

**Ministry of Environment of Estonia**

**Report to facilitate the estimation of  
Estonia's assigned amount under the  
Kyoto Protocol**

Final report to the European Commission

April 11, 2007

## **Foreword**

Estonia's Ministry of Environment has prepared this report to the European Commission, pursuant to Article 8(1) (e) of Decision No 280/2004/EC, to facilitate the estimation of Estonia's assigned amount for the commitment period pursuant to Articles 3.7 and 3.8 of the Kyoto Protocol and to demonstrate Estonia's capacity to account for its emissions and assigned amount.

The Ministry of the Environment is responsible for providing of National Greenhouse Gas Inventories and compiling of National Reports. Financial resources for this purpose are planned in the State Budget. Up to now the practical work has been done on the bases of single contracts. The Climate and Ozone Bureau of the Information Centre of the Ministry of Environment has been responsible for practical providing the GHG inventories and National Communications. In conducting inventories numerous leading specialists from Tallinn University of Technology have been involved.

This report is divided into two parts in accordance with the Annex to the draft decision - /CMP.1 (Modalities for the accounting of the assigned amounts).

**Part I** contains following information on:

- inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol for the years 1990 - 2004;
- identification of the selected base year for emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6);
- calculation of the assigned amount pursuant to Article 3.7 and 3.8 of the Kyoto Protocol.

**Part II** contains information on:

- calculation of the commitment period reserve pursuant to decision -/CMP.1 (Article 17);
- identification of the minimum values for tree crown cover, land area and tree height for use in accounting of activities under Articles 3.3 and 3.4, with justification that the values are consistent with the information historically reported to the Food and Agriculture Organisation of the United Nations; identification of elected activities under Article 3.4;
- identification how accounting of Article 3.3 and 3.4 accounting will be done, annually or for the whole commitment period. In addition, Part II contains descriptions of the National System (in accordance with Article 5.1 and the reporting guidelines under Article 7) and the National Registry (in accordance with reporting guidelines under Article 7).

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The information provided in Part I and Part II is complemented with information in separate reports which are included in the submission:

- Greenhouse Gas Emissions in Estonia 1990 - 2004 (Estonia's national inventory report and the common reporting tables)

- National Greenhouse Gas Inventory System in Estonia (a detailed description of the National System).
- Estonia's National Registry under Article 7 of the Kyoto Protocol (a detailed description of the National Registry).

This draft report has been reviewed by the ministries participating in the contact network on climate policy issues.

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# **Part I**

## **1. Greenhouse gas inventory for 1990 - 2004**

### **1.1 National Inventory Report and CRF Tables**

The current report on Estonia's assigned amount under the Kyoto Protocol was compiled on base of the latest GHG inventory submission using CRF Reporter (Submission 2007 v.1.2, Estonia) and presented to the UNFCCC on March 15, 2007.

A complete inventory on greenhouse gas emissions and removals for the years 1990 – 2005 will be provided in the report Greenhouse Gas Emissions in Estonia 1990 – 2005 (Estonia's national inventory report). This report is under preparation right now and will be delivered to the UNFCCC to April 1, 2007. The National Inventory Report will be prepared in accordance with the UNFCCC Guidelines for the preparation of national communications by Parties included in Annex I to the Convention: Part I: UNFCCC reporting guidelines on annual inventories (following incorporation of the provisions of decision 13/CP.9).

Information on emission and removals from land-use, land-use change and forestry activities under Article 3.3 (or Article 3.4) will be not included in the inventory report as the reporting on these activities will begin only during the commitment period of the Kyoto Protocol. Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol (Decision 22/CP.7) require that the emissions from sources listed in Annex A to the Protocol are clearly distinguished from estimates for Articles 3.3 and 3.4. Even if reporting under these Articles is not yet done, Estonia has clarified its reporting to facilitate this task in the future.

The methodologies used in the preparation of Estonia's greenhouse gas inventory are consistent with the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories as complemented by the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories and the IPCC Good Practice Guidance on Land Use, Land-Use Change and Forestry.

Estonia has made evaluation of the activity data and emission factors used in the 1990 (base year) inventory. In the Energy, Industrial Processes and Agriculture sectors some changes have been implemented. The recalculations have resulted in following changes: the base year emissions (without LULUCF) have increase with 2.33%, including increase of GHG in Industrial Processes sector for 54%, in Agriculture for 28% and in Energy sector only about 0.01%.

For the submission in 2007, Estonia made extensive quality checks and evaluation of the activity data and emission factors used in the inventory. These resulted in more consistent allocation of the emissions as well as increase the accuracy of the emissions and removals. The quality checks have involved, among others, applying the current fuel classification consistently to the whole time series, revision of some fuel characteristics, oxidation factors and emission factors to take into account new national data. In the Energy Sector some changes have been implemented connected with the new elaborated carbon emission factor for oil shale (CEF<sub>oil Shale FBC</sub>).

