Ministry of Environment
of the Slovak Republic

STATE OF THE ENVIRONMENT REPORT SLOVAK REPUBLIC 2010

Slovak Environmental Agency

• CLIMATE CHANGES

Key questions and key findings

♦ **Key questions**

- **What is the trend in the greenhouse gases emissions intensity - i.e. measurable greenhouse gases emissions per capita, or per GDP unit in the Slovakia?**
- **Does Slovakia fulfil the obligations it assumed from the valid approved documents dealing with climate protection?**
- **What is the observable impact of climate change on the Slovak territory?**

♦ **Key findings**

- **Trend in the development of total emissions suggests that measured greenhouse gases emissions have been decreasing. In terms of international comparisons, Slovakia shows values that are below the EU-27 average.**
- **Greenhouse gases emissions over a longer time horizon has been permanently dropping. (when the figures for 2009 are compared to 1990, there was a 41% reduction) However, it must be said that during the years 1996-2008, emissions showed roughly the same values. There was a more significant year-to-year reduction shown in 2009, attributed mainly to the emerging impacts of the economic crisis. Slovakia has been fulfilling its relevant international obligations (The Kyoto Protocol, the EU climate and energy package) and is expected to maintain the same course.**
- **In terms of comparison over a longer time horizon (since 1981) Slovakia has shown a growth in the average annual temperature, decline in the annual rainfall totals (with the exception of 2010 which was exceptionally humid), reduction in relative humidity and soil humidity, and substantially increased variability in weather patterns with relatively extended drought periods on the one hand, and extremely intensive flooding rainfalls on the other hand.**

Greenhouse gases emissions

Total greenhouse gases emissions in Slovakia in 2009 represented 43 426.07 Gg CO_2 (excluding the LULUCF sector). This meant a reduction by 41.44%, compared to the reference year of 1990. Compared to the previous inventory year of 2008, greenhouse gases emissions dropped significantly, by about 10%. Reduction in greenhouse gases emissions in 2009 has been mostly caused by the impacts of the financial market crisis and the subsequent economic recession. Impacted were mainly the sectors of power industry (industrial power management), and industry. Other sectors such as agriculture, waste, or forests have not shown significant reduction and in general show more stable trend characteristics. As anticipated, emissions in the area of transport, especially road transport and industrial emissions of fluorinated gases (F-gases) that substitute freons prohibited by the Montreal Protocol (mainly HFCs and SF_6). Total greenhouse gases emissions with calculated sinks in the sector of landscape use and forest management (LULUCF) in 2009 were 39 977.06 Gg CO_2 equivalents (the sinks represented 3 449.01 Gg CO_2).

Aggregated greenhouse gases emissions constitute total emissions of greenhouse gases expressed as the CO_2 equivalent, calculated through the GWP 100 (Global Warming Potential). In 2009, CO_2 emissions contributed by 80.8%, CH_4 (GWP = 21) were maintained at the level of 10%,

N_2O emissions (GWP = 310) contributed by 8.4%, and F-gases (HFC, PFC, and SF_6) contributed by 0.8%.

Within the share of individual sectors in 2009, power industry including transport reached with the share of 66.1%, with transport representing 21.6%. Industrial processes including solvents had the share of 21.9% on total greenhouse gases emissions. Agriculture represented 7%-share on emissions while waste contributed with 5% to total emissions.

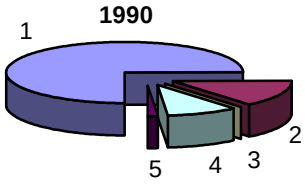
In relation to the requirements set forth by the UN Framework Convention on Climate Change (UNFCCC) and contained also in the Kyoto Protocol (KP), emission assessments for greenhouse gases emissions and reports sent to the UNFCCC office are subject to yearly evaluations. Slovakia reflected on the objections voiced by the office in 2010 and re-calculated the controversial categories such as road transport, assessments of emissions in industry (production of steel and iron), and assessment in the area of forests management.

