

## **ANNEXES TO THE NATIONAL INVENTORY REPORT**

**2017**

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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 2015 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.

In this submission category *3D Agricultural Soils N<sub>2</sub>O* was split into *3.D.1 Direct N<sub>2</sub>O Emissions From Managed Soils* and *3.D.2 Indirect N<sub>2</sub>O Emissions From Managed Soils*, to achieve consistency with the UNFCCC reporting table (Table 7).

**Table A1-1** Category list used in Tier 1 analysis

<b>CRF code and category name</b>	<b>GHG</b>
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

<b>CRF code and category name</b>	<b>GHG</b>
1A3c Railways - All Fuels	CH <sub>4</sub>
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>

<b>CRF code and category name</b>	<b>GHG</b>
1B2c Venting and flaring	CO <sub>2</sub>
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>

<b>CRF code and category name</b>	<b>GHG</b>
3D Agricultural Soils	CH <sub>4</sub>
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

<b>CRF code and category name</b>	<b>GHG</b>
5A Solid waste disposal	CH <sub>4</sub>
5A Solid waste disposal	CO <sub>2</sub>
5A Solid waste disposal	N <sub>2</sub> O
5B Biological Treatment of Solid Waste	CH <sub>4</sub>
5B Biological Treatment of Solid Waste	CO <sub>2</sub>
5B Biological Treatment of Solid 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

<b>CRF code + note</b>	<b>Direct Greenhouse Gas</b>	<b>Current Year Emission</b>	<b>Emission in absolute value</b>	<b>Level Assessment</b>	<b>Cumulative Total%</b>
		Gg CO <sub>2</sub> -eq	Gg CO <sub>2</sub> -eq		
<b>1A3b Road transport - All Fuels</b>	<b>CO<sub>2</sub></b>	<b>11795.53</b>	<b>11795.53</b>	<b>17.1%</b>	<b>17.1%</b>
<b>1A4 Other sectors - Gaseous fuels</b>	<b>CO<sub>2</sub></b>	<b>9508.23</b>	<b>9508.23</b>	<b>13.7%</b>	<b>30.8%</b>
<b>1A1 Energy Industries - Solid fuels</b>	<b>CO<sub>2</sub></b>	<b>8206.85</b>	<b>8206.85</b>	<b>11.9%</b>	<b>42.7%</b>
<b>1A1 Energy Industries - Gaseous fuels</b>	<b>CO<sub>2</sub></b>	<b>4236.52</b>	<b>4236.52</b>	<b>6.1%</b>	<b>48.8%</b>
<b>4A1 Forest Land Remaining Forest Land - CO<sub>2</sub></b>	<b>CO<sub>2</sub></b>	<b>-3917.22</b>	<b>3917.22</b>	<b>5.7%</b>	<b>54.4%</b>
<b>3.D.1 Direct N<sub>2</sub>O Emissions From Managed Soils</b>	<b>N<sub>2</sub>O</b>	<b>3081.68</b>	<b>3081.68</b>	<b>4.5%</b>	<b>58.9%</b>
<b>5A Solid waste disposal</b>	<b>CH<sub>4</sub></b>	<b>3058.80</b>	<b>3058.80</b>	<b>4.4%</b>	<b>63.3%</b>
<b>1A2 Manufacturing industries - Gaseous fuels</b>	<b>CO<sub>2</sub></b>	<b>2903.04</b>	<b>2903.04</b>	<b>4.2%</b>	<b>67.5%</b>
<b>2F1 Refrigeration and Air Conditioning</b>	<b>Aggregate F-gases</b>	<b>2084.96</b>	<b>2084.96</b>	<b>3.0%</b>	<b>70.5%</b>



<b>Equipment - HFC+PFC</b>					
<b>3A Enteric Fermentation</b>	<b>CH4</b>	<b>2036.69</b>	<b>2036.69</b>	<b>2.9%</b>	<b>73.5%</b>
<b>4A2 Land Converted to Forest Land - CO2</b>	<b>CO2</b>	<b>-1963.89</b>	<b>1963.89</b>	<b>2.8%</b>	<b>76.3%</b>
<b>1A4 Other sectors - Liquid fuels</b>	<b>CO2</b>	<b>1383.56</b>	<b>1383.56</b>	<b>2.0%</b>	<b>78.3%</b>
<b>2B8 Petrochemical and carbon black production</b>	<b>CO2</b>	<b>1365.65</b>	<b>1365.65</b>	<b>2.0%</b>	<b>80.3%</b>
<b>2C1 Iron and Steel Production</b>	<b>CO2</b>	<b>1166.19</b>	<b>1166.19</b>	<b>1.7%</b>	<b>82.0%</b>
<b>1A1 Energy Industries - Liquid fuels</b>	<b>CO2</b>	<b>1158.51</b>	<b>1158.51</b>	<b>1.7%</b>	<b>83.7%</b>
<b>2B1 Ammonia Production</b>	<b>CO2</b>	<b>960.06</b>	<b>960.06</b>	<b>1.4%</b>	<b>85.0%</b>
<b>1A2 Manufacturing industries - Liquid fuels</b>	<b>CO2</b>	<b>906.24</b>	<b>906.24</b>	<b>1.3%</b>	<b>86.4%</b>
<b>2A1 Cement Production</b>	<b>CO2</b>	<b>675.69</b>	<b>675.69</b>	<b>1.0%</b>	<b>87.3%</b>
<b>3B Manure Management</b>	<b>CH4</b>	<b>667.08</b>	<b>667.08</b>	<b>1.0%</b>	<b>88.3%</b>
<b>4G Harvested Wood Products - CO2</b>	<b>CO2</b>	<b>-648.20</b>	<b>648.20</b>	<b>0.9%</b>	<b>89.2%</b>
<b>1A4 Other sectors - Biomass</b>	<b>CH4</b>	<b>566.27</b>	<b>566.27</b>	<b>0.8%</b>	<b>90.0%</b>
<b>4B1 Cropland Remaining Cropland - CO2</b>	<b>CO2</b>	<b>-566.09</b>	<b>566.09</b>	<b>0.8%</b>	<b>90.9%</b>
<b>3B Manure Management</b>	<b>N2O</b>	<b>466.01</b>	<b>466.01</b>	<b>0.7%</b>	<b>91.5%</b>
<b>1A4 Other sectors - Solid fuels</b>	<b>CO2</b>	<b>425.02</b>	<b>425.02</b>	<b>0.6%</b>	<b>92.2%</b>
<b>1B2b Natural Gas</b>	<b>CH4</b>	<b>423.32</b>	<b>423.32</b>	<b>0.6%</b>	<b>92.8%</b>
<b>5D Wastewater Treatment and Discharge</b>	<b>CH4</b>	<b>373.08</b>	<b>373.08</b>	<b>0.5%</b>	<b>93.3%</b>
<b>4B2 Land Converted to Cropland - CO2</b>	<b>CO2</b>	<b>283.46</b>	<b>283.46</b>	<b>0.4%</b>	<b>93.7%</b>
<b>1A2 Manufacturing industries - Solid fuels</b>	<b>CO2</b>	<b>267.84</b>	<b>267.84</b>	<b>0.4%</b>	<b>94.1%</b>
<b>2A4 Other Process Uses of Carbonates</b>	<b>CO2</b>	<b>258.74</b>	<b>258.74</b>	<b>0.4%</b>	<b>94.5%</b>
<b>4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CO2</b>	<b>CO2</b>	<b>223.45</b>	<b>223.45</b>	<b>0.3%</b>	<b>94.8%</b>
<b>1A2 Manufacturing industries - Other</b>	<b>CO2</b>	<b>221.82</b>	<b>221.82</b>	<b>0.3%</b>	<b>95.1%</b>

<b>fossil fuels</b>					
<b>3.D.2 Indirect N2O Emissions From Managed Soils</b>					
N2O		221.16	221.16	0.3%	95.4%
<b>1A1 Energy Industries - Other fossil fuels</b>					
CO2		213.65	213.65	0.3%	95.7%
<b>4E2 Land Converted to Settlements - CO2</b>					
CO2		208.04	208.04	0.3%	96.0%
<b>4C2 Land Converted to Grassland - CO2</b>					
CO2		-195.01	195.01	0.3%	96.3%
<b>5C Incineration and open burning of waste</b>					
CO2		194.33	194.33	0.3%	96.6%
<b>1A3c Railways - All Fuels</b>					
CO2		156.13	156.13	0.2%	96.8%
<b>2A2 Lime Production</b>					
CO2		150.60	150.60	0.2%	97.1%
<b>2D Non-energy products from fuels and solvent use</b>					
CO2		142.97	142.97	0.2%	97.3%
<b>1B2c Venting and flaring</b>					
CO2		130.30	130.30	0.2%	97.5%
<b>2F2Foam Blowing - HFC</b>					
Aggregate F-gases		129.60	129.60	0.2%	97.6%
<b>1A3b Road transport - All Fuels</b>					
N2O		116.55	116.55	0.2%	97.8%
<b>2G Other Product Manufacture and Use - SF6</b>					
Aggregate F-gases		111.88	111.88	0.2%	98.0%
<b>5B Biological Treatment of Solid Waste</b>					
CH4		98.85	98.85	0.1%	98.1%
<b>1A4 Other sectors - Biomass</b>					
N2O		90.00	90.00	0.1%	98.2%
<b>3H Urea application</b>					
CO2		86.83	86.83	0.1%	98.4%
<b>3I Other carboncontaining fertilizers</b>					
CO2		80.06	80.06	0.1%	98.5%
<b>5D Wastewater Treatment and Discharge</b>					
N2O		76.86	76.86	0.1%	98.6%
<b>1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous</b>					
CO2		67.35	67.35	0.1%	98.7%
<b>1B2d Other (Thermal water extraction + NatGas storage)</b>					
CH4		63.88	63.88	0.1%	98.8%
<b>1B2c Venting and flaring</b>					
CH4		59.71	59.71	0.1%	98.9%
<b>1B1 Solid fuels</b>					
CH4		56.67	56.67	0.1%	99.0%
<b>2A3 Glass production</b>					
CO2		55.25	55.25	0.1%	99.0%
<b>2B2 Nitric Acid</b>					
N2O		50.29	50.29	0.1%	99.1%

<b>Production</b>					
<b>2G Other Product Manufacture and Use - N2O</b>	N2O	46.46	46.46	0.1%	99.2%
<b>2B8 Petrochemical and carbon black production</b>	CH4	45.36	45.36	0.1%	99.2%
<b>2F4Aerosol + MDI - HFC</b>	Aggregate F-gases	45.22	45.22	0.1%	99.3%
<b>4(III)Direct N2O emissions from N mineralization/immobilization - N2O</b>	N2O	39.25	39.25	0.1%	99.4%
<b>1B2aOil</b>	CH4	38.84	38.84	0.1%	99.4%
<b>5B Biological Treatment of Soil Waste</b>	N2O	34.25	34.25	0.0%	99.5%
<b>1A1 Energy Industries - Biomass</b>	N2O	31.36	31.36	0.0%	99.5%
<b>1A4 Other sectors - Solid fuels</b>	CH4	29.90	29.90	0.0%	99.6%
<b>1A1 Energy Industries - Solid fuels</b>	N2O	27.93	27.93	0.0%	99.6%
<b>1A3b Road transport - All Fuels</b>	CH4	25.22	25.22	0.0%	99.6%
<b>1A4 Other sectors - Gaseous fuels</b>	CH4	21.19	21.19	0.0%	99.7%
<b>1A1 Energy Industries - Biomass</b>	CH4	19.74	19.74	0.0%	99.7%
<b>1A3d Domestic navigation - All Liquid fuels</b>	CO2	19.12	19.12	0.0%	99.7%
<b>3C Rice Cultivation</b>	CH4	18.92	18.92	0.0%	99.7%
<b>4(V) Biomass Burning - CH4</b>	CH4	18.08	18.08	0.0%	99.8%
<b>1A3c Railways - All Fuels</b>	N2O	17.96	17.96	0.0%	99.8%
<b>3G Liming</b>	CO2	17.91	17.91	0.0%	99.8%
<b>1A5b Mobile</b>	CO2	17.89	17.89	0.0%	99.8%
<b>1A4 Other sectors - Liquid fuels</b>	N2O	13.63	13.63	0.0%	99.9%
<b>4(V) Biomass Burning - N2O</b>	N2O	12.13	12.13	0.0%	99.9%
<b>2F3Fire extinguishers - HFC</b>	Aggregate F-gases	7.96	7.96	0.0%	99.9%
<b>1A2 Manufacturing industries - Liquid fuels</b>	N2O	7.09	7.09	0.0%	99.9%
<b>1A2 Manufacturing industries - Biomass</b>	N2O	5.70	5.70	0.0%	99.9%
<b>4C1 Grassland Remaining Grassland - CO2</b>	CO2	-5.54	5.54	0.0%	99.9%
<b>2C1 Iron and Steel Production</b>	CH4	5.14	5.14	0.0%	99.9%

<b>1A4 Other sectors - Gaseous fuels</b>	N2O	5.05	5.05	0.0%	99.9%
<b>1A3a Domestic aviation - All fuels</b>	CO2	4.26	4.26	0.0%	99.9%
<b>1A2 Manufacturing industries - Biomass</b>	CH4	3.52	3.52	0.0%	99.9%
<b>1A2 Manufacturing industries - Other fossil fuels</b>	N2O	3.47	3.47	0.0%	100.0%
<b>1A1 Energy Industries - Other fossil fuels</b>	N2O	2.86	2.86	0.0%	100.0%
<b>1A4 Other sectors - Liquid fuels</b>	CH4	2.55	2.55	0.0%	100.0%
<b>1A1 Energy Industries - Gaseous fuels</b>	N2O	2.25	2.25	0.0%	100.0%
<b>1A2 Manufacturing industries - Other fossil fuels</b>	CH4	2.18	2.18	0.0%	100.0%
<b>5C Incineration and open burning of waste</b>	N2O	2.14	2.14	0.0%	100.0%
<b>1A1 Energy Industries - Gaseous fuels</b>	CH4	1.89	1.89	0.0%	100.0%
<b>1A4 Other sectors - Solid fuels</b>	N2O	1.84	1.84	0.0%	100.0%
<b>1A1 Energy Industries - Other fossil fuels</b>	CH4	1.80	1.80	0.0%	100.0%
<b>1A1 Energy Industries - Solid fuels</b>	CH4	1.79	1.79	0.0%	100.0%
<b>1A2 Manufacturing industries - Gaseous fuels</b>	N2O	1.54	1.54	0.0%	100.0%
<b>1A2 Manufacturing industries - Gaseous fuels</b>	CH4	1.29	1.29	0.0%	100.0%
<b>4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - N2O</b>	N2O	1.27	1.27	0.0%	100.0%
<b>4D12 Flooded Land Remaining Flooded Land - CO2</b>	CO2	-1.25	1.25	0.0%	100.0%
<b>1A1 Energy Industries - Liquid fuels</b>	N2O	1.14	1.14	0.0%	100.0%
<b>1A2 Manufacturing industries - Solid fuels</b>	N2O	0.87	0.87	0.0%	100.0%