Fluidised Bed Combustion technology, implemented in 2004 in some energy units of oil shale burning power plants.

## 1.2 Base year inventory and times series consistency

The greenhouse gas emissions in 1990 - 2004 are given in Table 1.1 by gas and in Figure 1.1 by sector.

**Table 1.1. Estonia's greenhouse gas emissions and removals in 1990 – 2004, Tg.**

<b>GHG EMISSIONS</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
<b>CO<sub>2</sub></b>	<b>38.44</b>	<b>35.95</b>	<b>26.52</b>	<b>21.27</b>	<b>22.26</b>	<b>20.10</b>	<b>21.11</b>	<b>20.58</b>	<b>18.28</b>	<b>16.95</b>	<b>16.95</b>	<b>17.26</b>	<b>16.95</b>	<b>19.06</b>	<b>18.52</b>
<b>Fuel Combustion</b>	<b>30.77</b>	<b>28.56</b>	<b>22.34</b>	<b>17.74</b>	<b>18.40</b>	<b>16.91</b>	<b>17.66</b>	<b>17.21</b>	<b>14.81</b>	<b>13.78</b>	<b>13.91</b>	<b>13.84</b>	<b>13.59</b>	<b>15.65</b>	<b>14.96</b>
<b>Industr. Processes</b>	0.95	0.93	0.54	0.30	0.55	0.57	0.59	0.64	0.67	0.61	0.59	0.61	0.42	0.47	0.58
<b>CH<sub>4</sub></b>	3.29	3.16	2.64	1.89	2.14	2.17	2.26	2.28	2.12	1.99	2.04	1.85	1.74	1.74	1.85
<b>N<sub>2</sub>O</b>	1.86	1.77	1.53	1.07	0.98	0.89	0.77	0.80	0.81	0.69	0.74	0.71	0.66	0.76	0.77
<b>SF<sub>6</sub>, HFCs, PFCs</b>	NO	NO	NO	NO	NO	0.000	0.001	0.002	0.003	0.004	0.006	0.007	0.009	0.011	0.013
<b>Total GHG in CO<sub>2</sub> eq</b>	<b>43.59</b>	<b>40.89</b>	<b>30.69</b>	<b>24.23</b>	<b>25.38</b>	<b>23.16</b>	<b>24.14</b>	<b>23.66</b>	<b>21.21</b>	<b>19.44</b>	<b>19.74</b>	<b>19.82</b>	<b>19.35</b>	<b>21.58</b>	<b>21.15</b>
<b>Land-Use Change and Forestry</b>	<b>-9.36</b>	<b>-9.80</b>	<b>-10.48</b>	<b>-10.50</b>	<b>-9.02</b>	<b>-9.21</b>	<b>-10.04</b>	<b>-8.75</b>	<b>-8.48</b>	<b>-8.76</b>	<b>-8.80</b>	<b>-8.43</b>	<b>-7.49</b>	<b>-7.73</b>	<b>-7.99</b>

(Remark: Due to rounding the sum of subtotals does not equal to total figures.)

**TABLE 10 EMISSION TRENDS (SUMMARY)**

**Inventory 2004**

**(Part 1 of 2)**

**Submission 2007 v2.1, Estonia**

GREENHOUSE GAS EMISSIONS	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)
CO <sub>2</sub> emissions including net CO <sub>2</sub> from LULUCF	29 071.635	26 152.95	16 035.10	10 769.86	13 238.25	10 888.25	11 069.33	11 827.54	9 789.66	7 995.63
CO <sub>2</sub> emissions excluding net CO <sub>2</sub> from LULUCF	38 442.341	35 953.10	26 524.87	21 272.16	22 264.26	20 104.73	21 110.23	20 583.34	18 276.55	16 751.43
CH <sub>4</sub> emissions including CH <sub>4</sub> from LULUCF	3 294.539	3 162.66	2 649.66	1 886.25	2 139.81	2 171.48	2 257.53	2 282.36	2 122.98	1 988.70
CH <sub>4</sub> emissions excluding CH <sub>4</sub> from LULUCF	3 287.455	3 162.58	2 642.68	1 885.01	2 135.45	2 169.31	2 255.18	2 278.62	2 120.16	1 985.69
N <sub>2</sub> O emissions including N <sub>2</sub> O from LULUCF	1 865.324	1 774.50	1 526.39	1 073.69	980.18	889.40	774.57	801.10	811.17	694.07
N <sub>2</sub> O emissions excluding N <sub>2</sub> O from LULUCF	1 864.605	1 774.49	1 525.68	1 073.56	979.74	889.18	774.33	800.72	810.88	693.76
HFCs	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.13	0.73	1.39	2.44	3.33
PFCs	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
SF <sub>6</sub>	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.25	0.31	0.58	0.81	1.05
<b>Total (including LULUCF)</b>	<b>34 231.498</b>	<b>31 090.11</b>	<b>20 211.15</b>	<b>13 729.79</b>	<b>16 358.23</b>	<b>13 949.51</b>	<b>14 102.47</b>	<b>14 912.97</b>	<b>12 727.05</b>	<b>10 682.78</b>
<b>Total (excluding LULUCF)</b>	<b>43 594.401</b>	<b>40 890.17</b>	<b>30 693.22</b>	<b>24 230.74</b>	<b>25 379.45</b>	<b>23 163.60</b>	<b>24 140.78</b>	<b>23 664.65</b>	<b>21 210.84</b>	<b>19 435.27</b>

