

***Slovak Republic***

***Report on the estimation of assigned  
amounts under the Kyoto Protocol***

***Report to the UNFCCC Secretariat***

***October 2006***

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# 1 INTRODUCTION

The Kyoto Protocol entered into force on the 16<sup>th</sup> February 2005 after fulfillment of condition stated in the Article 25. The Slovak Republic as an Annex I Party to the UNFCCC and the Annex B Party to the Kyoto Protocol has therefore prepared and is presenting its due report to facilitate the estimation of assigned amount for the commitment period pursuant to Articles 3.7 and 3.8 of the Kyoto Protocol and to demonstrate capacity to account for its GHG emissions.

This Draft report to the European Commission has been prepared by the Slovak Hydrometeorological Institute and Ministry of the Environment, pursuant to Article 8(1)(e) of Decision No. 280/2004/EC and in the scope that closely follows modalities and rules involved in the Decision 13/CMP.1 and 11/CMP.1.

A reduction commitment for Slovakia for the 2008-2012 period is defined in the Annex B to the Kyoto Protocol as a five-multiple of 92% of total national greenhouse gas emissions in 1990 (reduction commitment -8%). The strategy of meeting the Kyoto Protocol commitments in Slovakia reduces a total quantity for the Kyoto period by further 5%. This amount of 5% will not be however proportionally transferred to all sectors.

Slovakia is not a part of common redistribution of the Kyoto Protocol reduction commitments (so called burden sharing) and the Council Decision 2002/358/EC does not apply to it.

The National Focal Point (NFP) at the Air Protection Department of the Ministry of Environment SR is the key expert and legal guarantor for the achievement of commitments and requirements under the UNFCCC and KP.

SHMI, Department of Air Quality (DoAQ) is the organization authorized by the Ministry of the Environment as a chief coordinator of monitoring and reporting activities as related to the annual inventory of GHG emissions and sinks.

This report is divided into two parts in accordance with the Annex to the decision 13/CMP.1 (Modalities for the accounting of the assigned amounts under Article 7, paragraph 4, of the Kyoto Protocol).

## **Part 1 contains information on:**

- Complete 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 (SF<sub>6</sub>);
- Calculation of the assigned amount pursuant to Article 3.7 and 3.8 of the Kyoto Protocol.

## **Part 2 contains information on:**

- Calculation of the commitment period reserve pursuant to decision 11/CMP.1 (Modalities, rules and guidelines for emission trading under Article 17 of the KP);
- 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 Organization of the United Nations;

- Identification of selected activities under Article 3.4;
- Identification how accounting of Article 3.3 and 3.4 will be done, annually or for the whole commitment period;
- National GHG inventory system description (in accordance with Article 5.1 and the reporting guidelines under Article 7);
- National Registry description (in accordance with reporting guidelines under Article 7 of the Kyoto Protocol).

The information provided in Parts 1 and 2 is further complemented with the information in separate reports that has been already submitted to the UNFCCC:

- National Inventory Report SVK 2006 and CRF Tables 1990, 2000-2004;
- The Fourth National Communication on Climate Change and the Report on Demonstrable Progress of the SR to Achieve Commitments under the Kyoto Protocol, 2005.

## 2 PART I

### 2.1 Greenhouse Gas Emission Inventories for 1990 – 2004 (prepared in accordance with the Article 5, par.2 and relevant COP decisions)

#### 2.1.1 National Inventory Report and CRF Tables

Completed inventories on greenhouse gas emissions and removals for the years 1990 and 2000-2004 using the CRFReporter program, version 1.1 have been provided in the submissions to the UNFCCC and EC by 13. April 2006. The national GHGs inventory were prepared according to 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*.

Information on emission and removals from land-use, land-use change and forestry activities under Article 3.3 (or Article 3.4) is not included in the inventory report as the reporting on these activities will begin only during the commitment period of the Kyoto Protocol. But the emissions and removals from LULUCF prepared by new estimation method are included in the CRF inventory for the whole time series 1990-2004 and recalculations were made according the *IPCC Good Practice Guidance on Land Use, Land-Use Change and Forestry*.

The Fourth National Communication of the SR on the Climate Change was submitted by 31. December 2005 to the UNFCCC as prepared in accordance with the UNFCCC *Guidelines for the preparation of national communications by Parties included in Annex I to the Convention: Part II: UNFCCC reporting guidelines on national communication*.

For the submission in 2006, Slovak Republic has made extensive methodology changes and recalculations. The previous submissions to the UNFCCC were based on the reference approach in calculation of the national GHGs emission total. In the latest submission 2006 the Slovak Republic has already applied sectoral approach as a reference value of the energy sector for the years 1990 and 2000-2004. The recalculation and difference between two approaches are shown in Table 1. For the other years (1991-1999), which were not recalculated until now, we used the reference approach for estimation of the national total.