<b>1B2b Natural Gas</b>	CO2	0.78	0.78	0.0%	100.0%
<b>1A1 Energy Industries - Liquid fuels</b>	CH4	0.66	0.66	0.0%	100.0%
<b>4D2 Land Converted to Wetlands - CO2</b>	CO2	-0.64	0.64	0.0%	100.0%
<b>1B2aOil</b>	CO2	0.58	0.58	0.0%	100.0%
<b>1A2 Manufacturing industries - Solid fuels</b>	CH4	0.50	0.50	0.0%	100.0%
<b>1A2 Manufacturing industries - Liquid fuels</b>	CH4	0.45	0.45	0.0%	100.0%
<b>5C Incineration and open burning of waste</b>	CH4	0.31	0.31	0.0%	100.0%
<b>1B2c Venting and flaring</b>	N2O	0.27	0.27	0.0%	100.0%
<b>1A3c Railways - All Fuels</b>	CH4	0.22	0.22	0.0%	100.0%
<b>1A3d Domestic navigation - All Liquid fuels</b>	N2O	0.15	0.15	0.0%	100.0%
<b>1A5b Mobile</b>	N2O	0.15	0.15	0.0%	100.0%
<b>4F2 Land Converted to Other Land - CO2</b>	CO2	0.05	0.05	0.0%	100.0%
<b>1A3d Domestic navigation - All Liquid fuels</b>	CH4	0.05	0.05	0.0%	100.0%
<b>1A3a Domestic aviation - All fuels</b>	N2O	0.04	0.04	0.0%	100.0%
<b>1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous</b>	N2O	0.04	0.04	0.0%	100.0%
<b>1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous</b>	CH4	0.03	0.03	0.0%	100.0%
<b>1B2d Other (Thermal water extraction + NatGas storage)</b>	CO2	0.01	0.01	0.0%	100.0%
<b>1A5b Mobile</b>	CH4	0.00	0.00	0.0%	100.0%
<b>1A3a Domestic aviation - All fuels</b>	CH4	0.00	0.00	0.0%	100.0%
<b>3D Agricultural Soils</b>	CH4	0.00	0.00	0.0%	100.0%
<b>1A1 Energy Industries - Peat</b>	CH4	0.00	0.00	0.0%	100.0%
<b>1A1 Energy Industries - Peat</b>	N2O	0.00	0.00	0.0%	100.0%
<b>1A2 Manufacturing</b>	CH4	0.00	0.00	0.0%	100.0%

<b>industries - Peat</b>					
<b>1A2</b>					
<b>Manufacturing industries - Peat</b>	N2O	0.00	0.00	0.0%	100.0%
<b>1A3d Domestic navigation - Gaseous fuels</b>					
	CH4	0.00	0.00	0.0%	100.0%
<b>1A3d Domestic navigation - Gaseous fuels</b>					
	CO2	0.00	0.00	0.0%	100.0%
<b>1A3d Domestic navigation - Gaseous fuels</b>					
	N2O	0.00	0.00	0.0%	100.0%
<b>1A4 Other sectors - Other Fossil Fuels</b>					
	CH4	0.00	0.00	0.0%	100.0%
<b>1A4 Other sectors - Other Fossil Fuels</b>					
	CO2	0.00	0.00	0.0%	100.0%
<b>1A4 Other sectors - Other Fossil Fuels</b>					
	N2O	0.00	0.00	0.0%	100.0%
<b>1A5a Stationary</b>	CH4	0.00	0.00	0.0%	100.0%
<b>1A5a Stationary</b>	CO2	0.00	0.00	0.0%	100.0%
<b>1A5a Stationary</b>	N2O	0.00	0.00	0.0%	100.0%
<b>1B1 Solid fuels</b>	CO2	0.00	0.00	0.0%	100.0%
<b>1B2b Natural Gas</b>	N2O	0.00	0.00	0.0%	100.0%
<b>1B2d Other (Thermal water extraction + NatGas storage)</b>					
	N2O	0.00	0.00	0.0%	100.0%
<b>2B1 Ammonia Production</b>	CH4	0.00	0.00	0.0%	100.0%
<b>2B1 Ammonia Production</b>	N2O	0.00	0.00	0.0%	100.0%
<b>2B8 Petrochemical and carbon black production</b>					
	N2O	0.00	0.00	0.0%	100.0%
<b>2C1 Iron and Steel Production</b>	N2O	0.00	0.00	0.0%	100.0%
<b>2C2 Ferroalloys Production</b>					
	CH4	0.00	0.00	0.0%	100.0%
<b>2C2 Ferroalloys Production</b>					
	CO2	0.00	0.00	0.0%	100.0%
<b>2C2 Ferroalloys Production</b>					
	N2O	0.00	0.00	0.0%	100.0%
<b>2C3 Aluminium Production</b>					
	CH4	0.00	0.00	0.0%	100.0%
<b>2C3 Aluminium Production</b>					
	CO2	0.00	0.00	0.0%	100.0%
<b>2C3 Aluminium Production</b>					
	N2O	0.00	0.00	0.0%	100.0%
<b>2C3 Aluminium Production</b>					
	PFC	0.00	0.00	0.0%	100.0%
<b>2D Non-energy products from fuels and solvent use</b>					
	CH4	0.00	0.00	0.0%	100.0%
<b>2E Electronics industry - SF6</b>	SF6	0.00	0.00	0.0%	100.0%
<b>2F5Solvent - HFC+PFC</b>	Aggregate F-gases	0.00	0.00	0.0%	100.0%
<b>3F Field Burning of Agricultural</b>	CH4	0.00	0.00	0.0%	100.0%

<b>Residues</b>					
<b>3F Field Burning of Agricultural Residues</b>	N2O	0.00	0.00	0.0%	100.0%
<b>3J Other (please specify)</b>	CH4	0.00	0.00	0.0%	100.0%
<b>3J Other (please specify)</b>	CO2	0.00	0.00	0.0%	100.0%
<b>3J Other (please specify)</b>	N2O	0.00	0.00	0.0%	100.0%
<b>4(I) Direct N2O emissions from N inputs to managed soils - N2O</b>	N2O	0.00	0.00	0.0%	100.0%
<b>4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CH4</b>	CH4	0.00	0.00	0.0%	100.0%
<b>4(IV) Indirect N2O Emissions from Managed Soils - N2O</b>	N2O	0.00	0.00	0.0%	100.0%
<b>4(V) Biomass Burning - CO2</b>	CO2	0.00	0.00	0.0%	100.0%
<b>4D11 Peat Extraction Remaining Peat Extraction - CO2</b>	CO2	0.00	0.00	0.0%	100.0%
<b>4D13 Other Wetlands Remaining Other Wetlands - CO2</b>	CO2	0.00	0.00	0.0%	100.0%
<b>4E1 Settlements Remaining Settlements - CO2</b>	CO2	0.00	0.00	0.0%	100.0%
<b>4F1 Other Land Remaining Other Land - CO2</b>	CO2	0.00	0.00	0.0%	100.0%
<b>4H Other - CH4</b>	CH4	0.00	0.00	0.0%	100.0%
<b>4H Other - CO2</b>	CO2	0.00	0.00	0.0%	100.0%
<b>4H Other - N2O</b>	N2O	0.00	0.00	0.0%	100.0%
<b>5A Solid waste disposal</b>	CO2	0.00	0.00	0.0%	100.0%
<b>5A Solid waste disposal</b>	N2O	0.00	0.00	0.0%	100.0%
<b>5B Biological Treatment of Solid Waste</b>	CO2	0.00	0.00	0.0%	100.0%
<b>5D Wastewater Treatment and Discharge</b>	CO2	0.00	0.00	0.0%	100.0%
<b>5E Other</b>	CH4	0.00	0.00	0.0%	100.0%
<b>5E Other</b>	CO2	0.00	0.00	0.0%	100.0%
<b>5E Other</b>	N2O	0.00	0.00	0.0%	100.0%

Table A1-3 Tier1 trend assessment

CRF Code + note	Direct GHG	Base Year (av. 1985-87) emission	Current Year emission	Trend assessment	% Contribution to trend	Cumulative total %
		Gg CO <sub>2</sub> -eq	Gg CO <sub>2</sub> -eq			
1A3b Road transport - All Fuels	CO <sub>2</sub>	7154.86	11795.53	0.07027	15.8%	15.8%
1A4 Other sectors - Gaseous fuels	CO <sub>2</sub>	4340.16	9508.23	0.06333	14.3%	30.1%
1A4 Other sectors - Solid fuels	CO <sub>2</sub>	12499.72	425.02	0.05484	12.3%	42.4%
1A4 Other sectors - Liquid fuels	CO <sub>2</sub>	6948.24	1383.56	0.02039	4.6%	47.0%
2B2 Nitric Acid Production	N <sub>2</sub> O	4365.71	50.29	0.02002	4.5%	51.5%
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggregate F-gases	0.00	2084.96	0.01835	4.1%	55.6%
1A1 Energy Industries - Liquid fuels	CO <sub>2</sub>	5895.63	1158.51	0.01744	3.9%	59.6%
5A Solid waste disposal	CH <sub>4</sub>	2210.27	3058.80	0.01656	3.7%	63.3%
4A2 Land Converted to Forest Land - CO <sub>2</sub>	CO <sub>2</sub>	-91.87	-1963.89	0.01610	3.6%	66.9%
1A2 Manufacturing industries - Gaseous fuels	CO <sub>2</sub>	8853.82	2903.04	0.01595	3.6%	70.5%
1A2 Manufacturing industries - Solid fuels	CO <sub>2</sub>	3318.74	267.84	0.01320	3.0%	73.5%
1A2 Manufacturing industries - Liquid fuels	CO <sub>2</sub>	4241.30	906.24	0.01190	2.7%	76.1%
1A1 Energy Industries - Gaseous fuels	CO <sub>2</sub>	5513.54	4236.52	0.01144	2.6%	78.7%
2C1 Iron and Steel Production	CO <sub>2</sub>	4576.29	1166.19	0.01118	2.5%	81.2%
2B8 Petrochemical and carbon black production	CO <sub>2</sub>	571.26	1365.65	0.00934	2.1%	83.3%
1A1 Energy Industries - Solid fuels	CO <sub>2</sub>	14174.18	8206.85	0.00579	1.3%	84.6%
3.D.1 Direct N <sub>2</sub> O Emissions From Managed Soils	N <sub>2</sub> O	4553.72	3081.68	0.00578	1.3%	85.9%
4B1 Cropland Remaining Cropland - CO <sub>2</sub>	CO <sub>2</sub>	155.71	-566.09	0.00571	1.3%	87.2%
1B1 Solid fuels	CH <sub>4</sub>	1274.59	56.67	0.00547	1.2%	88.5%
1A4 Other sectors - Biomass	CH <sub>4</sub>	153.20	566.27	0.00427	1.0%	89.4%
1A4 Other sectors - Solid fuels	CH <sub>4</sub>	870.79	29.90	0.00382	0.9%	90.3%
4A1 Forest Land Remaining Forest Land - CO <sub>2</sub>	CO <sub>2</sub>	-2400.78	-3917.22	0.00347	0.8%	91.1%
4B2 Land Converted to Cropland - CO <sub>2</sub>	CO <sub>2</sub>	18.47	283.46	0.00241	0.5%	91.6%
2A1 Cement Production	CO <sub>2</sub>	1744.64	675.69	0.00223	0.5%	92.1%
1A3c Railways - All Fuels	CO <sub>2</sub>	758.92	156.13	0.00218	0.5%	92.6%
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>	872.82	223.45	0.00212	0.5%	93.1%
1A2 Manufacturing industries - Other fossil fuels	CO <sub>2</sub>	0.00	221.82	0.00195	0.4%	93.5%
3A Enteric Fermentation	CH <sub>4</sub>	4219.87	2036.69	0.00185	0.4%	93.9%