Aggregated emissions of greenhouse gases (Tg) in CO_2 equivalents

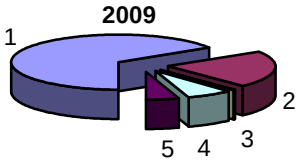
Year	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Net CO_2	59.78	38.06	36.07	34.31	36.33	36.85	40.05	36.63	35.02	35.90	31.61
CO_2*	62.77	41.18	42.38	40.83	42.17	41.97	41.50	40.77	39.00	39.10	35.09
CH_4	4.81	4.44	4.49	5.05	4.88	4.79	4.59	4.66	4.55	4.69	4.35
N_2O	6.31	3.51	3.64	3.77	3.79	3.83	3.81	4.19	4.04	4.08	3.65
HFCs	NA,NO	0.08	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26	0.30
PFCs	0.27	0.01	0.02	0.01	0.02	0.02	0.02	0.04	0.02	0.04	0.02
SF_6	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Total (with net CO_2)	71.20	46.16	44.33	43.28	45.20	45.67	48.68	45.76	43.90	45.01	39.98
Total*	74.15	49.24	50.62	49.78	51.01	50.78	50.11	49.89	47.86	48.19	43.43

Emission were assessed by 15.04.2011 Source: SHMI
The table shows calculated years 1990-2008
** Emissions without deducting the sinks in the sector of LULUCF (Land use-Land use change and forestry)*
NA = no applicable, NO = no occurrence

Share of individual sources on greenhouse gases emissions



1990		2009
74.6%	1. Power Industry	66.1%
14.2%	2. Industry Processes	21.6%
0.02%	3. Using solvents	0.4%
9.5%	4. Agriculture	7.0%
1.5%	5. Waste	5.0%



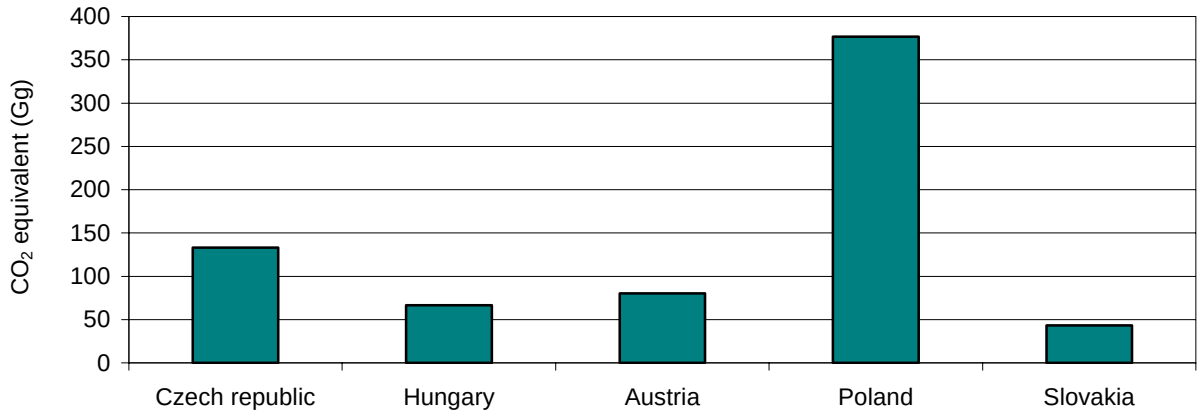
Emission were assessed by 15.04.2011 Source: SHMI

Aggregated emissions of greenhouse gases (Tg) by sectors in CO_2 equivalents

	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Power Industry*	55.32	34.05	35.17	33.07	34.52	33.43	33.16	32.39	30.60	31.32	28.69
Industry Processes**	10.53	9.88	10.09	10.47	10.47	11.50	11.23	11.64	11.47	11.18	9.39
Using solvents	0.14	0.09	0.10	0.13	0.13	0.16	0.17	0.17	0.17	0.17	0.16
Agriculture	7.06	3.44	3.45	3.53	3.39	3.22	3.21	3.16	3.28	3.15	3.02
LULUCF	-2.95	-3.07	-6.29	-6.51	-5.81	-5.10	-1.43	-4.13	-3.96	-3.18	-3.45
Waste	1.09	1.77	1.81	2.58	2.50	2.46	2.34	2.53	2.36	2.37	2.16

Emission were assessed by 15.04.2011 Source: SHMI
The table shows calculated years 1990-2008
** Including the traffic ** Including the F-gases*