**Table 1 The sectoral and reference approaches for the recalculated years 1990, 2000-2004**

Year	1990	2000	2001	2002	2003	2004
<b>Sectoral Approach (CO<sub>2</sub> Gg)*</b>	<b>57 053.26</b>	<b>37 665.82</b>	<b>40 562.61</b>	<b>38 550.83</b>	<b>39 183.33</b>	<b>38 592.94</b>
Reference Approach (CO <sub>2</sub> Gg)	55 342.48	36 088.63	38 318.52	37 953.07	38 582.53	37 850.05
<b>Difference in %</b>	<b>-3.00</b>	<b>-4.19</b>	<b>-5.53</b>	<b>-1.55</b>	<b>-1.53</b>	<b>-1.92</b>

\* Sectoral approach used for the calculation of national total

The second large scale recalculation connected with the LULUCF sector was made for the whole time series 1990-2004 according to the changes in the methodology for sector estimation of the emissions and sinks. Also, the implementation of the *IPCC Good Practice Guidance on Land Use, Land-Use Change and Forestry* has continued, and inclusion of new pools (dead organic

matter, soils) into the inventory have resulted in significant changes in the LULUCF sector.

In the activity related to the quality checks and evaluation of the activity data and emission factors as used in the inventory some updates and recalculations were made. This has resulted in more consistent allocation of the emissions and increased the accuracy of the emissions and removals. The deep revision of some fuel characteristics, oxidation factors and emission factors based on new national data leads to the increasing of the accuracy. The updating fuel classification in the sectoral approach (energy sector) was applying consistently to the whole time series. These changes helped to increase compatibility between national inventory and the EU emission trading scheme.

The recalculations and the reasoning behind them are described in detail in the National Inventory Report 2006. The recalculations have resulted in following changes between submission 2005 and 2006:

- the base year emissions (without LULUCF) have increased by 1.7%,
- the 2000 year emissions (without LULUCF) have increased by 1.6%,
- the 2001 year emissions (without LULUCF) have increased by 2.3%,
- the 2002 year emissions (without LULUCF) have decreased by 0.8%,
- the 2003 year emissions (without LULUCF) have decreased by 1.0%

## 2.1.2 Base year inventory and time series 1990-2004

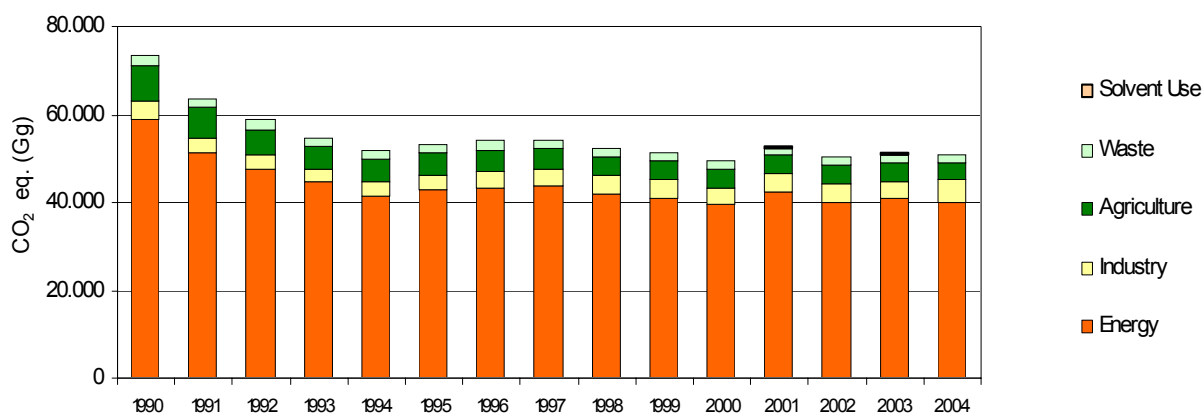
In the period 1991-2004, the total greenhouse gas emissions in the Slovak Republic did not exceed the level of the year 1990. The national total emissions determined as of 15 April 2006 are shown in the Table 2. The Figure 1 presents the total anthropogenic emissions by sectors without LULUCF removals. The actual recalculations and updates were taken into consideration and the time series has some changes if we compare with the previous submission 2005. The Figure 2 shows the total anthropogenic emissions and removals from LULUCF and the net emissions in CO<sub>2</sub> equivalents.

**Table 2 The total anthropogenic greenhouse gas emissions**

Year	1990 **	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Gas</b>	CO <sub>2</sub> equivalent (Tg)														
<b>CO<sub>2</sub></b>	60.5	52.1	48.4	45.4	42.4	43.8	44.4	44.7	43.6	42.6	40.9	43.9	41.9	42.4	42.5
<b>CH<sub>4</sub></b>	6.4	5.9	5.5	5.1	5.0	5.2	5.2	5.0	4.7	4.6	4.5	4.5	4.6	4.6	4.3
<b>N<sub>2</sub>O</b>	6.1	5.2	4.5	3.9	4.1	4.2	4.2	4.3	3.9	3.8	3.8	4.1	3.9	4.0	4.1
<b>F-Gases</b>	0.27	0.27	0.25	0.16	0.14	0.15	0.08	0.11	0.08	0.09	0.10	0.11	0.13	0.17	0.19
<b>GHGs*</b>	73.4	63.5	58.6	54.6	51.7	53.4	54.0	54.0	52.4	51.2	49.4	52.5	50.5	51.1	51.0