CRF Code + note	Direct GHG	Base Year (av. 1985-87) emission Gg CO <sub>2</sub> -eq	Current Year emission Gg CO <sub>2</sub> -eq	Trend assessment	% Contribution to trend	Cumulative total %
<b>2C3 Aluminium Production</b>	<b>PFC</b>	<b>371.08</b>	<b>0.00</b>	<b>0.00174</b>	<b>0.4%</b>	<b>94.3%</b>
<b>4C2 Land Converted to Grassland - CO2</b>	<b>CO2</b>	<b>2.52</b>	<b>-195.01</b>	<b>0.00173</b>	<b>0.4%</b>	<b>94.7%</b>
<b>1A1 Energy Industries - Other fossil fuels</b>	<b>CO2</b>	<b>44.08</b>	<b>213.65</b>	<b>0.00167</b>	<b>0.4%</b>	<b>95.1%</b>
<b>4E2 Land Converted to Settlements - CO2</b>	<b>CO2</b>	<b>62.42</b>	<b>208.04</b>	<b>0.00154</b>	<b>0.3%</b>	<b>95.4%</b>
<b>1B2c Venting and flaring</b>	<b>CO2</b>	<b>571.06</b>	<b>130.30</b>	<b>0.00153</b>	<b>0.3%</b>	<b>95.8%</b>
<b>2A2 Lime Production</b>	<b>CO2</b>	<b>606.79</b>	<b>150.60</b>	<b>0.00152</b>	<b>0.3%</b>	<b>96.1%</b>
<b>1A3d Domestic navigation - All Liquid fuels</b>	<b>CO2</b>	<b>341.27</b>	<b>19.12</b>	<b>0.00143</b>	<b>0.3%</b>	<b>96.4%</b>
<b>5C Incineration and open burning of waste</b>	<b>CO2</b>	<b>120.87</b>	<b>194.33</b>	<b>0.00114</b>	<b>0.3%</b>	<b>96.7%</b>
<b>2F2Foam Blowing - HFC</b>	Aggregate F-gases	0.00	129.60	0.00114	0.3%	96.9%
<b>2G Other Product Manufacture and Use - SF6</b>	Aggregate F-gases	6.15	111.88	0.00096	0.2%	97.2%
<b>5B Biological Treatment of Solid Waste</b>	<b>CH4</b>	<b>5.00</b>	<b>98.85</b>	<b>0.00085</b>	<b>0.2%</b>	<b>97.4%</b>
<b>5D Wastewater Treatment and Discharge</b>	<b>CH4</b>	<b>880.08</b>	<b>373.08</b>	<b>0.00084</b>	<b>0.2%</b>	<b>97.5%</b>
<b>1B2c Venting and flaring</b>	<b>CH4</b>	<b>281.42</b>	<b>59.71</b>	<b>0.00079</b>	<b>0.2%</b>	<b>97.7%</b>
<b>1A3b Road transport - All Fuels</b>	<b>N2O</b>	<b>59.39</b>	<b>116.55</b>	<b>0.00075</b>	<b>0.2%</b>	<b>97.9%</b>
<b>1A4 Other sectors - Biomass</b>	<b>N2O</b>	<b>24.35</b>	<b>90.00</b>	<b>0.00068</b>	<b>0.2%</b>	<b>98.0%</b>
<b>2C3 Aluminium Production</b>	<b>CO2</b>	<b>125.37</b>	<b>0.00</b>	<b>0.00059</b>	<b>0.1%</b>	<b>98.2%</b>
<b>1B2aOil</b>	<b>CH4</b>	<b>194.56</b>	<b>38.84</b>	<b>0.00057</b>	<b>0.1%</b>	<b>98.3%</b>
<b>3I Other carboncontaining fertilizers</b>	<b>CO2</b>	<b>48.11</b>	<b>80.06</b>	<b>0.00048</b>	<b>0.1%</b>	<b>98.4%</b>
<b>3B Manure Management</b>	<b>N2O</b>	<b>974.64</b>	<b>466.01</b>	<b>0.00047</b>	<b>0.1%</b>	<b>98.5%</b>
<b>2G Other Product Manufacture and Use - N2O</b>	<b>N2O</b>	<b>186.47</b>	<b>46.46</b>	<b>0.00047</b>	<b>0.1%</b>	<b>98.6%</b>
<b>3G Liming</b>	<b>CO2</b>	<b>130.21</b>	<b>17.91</b>	<b>0.00045</b>	<b>0.1%</b>	<b>98.7%</b>
<b>2F4Aerosol + MDI - HFC</b>	Aggregate F-gases	0.00	45.22	0.00040	0.1%	98.8%
<b>4(III)Direct N2O emissions from N mineralization/immobilization - N2O</b>	<b>N2O</b>	<b>5.34</b>	<b>39.25</b>	<b>0.00032</b>	<b>0.1%</b>	<b>98.9%</b>
<b>3H Urea application</b>	<b>CO2</b>	<b>229.03</b>	<b>86.83</b>	<b>0.00031</b>	<b>0.1%</b>	<b>99.0%</b>
<b>2B8 Petrochemical and carbon black production</b>	<b>CH4</b>	<b>20.40</b>	<b>45.36</b>	<b>0.00030</b>	<b>0.1%</b>	<b>99.0%</b>
<b>5B Biological Treatment of Solid Waste</b>	<b>N2O</b>	<b>3.58</b>	<b>34.25</b>	<b>0.00028</b>	<b>0.1%</b>	<b>99.1%</b>
<b>4G Harvested Wood Products - CO2</b>	<b>CO2</b>	<b>-463.45</b>	<b>-648.20</b>	<b>0.00028</b>	<b>0.1%</b>	<b>99.1%</b>
<b>1A1 Energy Industries - Biomass</b>	<b>N2O</b>	<b>0.94</b>	<b>31.36</b>	<b>0.00027</b>	<b>0.1%</b>	<b>99.2%</b>
<b>1A4 Other sectors - Solid fuels</b>	<b>N2O</b>	<b>57.48</b>	<b>1.84</b>	<b>0.00025</b>	<b>0.1%</b>	<b>99.3%</b>
<b>1A3c Railways - All Fuels</b>	<b>N2O</b>	<b>84.02</b>	<b>17.96</b>	<b>0.00024</b>	<b>0.1%</b>	<b>99.3%</b>
<b>1B2b Natural Gas</b>	<b>CH4</b>	<b>841.74</b>	<b>423.32</b>	<b>0.00022</b>	<b>0.0%</b>	<b>99.4%</b>
<b>3C Rice Cultivation</b>	<b>CH4</b>	<b>81.23</b>	<b>18.92</b>	<b>0.00021</b>	<b>0.0%</b>	<b>99.4%</b>

CRF Code + note	Direct GHG	Base Year (av. 1985-87) emission	Current Year emission	Trend assessment	% Contribution to trend	Cumulative total %
		Gg CO <sub>2</sub> -eq	Gg CO <sub>2</sub> -eq			
<b>3F Field Burning of Agricultural Residues</b>	CH <sub>4</sub>	45.52	0.00	0.00021	0.0%	99.5%
<b>2C2 Ferroalloys Production</b>	CO <sub>2</sub>	40.24	0.00	0.00019	0.0%	99.5%
<b>1A1 Energy Industries - Biomass</b>	CH <sub>4</sub>	0.59	19.74	0.00017	0.0%	99.5%
<b>2A4 Other Process Uses of Carbonates</b>	CO <sub>2</sub>	453.29	258.74	0.00015	0.0%	99.6%
<b>1A4 Other sectors - Gaseous fuels</b>	CH <sub>4</sub>	9.67	21.19	0.00014	0.0%	99.6%
<b>1B2d Other (Thermal water extraction + NatGas storage)</b>	CH <sub>4</sub>	94.91	63.88	0.00012	0.0%	99.6%
<b>1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous</b>	CO <sub>2</sub>	103.30	67.35	0.00011	0.0%	99.7%
<b>3.D.2 Indirect N<sub>2</sub>O Emissions From Managed Soils</b>	N <sub>2</sub> O	393.10	221.16	0.00010	0.0%	99.7%
<b>2D Non-energy products from fuels and solvent use</b>	CO <sub>2</sub>	246.89	142.97	0.00010	0.0%	99.7%
<b>4C1 Grassland Remaining Grassland - CO<sub>2</sub></b>	CO <sub>2</sub>	-10.87	-5.54	0.00009	0.0%	99.7%
<b>1A5b Mobile</b>	CO <sub>2</sub>	14.26	17.89	0.00009	0.0%	99.7%
<b>1A4 Other sectors - Liquid fuels</b>	CH <sub>4</sub>	20.71	2.55	0.00007	0.0%	99.8%
<b>2F3 Fire extinguishers - HFC</b>	Aggregate F-gases	0.00	7.96	0.00007	0.0%	99.8%
<b>3F Field Burning of Agricultural Residues</b>	N <sub>2</sub> O	14.07	0.00	0.00007	0.0%	99.8%
<b>2B1 Ammonia Production</b>	CO <sub>2</sub>	1789.07	960.06	0.00006	0.0%	99.8%
<b>1A2 Manufacturing industries - Solid fuels</b>	N <sub>2</sub> O	12.70	0.87	0.00005	0.0%	99.8%
<b>1A1 Energy Industries - Solid fuels</b>	N <sub>2</sub> O	63.36	27.93	0.00005	0.0%	99.8%
<b>5D Wastewater Treatment and Discharge</b>	N <sub>2</sub> O	154.87	76.86	0.00005	0.0%	99.8%
<b>1A1 Energy Industries - Liquid fuels</b>	N <sub>2</sub> O	12.53	1.14	0.00005	0.0%	99.9%
<b>1A2 Manufacturing industries - Biomass</b>	N <sub>2</sub> O	0.90	5.70	0.00005	0.0%	99.9%
<b>2A3 Glass production</b>	CO <sub>2</sub>	94.66	55.25	0.00004	0.0%	99.9%
<b>4(V) Biomass Burning - CH<sub>4</sub></b>	CH <sub>4</sub>	24.87	18.08	0.00004	0.0%	99.9%
<b>3B Manure Management</b>	CH <sub>4</sub>	1243.59	667.08	0.00004	0.0%	99.9%
<b>1A4 Other sectors - Gaseous fuels</b>	N <sub>2</sub> O	2.31	5.05	0.00003	0.0%	99.9%
<b>4(V) Biomass Burning - N<sub>2</sub>O</b>	N <sub>2</sub> O	15.84	12.13	0.00003	0.0%	99.9%
<b>1A3b Road transport - All Fuels</b>	CH <sub>4</sub>	54.06	25.22	0.00003	0.0%	99.9%
<b>1A2 Manufacturing industries - Other fossil fuels</b>	N <sub>2</sub> O	0.00	3.47	0.00003	0.0%	99.9%
<b>1A2 Manufacturing industries - Solid fuels</b>	CH <sub>4</sub>	7.16	0.50	0.00003	0.0%	99.9%
<b>1A2 Manufacturing industries - Biomass</b>	CH <sub>4</sub>	0.57	3.52	0.00003	0.0%	99.9%
<b>1B2a Oil</b>	CO <sub>2</sub>	5.57	0.58	0.00002	0.0%	99.9%

CRF Code + note	Direct GHG	Base Year (av. 1985-87) emission	Current Year emission	Trend assessment	% Contribution to trend	Cumulative total %
		Gg CO <sub>2</sub> -eq	Gg CO <sub>2</sub> -eq			
<b>1A1 Energy Industries - Other fossil fuels</b>	N <sub>2</sub> O	0.94	2.86	0.00002	0.0%	99.9%
<b>1A3a Domestic aviation - All fuels</b>	CO <sub>2</sub>	3.63	4.26	0.00002	0.0%	100.0%
<b>4D2 Land Converted to Wetlands - CO<sub>2</sub></b>	CO <sub>2</sub>	3.09	-0.64	0.00002	0.0%	100.0%
<b>1A1 Energy Industries - Liquid fuels</b>	CH <sub>4</sub>	5.39	0.66	0.00002	0.0%	100.0%
<b>1A2 Manufacturing industries - Other fossil fuels</b>	CH <sub>4</sub>	0.00	2.18	0.00002	0.0%	100.0%
<b>4D12 Flooded Land Remaining Flooded Land - CO<sub>2</sub></b>	CO <sub>2</sub>	-2.16	-1.25	0.00002	0.0%	100.0%
<b>1B1 Solid fuels</b>	CO <sub>2</sub>	3.60	0.00	0.00002	0.0%	100.0%
<b>1A2 Manufacturing industries - Liquid fuels</b>	CH <sub>4</sub>	4.34	0.45	0.00002	0.0%	100.0%
<b>5C Incineration and open burning of waste</b>	N <sub>2</sub> O	1.16	2.14	0.00001	0.0%	100.0%
<b>1A1 Energy Industries - Other fossil fuels</b>	CH <sub>4</sub>	0.59	1.80	0.00001	0.0%	100.0%
<b>1A3d Domestic navigation - All Liquid fuels</b>	N <sub>2</sub> O	2.87	0.15	0.00001	0.0%	100.0%
<b>1A4 Other sectors - Liquid fuels</b>	N <sub>2</sub> O	28.16	13.63	0.00001	0.0%	100.0%
<b>4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - N<sub>2</sub>O</b>	N <sub>2</sub> O	0.14	1.27	0.00001	0.0%	100.0%
<b>1A2 Manufacturing industries - Gaseous fuels</b>	N <sub>2</sub> O	4.70	1.54	0.00001	0.0%	100.0%
<b>1A2 Manufacturing industries - Gaseous fuels</b>	CH <sub>4</sub>	3.95	1.29	0.00001	0.0%	100.0%
<b>1A1 Energy Industries - Gaseous fuels</b>	N <sub>2</sub> O	2.93	2.25	0.00001	0.0%	100.0%
<b>2C1 Iron and Steel Production</b>	CH <sub>4</sub>	10.89	5.14	0.00001	0.0%	100.0%
<b>1A1 Energy Industries - Gaseous fuels</b>	CH <sub>4</sub>	2.46	1.89	0.00001	0.0%	100.0%
<b>1A3d Domestic navigation - All Liquid fuels</b>	CH <sub>4</sub>	0.84	0.05	0.00000	0.0%	100.0%
<b>1A2 Manufacturing industries - Liquid fuels</b>	N <sub>2</sub> O	13.98	7.09	0.00000	0.0%	100.0%
<b>1A3c Railways - All Fuels</b>	CH <sub>4</sub>	1.04	0.22	0.00000	0.0%	100.0%
<b>1B2b Natural Gas</b>	CO <sub>2</sub>	1.98	0.78	0.00000	0.0%	100.0%
<b>1B2c Venting and flaring</b>	N <sub>2</sub> O	0.89	0.27	0.00000	0.0%	100.0%
<b>5C Incineration and open burning of waste</b>	CH <sub>4</sub>	0.28	0.31	0.00000	0.0%	100.0%
<b>2C2 Ferroalloys Production</b>	CH <sub>4</sub>	0.25	0.00	0.00000	0.0%	100.0%
<b>1A1 Energy Industries - Solid fuels</b>	CH <sub>4</sub>	3.59	1.79	0.00000	0.0%	100.0%
<b>1A5b Mobile</b>	N <sub>2</sub> O	0.12	0.15	0.00000	0.0%	100.0%
<b>4F2 Land Converted to Other Land - CO<sub>2</sub></b>	CO <sub>2</sub>	0.00	0.05	0.00000	0.0%	100.0%

CRF Code + note	Direct GHG	Base Year (av. 1985-87) emission	Current Year emission	Trend assessment	% Contribution to trend	Cumulative total %
		Gg CO <sub>2</sub> -eq	Gg CO <sub>2</sub> -eq			
<b>1A3a Domestic aviation - All fuels</b>	N <sub>2</sub> O	0.03	0.04	0.00000	0.0%	100.0%
<b>1B2d Other (Thermal water extraction + NatGas storage)</b>	CO <sub>2</sub>	0.04	0.01	0.00000	0.0%	100.0%
<b>1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous</b>	N <sub>2</sub> O	0.05	0.04	0.00000	0.0%	100.0%
<b>1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous</b>	CH <sub>4</sub>	0.05	0.03	0.00000	0.0%	100.0%
<b>1A5b Mobile</b>	CH <sub>4</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>1A3a Domestic aviation - All fuels</b>	CH <sub>4</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>1A1 Energy Industries - Peat</b>	CH <sub>4</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>1A1 Energy Industries - Peat</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>1A2 Manufacturing industries - Peat</b>	CH <sub>4</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>1A2 Manufacturing industries - Peat</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>1A3d Domestic navigation - Gaseous fuels</b>	CH <sub>4</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>1A3d Domestic navigation - Gaseous fuels</b>	CO <sub>2</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>1A3d Domestic navigation - Gaseous fuels</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>1A4 Other sectors - Other Fossil Fuels</b>	CH <sub>4</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>1A4 Other sectors - Other Fossil Fuels</b>	CO <sub>2</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>1A4 Other sectors - Other Fossil Fuels</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>1A5a Stationary</b>	CH <sub>4</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>1A5a Stationary</b>	CO <sub>2</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>1A5a Stationary</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>1B2b Natural Gas</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>1B2d Other (Thermal water extraction + NatGas storage)</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>2B1 Ammonia Production</b>	CH <sub>4</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>2B1 Ammonia Production</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>2B8 Petrochemical and carbon black production</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>2C1 Iron and Steel Production</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>2C2 Ferroalloys Production</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>2C3 Aluminium Production</b>	CH <sub>4</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>2C3 Aluminium Production</b>	N <sub>2</sub> O	0.00	0.00	0.00000	0.0%	100.0%
<b>2D Non-energy products from fuels and solvent use</b>	CH <sub>4</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>2E Electronics industry - SF<sub>6</sub></b>	SF <sub>6</sub>	0.00	0.00	0.00000	0.0%	100.0%
<b>2F5Solvent - HFC+PFC</b>	Aggregate F-gases	0.00	0.00	0.00000	0.0%	100.0%

