Review Year	Status
1A1a Public electricity and heat production	The IEF decreased by 18% compared to 2014	2017	closed (Resolved)
2C1 Iron and steel production	The implied emission factor for CO2 emissions from 2C1d sinter shows a substantial increase.	2017	closed (Resolved)
5D Wastewater treatment and discharge	Recalculation of N2O emissions from domestic wastewater handling (5.D.1).	2017	closed (Resolved)
2F4 Aerosols	2.F.4 Aerosols (Other): Invalid product life factor	2017	closed (Partly resolved)
2F1 Refrigeration and air conditioning	2.F.1.a Manufacture of domestic refrigeration equipment with R134a in 2015?	2017	closed (Resolved)
5A Solid waste disposal	Recalculation of CH4 emissions from 5.A.1.	2017	closed (Resolved)
7 KP LULUCF	Inconsistency between total areas at the end of current inventory years and total areas at the end of the previous inventory year reported in CRF table NIR 2	2017	closed (Resolved)
4 Land use, land-use change and forestry	Inconsistencies between total country area at the end of the current inventory year reported in table NIR2 and final area reported in table 4.1	2017	closed (Resolved)
7 KP LULUCF	Inconsistency between total areas at the end of the current inventory year in CRF table NIR 2 and this reported in table 4(KP-I)A.1	2017	closed (Resolved)
2F1 Refrigeration and air conditioning	2.F.1 Disposal loss factor values	2017	closed (Resolved)
2C1 Iron and steel production	Under 2.C.1, recovery of CO2 from pig iron production is reported	2017	closed (Partly resolved)
2C1 Iron and steel production	The change in emissions (total of 1A2a+2C1) deviates from the change in pig iron production.	2017	closed (Resolved)
7 KP LULUCF	HWP originating from the deforestation events should be reported using instantaneous oxidation following paragraph 2 (g) (v) of the Annex II of Decision 2/CMP.8	2017	closed (Resolved)

## ANNEX 8 List of abbreviations and units

### A8.1 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

## A8.2 Chemical formulas

C	carbon
CH <sub>4</sub>	methane
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
HFCs	hydrofluorocarbons
NMVOC	non-methane volatile organic compound
N <sub>2</sub> O	nitrous oxide
NO <sub>x</sub>	nitrogen oxide
PFCs	perfluorocarbons
SF <sub>6</sub>	sulphur hexafluoride
SO <sub>2</sub>	sulphur dioxide
CaCO <sub>3</sub>	calcium carbonate, limestone
MgCO <sub>3</sub>	magnesium carbonate
CaO	calcium oxide, quicklime
Ca(OH) <sub>2</sub>	slack lime
NH <sub>3</sub>	ammonia
HNO <sub>3</sub>	nitric acid
CF <sub>4</sub>	tetrafluoromethane
C <sub>2</sub> F <sub>6</sub>	hexafluoroethane

## A8.3 Units

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