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1990)	1991	1992	1993	1994	1995	1996	1997	1998	1999
	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)
1. Energy	38 834.332	36 315.53	26 888.84	21 565.41	22 430.96	20 333.83	21 412.12	20 815.75	18 366.52	16 871.60
2. Industrial Processes	945.586	925.73	538.11	304.58	546.53	568.92	587.46	635.77	672.98	607.68
3. Solvent and Other Product Use	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Agriculture	3 124.401	2 948.66	2 519.46	1 837.65	1 681.49	1 506.41	1 331.63	1 355.43	1 353.45	1 136.51
5. Land Use, Land-Use Change and Forestry <sup>(5)</sup>	-9 362.903	-9 800.06	-10 482.07	-10 500.94	-9 021.21	-9 214.08	-10 038.31	-8 751.69	-8 483.79	-8 752.49
6. Waste	690.082	700.25	746.82	523.09	720.47	754.44	809.57	857.71	817.30	819.48
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>Total (including LULUCF)<sup>(5)</sup></b>	<b>34 231.498</b>	<b>31 090.11</b>	<b>20 211.15</b>	<b>13 729.79</b>	<b>16 358.23</b>	<b>13 949.51</b>	<b>14 102.47</b>	<b>14 912.97</b>	<b>12 726.46</b>	<b>10 682.78</b>
<b>Total (without LULUCF)<sup>(5)</sup></b>	<b>43 594.401</b>	<b>40 890.17</b>	<b>30 693.22</b>	<b>24 230.74</b>	<b>25 379.45</b>	<b>23 163.60</b>	<b>24 140.78</b>	<b>23 664.65</b>	<b>21 210.25</b>	<b>19 435.27</b>

GREENHOUSE GAS EMISSIONS	2000	2001	2002	2003	2004
	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)
CO <sub>2</sub> emissions including net CO <sub>2</sub> from LULUCF	8 147.48	8 822.05	9 452.55	11 328.78	10 530.899
CO <sub>2</sub> emissions excluding net CO <sub>2</sub> from LULUCF	16 952.10	17 255.48	16 950.77	19 064.63	18 520.789
CH <sub>4</sub> emissions including CH <sub>4</sub> from LULUCF	2 049.09	1 850.03	1 745.46	1 743.42	1 849.364
CH <sub>4</sub> emissions excluding CH <sub>4</sub> from LULUCF	2 044.46	1 848.47	1 736.43	1 742.10	1 846.965
N <sub>2</sub> O emissions including N <sub>2</sub> O from LULUCF	735.85	709.25	658.71	757.69	771.536
N <sub>2</sub> O emissions excluding N <sub>2</sub> O from LULUCF	735.38	709.09	657.79	757.55	771.292
HFCs	4.19	4.89	5.68	6.59	7.210
PFCs	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
SF <sub>6</sub>	1.43	2.24	3.68	4.75	5.280
<b>Total (including LULUCF)</b>	<b>10 938.04</b>	<b>11 338.45</b>	<b>11 866.07</b>	<b>13 841.22</b>	<b>13 164.288</b>
<b>Total (without LULUCF)</b>	<b>19 737.57</b>	<b>19 820.17</b>	<b>19 354.35</b>	<b>21 575.62</b>	<b>21 151.537</b>