CRF Code + note	Direct GHG	Base Year (av. 1985-87) emission	Current Year emission	Trend assessment	% Contribution to trend	Cumulative total %
		Gg CO <sub>2</sub> -eq	Gg CO <sub>2</sub> -eq			
3D Agricultural Soils	CH4	0.00	0.00	0.00000	0.0%	100.0%
3J Other (please specify)	CH4	0.00	0.00	0.00000	0.0%	100.0%
3J Other (please specify)	CO2	0.00	0.00	0.00000	0.0%	100.0%
3J Other (please specify)	N2O	0.00	0.00	0.00000	0.0%	100.0%
4(I) Direct N2O emissions from N inputs to managed soils - N2O	N2O	0.00	0.00	0.00000	0.0%	100.0%
4(II) Emissions and removals from drainage and rewetting and other management of organic and mineral soils - CH4	CH4	0.00	0.00	0.00000	0.0%	100.0%
4(IV) Indirect N2O Emissions from Managed Soils - N2O	N2O	0.00	0.00	0.00000	0.0%	100.0%
4(V) Biomass Burning - CO2	CO2	0.00	0.00	0.00000	0.0%	100.0%
4D11 Peat Extraction Remaining Peat Extraction - CO2	CO2	0.00	0.00	0.00000	0.0%	100.0%
4D13 Other Wetlands Remaining Other Wetlands - CO2	CO2	0.00	0.00	0.00000	0.0%	100.0%
4E1 Settlements Remaining Settlements - CO2	CO2	0.00	0.00	0.00000	0.0%	100.0%
4F1 Other Land Remaining Other Land - CO2	CO2	0.00	0.00	0.00000	0.0%	100.0%
4H Other - CH4	CH4	0.00	0.00	0.00000	0.0%	100.0%
4H Other - CO2	CO2	0.00	0.00	0.00000	0.0%	100.0%
4H Other - N2O	N2O	0.00	0.00	0.00000	0.0%	100.0%
5A Solid waste disposal	CO2	0.00	0.00	0.00000	0.0%	100.0%
5A Solid waste disposal	N2O	0.00	0.00	0.00000	0.0%	100.0%
5B Biological Treatment of Solid Waste	CO2	0.00	0.00	0.00000	0.0%	100.0%
5D Wastewater Treatment and Discharge	CO2	0.00	0.00	0.00000	0.0%	100.0%
5E Other	CH4	0.00	0.00	0.00000	0.0%	100.0%
5E Other	CO2	0.00	0.00	0.00000	0.0%	100.0%
5E Other	N2O	0.00	0.00	0.00000	0.0%	100.0%

## **Annex 2 Assessment of uncertainty**

### **A2.1 Description of methodology used for uncertainty calculation**

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

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

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

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

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A1 Energy Industries - Biomass	CH <sub>4</sub>	0.59	19.74	5.00	100	100.12	0.032	0.000	0.000	0.018	0.001	0.018
1A1 Energy Industries - Biomass	N <sub>2</sub> O	0.94	31.36	5.00	200	200.06	0.103	0.000	0.000	0.056	0.002	0.056
1A1 Energy Industries - Gaseous fuels	CH <sub>4</sub>	2.46	1.89	1.00	100	100.00	0.003	0.000	0.000	0.000	0.000	0.000
1A1 Energy Industries - Gaseous fuels	CO <sub>2</sub>	5 513.54	4 236.52	1.00	3.00	3.16	0.219	0.011	0.039	0.032	0.055	0.063
1A1 Energy Industries - Gaseous fuels	N <sub>2</sub> O	2.93	2.25	1.00	200.00	200.00	0.007	0.000	0.000	0.001	0.000	0.001
1A1 Energy Industries - Liquid fuels	CH <sub>4</sub>	5.39	0.66	1.00	100.00	100.00	0.001	0.000	0.000	-0.002	0.000	0.002
1A1 Energy Industries - Liquid fuels	CO <sub>2</sub>	5 895.63	1 158.51	1.00	2.00	2.24	0.042	-0.019	0.011	-0.039	0.015	0.042
1A1 Energy Industries - Liquid fuels	N <sub>2</sub> O	12.53	1.14	1.00	200	200.00	0.004	0.000	0.000	-0.011	0.000	0.011
1A1 Energy Industries - Other fossil fuels	CH <sub>4</sub>	0.59	1.80	1.00	100	100.00	0.003	0.000	0.000	0.001	0.000	0.001

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A1 Energy Industries - Other fossil fuels	CO <sub>2</sub>	44.08	213.65	1.00	5	5.10	0.018	0.002	0.002	0.009	0.003	0.009
1A1 Energy Industries - Other fossil fuels	N <sub>2</sub> O	0.94	2.86	1.00	200	200.00	0.009	0.000	0.000	0.004	0.000	0.004
1A1 Energy Industries - Solid fuels	CH <sub>4</sub>	3.59	1.79	1.00	100	100.00	0.003	0.000	0.000	0.000	0.000	0.000
1A1 Energy Industries - Solid fuels	CO <sub>2</sub>	14 174.18	8 206.85	1.00	2	2.24	0.300	0.003	0.075	0.005	0.106	0.106
1A1 Energy Industries - Solid fuels	N <sub>2</sub> O	63.36	27.93	1.00	200	200.00	0.091	0.000	0.000	-0.014	0.000	0.014
1A2 Manufacturing industries - Biomass	CH <sub>4</sub>	0.57	3.52	5.00	100	100.12	0.006	0.000	0.000	0.003	0.000	0.003
1A2 Manufacturing industries - Biomass	N <sub>2</sub> O	0.90	5.70	5.00	200	200.06	0.019	0.000	0.000	0.009	0.000	0.009
1A2 Manufacturing industries - Gaseous fuels	CH <sub>4</sub>	3.95	1.29	5.00	100	100.12	0.002	0.000	0.000	-0.001	0.000	0.001
1A2 Manufacturing industries - Gaseous fuels	CO <sub>2</sub>	8 853.82	2 903.04	5.00	5	7.07	0.336	-0.019	0.027	-0.093	0.187	0.209
1A2 Manufacturing industries - Gaseous fuels	N <sub>2</sub> O	4.70	1.54	5.00	200	200.06	0.005	0.000	0.000	-0.002	0.000	0.002



CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A2 Manufacturing industries - Liquid fuels	CH <sub>4</sub>	4.34	0.45	5.00	100	100.12	0.001	0.000	0.000	-0.002	0.000	0.002
1A2 Manufacturing industries - Liquid fuels	CO <sub>2</sub>	4 241.30	906.24	5.00	2	5.39	0.080	-0.013	0.008	-0.027	0.059	0.064
1A2 Manufacturing industries - Liquid fuels	N <sub>2</sub> O	13.98	7.09	5.00	200	200.06	0.023	0.000	0.000	-0.001	0.000	0.001
1A2 Manufacturing industries - Other fossil fuels	CH <sub>4</sub>	0.00	2.18	5.00	100	100.12	0.004	0.000	0.000	0.002	0.000	0.002
1A2 Manufacturing industries - Other fossil fuels	CO <sub>2</sub>	0.00	221.82	5.00	5	7.07	0.026	0.002	0.002	0.010	0.014	0.018
1A2 Manufacturing industries - Other fossil fuels	N <sub>2</sub> O	0.00	3.47	5.00	200	200.06	0.011	0.000	0.000	0.006	0.000	0.006
1A2 Manufacturing industries - Solid fuels	CH <sub>4</sub>	7.16	0.50	5.00	100	100.12	0.001	0.000	0.000	-0.003	0.000	0.003
1A2 Manufacturing industries - Solid fuels	CO <sub>2</sub>	3 318.74	267.84	5.00	5	7.07	0.031	-0.014	0.002	-0.072	0.017	0.074
1A2 Manufacturing industries - Solid fuels	N <sub>2</sub> O	12.70	0.87	5.00	200	200.06	0.003	0.000	0.000	-0.011	0.000	0.011

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A3a Domestic aviation - All fuels	CH <sub>4</sub>	0.00	0.00	5.00	100	100.12	0.000	0.000	0.000	0.000	0.000	0.000
1A3a Domestic aviation - All fuels	CO <sub>2</sub>	3.63	4.26	5.00	5	7.07	0.000	0.000	0.000	0.000	0.000	0.000
1A3a Domestic aviation - All fuels	N <sub>2</sub> O	0.03	0.04	5.00	150	150.08	0.000	0.000	0.000	0.000	0.000	0.000
1A3b Road transport - All Fuels	CH <sub>4</sub>	54.06	25.22	5.00	100	100.12	0.041	0.000	0.000	-0.005	0.002	0.005
1A3b Road transport - All Fuels	CO <sub>2</sub>	7 154.86	11 795.53	5.00	1.5	5.22	1.008	0.071	0.108	0.107	0.762	0.769
1A3b Road transport - All Fuels	N <sub>2</sub> O	59.39	116.55	5.00	200	200.06	0.382	0.001	0.001	0.152	0.008	0.153
1A3c Railways - All Fuels	CH <sub>4</sub>	1.04	0.22	5.00	250	250.05	0.001	0.000	0.000	-0.001	0.000	0.001
1A3c Railways - All Fuels	CO <sub>2</sub>	758.92	156.13	5.00	1	5.10	0.013	-0.002	0.001	-0.002	0.010	0.010
1A3c Railways - All Fuels	N <sub>2</sub> O	84.02	17.96	5.00	300	300.04	0.088	0.000	0.000	-0.079	0.001	0.079
1A3d Domestic navigation - All Liquid fuels	CH <sub>4</sub>	0.84	0.05	5.00	50	50.25	0.000	0.000	0.000	0.000	0.000	0.000
1A3d Domestic navigation - All Liquid fuels	CO <sub>2</sub>	341.27	19.12	5.00	1.5	5.22	0.002	-0.002	0.000	-0.002	0.001	0.003
1A3d Domestic navigation - All Liquid fuels	N <sub>2</sub> O	2.87	0.15	5.00	140	140.09	0.000	0.000	0.000	-0.002	0.000	0.002

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline. only gaseous	CH <sub>4</sub>	0.05	0.03	5.00	100	100.12	0.000	0.000	0.000	0.000	0.000	0.000
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline. only gaseous	CO <sub>2</sub>	103.30	67.35	5.00	5	7.07	0.008	0.000	0.001	0.000	0.004	0.004
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline. only gaseous	N <sub>2</sub> O	0.05	0.04	5.00	200	200.06	0.000	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Biomass	CH <sub>4</sub>	153.20	566.27	20.00	100	101.98	0.945	0.004	0.005	0.439	0.146	0.463
1A4 Other sectors - Biomass	N <sub>2</sub> O	24.35	90.00	20.00	200	201.00	0.296	0.001	0.001	0.140	0.023	0.141
1A4 Other sectors - Gaseous fuels	CH <sub>4</sub>	9.67	21.19	5.00	100	100.12	0.035	0.000	0.000	0.014	0.001	0.014
1A4 Other sectors - Gaseous fuels	CO <sub>2</sub>	4 340.16	9 508.23	5.00	5	7.07	1.101	0.065	0.087	0.323	0.614	0.694
1A4 Other sectors - Gaseous fuels	N <sub>2</sub> O	2.31	5.05	5.00	200	200.06	0.017	0.000	0.000	0.007	0.000	0.007

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A4 Other sectors - Liquid fuels	CH <sub>4</sub>	20.71	2.55	5.00	100	100.12	0.004	0.000	0.000	-0.008	0.000	0.008
1A4 Other sectors - Liquid fuels	CO <sub>2</sub>	6 948.24	1 383.56	5.00	2	5.39	0.122	-0.023	0.013	-0.045	0.089	0.100
1A4 Other sectors - Liquid fuels	N <sub>2</sub> O	28.16	13.63	5.00	200	200.06	0.045	0.000	0.000	-0.004	0.001	0.004
1A4 Other sectors - Other Fossil Fuels	CH <sub>4</sub>	0.00	0.00	5.00	100	100.12	0.000	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Other Fossil Fuels	CO <sub>2</sub>	0.00	NO	5.00	7	8.60	0.000	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Other Fossil Fuels	N <sub>2</sub> O	0.00	0.00	5.00	200	200.06	0.000	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Solid fuels	CH <sub>4</sub>	870.79	29.90	5.00	100	100.12	0.049	-0.004	0.000	-0.416	0.002	0.416
1A4 Other sectors - Solid fuels	CO <sub>2</sub>	12 499.72	425.02	5.00	7	8.60	0.060	-0.060	0.004	-0.418	0.027	0.419
1A4 Other sectors - Solid fuels	N <sub>2</sub> O	57.48	1.84	5.00	200	200.06	0.006	0.000	0.000	-0.055	0.000	0.055
1A5b Other - Mobile	CH <sub>4</sub>	0.00	0.00	25.00	100	103.08	0.000	0.000	0.000	0.000	0.000	0.000
1A5b Other - Mobile	CO <sub>2</sub>	14.26	17.89	25.00	5	25.50	0.007	0.000	0.000	0.000	0.006	0.006
1A5b Other - Mobile	N <sub>2</sub> O	0.12	0.15	25.00	200	201.56	0.000	0.000	0.000	0.000	0.000	0.000
1B1 Solid fuels	CH <sub>4</sub>	1 274.59	56.67	5.00	200	200.06	0.186	-0.006	0.001	-1.195	0.004	1.195
1B1 Solid fuels	CO <sub>2</sub>	3.60	NO,IE,NA	5.00	200	200.06	0.000	0.000	0.000	0.000	0.000	0.000
1B2a Oil	CH <sub>4</sub>	194.56	38.84	5.00	84	84.20	0.054	-0.001	0.000	-0.053	0.003	0.054

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1B2a Oil	CO <sub>2</sub>	5.57	0.58	5.00	44	44.58	0.000	0.000	0.000	-0.001	0.000	0.001
1B2b Natural Gas	CH <sub>4</sub>	841.74	423.32	5.00	276	276.52	1.916	0.000	0.004	-0.117	0.027	0.120
1B2b Natural Gas	CO <sub>2</sub>	1.98	0.78	5.00	278	277.70	0.004	0.000	0.000	-0.001	0.000	0.001
1B2c Venting and flaring	CH <sub>4</sub>	281.42	59.71	5.00	50	50.74	0.050	-0.001	0.001	-0.045	0.004	0.045
1B2c Venting and flaring	CO <sub>2</sub>	571.06	130.30	5.00	472	471.80	1.006	-0.002	0.001	-0.811	0.008	0.811
1B2c Venting and flaring	N <sub>2</sub> O	0.89	0.27	5.00	546	546.05	0.002	0.000	0.000	-0.001	0.000	0.001
1B2d Other (Thermal water extraction + NatGas storage)	CH <sub>4</sub>	94.91	63.88	5.00	200	200.06	0.209	0.000	0.001	0.020	0.004	0.020
1B2d Other (Thermal water extraction + NatGas storage)	CO <sub>2</sub>	0.04	0.01	5.00	200	200.06	0.000	0.000	0.000	0.000	0.000	0.000
2A1 Cement Production	CO <sub>2</sub>	1 744.64	675.69	2.5	2.5	3.54	0.039	-0.003	0.006	-0.007	0.022	0.023
2A2 Lime Production	CO <sub>2</sub>	606.79	150.60	2.5	2.5	3.54	0.009	-0.002	0.001	-0.004	0.005	0.006
2A3 Glass production	CO <sub>2</sub>	94.66	55.25	2.5	2.5	3.54	0.003	0.000	0.001	0.000	0.002	0.002
2A4 Other Process Uses of Carbonates	CO <sub>2</sub>	453.29	258.74	2.5	2.5	3.54	0.015	0.000	0.002	0.000	0.008	0.008
2B1 Ammonia Production	CO <sub>2</sub>	1 789.07	960.06	5	5	7.07	0.111	0.000	0.009	-0.002	0.062	0.062