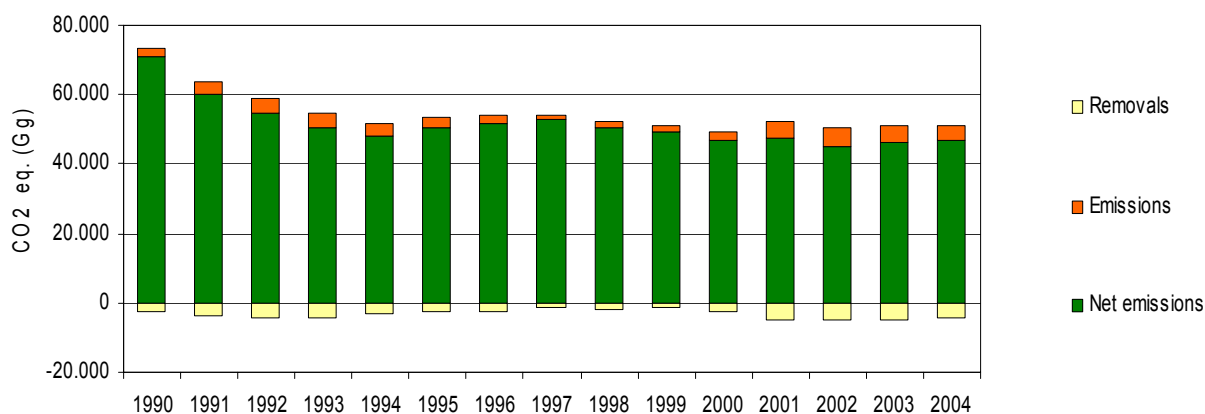
\*Total aggregated GHGs emission without LULUCF, \*\*Base year

**Figure 1 The aggregated emissions of greenhouse gases by sectors in 1990-2004**



Note: Aggregated emissions are determined as of 15.04.2006

**Figure 2 The aggregated emissions of greenhouse gases in 1990-2004**



Note: Aggregated emissions are determined as of 15.04.2006

The base year for the Slovak Republic is the year 1990 for the CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions by sources and removals by sinks and also for the F-gases (HFCs, PFCs and SF<sub>6</sub>).

Total anthropogenic emission in the base year inventory 1990 according the current submission 2006 is 73 360.100 Gg of CO<sub>2</sub> equivalents without LULUCF. The total removals in the 1990 from LULUCF are -2 388.48 Gg of CO<sub>2</sub> equivalents. Total decreasing of the anthropogenic emissions in comparison to the recent inventory year 2004 is 30.43%. The base year and the recent inventory year are easily comparable due to using of the same methodological approach (sectoral) in the energy sector. The most important sector in the base year inventory, as well as the current inventory year is the energy sector, which contributed more than 80% to the total emissions without LULUCF in 1990 and almost 79% in 2004. Agriculture (11%), Industrial Processes (6%) and Waste (3%) were also important sources of emissions, whereas Solvent and Other Product Use and Other sectors were not estimated in the base year. Between

1990 and 2004 the emissions from energy sector decreased by more than 31%, but the energy sector, especially transport, still remain the most important emission source for Slovakia.

The emissions in the Industrial Processes sector have grown by almost 14% between 1990 and 2004, whereas emissions have decreased in the Agriculture (-52%) and Waste (-0.2%) sectors. The emissions from Solvent and Other Product Use have increased by 100%, because of no estimation of this sector and lack of data in 1990.

The time series after recalculation seems to be more balanced and continually decreased from base year with some small fluctuations in 2000 and 2001, respectively.

Two IPCC methods are prescribed for the determination of emissions from fuel combustion of stationary sources. The Statistic Office of the SR is issuing National energy balance every year, which is base for calculation of reference approach (RA) (top down). The reference approach determines the apparent consumption of individual fossil fuel types (primary, secondary and biomass) for which inventory is prepared. The sectoral approach (SA) (bottom up) is based on National Emission Inventory System (NEIS), the database of stationary sources, which collects the data of fuels consumption from the major sources of air pollution in the Slovak Republic.

Reference and sectoral approach are applied to fully independent data sets, whereby obtained differences are negligible. The difference between the top down and the bottom up energy balance estimates the uncertainty level.

The carbon emission factors (t C/TJ) are estimated for individual fuels type based on international methodology (IPCC, OECD, IAEA) and national measurements. Slovak Republic is preparing the deep revision of national energy balance from 1991-1999. The base problem is to change inventory methodology from the reference approach to the sectoral one (now only informative character). The revision impacts fuels base, NCV and emission factors in base year 1990 in accordance with the new inputs from operators of the most important plants. The national emission factors for CO<sub>2</sub> are in use for this time, for natural gas from year 2000. The emission factors for natural gas are based on preciously measurements and calculation published every month by the Slovak Gas Industry Ltd. These EFs are in use for installations covered by the Emission Trading Scheme and for the requirements of the Ministry of Environment of SR. For the time series 1990-1999 the IPCC default emission factor for natural gas was used (56.1 t CO<sub>2</sub>/TJ) and the emissions from combustion of NG were recalculated.