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2000	2001	2002	2003	2004
	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)	CO <sub>2</sub> equivalent (Gg)
1. Energy	17 180.55	17 489.13	17 293.64	19 418.52	18 847.729
2. Industrial Processes	587.80	612.21	423.03	467.64	579.947
3. Solvent and Other Product Use	NA	NA	NA	NA	NA
4. Agriculture	1 172.20	1 168.35	1 090.92	1 168.34	1 186.175
5. Land Use, Land-Use Change and Forestry <sup>(5)</sup>	-8 799.53	-8 431.72	-7 488.28	-7 734.40	-7 987.249
6. Waste	797.02	550.49	546.44	521.12	537.686
7. Other	NA	NA	NA	NA	NA
<b>Total (including LULUCF)<sup>(5)</sup></b>	<b>10 938.04</b>	<b>11 388.45</b>	<b>11 865.75</b>	<b>13 841.22</b>	<b>13 164.288</b>
<b>Total (without LULUCF)<sup>(5)</sup></b>	<b>19 737.57</b>	<b>19 820.17</b>	<b>19 354.03</b>	<b>21 575.62</b>	<b>21 151.537</b>

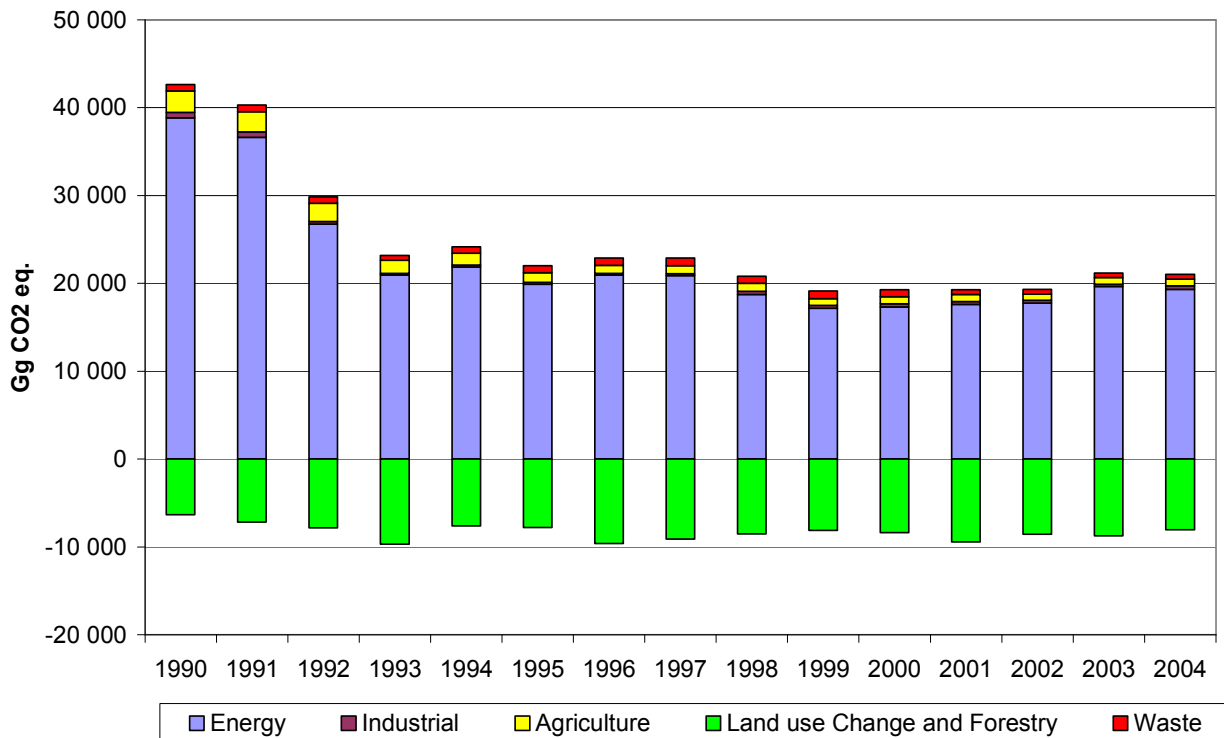


Figure 1.1 Greenhouse gas emissions in Estonia in 1990-2004 by reporting sectors (Gg CO<sub>2</sub> eq).

In the base year the most important source of emissions was the Energy sector, which contributed about 89% to the total emissions without LULUCF. Agriculture (7%), Industrial Processes (2.2%) and Waste (1.6%) were also important sources of emissions.

During 1990 to 2004 the Energy emissions have remained the most important category in the inventory, in 2000 - 2004 the share has increased from 89.08% to 89.1 %. In the other sectors the emissions have grown more rapidly (e.g. in the Industrial Processes and Waste sectors) or even decreased (Agriculture sector).

The total national emissions (without LULUCF) in 2004 are about 50% lower in 2004 than in 1990.