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
2B2 Nitric Acid Production	N <sub>2</sub> O	4 365.71	50.29	7.5	7.5	10.61	0.009	-0.022	0.000	-0.163	0.005	0.163
2B8 Petrochemical and carbon black production	CH <sub>4</sub>	20.40	45.36	3	10	10.44	0.008	0.000	0.000	0.003	0.002	0.004
2B8 Petrochemical and carbon black production	CO <sub>2</sub>	571.26	1 365.65	7.5	7.5	10.61	0.237	0.010	0.012	0.072	0.132	0.150
2C1 Iron and Steel Production	CH <sub>4</sub>	10.89	5.14	10	10	14.14	0.001	0.000	0.000	0.000	0.001	0.001
2C1 Iron and Steel Production	CO <sub>2</sub>	4 576.29	1 166.19	7.5	5	9.01	0.172	-0.013	0.011	-0.063	0.113	0.129
2C2 Ferroalloys Production	CH <sub>4</sub>	0.25	0.00	5	37.5	37.83	0.000	0.000	0.000	0.000	0.000	0.000
2C2 Ferroalloys Production	CO <sub>2</sub>	40.24	0.00	5	37.5	37.83	0.000	0.000	0.000	-0.008	0.000	0.008
2C3 Aluminium Production	CO <sub>2</sub>	125.37	0.00	2	10	10.20	0.000	-0.001	0.000	-0.006	0.000	0.006
2C3 Aluminium Production	PFC	371.08	0.00	2	99	99.02	0.000	-0.002	0.000	-0.187	0.000	0.187
2D Non-energy products from fuels and solvent use	CO <sub>2</sub>	246.89	142.97	5	50	50.25	0.118	0.000	0.001	0.002	0.009	0.010
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggr. F-gases	0.00	2 084.96	10	10	14.14	0.483	0.019	0.019	0.190	0.269	0.330

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
2F2 Foam Blowing - HFC	Aggr. F-gases	0.00	129.60	50	21	54.23	0.115	0.001	0.001	0.025	0.084	0.087
2F3 Fire extinguishers - HFC	Aggr. F-gases	0.00	7.96	15	2	15.13	0.002	0.000	0.000	0.000	0.002	0.002
2F4 Aerosol + MDI - HFC	Aggr. F-gases	0.00	45.22	10	50	50.99	0.038	0.000	0.000	0.021	0.006	0.021
2G Other Product Manufacture and Use - SF6	Aggr. F-gases	6.15	111.88	3	40	40.11	0.073	0.001	0.001	0.040	0.004	0.040
2G Other Product Manufacture and Use	N <sub>2</sub> O	186.47	46.46	3	3	4.24	0.003	-0.001	0.000	-0.002	0.002	0.002
3A Enteric Fermentation	CH <sub>4</sub>	4 219.87	2 036.69	0	12.48	12.48	0.416	-0.003	0.019	-0.036	0.000	0.036
3B Manure Management	CH <sub>4</sub>	1 243.59	667.08	0	15.12	15.12	0.165	0.000	0.006	-0.004	0.000	0.004
3B Manure Management	N <sub>2</sub> O	974.64	466.01	0	142.86	142.86	1.090	-0.001	0.004	-0.101	0.000	0.101
3C Rice Cultivation	CH <sub>4</sub>	81.23	18.92	5	75.44	75.61	0.023	0.000	0.000	-0.018	0.001	0.018
3D Agricultural Soils	N <sub>2</sub> O	4 946.82	3 302.84	0	187.65	187.65	10.145	0.005	0.030	0.930	0.000	0.930
3F Field Burning of Agricultural Residues	CH <sub>4</sub>	45.52	NO	0	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000

CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
3F Field Burning of Agricultural Residues	N <sub>2</sub> O	14.07	NO	0	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000
3G Liming	CO <sub>2</sub>	130.21	17.91	10.00	20	22.36	0.007	0.000	0.000	-0.010	0.002	0.010
3H Urea application	CO <sub>2</sub>	229.03	86.83	5.00	20	20.62	0.029	0.000	0.001	-0.007	0.006	0.009
3I Other carboncontaining fertilizers	CO <sub>2</sub>	48.11	80.06	5.00	20	20.62	0.027	0.000	0.001	0.010	0.005	0.011
5A Solid waste disposal	CH <sub>4</sub>	2 210.27	3 058.80	10	33	34.48	1.726	0.017	0.028	0.550	0.395	0.677
5B Biological Treatment of Soild Waste	CH <sub>4</sub>	5.00	98.85	10	140	140.36	0.227	0.001	0.001	0.123	0.013	0.123
5B Biological Treatment of Soild Waste	N <sub>2</sub> O	3.58	34.25	10	130	130.38	0.073	0.000	0.000	0.038	0.004	0.039
5C Incineration and open burning of waste	CH <sub>4</sub>	0.28	0.31	10	100	100.50	0.001	0.000	0.000	0.000	0.000	0.000
5C Incineration and open burning of waste	CO <sub>2</sub>	120.87	194.33	10	25	26.93	0.086	0.001	0.002	0.029	0.025	0.038
5C Incineration and open burning of waste	N <sub>2</sub> O	1.16	2.14	10	100	100.50	0.004	0.000	0.000	0.001	0.000	0.001
5D Wastewater Treatment and Discharge	CH <sub>4</sub>	880.08	373.08	30	40	50.00	0.305	-0.001	0.003	-0.043	0.145	0.151



CRF	GHG	Base year emissions	Year t emissions	Activity data uncertainty	Emission factor uncertainty	Combined uncertainty	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
5D Wastewater Treatment and Discharge	CO <sub>2</sub>	0.00	0.00	0	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000
5D Wastewater Treatment and Discharge	N <sub>2</sub> O	154.87	76.86	15	200	200.56	0.252	0.000	0.001	-0.017	0.015	0.023
		<b>Σ C</b>	<b>Σ D</b>					<b>(ΣH2)1/2</b>		<b>(ΣM2)1/2</b>		
<b>TOTAL exc LULUCF</b>		<b>109 505.42</b>	<b>61 091.75</b>					<b>10.8</b>		<b>2.3</b>		

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

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A1 Energy Industries - Gaseous fuels	CO <sub>2</sub>	5 513.54	4 236.52	1	3	3.16	0.286	0.014	0.050	0.043	0.070	0.082
1A1 Energy Industries - Liquid fuels	CO <sub>2</sub>	5 895.63	1 158.51	1	2	2.24	0.055	-0.024	0.014	-0.048	0.019	0.052

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A1 Energy Industries - Other fossil fuels	CO <sub>2</sub>	44.08	213.65	1	5	5.10	0.023	0.002	0.002	0.011	0.004	0.012
1A1 Energy Industries - Solid fuels	CO <sub>2</sub>	14 174.18	8 206.85	1	2	2.24	0.392	0.005	0.096	0.011	0.136	0.136
1A2 Manufacturing industries - Gaseous fuels	CO <sub>2</sub>	8 853.82	2 903.04	5	5	7.07	0.439	-0.023	0.034	-0.113	0.240	0.265
1A2 Manufacturing industries - Liquid fuels	CO <sub>2</sub>	4 241.30	906.24	5	2	5.39	0.104	-0.016	0.011	-0.033	0.075	0.082
1A2 Manufacturing industries - Other fossil fuels	CO <sub>2</sub>	0.00	221.82	5	5	7.07	0.034	0.003	0.003	0.013	0.018	0.022
1A2 Manufacturing industries - Solid fuels	CO <sub>2</sub>	3 318.74	267.84	5	5	7.07	0.040	-0.018	0.003	-0.090	0.022	0.093
1A3a Domestic aviation - All fuels	CO <sub>2</sub>	3.63	4.26	5	5	7.07	0.001	0.000	0.000	0.000	0.000	0.000
1A3b Road transport - All Fuels	CO <sub>2</sub>	7 154.86	11 795.53	5	2	5.22	1.316	0.092	0.138	0.138	0.975	0.985
1A3c Railways - All Fuels	CO <sub>2</sub>	758.92	156.13	5	1	5.10	0.017	-0.003	0.002	-0.003	0.013	0.013
1A3d Domestic navigation - All Liquid fuels	CO <sub>2</sub>	341.27	19.12	5	2	5.22	0.002	-0.002	0.000	-0.003	0.002	0.003

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline. only gaseous	CO <sub>2</sub>	103.30	67.35	5	5	7.07	0.010	0.000	0.001	0.001	0.006	0.006
1A4 Other sectors - Gaseous fuels	CO <sub>2</sub>	4 340.16	9 508.23	5	5	7.07	1.437	0.083	0.111	0.417	0.786	0.889
1A4 Other sectors - Liquid fuels	CO <sub>2</sub>	6 948.24	1 383.56	5	2	5.39	0.159	-0.028	0.016	-0.056	0.114	0.127
1A4 Other sectors - Other Fossil Fuels	CO <sub>2</sub>	0.00	NO	5	7	8.60	0.000	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Solid fuels	CO <sub>2</sub>	12 499.72	425.02	5	7	8.60	0.078	-0.075	0.005	-0.524	0.035	0.525
1A5b Other - Mobile	CO <sub>2</sub>	14.26	17.89	25	5	25.50	0.010	0.000	0.000	0.001	0.007	0.007
1B1 Solid fuels	CO <sub>2</sub>	3.60	NO,IE,NA	5	200	200.06	0.000	0.000	0.000	0.000	0.000	0.000
1B2aOil	CO <sub>2</sub>	5.57	0.58	5	44	44.58	0.001	0.000	0.000	-0.001	0.000	0.001
1B2b Natural Gas	CO <sub>2</sub>	1.98	0.78	5	278	277.70	0.005	0.000	0.000	-0.001	0.000	0.001
1B2c Venting and flaring	CO <sub>2</sub>	571.06	130.30	5	472	471.80	1.314	-0.002	0.002	-1.003	0.011	1.003
1B2d Other (Thermal water extraction + NatGas storage)	CO <sub>2</sub>	0.04	0.01	5	200	200.06	0.000	0.000	0.000	0.000	0.000	0.000
2A1 Cement Production	CO <sub>2</sub>	1 744.64	675.69	3	3	3.54	0.051	-0.003	0.008	-0.008	0.028	0.029
2A2 Lime Production	CO <sub>2</sub>	606.79	150.60	3	3	3.54	0.011	-0.002	0.002	-0.005	0.006	0.008

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
2A3 Glass production	CO <sub>2</sub>	94.66	55.25	3	3	3.54	0.004	0.000	0.001	0.000	0.002	0.002
2A4 Other Process Uses of Carbonates	CO <sub>2</sub>	453.29	258.74	3	3	3.54	0.020	0.000	0.003	0.000	0.011	0.011
2B1 Ammonia Production	CO <sub>2</sub>	1 789.07	960.06	5	5	7.07	0.145	0.000	0.011	-0.001	0.079	0.079
2B8 Petrochemical and carbon black production	CO <sub>2</sub>	571.26	1 365.65	8	8	10.61	0.310	0.012	0.016	0.092	0.169	0.193
2C1 Iron and Steel Production	CO <sub>2</sub>	4 576.29	1 166.19	8	5	9.01	0.225	-0.016	0.014	-0.078	0.145	0.164
2C2 Ferroalloys Production	CO <sub>2</sub>	40.24	0.00	5	38	37.83	0.000	0.000	0.000	-0.010	0.000	0.010
2C3 Aluminium Production	CO <sub>2</sub>	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	CO <sub>2</sub>	246.89	142.97	5	50	50.25	0.154	0.000	0.002	0.005	0.012	0.013
3G Liming	CO <sub>2</sub>	130.21	17.91	10	20	22.36	0.009	-0.001	0.000	-0.012	0.003	0.013
3H Urea application	CO <sub>2</sub>	229.03	86.83	5	20	20.62	0.038	0.000	0.001	-0.009	0.007	0.011
3I Other carboncontaining fertilizers	CO <sub>2</sub>	48.11	80.06	5	20	20.62	0.035	0.001	0.001	0.013	0.007	0.014
5C Incineration and open burning of waste	CO <sub>2</sub>	120.87	194.33	10	25	26.93	0.112	0.001	0.002	0.037	0.032	0.049

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
5D Wastewater Treatment and Discharge		0.00	0.00	0	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000
		$\Sigma$ C	$\Sigma$ D				( $\Sigma$ H2)1/2					( $\Sigma$ M2)1/2
<b>TOTAL CO<sub>2</sub> excluding LULUCF</b>		<b>85 564.64</b>	<b>46 777.50</b>				<b>2.5</b>					<b>1.8</b>
1A1 Energy Industries - Biomass	CH <sub>4</sub>	0.59	19.74	5	100	100.12	0.259	0.002	0.002	0.155	0.011	0.155
1A1 Energy Industries - Gaseous fuels	CH <sub>4</sub>	2.46	1.89	1	100	100.00	0.025	0.000	0.000	0.003	0.000	0.003
1A1 Energy Industries - Liquid fuels	CH <sub>4</sub>	5.39	0.66	1	100	100.00	0.009	0.000	0.000	-0.021	0.000	0.021
1A1 Energy Industries - Other fossil fuels	CH <sub>4</sub>	0.59	1.80	1	100	100.00	0.024	0.000	0.000	0.012	0.000	0.012
1A1 Energy Industries - Solid fuels	CH <sub>4</sub>	3.59	1.79	1	100	100.00	0.023	0.000	0.000	-0.003	0.000	0.003
1A2 Manufacturing industries - Biomass	CH <sub>4</sub>	0.57	3.52	5	100	100.12	0.046	0.000	0.000	0.025	0.002	0.025

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A2 Manufacturing industries - Gaseous fuels	CH <sub>4</sub>	3.95	1.29	5	100	100.12	0.017	0.000	0.000	-0.009	0.001	0.009
1A2 Manufacturing industries - Liquid fuels	CH <sub>4</sub>	4.34	0.45	5	100	100.12	0.006	0.000	0.000	-0.017	0.000	0.017
1A2 Manufacturing industries - Other fossil fuels	CH <sub>4</sub>	0.00	2.18	5	100	100.12	0.029	0.000	0.000	0.017	0.001	0.017
1A2 Manufacturing industries - Solid fuels	CH <sub>4</sub>	7.16	0.50	5	100	100.12	0.007	0.000	0.000	-0.031	0.000	0.031
1A3a Domestic aviation - All fuels	CH <sub>4</sub>	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	CH <sub>4</sub>	54.06	25.22	5	100	100.12	0.331	-0.001	0.002	-0.061	0.014	0.063
1A3c Railways - All Fuels	CH <sub>4</sub>	1.04	0.22	5	250	250.05	0.007	0.000	0.000	-0.008	0.000	0.008
1A3d Domestic navigation - All Liquid fuels	CH <sub>4</sub>	0.84	0.05	5	50	50.25	0.000	0.000	0.000	-0.002	0.000	0.002
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	CH <sub>4</sub>	0.046	0.030	5	100	100.12	0.000	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Biomass	CH <sub>4</sub>	153.20	566.27	20	100	101.98	7.573	0.038	0.045	3.771	1.277	3.982