The emission estimates for the Industrial Processes sector are calculated using the same methods for the whole time series. The emissions in the recent inventory are about 14% higher than in 1990, largely due to increased industrial activity. The most important sources of CO<sub>2</sub> emissions in the sector are the cement industry and the iron and steel industry. The Industrial Processes sector in the Slovak Republic is a source of CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, NO<sub>x</sub>, CO, NM VOC, SO<sub>2</sub>, CF<sub>4</sub>, C<sub>2</sub>F<sub>6</sub>, and SF<sub>6</sub> pollution. Even though the emissions of CO<sub>2</sub> and N<sub>2</sub>O are reported in this sector only, because of problematic estimation of this emissions and hard separation of industrial sources and fuel combustion sources from each other in industrial processes. The emissions of CO<sub>2</sub> occurring by manufacture of glass, ammonium production and partly by iron & steel production are included in the sectoral approach for energy sector – manufacturing industries (1.A.2) and in the reference approach in the balance of fossil fuel combustion. The situation is



complicated by the confidentiality aspects of adopted legislation (which is like protecting the large installations against the publicity of activity data). The national EFs are available only for several industrial processes (cement and lime production, limestone and dolomite use, the magnesite production and nitric acid production). The emissions from nitric acid production have been calculated using plant-specific data in two producers. The emission factors have been changed in 1996 according to the new technology in one of the plant for nitric acid production, but the method stayed stable for whole time series.

The emissions from the Solvent and Other Product Use are largely NMVOC emissions for the base year, the lack of input data avoids to estimate N<sub>2</sub>O emissions during 1990-1997 and the emissions from anesthesia and aerosol cans are estimated only from 1998, from when the data are available. However, the amount of N<sub>2</sub>O emitted from these sources is negligible. The indirect emissions of NMVOC are estimated from 1990 with the consistent methodology.

In Agriculture sector, the emissions for the base year and the time series have been calculated using the same methods without exceptions. The activity data and emission factors are dependent on the agricultural practices and productivity, which have been taken into account. N<sub>2</sub>O and CH<sub>4</sub> emitted in agricultural sector are considered as the most important gases from the point of view of planning adaptive measures to reduce their influence on environment. The changes of animal populations during evaluated period were caused drop of total methane emissions from 133.8 Gg in 1990 to 52.9 Gg in 2004, (decrease by more 60%). In period after enter of the SR in EU methane emissions can drop on level slightly exceeding 50.0 Gg because of next decrease of populations of the cattle. Population of cattle determines total CH<sub>4</sub> emissions. Therefore, the emission from enteric fermentation decreased more drastically (by about 62%) as compare with emission from animal excreta (decrease by about 55%). Trends of the total N<sub>2</sub>O emissions from agricultural sector reflect trends of direct emissions from cultivated soils, emissions from AWMS and indirect emission from leaching and deposition of ammonia and NO<sub>x</sub>. After big decrease of N<sub>2</sub>O emissions in the 1<sup>st</sup> half of 90's (from 17.0 Gg in 1990 to 10.0 Gg in 1995) the emissions stabilized on level 9.0 Gg per year. The decreasing of N<sub>2</sub>O emissions from manure management and agricultural soils comparable to the base year is 48%.

The most significant change in the Waste sector emission inventory is connected with the waste incineration, emission of CO<sub>2</sub>. The quantity of fuel incinerates like waste is based on data in National Emission Inventory System (NEIS), the database of stationary sources, which collects the data of fuels consumption from the major sources of air pollution in the Slovak republic. These data are available in consistent series only from year 2000, when the system NEIS was put in operation and replaced the old system EAPSI (Emission and Air Pollution Source Inventory). These two systems are comparable only on national level. Also the categorisation of the fuels was changed. This is the reason for the data gaps and inconsistencies in 1990-1999, in the waste incineration. Also, the time series and decreasing of the emissions from Waste sector between 1990 and 2004 is depended on this fact. The first assessments were made in this year in the Tier 2 (First order decay method) approach for the emission estimation in SWDS management in the Slovak republic. As we expected before, no dramatic changes will appeared after using Tier 2 method in emission estimation from SWDS. This approach will be used in 2007 submission for the whole time series.

The emissions from the LULUCF sector do not influence the estimation of the assigned amount for Slovak republic, as the sector was a sink in 1990, as also for the whole time series. The LULUCF sector offsets about 2.5 – 10.5% of emission of the other sectors.

The methodological progress for calculation of national total emissions is consistent from base year (1990). Slovak republic made a big effort in the consistency and accuracy of the emission inventories from 1990-2004 after joining to the EC. The methods and emission factors for the whole time series are comparable and consistent taking the IPCC Good Practice Guidance into account, as far as availability of input data. For all sectors, the accuracy of the data have increased in recent inventory years due to improved national politics and measures and improved national database of sources. Detailed descriptions of the methods, activity data collection and emission factors, as well as key sources and uncertainties can be found in the national inventory report and the CRF tables.

## **2.2 Identification of selected base year for HFCs, PFCs and SF<sub>6</sub> (in accordance with Article 3, par. 8)**

According to the Article 3.8 of the Kyoto Protocol may all Annex I Parties (including the Slovak Republic) use the 1995 year as a base year for all F-gases (HFCs, PFCs and SF<sub>6</sub>). Slovak Republic has considered this fact for the purpose of calculating the assigned amount unit. Final decision of the Slovak Republic was to select the year 1990 as the base year for all F-gases. The Table 3 shows time series of actual emissions of F-gases in 1990-2004.