The Energy sector emissions have been calculated with Intergovernmental Panel on Climate Change (IPCC) tier 1 methods and default emission factors (EFs). However, country-specific data are applied in the case of oil shale combustion, which is Estonia's principal source of emissions, accounting for approximately two-thirds of the total in 2004.

In the Industrial Processes sector the GHG emissions for the years 1990 (base year) and 2004 are recalculated. The reason of recalculations was adding one important CO<sub>2</sub> key source – ammonia production (CRF Table 2(I).B.1). During the GHG submission 2007 recalculations have been made also for the rest of time series. The most important sources of CO<sub>2</sub> emissions in the sector are the cement industry and the lime industry, for which the process emissions have been allocated in the Industrial Processes sector. The emissions from these sectors have been calculated using plant-specific data.

The emissions from the Agriculture sector are calculated using the same methods, default emission factors (EFs) and country specific data. Activity data are mainly based on official Estonian statistics provided by the Statistical Office of Estonia. Livestock is the main

contributor to greenhouse gas emissions from agriculture. Methane emission from enteric fermentation forms about 37.2%, CH<sub>4</sub> from manure management about 4.5%, N<sub>2</sub>O from agricultural soils about 49.7% and N<sub>2</sub>O from manure management 4.6% of the total GHG emission from agriculture in 2004.

Since 2003 Estonia uses in the agriculture sector only Western Europe and Developed countries emission factors. This causes a slight decrease in the methane net emission from manure management in 2003. The decreasing number of animals, decreasing nitrogen fertiliser use and decreasing area of organic arable land has led to an overall decreasing trend in the emissions from Agriculture. In total emissions in 2004 from Agriculture were about 63% lower than in 1990.

The emissions from the waste sector are calculated using the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories and the IPCC Good Practice Guidance. In the waste sector the reliability of activity data is rather low for the years 1990-1994. During Soviet time there was a huge amount of landfills and practically statistical data about the deposits were absent. Only for 2-3 landfills it was possible to find the data. Up to 1992-1993 there were also many Soviet military camps and large military factories and the data about their activity were firmly classified. The situation was the same with the data of waste water treatment. Therefore in our previous calculations we had to operate only with different expert opinions and sometimes extrapolated data for the Tallinn area for the whole republic. Also the data published in the book *Past pollution of the Soviet Army in Estonia and its Liquidation* were used. Now we have recalculated all previous inventories using national statistics collected by the Estonian Environment Information Centre. Nevertheless, the actual methane emission in the base year from the Estonian territory was bigger than our calculations show.

The emissions from the LULUCF sector do not influence the estimation of the assigned amount for Estonia, as the sector was a sink in 1990, as also for the whole time series since. The LULUCF sector offsets about 15% (in 1990) up to 38% (in 2004) of emission of the other sectors in Estonia.

In 2004 inventory submission, which reports carbon stock changes and greenhouse gas emissions from LULUCF Estonia has used the new UNFCCC reporting guidelines on annual inventories (FCCC/SBSTA/2004/8) and GPG LULUCF (IPCC 2003) for the first time. The earlier period (1990–2003) has been reported by using previous version of CRF tables (corresponding to 3/CP.5) and methods (IPCC 1997). The whole LULUCF-sector reporting is under ongoing development and will be more complete in forthcoming submissions.

Based on forest land data, the LULUCF sector acted as a carbon dioxide sink in Estonia in 2004. Emissions from the forestry sector (CO<sub>2</sub> and CH<sub>4</sub> emissions by biomass removals and burning) are smaller than removals (increase in C stock in tree biomass on forest land). In 2004 the LULUCF sector (which includes only forest land) was a sink of about –8016.07 Gg CO<sub>2</sub> eq.

Overall, the base year and the recent year estimates have been estimated with consistent methods, to the extent the available activity data and emission factors make it possible, taking the IPCC Good Practice Guidance on time series into account. For some sectors, the accuracy of the data has increased in recent inventory years due to improved data collection measures and improved knowledge on the emission levels based on measurements and other research. However, no evidence suggests that this would have resulted in overestimation of the base year emissions in comparison with the recent inventory years. Detailed descriptions of the methods, activity data collection and emission factors, as well as associated uncertainties can be found in the national inventory report and the CRF tables.

## 2. Selected base year for HFCs, PFCs and SF<sub>6</sub> in accordance with Article 3.8

Article 3.8 of the Kyoto Protocol reads “any Party included in Annex I may use 1995 as its base year for hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride” for the purposes of calculating its assigned amount in accordance with Article 3.7. In accordance with this, Estonia has chosen the year 1995 as the base year for the emissions of the hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulphur hexafluoride (SF<sub>6</sub>).