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A4 Other sectors - Gaseous fuels	CH <sub>4</sub>	9.67	21.19	5	100	100.12	0.278	0.001	0.002	0.122	0.012	0.123
1A4 Other sectors - Liquid fuels	CH <sub>4</sub>	20.71	2.55	5	100	100.12	0.033	-0.001	0.000	-0.080	0.001	0.080
1A4 Other sectors - Other Fossil Fuels	CH <sub>4</sub>	0.00	0.00	5	100	100.12	0.000	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Solid fuels	CH <sub>4</sub>	870.79	29.90	5	100	100.12	0.393	-0.040	0.002	-3.979	0.017	3.979
1A5b Other - Mobile	CH <sub>4</sub>	0.00	0.00	25	100	103.08	0.000	0.000	0.000	0.000	0.000	0.000
1B1 Solid fuels	CH <sub>4</sub>	1 274.59	56.67	5	200	200.06	1.487	-0.057	0.005	-11.440	0.032	11.440
1B2a Oil	CH <sub>4</sub>	194.56	38.84	5	84	84.20	0.429	-0.006	0.003	-0.532	0.022	0.533
1B2b Natural Gas	CH <sub>4</sub>	841.74	423.32	5	276	276.52	15.350	-0.007	0.034	-1.948	0.239	1.962
1B2c Venting and flaring	CH <sub>4</sub>	281.42	59.71	5	50	50.74	0.397	-0.009	0.005	-0.448	0.034	0.450
1B2d Other (Thermal water extraction + NatGas storage)	CH <sub>4</sub>	94.91	63.88	5	200	200.06	1.676	0.000	0.005	0.098	0.036	0.105
2B8 Petrochemical and carbon black production	CH <sub>4</sub>	20.40	45.36	3	10	10.44	0.062	0.003	0.004	0.026	0.015	0.030
2C1 Iron and Steel Production	CH <sub>4</sub>	10.89	5.14	10	10	14.14	0.010	0.000	0.000	-0.001	0.006	0.006
2C2 Ferroalloys Production	CH <sub>4</sub>	0.25	0.00	5	38	37.83	0.000	0.000	0.000	0.000	0.000	0.000

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
3A Enteric Fermentation	CH <sub>4</sub>	4 219.87	2 036.69	0	12	12.48	3.333	-0.042	0.162	-0.524	0.000	0.524
3B Manure Management	CH <sub>4</sub>	1 243.59	667.08	0	15	15.12	1.323	-0.007	0.053	-0.107	0.000	0.107
3C Rice Cultivation	CH <sub>4</sub>	81.23	18.92	5	75	75.61	0.188	-0.002	0.002	-0.183	0.011	0.184
3F Field Burning of Agricultural Residues	CH <sub>4</sub>	45.52	NO	0	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000
5A Solid waste disposal	CH <sub>4</sub>	2 210.27	3 058.80	10	33	34.48	13.831	0.136	0.244	4.504	3.449	5.673
5B Biological Treatment of Solid Waste	CH <sub>4</sub>	5.00	98.85	10	140	140.36	1.819	0.008	0.008	1.069	0.111	1.075
5C Incineration and open burning of waste	CH <sub>4</sub>	0.28	0.31	10	100	100.50	0.004	0.000	0.000	0.001	0.000	0.001
5D Wastewater Treatment and Discharge	CH <sub>4</sub>	880.08	373.08	30	40	50.00	2.446	-0.013	0.030	-0.516	1.262	1.363
		Σ C	Σ D					(ΣH2)1/2		(ΣM2)1/2		
<b>TOTAL CH<sub>4</sub> excluding LULUCF</b>		<b>12 543.60</b>	<b>7 625.88</b>					<b>22.6</b>		<b>14.2</b>		
1A1 Energy Industries - Biomass	N <sub>2</sub> O	0.94	31.36	5	200	200.06	1.456	0.003	0.003	0.562	0.020	0.563



CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A1 Energy Industries - Gaseous fuels	N <sub>2</sub> O	2.93	2.25	1	200	200.00	0.105	0.000	0.000	0.020	0.000	0.020
1A1 Energy Industries - Liquid fuels	N <sub>2</sub> O	12.53	1.14	1	200	200.00	0.053	0.000	0.000	-0.068	0.000	0.068
1A1 Energy Industries - Other fossil fuels	N <sub>2</sub> O	0.94	2.86	1	200	200.00	0.133	0.000	0.000	0.045	0.000	0.045
1A1 Energy Industries - Solid fuels	N <sub>2</sub> O	63.36	27.93	1	200	200.00	1.296	0.000	0.003	0.057	0.004	0.057
1A2 Manufacturing industries - Biomass	N <sub>2</sub> O	0.90	5.70	5	200	200.06	0.265	0.000	0.001	0.097	0.004	0.097
1A2 Manufacturing industries - Gaseous fuels	N <sub>2</sub> O	4.70	1.54	5	200	200.06	0.072	0.000	0.000	-0.005	0.001	0.005
1A2 Manufacturing industries - Liquid fuels	N <sub>2</sub> O	13.98	7.09	5	200	200.06	0.329	0.000	0.001	0.030	0.005	0.030
1A2 Manufacturing industries - Other fossil fuels	N <sub>2</sub> O	0.00	3.47	5	200	200.06	0.161	0.000	0.000	0.063	0.002	0.063
1A2 Manufacturing industries - Solid fuels	N <sub>2</sub> O	12.70	0.87	5	200	200.06	0.040	0.000	0.000	-0.074	0.001	0.074
1A3a Domestic aviation - All fuels	N <sub>2</sub> O	0.03	0.04	5	150	150.08	0.001	0.000	0.000	0.000	0.000	0.000

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
1A3b Road transport - All Fuels	N <sub>2</sub> O	59.39	116.55	5	200	200.06	5.412	0.008	0.011	1.694	0.075	1.695
1A3c Railways - All Fuels	N <sub>2</sub> O	84.02	17.96	5	300	300.04	1.250	-0.001	0.002	-0.405	0.012	0.406
1A3d Domestic navigation - All Liquid fuels	N <sub>2</sub> O	2.87	0.15	5	140	140.09	0.005	0.000	0.000	-0.012	0.000	0.012
1A3e Other Transportation (as specified in table 1A(a) sheet 3) - Pipeline, only gaseous	N <sub>2</sub> O	0.05	0.04	5	200	200.06	0.002	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Biomass	N <sub>2</sub> O	24.35	90.00	20	200	201.00	4.198	0.007	0.008	1.461	0.231	1.479
1A4 Other sectors - Gaseous fuels	N <sub>2</sub> O	2.31	5.05	5	200	200.06	0.235	0.000	0.000	0.075	0.003	0.075
1A4 Other sectors - Liquid fuels	N <sub>2</sub> O	28.16	13.63	5	200	200.06	0.633	0.000	0.001	0.047	0.009	0.048
1A4 Other sectors - Other Fossil Fuels	N <sub>2</sub> O	0.00	0.00	5	200	200.06	0.000	0.000	0.000	0.000	0.000	0.000
1A4 Other sectors - Solid fuels	N <sub>2</sub> O	57.48	1.84	5	200	200.06	0.085	-0.002	0.000	-0.375	0.001	0.375
1A5b Other - Mobile	N <sub>2</sub> O	0.12	0.15	25	200	201.56	0.007	0.000	0.000	0.002	0.000	0.002
1B2c Venting and flaring	N <sub>2</sub> O	0.89	0.27	5	546	546.05	0.035	0.000	0.000	-0.004	0.000	0.004

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
2B2 Nitric Acid Production	N <sub>2</sub> O	4 365.71	50.29	8	8	10.61	0.124	-0.150	0.005	-1.123	0.048	1.124
2G Other Product Manufacture and Use	N <sub>2</sub> O	186.47	46.46	3	3	4.24	0.046	-0.002	0.004	-0.007	0.018	0.019
3B Manure Management	N <sub>2</sub> O	974.64	466.01	0	143	142.86	15.451	0.008	0.042	1.100	0.000	1.100
3D Agricultural Soils	N <sub>2</sub> O	4 946.82	3 302.84	0	188	187.65	143.845	0.124	0.300	23.202	0.000	23.202
3F Field Burning of Agricultural Residues	N <sub>2</sub> O	14.07	NO	0	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000
5B Biological Treatment of Soild Waste	N <sub>2</sub> O	3.58	34.25	10	130	130.38	1.036	0.003	0.003	0.388	0.044	0.390
5C Incineration and open burning of waste	N <sub>2</sub> O	1.16	2.14	10	100	100.50	0.050	0.000	0.000	0.015	0.003	0.016
5D Wastewater Treatment and Discharge	N <sub>2</sub> O	154.87	76.86	15	200	200.56	3.578	0.001	0.007	0.296	0.148	0.331
		Σ C	Σ D	(ΣH2)1/2				(ΣM2)1/2				
<b>TOTAL N<sub>2</sub>O excluding LULUCF</b>		<b>11 019.95</b>	<b>4 308.75</b>	<b>144.9</b>				<b>23.4</b>				
2C3 Aluminium Production	PFC	371.08	0.00	2	99	99.02	0.000	-6.145	0.000	-608.351	0.000	608.351

CRF	GHG	Base year emissions	Year t emissions	Activity data uncert.	Emission factor uncert.	Combined uncert.	Combined uncertainty as % of total national emissions in the year t	Type A sensitivity	Type B sensitivity	Uncertainty introduced in trend in national emissions introduced by emission factor uncertainty	Uncertainty introduced in trend in national emissions introduced by activity data uncertainty	Uncertainty introduced in trend in national emissions
2F1 Refrigeration and Air Conditioning Equipment - HFC+PFC	Aggr. F-gases	0.00	2084.96	10	10	14.14	12.391	5.527	5.527	55.271	78.165	95.732
2F2 Foam Blowing - HFC	Aggr. F-gases	0.00	129.60	50	21	54.23	2.954	0.344	0.344	7.215	24.293	25.342
2F3 Fire extinguishers - HFC	Aggr. F-gases	0.00	7.96	15	2	15.13	0.051	0.021	0.021	0.042	0.448	0.450
2F4 Aerosol + MDI - HFC	Aggr. F-gases	0.00	45.22	10	50	50.99	0.969	0.120	0.120	5.994	1.695	6.229
2G Other Product Manufacture and Use - SF6	Aggr. F-gases	6.15	111.88	3	40	40.11	1.886	0.194	0.297	7.751	1.258	7.852
		$\Sigma$ C	$\Sigma$ D					$(\Sigma H2)1/2$		$(\Sigma M2)1/2$		
<b>TOTAL Aggregate F-gases excluding LULUCF</b>		<b>377.23</b>	<b>2 379.62</b>					<b>12.9</b>		<b>616.4</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 - including surfaces 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> )	-	-
	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 - including surfaces mines	Mt	MBFH (Hungarian Office for Mining and Geology)	CS: 10% of the mining emission factor - like IPCC 2006 GLs T1 methodology	-	-
	Coal production from all other underground Mines	Mt	MBFH (Hungarian Office for Mining and Geology)	CS: 10% of the mining emission factor - like IPCC 2006 GLs T1 methodology	-	-
Abandoned underground mines	Expert estimate	number of closed mines in the given time interval	based on MBFH (Hungarian Office for Mining and Geology) publication	IPCC 2006 GLs, T1 emission factors	-	-
ii. Surface mines <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				-	-	-
<b>1. B. 1. b. Solid fuel transformation<sup>(5)</sup></b>	IE to 1A1c	-	-	-	-	IE to 1A1c
<b>1. B. 1. c. Other (please specify)<sup>(6)</sup></b>	-	-	-			-

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
<b>1. B. 2. a. Oil</b>						
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, pipelines	
	Oil transported by tanker trucks and rail cars	1000 m3	MOL Hungary	IPCC 2006 GLs, tanker trucks and rail cars	IPCC 2006 GLs, tanker trucks and rail cars	
	Condensate and Pentanes Plus transport	1000 m3	MOL Hungary	IPCC 2006 GLs, condensates	IPCC 2006 GLs, condensates	
	LPG	1000 m3	MOL Hungary	IPCC 2006 GLs, LPG		
4. Refining/storage	Oil refined	1000 m3	IEA, data converted kt to thousand m <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	

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
	Sour Gas Plants - raw gas feed	million m3	MOL Hungary	IPCC 2006 GLs, gas processing	IPCC 2006 GLs, gas processing	
	Deep cut Plants - raw gas feed	million m3	MOL Hungary	IPCC 2006 GLs, gas processing	IPCC 2006 GLs, gas processing	
4. Transmission and storage	Marketable gas: import+production	million m3	IEA	IPCC 2006 GLs, transmission	IPCC 2006 GLs, transmission	
	Marketable gas: import+production	million m3	IEA	IPCC 2006 GLs, storage	IPCC 2006 GLs, storage	
5. Distribution	Utility sales: import + production + storage - export	million m3	IEA: import, export, production; FGSZ Ltd. (MOL Group): storage	IPCC 2006 GLs, gas distribution	IPCC 2006 GLs, gas distribution	
6. Other		NO	NO			
<b>1. B. 2. c. Venting and flaring</b>						
<b>Venting</b>						
i. Oil	Conventional oil production	1000 m3	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 m3	MOL Hungary	IPCC 2006 GLs, gas production venting (raw CO <sub>2</sub> venting)		
	Marketable gas: import+production	million m3	IEA	IPCC 2006 GLs, gas transmission venting	IPCC 2006 GLs, gas transmission venting	
iii. Combined		NO	IE to 1B2c1.Venting i. Oil			