**Table 3 The actual emissions of F-gases in 1990-2004 in Gg of CO<sub>2</sub> equivalents**

Year	1990*	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Gas	CO <sub>2</sub> equivalent (Gg)														
HFCs	NO	NO	NO	NO	2.9	22.2	37.6	61.1	41.0	65.2	75.8	82.8	103.1	133.2	154.4
PFCs	271.4	266.9	248.4	155.4	132.1	114.3	34.5	34.6	25.4	13.6	11.7	11.4	11.4	20.9	19.3
SF <sub>6</sub>	0.03	0.03	0.04	0.06	9.27	9.91	10.76	11.34	12.24	12.69	13.25	13.84	14.78	15.39	15.89
F-Gases	271.4	267.0	248.5	155.5	144.2	146.4	82.9	107.1	78.6	91.5	100.7	108.1	129.3	169.4	189.6

\*Base year

The analysis shows that in the year 2004 in spite of the forbidden HCFCs applications by the Act No. 76/1998 Coll. in version of the Decree No. 408/2000 Coll. wasn't reached faster application of HFCs. A decline of extinguishing media consumption is because they are very expensive and the investment to them is planned for a longer time. Consumption of SF<sub>6</sub> is not rising. Technical solutions, which could substitute this gas, are still very expensive. Consumption of PFCs during etching is practically without emissions. In relation with the high reliability of the new cooling equipments with the content of HFCs, PFCs and SF<sub>6</sub> and progressive implementation of preventive service, the ratio of potential and actual emissions in the year 2004 and as well the ratio of the cumulative potential and actual emissions is declining. It is because the cumulative amount of these HFCs substances – substitutes of ODS is rising quicker as the actual emissions are declining. The saturation of this ratio we can expect only after the year 2010.

### **2.3 Calculation of the assigned amounts for the Slovak Republic**

Quantified emission limitation or reduction commitment of 92% from the base year level has been accepted by the Slovak Republic in Annex B of the Kyoto Protocol. The calculation of assigned amount for the Slovak Republic pursuant to Article 3.7 of the Kyoto Protocol is based on the base year (1990) inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol to the UNFCCC (see also the part 2.2).

The assigned amount of the SR for the first commitment period (2008-2012) pursuant to Article 3.7 and 3.8 of the Kyoto Protocol has been calculated in accordance with Decision 13/CMP.1 as the total GHG emissions in 1990, excluding LULUCF (in tonnes of carbon dioxide equivalents), multiplied by the quantified emission limitation commitment (92%) and multiplied by 5 (years):

$$73\,360\,100 * 0.92 * 5 = \mathbf{337\,456\,459}$$
 tonnes of CO<sub>2</sub> equivalent

The assigned amount of the Slovak Republic averaged over the first commitment period is:

$$337\,456\,460 / 5 = \mathbf{67\,491\,292}$$
 tonnes of CO<sub>2</sub> equivalent

**Table 4 The assigned amount of the Slovak Republic for period 2008-2012**

<b>Item</b>	<b>Unit [tonnes of CO<sub>2</sub> equiv]</b>
<b>Base year emissions excluding LULUCF (1990)</b>	<b>73 360 100</b>
<b>F-gases emissions in 1990</b>	<b>271 403</b>
<b>Percentage corresponding to the reduction commitment</b>	<b>92%</b>
<b>Estimated assigned amount for the first commitment period</b>	<b>337 456 459</b>
<b>Assigned amount averaged over the first commitment period</b>	<b>67 491 292</b>

### **3 PART II**

#### **3.1 Calculation of the commitment period reserve in accordance with Decision 11/CMP.1**

The commitment period reserve of the Slovak Republic is calculated in accordance with Decision 11/CMP.1 (Modalities, rules and guidelines for emission trading under Article 17 of the KP) as 90% of the proposed assigned amount or 100% of its most recently reviewed inventory times five, whichever value is the lowest. Due to substantive methodology improvements and fulfilled recalculations the Slovak Republic decided to use inventory submission 2006 as an alternate to estimate the commitment period reserve.

Using the 100% of this value multiplied by five gives the number 255 230 824 tonnes of CO<sub>2</sub> equivalent.

This number is lower than the 90% of the calculated assigned amount, which is 303 710 813 tonnes of CO<sub>2</sub> equivalent.

Following the decision 11/CMP.1 we would give an ***estimated commitment period reserve for the Slovak Republic as equal to the 255 230 824 tonnes of CO<sub>2</sub> equivalent.***

#### **3.2 Selection of single minimum values for the crown cover, land area and tree height for use in accounting under Articles 3.3 and 3.4**

**Slovakia** has selected as threshold values for the forest definition for reporting under Article 3.3 (ARD activities: afforestation, reforestation and deforestation) the following: forest land includes land with minimum tree crown cover of 20 % for trees capable to reach minimum height of 5 m in situ. The minimum area for forest is 0.3 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, Slovakia has decided not to use Article 3.4 activities in meeting its commitments for the first commitment period.