Comparison in GHGs emissions in selected countries - in 2009



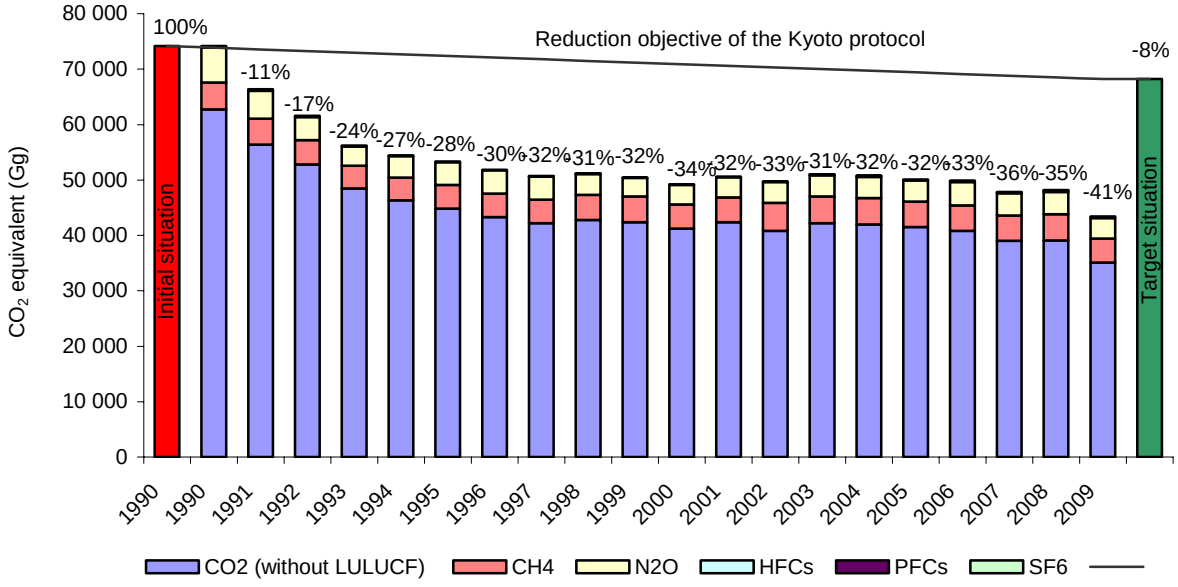
Source: Eurostat

Consequences of climate change

In Slovakia, over the period 1881-2009, there was recorded an increasing trend in the average annual air temperature by 1.6°C and reduction in annual precipitation balance by 3.4% (south of Slovakia showed a reduction by more than 10%, while the north and north-east locations showed a sporadic increase of up to 3% over the whole monitored period). There was also a significant reduction in air humidity (up to 5%) and a reduction to the snow cap for almost the whole Slovak territory (slight increase in upper mountain regions) Characteristics of the potential and actual evaporation, soil humidity, global radiation and radiation balance also prove that the south of Slovakia is gradually drying up (potential evapo-transpiration rises and soil humidity decreases); however, no substantial changes were detected in solar radiation characteristics (with the exception of temporary reduction in the years 1965-1985). There has been a significant increase in weather variability, especially rainfall totals.

Over the last 15 years, there was a significant increase in the occurrence of extreme daily precipitation figures, which consequently produced an increased risk in local floods in various regions of Slovakia. On the other hand, during 1989-2009, much more often than before there would occur a large-territory drought, which was caused mostly by prolonged periods of relatively warm weather with little rainfall totals in a particular part of the vegetation period. Especially harmful were droughts in the periods of 1990-1994, 2000, 2002, 2003, and 2007. The decades of 1991-2000 and 2001-2009 with their air characteristics, rainfall totals, evapo-transpiration, snow cap, as well as other elements, approached the anticipated conditions for 2030 in the area of climate change scenarios for Slovakia. Exceptional values have been recorded for rainfall totals over the cold semester and the winter season of 1991-2000. Also, the year 2010 was characterised as exceptionally humid, with extreme rainfalls, especially in the months of May through September.

Assessment of anthropogenic emission of greenhouse gases under compliance with the Kyoto protocols outcomes



Source: SHMI