Due the lack of activity data Estonia has not been able to calculate emissions from F-gases. The aggregated F-gases emissions presented in this report are the result of a gap-filling exercise made together with the European Commission in accordance with the Article 4(1) of Council Decision 280/2004/EC and Articles 13 and 14 of Commission Decision 2005/166/EC using a linear trend extrapolation method. Since the Statistical Office of Estonia started collect some selected background data for F-gases only in 2001 recalculations of actual emissions of HFCs, PFCs and SF<sub>6</sub> for the years 2001- 2005 is planned for the 2007 GHG inventory submission.

The time series for the emissions of the hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulphur hexafluoride (SF<sub>6</sub>) can be seen in Table 1.2.

**Table 2.2 Actual emissions of HFCs, PFCs and SF<sub>6</sub>, 1990-2004 (CO<sub>2</sub> equivalent Gg).**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
HFCs	NO	NO	NO	NO	NO	0.130	0.730	1.390	2.440	3.330	4.190	4.890	5.680	6.590	7.210
PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NE	NE	NE	NE
SF <sub>6</sub>	NO	NO	NO	NO	NO	0.250	0.310	0.580	0.810	1.050	1.430	2.240	3.680	4.750	5.280
Total F-gases	NO	NO	NO	NO	NO	0.380	1.040	1.970	3.250	4.380	5.620	7.130	9.360	11.340	12.490

## 3. Calculation of Estonia's assigned amount

The assigned amount is calculated according to Articles 3.7 and 3.8 of the Kyoto Protocol, on the basis of the base year inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol.

Estonia's assigned amount pursuant to Article 3.7 and 3.8 of the Kyoto Protocol is calculated in accordance with Draft Decision -/CMP.1 (Modalities for the accounting of the assigned amounts) equal to the percentage corresponding to the emission reduction level according to the Kyoto Protocol (Annex B) of Estonia's aggregate anthropogenic CO<sub>2</sub> equivalent emissions of greenhouse gases in the base year (1990 except for emissions of HFCs, PFCs and SF<sub>6</sub> 1995), multiplied by five.

Land use, land-use change and forestry constituted a net sink in 1990, therefore the emissions and removals from this sector do not affect the calculation of Estonia's assigned amount.

Equation for the accounting of Estonia's assigned amount is:

*Estonia's Assigned Amount = Base year emissions (1990, except 1995 for the F-gases) x 5 x the percentage corresponding to the emission reduction level according to the Kyoto Protocol Annex B (92%)*

The estimation of the Estonia's assigned amount is illustrated in Table 1.3. The estimated assigned amount is **200535.993 Gg CO<sub>2</sub> equivalent**.

**Table 3.3 Estimation of Estonia's assigned amount.**

Base year emission	Emissions in column 1 times five	Percentage corresponding to the emission reduction level according to the Kyoto Protocol Annex B	Estimated assigned amount
Gg CO <sub>2</sub> equivalent	Gg CO <sub>2</sub> equivalent	per cent	Gg CO <sub>2</sub> equivalent
Emission without HCFs, PFCs and SF6 and the LU-LUCF sector in 1990: <b>43594.401</b>	217 972.005	92%	<b>200534.245</b>
Emissions of HCFs, PFCs and SF6 in 1995 <b>0.380</b>	1.900	92%	<b>1.748</b>
Total Base Year Emissions <b>43594.781</b>	217973.905	92%	<b>200535.993</b>

## **Part II**

### **4. Calculation of Estonia's commitment period reserve**

The commitment period reserve is calculated in accordance with decision -/CMP.1 (Article 17) as 90% of the proposed assigned amount or 100% of its most recently reviewed inventory times five, whichever is lowest.

Estonia has interpreted the “most recently reviewed inventory” the inventory for the year 2004. This would mean that the five times the emissions from the total inventory of 2004 would be lower, than 90% of the assigned amount. This would give an estimated commitment period reserve of **105757.685 Gg CO<sub>2</sub> equivalent**.

**Figure 4.1 Calculation of the commitment period reserve**

	Calculation	Possible reserve, Gg CO <sub>2</sub> eqv
100% of the most recently reviewed inventory (2004) times five	5 x 21151.537	<b>105757.685</b>
90% of the proposed assigned amount	0.9 x <b>200535.993</b>	<b>180482.394</b>

### **5. Selection of threshold values for the forest definition to be used for reporting under Articles 3.3 and 3.4**

Estonia has selected as threshold values for the forest definition for reporting under Article 3.3 (including activities afforestation, reforestation and deforestation) the following: forest land includes land with minimum tree crown cover of 30 % for trees with minimum height at last 1.3 m. The minimum area for forest land is 0.5 ha. Temporarily unstocked areas are included (forest regeneration areas). For linear formations, a minimum width of 20 m is applied. This definition would be applicable also for reporting, under Article 3.4 - however, Estonia has decided not to use Article 3.4 activities in meeting its commitments for the first commitment period.