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

## HUNGARYNational Inventory Report 1985-2014ANNEX 5

### A3.2 IPPU sector

				Unit	Solids						Liquids										Gas				
Year: 2015					Coal	Coke	Coal tars	Coal oils	BF/OF gas (CO gas) b)	Total solids	Naphtha	Gas oil	Fuel Oil	Ethane	LPG b)	Pet.coke	Other	Chem. gas	Lubricants	Waxes	Bitumen	Total liquids	Nat Gas	Total gas	
A: Declared NEU (from commodity balance)				TJ	0	20306	570	0	2414	0		40908	502	0	0	12126	0	9158	0	2866	465	5732		22752	
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		
C: Total supplied for feedstock/non-energy	[C = A * B / 1000]			Gg C	0.0	592.9	12.5	0.0	170.9	0.0	776.4	818.2	10.1	0.0	0.0	208.6	0.0	183.2	0.0	57.3	9.3	126.1	1412.7	348.1	348.1
D: Total supplied for feedstock/non-energy	[D = C * 44/12]			Gg CO <sub>2</sub> -eq	0.0	2174.1	46.0	0.0	626.7	0.0	2846.8	2999.9	37.1	0.0	0.0	764.7	0.0	671.6	0.0	210.1	34.1	462.4	5180.0	1276.4	1276.4
E: Implied carbon fraction oxidised	[E = F / D * 100]			%		1.0	0.0		1.0	0.0	0.0	0.0	0.0		0.0		0.0		0.2	0.2	0.0	0.2	1.0	0.0	
	Activity a)	CO <sub>2</sub>	IEF																						
	Emissions a			CO <sub>2</sub>																					
F: Total fossil IPPU CO <sub>2</sub> reported		0		Gg CO <sub>2</sub>	0.0	2166.3	0.0	0.0	612.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.6	6.8	0.0	1194.0	1227.8	0.0
2 INDUSTRIAL PROCESSES				Gg CO <sub>2</sub>																					
2A: Mineral Industry		0		Gg CO <sub>2</sub>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(Please specify the subcategory.)				Gg CO <sub>2</sub>																					
2B: Chemical Industry		0		Gg CO <sub>2</sub>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1194.0	1131.7	0.0
2B1: Ammonia Production				Gg CO <sub>2</sub>																				960.1	
2B5: Carbide Production				Gg CO <sub>2</sub>																					
2B6: Titanium Dioxide Production				Gg CO <sub>2</sub>																					
2B8: Petrochemical and Carbon Black Production		0		Gg CO <sub>2</sub>	0.0	0.0	0.0	0.0	0.0	0.0	0.0												1194.0	171.6	
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>																					
2C: Metal Industry		0		Gg CO <sub>2</sub>	0.0	2166.3	0.0	0.0	612.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.2	0.0
2C1: Iron and Steel Production				Gg CO <sub>2</sub>		2166.3			612.7															96.2	
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>																					
2D: Non-Energy Products from Fuels and Solvent Use		0		Gg CO <sub>2</sub>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.6	6.8	0.0	0.0	0.0	
2D1: Lubricant Use				Gg CO <sub>2</sub>																41.6					
2D2: Paraffin Wax Use				Gg CO <sub>2</sub>																	6.8				
2D3: Solvent Use				Gg CO <sub>2</sub>																					
2D4: Other				Gg CO <sub>2</sub>																					
2H: Other		0		Gg CO <sub>2</sub>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2H1: Pulp and Paper Industry				Gg CO <sub>2</sub>																					
2H2: Food and Beverages Industry				Gg CO <sub>2</sub>																					
2F3: Other				Gg CO <sub>2</sub>																					
EXCEPTIONS REPORTED ELSEWHERE				Gg CO <sub>2</sub>																					
1A FUEL COMBUSTION ACTIVITIES		0		Gg CO <sub>2</sub>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1A1a: Main Activity Electricity and Heat Production				Gg CO <sub>2</sub>																					
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>																					

## 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/e/02/30000/7\\_2\\_orzagos\\_eves\\_energiamerleg.xlsx](http://mekh.hu/download/e/02/30000/7_2_orzagos_eves_energiamerleg.xlsx)

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

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

						(petajoule)
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	434.1	910.3	172.0	–6.4	1 166.0	
2006	432.7	911.2	185.5	–2.9	1 155.5	
2007	427.7	884.1	193.4	8.7	1 127.1	
2008	439.5	898.3	187.1	–31.5	1 119.2	
2009	460.8	749.9	127.9	–33.0	1 049.8	
2010	496.9	789.2	156.4	–9.9	1 119.8	
2011	493.1	732.5	185.1	55.2	1 095.7	
2012	492.1	720.8	201.8	30.2	1 041.3	
2013	480.4	721.3	220.3	25.8	1 007.2	
2014	464.1	806.1	210.2	–55.0	1 005.0	
2015	472.7	756.3	187.5	21.5	1 063.0	

Energy Balance of Hungary, 2015											
(terajoule)											
	Coal	Crude Oil and Oil Products	Natural Gas	Combustible Renewables & Waste	Nuclear	Hydro	Wind	Other Renewables	Electricity	Heat	Total
2015											
<b>Production</b>	63,568	36,257	57,303	133,354	173,567	843	2,495	5,300		0	472,687
<b>Imports</b>	46,383	391,047	237,602	9,479				0	71,779	0	756,290
<b>Exports</b>	-13,115	-115,040	-19,178	-17,645				0	-22,500	0	-187,478
<b>International aviation bunkers</b>		-7,525	0	0				0	0		-7,525
<b>Stock changes</b>	1,769	-17,847	37,806	-243				0	0		21,485
<b>Total primary energy supply</b>	98,605	286,892	313,533	124,945	173,567	843	2,495	5,300	49,279	0	1,055,459
<b>Transfers</b>	0	428									428
<b>Statistical differences</b>	-590	-38	9,782	40	0	0	0	0	-2,820	-803	5,571
<b>Transformation</b>	-80,606	-1,521	-75,995	-33,688	-173,567	-843	-2,495	-2,622	109,251	52,011	-210,075
<b>Energy industry own use</b>	-3,436	-13,067	-3,558	-540				0	-12,091	-7,086	-39,778
<b>Losses</b>	-356	0	-4,267	0				0	-13,304	-3,694	-21,621
<b>Final consumption</b>	13,617	272,694	239,495	90,757				2,678	130,315	40,428	789,984
<b>Industry</b>	8,922	26,674	52,329	7,662				44	55,412	14,817	165,860
Iron and steel	7,164	43	1,725	1				0	2,207	927	12,067
Chemical and petrochemical	0	15,520	9,688	57				0	11,799	9,082	46,146
Non-ferrous metals	0	43	2,922	0				0	1,375	336	4,676
Non-metallic minerals	1,437	3,540	7,560	2,855				0	4,821	141	20,354
Transport equipment	0	89	2,861	6				0	5,613	230	8,799
Machinery	72	354	6,516	153				19	8,966	218	16,298
Mining and quarrying	0	511	133	3				0	356	0	1,003
Food and tobacco	59	538	12,250	2,364				12	8,130	1,316	24,669
Paper, pulp and print	0	126	2,596	340				0	2,812	2,065	7,939
Wood and wood products	0	170	153	1,325				0	925	0	2,573
Construction	190	5,605	1,731	166				13	1,044	192	8,941
Textile and leather	0	0	887	15				0	789	13	1,704
Non-specified industry	0	135	3,307	377				0	6,575	297	10,691
<b>Transport</b>	0	163,639	1,321	7,292				0	4,184		176,436
Road		161,296	121	7,292				0	65		168,774
Domestic aviation		0		0				0	0		0
Rail	0	2,087		0				0	4,072		6,159
Pipeline transport		0	1,200	0				0	47		1,247
Domestic navigation	0	256	0	0				0	0		256
Non-specified transport	0	0	0	0				0	0		0
<b>Other</b>	4,125	18,907	167,304	75,803				2,634	70,719	25,611	365,103
Residential	3,964	2,478	109,907	73,872				439	39,027	19,597	249,284
Commercial and public services	123	1,573	52,784	1,524				828	28,578	5,995	91,405
Agriculture/forestry/fishing	19	14,816	4,613	407				1,367	3,114	19	24,355
Non-specified other	19	40	0	0				0	0	0	59
<b>Non-energy use</b>	570	63,474	18,541								82,585

## **Annex 5 Additional information**

### **Quality Assurance and Quality Control**

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

#### **HUNGARIAN METEOROLOGICAL SERVICE**



### **Q A - Q C P L A N**

#### **ÉLFO/NELO 401**

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

Name	signature
<b>Prepared (and translated) by:</b>	Katalin Kőbányai expert Katalin Kajtárné Lovas expert

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**Approved by:** Krisztina Labancz Head of Department  
**Version:** 01  
**Pages:** 22

**2 April 2016**

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## **OBJECTIVE**

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

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

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

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

## **TASKS AND RESPONSIBILITIES**

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

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

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

## **DESCRIPTION OF THE ACTIVITIES / ANNUAL INVENTORY CYCLE**

### **Principles**

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

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

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

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

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

### **Main steps of the annual inventory cycle**

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

The outline of the process is included in Annex 3.

### **Tasks and responsibilities of persons involved in the inventory preparation**

#### **Sectoral experts:**

- choice of emission estimation methods;



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

*Sectoral experts regarding documentation and archiving:*

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

**Head of NEI:**

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

**QA/QC coordinator:**

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

*QA/QC coordinator regarding documentation and archiving:*

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

**Archiving coordinator:**

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

**Main steps of the annual inventory cycle**

**Choice of estimation method**

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

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

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

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

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

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

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

## Data collection

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

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

Special care is needed in the case where the number of data providers is less than three as *Govt. Decree 170/1993 (XII.3.) on the implementation of Act XLVI of 1993 on statistics* (hereafter Statistical Law) requires the Hungarian Statistical Office not to publish data - not even in an aggregated way- in such cases<sup>1</sup>.

<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.

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

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

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

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

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

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

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

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

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

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

Beyond the above recommendations, calculations should be checked.

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

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

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

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

### *Recalculations*

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

### **Uncertainty and key category analysis**

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

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

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

### **Compilation, approval and submission of the report**

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

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

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

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

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

### **International reviews**

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

### **Documentation and archiving**

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

#### **HMS Regulations regarding documentation and archiving**

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

## Collection, processing and storage of data and documents

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

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

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

## General principles for managing files and other recommendations

### **Names**

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

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

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

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

### *Files relating data collection*

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

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

### *Calculation files and text files*

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

### *QA/QC documents*

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

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

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

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## **Development Plan**

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

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

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

### **Further notes on CLRTAP reporting**

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

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

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

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

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

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

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

### **Requirements relating to external experts**

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

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

### **Legal background:**

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

### **Documents created as output of the activities described above:**

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



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

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

**Deadline:** As included in Annex1.

**Check points, monitoring, quality control points:**

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

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

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

**Financial or accounting issues:** n/a

### **LIST OF QUALITY RECORDS**

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

### **REFERENCES**

- HMS Regulation on procedures of the departments and the presidency of HSM
- HMS Regulation on documentation and archiving
- HMS QA/QC Manual  
<http://www.ipcc-nggip.iges.or.jp/public/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 chacklists, verifications); Division meetings; documentation	n.a.(calculation files)	n.a. (internal)	D. WORKING FOLDER ...	possibly review by third parties, external experts
Sept - Dec (- April)	final results and calculations from external experts	HMS quality record ME-06 (Evaluation of contractors); documentation	n.a.(incoming files)	n.a. (internal)	A. OFFICIAL ARCHIVE\ A. DATABASE ...	checks performed by sectoral expert
31.Dec.	compilation and submission of <i>NECD</i> report	documentation	<i>NECD report - Main pollutants (NO<sub>x</sub>, NMVOC, SO<sub>2</sub>, NH<sub>3</sub>) NFR Table</i>	<i>Ministry of Agriculture → EU Commission (DG Environment)</i>	<i><a href="http://rod.eionet.europa.eu/obligations/141/deliveries">http://rod.eionet.europa.eu/obligations/141/deliveries</a></i>	<i>EEA Report on NECD - CLRTAP</i>
Jan-April	compilation of CRF compilation of CollectER	Completeness check Recalculation check incorporated into CRF Reporter; possibly cross-check among <i>CALC files</i> and sectoral experts				

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/  Completeness check of the LULUCF sector	<b>preliminary report required by 525/2013/EC (CRF table, preliminary NIR, indicators, SEF)</b>	<b>Ministry of National Development → EU Commission (DG Climate Action)</b>	<a href="http://cdr.eionet.europa.eu/hu/eu/ghgmm">http://cdr.eionet.europa.eu/hu/eu/ghgmm</a>	<b>STEP1 of the EU annual review</b>
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) -nek + 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.March	<i>compilation and submission of CLRTAP report</i>	Documentation and archiving	<b>CLRTAP IIR (+grid+LPS every 5 years)</b>	<i>Ministry of Agriculture → EMEP Centre on Emission Inventories and Projections (CEIP) -nek + 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>	
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)</b>	<b>Ministry of National Development → EU Commission DG Climate Action)</b>	<a href="http://cdr.eionet.europa.eu/hu/eu/mmr/art07_inventor">http://cdr.eionet.europa.eu/hu/eu/mmr/art07_inventor</a> y	STEP1 of the EU annual review, Comprehensive review depending on the results of the former steps

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	<b>compilation and submission of UNFCCC report</b>	Documentation and archiving	<b>UNFCCC report (CRF Tables, NIR, SEF)</b>	<b>Ministry of National Development → UNFCCC Secretariat</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></b>	Before submission: Approval by Ministry of Agriculture, National Development and National Economy After submission: <b>UNFCCC review process:</b> 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> 2. Synthesis and Assessment (Reports: <a href="http://unfccc.int/documentation/documents/advanced_search/items/6911.php?priref=600008003#beg">http://unfccc.int/documentation/documents/advanced_search/items/6911.php?priref=600008003#beg</a>
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 actual review); update of QA/QC documents if needed	NELO 01 quality record – corrective actions and planned improvements; NELO 03 Development Plan; ÉLFO_UHG_401.02				

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	
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 <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_ISO-9001_tanusitvany_2012-15_en.pdf">http://www.met.hu/doc/minosegiranyitas/OMSZ_ISO-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