The selected threshold values are consistent with those values used in the reporting to the Food and Agriculture Organisation of the United Nations (the GFRA 2005, National Forest Inventory, and MCPFE criteria and indicators of sustainable forest management).

### **3.3 Selection of activities under Article 3.4 for inclusion in the accounting for the first commitment period**

**Slovakia** has decided not to use any activities under Article 3.4 (forest management, cropland management, grazing land management and revegetation) for meeting its commitment under the first commitment period of the Kyoto Protocol.

### **3.4 Identification of each activities under Article 3.3 and 3.4**

**Slovakia** has chosen to account for the activities under Article 3.3 (afforestation, reforestation and deforestation) for the whole commitment period.

### **3.5 National inventory system for GHG emissions - current stage**

#### **3.5.1 Systemic level**

Inventories of greenhouse gas emissions for the Secretariat of UNFCCC have been carried out since 1995 and since 2000 they are submitted in the Common Reporting Format (CRF). NFP (Ministry of Environment) – the legal and expert guarantor for emission inventories, submits the complete inventory to the Secretariat UNFCCC every year prior to 15 April. After an in-depth review, the report - Slovakia Centralized Review<sup>1</sup> is released. The inventory also contains the National inventory report (NIR), which has been in preparation since 2003 up to 15 April. In Slovakia the greenhouse gas emissions have not been charged as there were no emission quotas (ceilings) and no systematic monitoring. Act No. 478/2002 on air protection stipulates the obligation for polluting sources to report data also on greenhouse gases, including CO<sub>2</sub>. The obligations were significantly expanded when the Slovak republic joined the EU. This situation requires the strengthening of the capacities for monitoring and reporting. In the SR the inventory of greenhouse gas emissions is carried out by standard methodologies: IPCC (revised in 1996 and 2000), CORINAIR (revised in 2003), COPERT III (revised in 2002), national methodologies (for example wastes, NEIS), other methodologies and combinations. The emission factors comply with the methodologies: IPCC default, national, specific and other factors. The emission balances are performed for seven main sectors (listed in Annex A of the Kyoto Protocol) and they are divided into the following sub-categories:

- Energy (fuel combustion, transport, fugitive emissions) ;
- Industrial Processes (technologies, F-gases);
- Solvents and Solvent Use;
- Agriculture;
- Land Use, Land Use Change and Forestry;
- Waste
- Other

The inventory process has not yet been certified (for example according to ISO 9001) and the quality system (QA/QC) has not been implemented.

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<sup>1</sup> <http://unfccc.int/program/mis/ghg/indrev2003.html>.

The quality system according to IPCC requires:

- transparency (is kept, NIR);
- consistency (good, re-calculations since 1990 in case of change);
- comparability (default EF according to IPCC, in case of absence EF comparison with the Czech Republic);
- completeness (expert estimation about 95%), accuracy (not yet sufficiently assessed);
- use of good practice (according to the Good Practice Guidance, 2000).

The uncertainties of emission factors are not assessed consistently and usually expert estimates are used. Needs for capacity strengthening (human, financial and material sources) are closely related with demands for capacity development with regard to the completion of the inventory system NIS. The Ministry of Environment provides funds and the Slovak Hydrometeorological Institute also contributes with its own resources. The obligation of COP- 20/CP.7 on setting up and operating an e-mail address and a web page for the national unit for emission inventories has been met already and the inventories are released. The other similar web pages are available at the Department of Meteorology and Climatologic Faculty of Mathematics and Physics of Comenius University, the Slovak Hydrometeorological Institute (SHMU) and the Ministry of Environment, where basic data and reports on climate change can be found.

### **3.5.2 Institutional level**

SHMU is the organization authorized by the Ministry of the Environment of the Slovak republic (MŽP SR) for the air quality and at the same time also the chief coordinator of the activities related to the annual inventory of air emissions, including greenhouse gas emissions. Within the organizational structure of the SHMU the Department of Air Quality performs all the activities. A detailed review of the institutions, including external experts, and their competencies for IPCC sectors are presented in Table 5. As all the activities, in relation to inventories, emission projections and national communications of climate change in Slovakia are performed by almost identical institutions; the table presents summary information about all three fields. In the SR the emissions from the sector "others" are not assessed. Although a relatively high number of institutions and experts are involved, the process of greenhouse gas inventory is not adequately institutionalized. More exact specification of mandates for both national and international obligations would contribute to more effective performance. Annual inventories are based on the input data provided by the Statistic Office of the SR and the operators of air pollution sources through NEIS. It is difficult to meet the deadline for releasing official statistic data. Since Slovakia has joined the EU, the deadline for submitting emission inventories has been shifted forward to 15 January. Based upon existing experience with energy data the deadline is difficult to be met. Another urgent problem is the scope and form of providing statistic data in a way that allows as correct as possible balancing of all IPCC categories.