Except for crown cover, which is 30% as defined in Forest Act, the selected threshold values are consistent with those values used in the reporting to the Food and Agriculture Organisation of the United Nations (the FAO TBFRA 2000 and FRA 2005 forest definition).

### **6. Selection of activities under Article 3.4**

Estonia does not have reliable estimates of the GHG emissions/removals from activities under Article 3.4 for the first commitment period. In accounting for forest management, data reported by National Forest Inventory have been used.

### **7. Accounting of activities under Article 3.3**

Estonia has chosen to account for the activities under Article 3.3 (afforestation, reforestation

and deforestation) for the whole commitment period.

## ***8. Estonia's national greenhouse gas inventory system***

Estonian national GHG inventory system is designed and operated according to the guidelines for national system under article 5, paragraph 1, of the Kyoto Protocol (Decision 20/CP7) to ensure the transparency, consistency, comparability, completeness and accuracy of inventories. Inventory activities include planning, preparation and management of the inventories.

The inventory phases are:

- collecting activity data;
- selecting methods and emission factors appropriately;
- estimating anthropogenic GHG emissions by sources and removals by sinks;
- implementing uncertainty assessment;
- implementing QA/QC activities;
- verification of the inventory data at the national level.

### ***8.1 Responsibilities in the inventory preparation process***

The Ministry of the Environment organises the practical providing of GHG inventories. Financial resources for this purpose are planned in the State Budget. Practical work has been done on the basis of contracts. The Institute of Ecology at Tallinn University is responsible for the inventories under contract to the Ministry of Environment in Estonia. The Institute of Ecology informs regularly the Ministry of the Environment about advances and problems. The active contribution of the Tartu University, Estonian University of Life Sciences and Tallinn University of Technology in the national inventory preparation should also be mentioned.

Eight specialists were involved in the preparation of the last inventory. Most of them have long experience since 1993 when a new project, Estonian Country Study, was initiated within the U.S. Country Studies Program. The project was of great help to Estonian specialists in starting with the work to compile the GHG inventory, to find contemporary trends in the investigation of the impact of climate change on Estonian ecosystems and economy and to formulate national strategies for Estonia for addressing global climate change.

### ***8.2 Inventory preparation***

#### **8.2.1 Data collection**

The main sources of data were the Statistical Yearbooks and other publications issued by the Statistical Office of Estonia. Unfortunately the availability and reliability of data from different sectors differs, especially for the first years of independence regained in 1991.

#### **8.2.2 Methodology**

The report and associated Common Reporting Format (CRF) tables are prepared in accordance with the UNFCCC reporting Guidelines on Annual Inventories. The methodology used in calculations of emissions is harmonised with the Guidelines for National Greenhouse Gas Inventories and those of Good Practice Guidance and Uncertainty Management in

National Greenhouse Gas Inventories published by the Intergovernmental Panel of Climate Change (IPCC). The methodology is described in detail in the *Estonia's Third National Communication* (2001) and *Estonia's Fourth National Communication* (2006).

Methodological improvements in accordance with the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories and the Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, and according to the recommendations by the Expert Review Teams, have been implemented in the year 2004 inventory as far as possible and will be implemented in their entirety as soon as possible.

### **8.2.3 Emission estimates**

The estimation of GHG emissions in Estonia is based almost entirely on Intergovernmental Panel on Climate Change (IPCC) tier 1 methods and default emission factors (EFs). However, country-specific data are applied in the case of oil shale combustion, which is Estonia's principal source of emissions, accounting for approximately two-thirds of the total in 2004.

In deriving emissions/removals estimates for LULUCF IPCC *Good Practice Guidance for Land Use, Land-use Change and Forestry* (LULUCF) (hereinafter referred to as the IPCC good practice guidance for LULUCF) and the requirements of decision 13/CP.9 were accounted.

### **8.2.4 Uncertainty assessment**

During the last 10 years Estonia has made great efforts in all directions, including those aimed at increasing the reliability of statistical data. The quality of data on the emissions for different years and sectors is variable. In the early 1990s, uncertainties were much higher than in recent years. It is practically not possible to revise estimates for 1990 because at that time absolutely different system of the statistic was used. Emissions for the base year are not overestimated but are most probably underestimated. In 1990 in Estonia were a huge amount of Soviet troops and in the inventory were not included emissions from military sources.