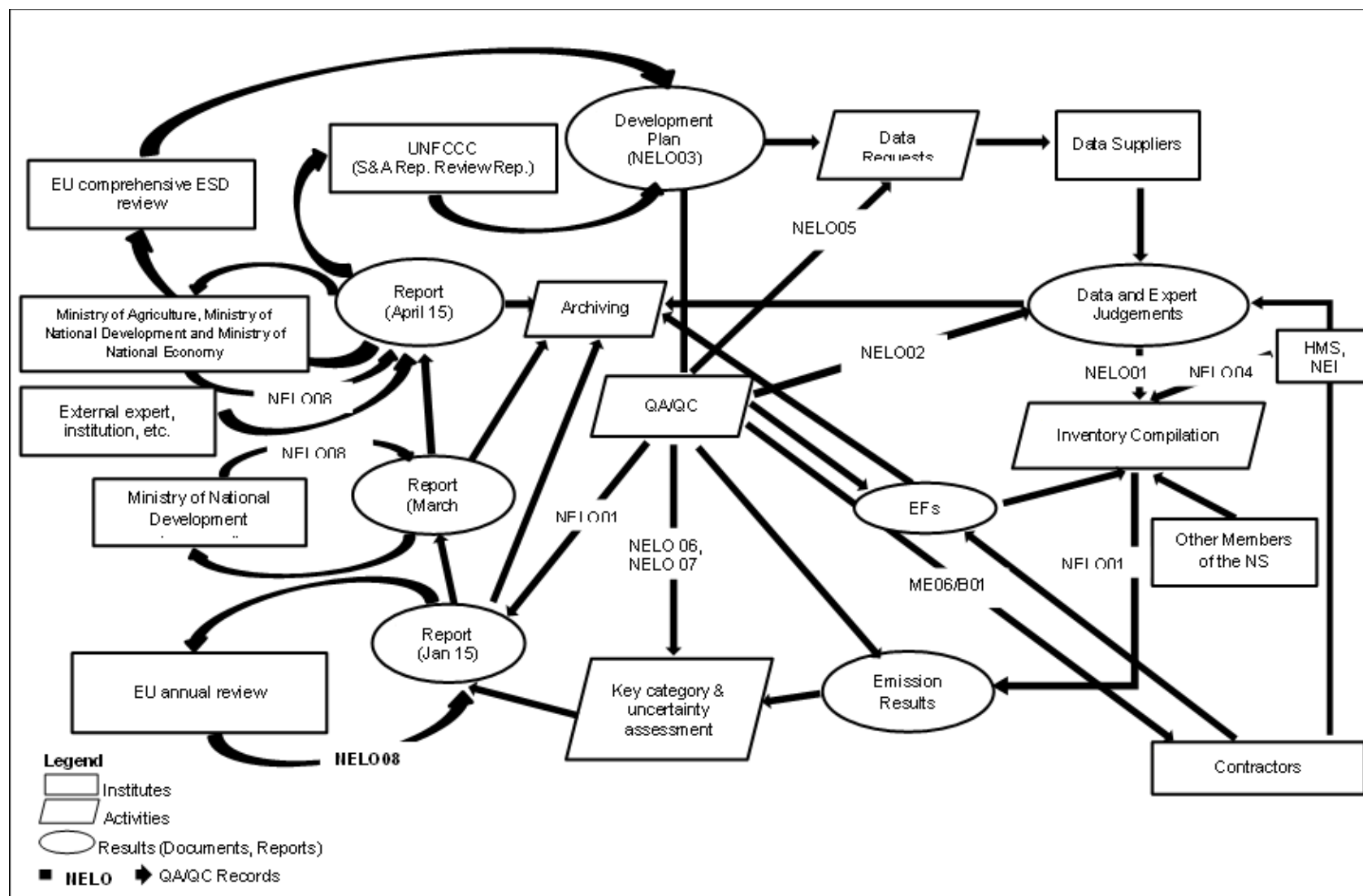
F. ARCHIVE

**F. MANAGEMENT**

A. DATA REQUESTS

**G. OTHERS**

### Annex 3: Outline of the process



**Annex 4: Abbreviations and inventory principles**

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

CLRTAP (EMEP/EEA 2009. )	UNFCCC (18/CP.8 )
<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;
<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.	<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>
<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	<i>Comparability</i> means that estimates of emissions and removals reported by Annex I Parties in inventories should be comparable



<p>achieved by using accepted methodologies as elaborated in the Reporting Guidelines by using the reporting templates and through the use of the harmonized Nomenclature For Reporting (NFR), as specified in Annex IV of the Reporting Guidelines.</p>	<p>among Annex I Parties. For this purpose, Annex I Parties should use the methodologies and formats agreed by the COP for estimating and reporting inventories. The allocation of different source/sink categories should follow the split of the <i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>,<sup>2</sup> and the <i>IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>, at the level of its summary and sectoral tables;</p>
<p><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. <i>Completeness</i> 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 Sector:	checklist	Y (no problem identified) /N /n.a	Notes, explanation, supporting documents, further details...		
	Check that AD is properly recorded, archived and referenced				
	Check that EF is properly recorded, archived and referenced				
	Check for transcription errors				
	Check units and conversion factors				
	Check integrity of database files (e.g.: processing steps are correct and represented in the calculation file)				
	Check data consistency between source categories (e.g.: subtractions to avoid double counts)		Other sector(s) where the data is used:		
	Check movement of data between steps correct (e.g. calculation file consistency with CRF?)				
	Check uncertainties are estimated correctly				
	Undertake review of documentation (e.g. replicability is assured?)				
	Check recalculations (e.g. time-series consistency is assured? comparison table created, difference is explained, included in NIR?)				
	Check the completeness (e.g.: Every year, every element of the sub-source is included? Base year correct? Data gaps are documented?)				
	Compare estimates to previous ones (e.g.: differences from expected trends are explainable?)				

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

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

## Verification - OPTIONAL

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

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

of the data? If so, have they been employed?				
5. Have uncertainties in the data been estimated and documented?				
6. Have any limitations of the secondary data been identified and documented, such as biases or incomplete estimates? Have errors been found?				
7. Have the secondary data undergone peer review and, if so, of what nature?				
8. Other (detailed checks)				
<b>DIRECT EMISSION MEASUREMENT: CHECKS ON PROCEDURES TO MEASURE EMISSIONS</b>				
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:	
<b>I. Adat minőség/ Data quality</b>	
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?
<b>II. Megbízhatóság/ Uncertainty</b>	
1	Történik-e számszerű becslés az adat megbízhatóságára vonatkozóan?/ Is there any quantitative analysis relating to the uncertainty of the data?
2	Végeznek-e statisztikai elemzést az adat megbízhatóságára vonatkozóan? (Konfidencia intervallum, hibahatárok)/ Have the data undergone on statistical analysis to estimate the uncertainty?
3	Ha nem, az adat bizonytalansága összehasonlítható-e/ összefüggésbe hozható-e más ismert bizonytalanságú adattal? Melyik adat az, és milyen kapcsolat ismert?/ If no, is there any other correlating data, which uncertainty is known? Which one and what

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

## NELO 03

## Development Plan (Fejlesztési terv)

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

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

**NELO 04****Responsibilities**

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

**NELO 05****Data source logbook**

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

**NELO 06 Uncertainty – As Tables in Annex 2**

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

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



**Annex 6 Responses to the review of the 2016 inventory submission**

CRF category / issue	Review recommendation	Review report / paragraph	Party response / status of implementation	Chapter/section in the NIR
1.A.3.a Domestic aviation – liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	The ERT recommends that Hungary include, in the NIR a description of the EUROCONTROL data, including its quality	E.13	The description has been included in the NIR.	Ch. 3.2.7.2
1.A.3.b Road transportation – all fuels – CH <sub>4</sub> and N <sub>2</sub> O	The ERT recommends that Hungary recalculate the non-CO <sub>2</sub> emissions from road transport using the same version of the COPERT model for the entire time series, while also resolving the remaining inconsistencies in the underlying databases	E.14	This issue has not yet been solved. We planned to use the new COPERT 5 model as it supposed to handle time series better. However, as we have some problems with the new vehicle categories in COPERT 5 (e.g 2-stroke PC is missing), we think that it is not yet suitable for inventory compilation.	
Comparison with international data – all fuels – CO <sub>2</sub>	The ERT recommends that Hungary include the data on additives in CRF table 1.A(b) for the entire time series in the next annual inventory submission	E.15	Additives have been included in the relevant CRF table (1.A(b))	
1.A. Fuel combustion – sectoral approach – liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O	The ERT recommends that Hungary: correctly estimate all emissions from all fuels used for off-road vehicles and other machinery and allocate them to the relevant categories.	E.16	Has been partly addressed. Tier 2 approach from the 2016 EMEP/EEA guidebook is used now in 1A2gvii and 1A4cii. First estimates are presented also for 1A4bii with the T1 methodology.	

CRF category / issue	Review recommendation	Review report / paragraph	Party response / status of implementation	Chapter/section in the NIR
2.F.1 Refrigeration and air conditioning – HFCs and PFCs	Make efforts to collect relevant data from companies and develop a country-specific value for recovery efficiency for refrigeration and air conditioning equipment	I.8.	The Hungarian National Climate Protection Authority, responsible for the F-gas database, has been contacted. However, the required data are still not available. Probably this issue needs to be postponed.	4.8.3
2.A.1 Cement production – CO2	The ERT recommends that Hungary: use a good practice data splicing technique given in the 2006 IPCC Guidelines (e.g. overlap technique or surrogate data), as appropriate for Hungary's national circumstances, to fill data gaps in the time series of the CO2 IEF for the period before 2005; recalculate CO2 emissions based on the revised CO2 IEF for that period; and include transparent information in the NIR on the estimation methodology	I.9	resolved	4.3.1
2.A.4 Other process uses of carbonates – CO2	The ERT recommends that Hungary provide information on exports of soda ash and an explanation of how it has been taken into account in the calculations to estimate emissions	I.10	resolved	4.3.5
2.C.6 Zinc production – CO2	The ERT recommends that Hungary use the appropriate notation key, "NO", instead of "IE" for zinc production in the CRF table for	I.11	Corrected notation key.	4.6.4

CRF category / issue	Review recommendation	Review report / paragraph	Party response / status of implementation	Chapter/section in the NIR
	the IPPU sector (2(I).A-Hs2) and clarify the nature of zinc production (i.e. primary or secondary) in the NIR			
2.F.1 Refrigeration and air conditioning – HFCs and PFCs	The ERT recommends that Hungary recalculate the F-gas emissions from refrigeration and air conditioning by replacing the extrapolated HFC and PFC activity data for 2014 with actual data	I.12	Request was sent to the Hungarian National Climate Protection Authority to obtain the 2014 dataset, Hungary will replace the former estimation with the new dataset if it is available (till then interpolation method was used for year 2014)	4.8.3
3B1 Cattle -CH <sub>4</sub>	Correct value for the MCF for solid storage and dry lot manure management systems for non-dairy cattle in CRF table 3.B(a)s2	A.6.	resolved	Not applicable
3.C.1 Irrigated rice cultivation – CH <sub>4</sub>	Include the values of parameters used for calculating the EFs for irrigated rice cultivation in the NIR	A.7	resolved	5.4
3.D Direct and indirect N <sub>2</sub> O emissions from agricultural soils – N <sub>2</sub> O	Correct the typographical error in equation 5.3 of the NIR to include the term for FC	A.8	resolved	5.5.2
3.D Direct and indirect N <sub>2</sub> O emissions from agricultural soils – N <sub>2</sub> O	Include the correct version of table 5.5.1 in the NIR which is consistent with CRF table 3.D	A.9	resolved	5.5.1
3.D.a Direct N <sub>2</sub> O emissions from managed soils – N <sub>2</sub> O	Include the correct version of table 5.5.5 in the NIR	A.10	resolved	5.5.2

CRF category / issue	Review recommendation	Review report / paragraph	Party response / status of implementation	Chapter/section in the NIR
3.D.a.2 Organic N fertilizers – N <sub>2</sub> O	Use the correct notation key “NE” in the CRF table 3.D for emissions from the subcategory “other organic fertilizers applied to soils” (3.D.a.2.c)	A.11	Emissions have been estimated; therefore the recommendation is not relevant.	5.5.2
3.D.a.6 Cultivation of organic soils (i.e. histosols) – N <sub>2</sub> O	Provide a robust rationale to demonstrate that the area of cultivated organic soil in Hungary is zero and/or explore ways to resolve this issue with FAO and EC-JRC	A.12	Information will be provided in the April submission of the NIR.	
3.D.b.1 Atmospheric deposition – N <sub>2</sub> O	Provide, in the more detailed information on the EMEP/EEA estimation methodology used to derive FracGASF and FracGASM, including the parameters and equation used	A.13	resolved	5.5.2
3.D.b.2 Nitrogen leaching and run-off – N <sub>2</sub> O	Include the QA/QC process and verification information for the model used to classify areas into leaching and non-leaching areas(e.g. scientific paper	A.14	resolved	5.5.4

CRF category / issue	Review recommendation	Review report / paragraph	Party response / status of implementation	Chapter/section in the NIR
3.G Liming – CO <sub>2</sub>	Provide in the NIR: detailed information on: the different sources of AD used in the time series; country-specific calculation methods used for deriving the missing AD for the period 1985–1999; and how the Party addressed the time-series consistency issues arising from the use of different sources of AD through the time series	A.15	resolved	5.8
4.C.1 Grassland remaining grassland – CO <sub>2</sub>	Develop country-specific values for the carbon stock changes in biomass under different conditions	L.9	Generating country-specific data is under way	
4. General (LULUCF) – CO <sub>2</sub> , N <sub>2</sub> O and NH <sub>4</sub>	include graphs containing AD and data on emissions/removals for the whole inventory time series in the NIR, distinguishing (where relevant) the period before 2005 graphically and/or by providing suitable explanation in the NIR text and figure legend	L.10	Will be done for the upcoming revision of the NIR	

CRF category / issue	Review recommendation	Review report / paragraph	Party response / status of implementation	Chapter/section in the NIR
4.A.2 Land converted to forest land – CO <sub>2</sub>	develop tier 1 estimates of changes in the carbon stocks in litter pool in cropland converted to forest land, grassland converted to forest land and settlements converted to forest land using the default values of litter stocks provided in the 2006 IPCC Guidelines and report these in the annual submission.	L.11	We have developed these estimates, and they are already included in the recent submission (these estimates are the single most important reasons for the recalculation of the previous estimates	
5.A.1 Managed waste disposal sites – CH <sub>4</sub>	add information on biogas production (e.g. by adding a column in table 7.2.4) in the NIR.	W.5	Data on flaring and biogas utilization is presented in Table 7.2.4 in the NIR.	
5.C.1 Waste incineration – CH <sub>4</sub> and N <sub>2</sub> O	provide detailed and transparent information on the derivation of the carbon content and the non-CO <sub>2</sub> EF for waste incineration	W.6	The methodological description in Chapter 7.4.2 has been amended accordingly.	
5.D Wastewater treatment and discharge – CH <sub>4</sub>	improve the transparency of the description of the calculation for CH <sub>4</sub> recovery in the NIR by including an explanation on the amount of CH <sub>4</sub> flared and adding a new column for CH <sub>4</sub> recovery from biogas production	W.7	Amount of CH <sub>4</sub> flared has been added to CRF Table 5.D.	
5.D.1 Domestic wastewater – N <sub>2</sub> O	provide correct values of N <sub>2</sub> O emissions from domestic wastewater in table 7.5.4 in the NIR, consistent with the values reported in CRF table 5.D	W.8	New methodology of N <sub>2</sub> O emission estimation has been introduced, Data reported in the NIR and CRF are consistent.	

CRF category / issue	Review recommendation	Review report / paragraph	Party response / status of implementation	Chapter/section in the NIR
5.D.1 Domestic wastewater – CH <sub>4</sub>	include the share (per cent) of untreated wastewater in table 7.5.3 of the NIR	W.9	Table 7.5.1 in NIR has been extended.	
N <sub>2</sub> O emissions from N mineralization/immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils – N <sub>2</sub> O	provide the correct values for the area under deforestation activity and N <sub>2</sub> O emissions in CRF table 4(KP-II)3. The ERT also recommends that Hungary introduce a QA/QC procedure to check that areas are reported consistently across CRF tables to avoid such issues in the future	KL.4	Correct values for the area under deforestation activity and N <sub>2</sub> O emissions are provided in CRF table 4(KP-II)3.	

## ANNEX 7 List of abbreviations and units

### Abbreviations

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

### Chemical formulas

C	carbon
CH <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

**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)