**Table 5 Inventory and projections of greenhouse gas emissions – current institutional framework of the Slovak Republic**

<b>Institution - name</b>	<b>Type of organisation</b>	<b>Competences and responsibilities</b>
Ministry of Environment of the SR NFP – Air Protection Department	State administration	<ul style="list-style-type: none"> <li>▪ Legislative guarantor the preparation and publication of inventory and projections of greenhouse gas emissions and national communications on climate change in compliance with the IPCC methodology and UNFCCC recommendations and COP decisions;</li> <li>▪ Responsibility for preparing action plans to mitigate greenhouse gas emissions;</li> <li>▪ Responsibility for regular submitting inventory reports and national communications on climate change to the Secretariat of UNFCCC in compliance with the convention and COP decisions;</li> <li>▪ Responsibility for desk review and in-depth review of emission inventory and NS by the Secretariat of UNFCCC.</li> </ul>
Statistic Office of the SR	State administration	<ul style="list-style-type: none"> <li>▪ Collection and publication of official statistic data used for inventory and projections of greenhouse gas emissions and national communications on climate change.</li> </ul>
Customs Directorate of the Slovak Republic	State administration	<ul style="list-style-type: none"> <li>▪ Collection and providing data on import and export of fossil fuels for emission inventory in energy sector.</li> </ul>
Ministry of Economy SR Ministry of Agriculture SR Ministry of Transport, Posts and Telecommunication SR Ministry of Construction and Regional Development SR	State administration	<ul style="list-style-type: none"> <li>▪ Providing documents and data for inventory and projections of greenhouse gas emissions and national communications on climate change.</li> </ul>
Slovak Hydrometeorological Institute (SHMÚ)	State contributory institution	<ul style="list-style-type: none"> <li>▪ Pursuant to Act no. 478/2002 an authorized institution to perform annual inventories of air emissions, including greenhouse gas emissions;</li> <li>▪ Preparing the inventory of greenhouse gas emissions for IPCC sectors in cooperation with external experts;</li> <li>▪ Being responsible jointly with the NFP(MŽP SR) for improving the quality of the inventory in compliance with UNFCCC recommendations and COP decisions;</li> <li>▪ Completing inventories in CRF format;</li> <li>▪ Determining emissions from combusting processes by the bottom-up method, i.e. from an operator to a sector;</li> <li>▪ Preparing annual national inventory reports (NIR);</li> <li>▪ Being responsible for active communication with the Secretariat of UN FCCC with regard to annual reviews;</li> <li>▪ Preparing the projections of greenhouse gas emissions in waste management and the projections of fugitive emissions of CH<sub>4</sub> in cooperation with external experts;</li> <li>▪ Coordinating and contributing to national communications on climate change of SR.</li> </ul>
Air Quality Department (OKO)	A department of SHMÚ	<ul style="list-style-type: none"> <li>▪ Ensuring all activities in relation with air quality-monitoring, measuring, evaluating and reporting air emission data in Slovakia;</li> <li>▪ Operating the National Emission Inventory system (NEIS) functioning for the registration of emissions from operators of stationary sources of air pollution;</li> <li>▪ Providing annual data on greenhouse gas emissions to the European Environmental Agency (EEA) through the national internet system CIRCA (Communication and Information Resource Centre Administrator).</li> </ul>
Slovak Environmental Agency (SAŽP) Banská Bystrica	Implementing agency of MŽP	<ul style="list-style-type: none"> <li>▪ NFP for the cooperation of Slovakia with EEA;</li> <li>▪ Operating national internet system CIRCA.</li> </ul>
PROFING, s.r.o., Bratislava	Consulting company	<ul style="list-style-type: none"> <li>▪ Cooperating in the inventory of emissions, including fugitive emissions in the IPCC energy sector;</li> <li>▪ Projections of emissions in IPCC energy sector and total aggregated greenhouse gas emissions;</li> <li>▪ Coordination and cooperation in the preparation of national communications on climate change;</li> <li>▪ Preparing the action plan for CO<sub>2</sub> reduction in energy.</li> </ul>

EFRA Zvolen Lesnícky výskumný ústav Zvolen	Research	<ul style="list-style-type: none"> <li>▪ Inventory of greenhouse gas emissions in agriculture, forestry and landscape use;</li> <li>▪ Projections of greenhouse gas emissions in agriculture, forestry and landscape use;</li> <li>▪ Sector documentation for national communications from agriculture and forestry.</li> </ul>
SjF STU Bratislava SZ CHKT Rovinka	University Professional association	<ul style="list-style-type: none"> <li>▪ Inventory of F-gas emissions;</li> <li>▪ Projections of F-gas emissions;</li> <li>▪ Documentation for national communications.</li> </ul>
SPU Nitra	University	<ul style="list-style-type: none"> <li>▪ Inventory of greenhouse gas emissions in agriculture;</li> <li>▪ Projections of greenhouse gas emissions in agriculture;</li> <li>▪ Documentation for national communications.</li> </ul>
Žilinský vzdelávací servis, Žilina Výskumný ústav dopravný Žilina	Consulting company – Transport Research Institute	<ul style="list-style-type: none"> <li>▪ Inventory of greenhouse gas emissions from transportation;</li> <li>▪ Projections of greenhouse gas emissions from transportation;</li> <li>▪ Documentation for national communications.</li> </ul>