It is not possible to quantify the margin of error and the estimates are mainly expert assessments. By the expert estimates, and quantifications uncertainties based on the methods given by the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) in the energy sector the reliability of statistical data on fuel consumption is  $\pm 10\%$ . In the transport and landfills and waste sectors it is somewhat higher, exceeding  $\pm 15\%$ . In the LULUCF the reliability is even somewhat higher.

The total uncertainty of the inventory for the year 2003 has in this preliminary assessment been estimated to be around  $\pm 10\%$ . In the future more resources will be allocated to the development of better quantitative uncertainty estimates.

Each year Estonia attempts to improve the inventory estimates through the use of better methods and data, taking into account the development in the IPCC methodologies and UNFCCC reporting requirements as well the country experts suggestions. The required changes and improvements mean that recalculations and revised estimates on historical inventory data are needed in order to maintain the consistency in the time series.

### 8.2.5 QA/QC

General (Tier 1) Quality Control (QC) procedures are applied to all categories as following:

- Activity data were compiled and gross-checked.
- The default factors were used.
- All units were checked

General plan of overall QA/QC system will be developed during the process of inventory system improvement.

### 8.3 Inventory management

All the inventory information is archived and saved at a single location. The archived information is accessible on the Internet address:

<http://www.envir.ee/kliima/?lang=est&cpg=29&a=44>.

All the requests for clarifying inventory information are responded in a timely manner in accordance with Article 8.

## 9. Estonia's National Registry

Description of Estonia's national registry, in accordance with the guidelines under Article 7 of the Kyoto Protocol:

1. Name and contact information of the registry administrator designated by the Party to maintain the national registry:

Estonian Environment Information Centre  
Mustamäe tee 33  
10 616  
Tallinn  
Estonia  
Tel. +372 6 737 577  
Fax: +372 6 564 071  
E-mail: [info@ic.envir.ee](mailto:info@ic.envir.ee)

2. Any other Party with which the Party cooperates by maintaining their respective registries in a consolidated system:

Estonia's national registry is currently linked to the other operational EU member states' National Registries by way of the European Commission CITL (Community Independent Transaction Log).

3. The description of the database structure used in the national registry:

The GRETA registry system is implemented using a Microsoft SQL Server relational database management system with a dedicated data model for supporting registry operations.

SQL Server database model is also scalable up to 2 processors (2xIntel Xeon 3.8 GHz/800MHz -2MB L2) with max 16 gigabytes of memory.

The maximum size of a SQL Server 2000 database is 116 gigabytes.

Currently Estonia's registry contains:

- a. 50 organizations;
- b. with 100 users;
- c. with 55 holding accounts;
- d. with 370 transactions having been performed;
- e. has a total size of database more than 65 megabytes.

Applying a growth of 10 % in organizations, users and accounts we predict that this will result in annual growth in database storage max 10 megabytes per year.

4. A description of how the national registry conforms to the technical standards for the purpose of ensuring the accurate, transparent and efficient exchange of data between national registries, the clean development registry and the independent transaction log:

To ensure the technical standards for purpose of ensuring the accurate, transparent and efficient exchange of data between national registries, daily automated checks and the data reconciliation process is being initiated by the CITL. The process is set in European Commission Regulation No. 2216/2004 for a standardized and secured system of registries pursuant to Directive 2003/87/EC of the European Parliament and of the Council and Decision 280/2004/EC of the European Parliament and the Council.

Estonia is using GRETA software which is supplied by DEFRA (Department for Environment Food and Rural Affairs of the United Kingdom).

The GRETA registry system has been developed for the EU Emissions Trading Scheme (EU ETS). Under EU ETS requirements its Member States registries have to be compliant with the Data Exchange Standards specified for the Kyoto Protocol.

Estonia's registry system has been tested successfully with the EU Commission and after the testing the Registry went live.

Security measures employed in the national registry to deter unauthorized manipulations and minimize operator error:

- a. Access to the Registry is via Username and Password;
- b. The actions that a user can perform are controlled by a permissions system, hence preventing unauthorised access to restricted actions;
- c. All actions performed are recorded by audit;
- d. Applies validation on all user inputs to ensure that only valid details are submitted for processing;
- e. Database manipulations are only carried out by protected, internal stored procedures which are not accessible directly from the user interface and can only be invoked by our internal web-services.
- f. And a dedicated Greta development team is available to make any further security enhancements as and when required.

5. A list of the information publicly accessible through the user interface to the national registry:

The information publicly available is maintained in accordance with the Commission Regulation of 21 December 6 2004 for a standardized and secured system of registries pursuant to Directive 2003/87/EC of the European Parliament.

6. An explanation of how to access information through the user interface of the national registry:

Open Internet Explorer (or similar) and browse to the following URL: <http://khgregister.envir.ee/>. Select the public reports link at the bottom of the page.