Establishing the national inventory system of GHG emissions in compliance with Article 5.1 of the Kyoto Protocol and Council Decision 280/2004/EC is now considered as a priority target both at the Ministry and SHMI level. This capacity need has been already identified as a middle-term objective (2003-2007) of the Strategy of SR towards the Kyoto Protocol. Main characteristics required for proposed NIS are follows:

- to define a National inventory system (institutions, competences), which will group the experts from all sectors according to IPCC (NFP, SNE, scientific institutions, universities, research institutes, private sector, non-governmental organizations, Statistical Office...);
- to establish an independent working unit entitled the Single National Entity (SNE – according to a COP recommendation), which will coordinate the NIS and have competencies and responsibilities stipulated by law. The SNE will be controlled directly by NFP (MŽP SR), including financial resources;
- the SNE should interlink all stakeholders at the horizontal level with regard to expert, financial, legal and information issues. The SNE should also be responsible for achieving the commitments under the UNFCCC and KP in the field of reporting, assessment and providing information to all stakeholders, administration of national databases (NEIS, IPPC – air, NEC directive, EPER), implementation of QA/QC process, accreditation and certification, organization of „cross-country“ meetings and communication with international organizations;
- to appoint experts or organizations for each IPCC sector or gas, and explicitly determine their responsibilities; to appoint a team for the work on national communications, modelling and projections of emissions (RAINS, CAFE) in the sense of keeping consistency, reproducibility and transparency;
- to obtain dedicated continuous finances from the State budget for achieving the commitments under the UNFCCC and KP on annual basis and in a sufficient amount (according to actual needs and analysis);
- to determine the competencies of the NIS and the operators of polluting sources, with regard to the dissemination of information.

Actually is in place a project of the Slovak Ministry of the Environment aimed at proposal of national integrated system of inventory and projections of GHG emissions. The project will be carried out in two phases – outcomes from the first phases which is mainly focused on methodological and organizational aspects will



be during the second phase complemented with required QA/QC parameters and procedures for continuous GHG emission inventory improvement.

### **3.6 Slovak National Emission Registry**

#### **3.6.1 Contact data of Registry administrator**

Name	Dexia banka Slovensko, a. s.
Address	Hodzova 11
Postcode	01011
City	Zilina
Country	Slovak Republic
Contact person	Ms. Alena Stalmachova
Tel	+421 (0) 41 5111 285, 451
Fax	+421 (0) 41 5111 250
E-mail	co2@dexia.sk

#### **3.6.2 Technical description**

Ministry of Environment of the Slovak Republic as competent authority designated private bank Dexia banka Slovensko a. s. as the national registry administrator, under specific agreement in late 2004. Public tender was launched for registry software and French company Caisse des Dépôts et Consignations (CDC-IXIS) had won. CDC with their Seringas™ software is under license contract exclusive software provider for the Slovak National Emission Registry. Software is customized for the Slovak Republic internal needs.

In April 2005, Slovakia passed main tests and in autumn 2005 subsidiary tests with European Commission and was accredited for EU ETS and for Kyoto period as well. Seringas software is fully in compliance with the Regulation 2216/2004/EC and the Directive 2003/87/EC. Software is also compliant with UN Data Exchange Standards #7 (DES #7) for the Kyoto period.

Slovak Republic has launched its emission registry on 23<sup>rd</sup> December 2005 as a standalone registry, not consolidated with other countries.

Slovak National Emission Registry public website is accessible via Internet on: <http://co2.dexia.sk> , and is in both Slovak and English language.

Through the public website, it is possible to reach customer section secured by the Secure Socket Layer (SSL) protocol and available only for registered users by entering username and password.

According the EU specifications, Seringas software is installed on two separate machines (application and database). Database system uses Microsoft SQL server 2000 SP4 on the Microsoft Windows Server 2003 operating system and all latest security patches are applied. Application server has the same operation system and uses Internet Information Services 6.0 as a web server for website and application. Both server machines are IBM xSeries with over-dimensioned

configuration. Registry has backup center with mirror servers of production environment for case of emergency.

For secured client-server, server-server communication, SSL certificate is used. Certificate is provided by the European Commission and uses high 128-bit encryption.

Operations with accounts and transactions must be validated by central registry CITL and accepted by all concerned registries, otherwise transaction is cancelled. Community independent transaction log CITL communicates with other registries via SOAP messages and web services based on XML standard.

Registry users are provided with unique usernames and passwords to enter customer section and access their accounts, which is in compliance with the EU Regulation. Each password has as the minimum 10 characters and letters and numbers are mixed. Each user is forced to change his password every 2 month.

Registry administrator keeps number of persons with access to the registry at the minimum. Access to the server rooms is also limited. Security in server rooms is on the highest level and access is granted only to allowed employees with security card and PIN code. Server rooms are controlled by automatic fire alarm system and guarded 24/7 by Security Company. Server systems are connected to UPS (Uninterruptible power supply) in case of disruption to the electricity supply.

Backup of databases, application and server configuration is managed by Tivoli Storage Management (TSM). Last 10 backups are available immediately, older ones are archived on DVD media. TSM archives all data on the tapes in the backup center (in the distance of 2 km from HQ), which is connected to main building by fibre optics. In case of accident, it is possible to make complete recovery of the registry within hours.