SLOVAK HYDROMETEOROLOGICAL INSTITUTE

FINAL REPORT

METHODOLOGY AND TOOLS FOR PREPARATION OF ENVIRONMENTAL ACCOUNTS – AIR EMISSIONS IN THE SLOVAK REPUBLIC

Grant agreement No 50904.2010.004-2010.596

Project Coordinator
Martin Kremler – Slovak Hydrometeorological Institute

Compiled by
Martin Kremler – Slovak Hydrometeorological Institute
Janka Szemesová – Slovak Hydrometeorological Institute
Blanka Fógelová – Slovak Hydrometeorological Institute
Lýdia Ostradická – Slovak Hydrometeorological Institute

SHMÚ

JULY 2013

Table of content

INTRODUCTION

The main objective of the project was to adapt the National Emission Information System (the "**NEIS**") to support the NACE Rev.2 classification reporting of air emission sources into the Environmental Accounts part Air Emissions for the Statistical Office of the Slovak Republic (the "**SO SR**") and the European Commission, DG Eurostat. The Slovak Hydrometeorological Institute (the "**SHMU**") is exclusive supplier of air emissions information in the Slovak Republic and partner of the national statistical authority.

The reporting of the Air Emission Accounts (the "**AEA**") are based on data including in the NEIS database which is operated by the SHMU according to the Act No 478/2002 Coll. on Air Pollution and maintained (software tools) by the Spirit – Informacne systemy, a.s. company (the "**Spirit**"). The NEIS database is representing large-scale, unified bottom-up data collection, inventory, verification, quality assurance and reporting system. The NEIS includes a huge set of data - about 7 664 fuel combustion emission sources allocated in energy balance. Industrial (technological) categories include 4 379 industrial sources and agriculture - animal husbandry categories include 1 501 emission sources. The classification of sources in the NEIS was based on data NACE Rev.1.1 which was rather different to the NACE Rev.2. The reclassification process had to adapt NACE Rev.2 methodology to Slovak specificities, to upgrade all tools and databases involved in the NEIS, to solve specific tasks and finally to implement to the reporting under the Regulation (EU) No 691/2011 of the European Parliament and of the Council on European Environmental Economic Accounts.

PROCEDURES

The basic principles of the structural functionalities of the Grant procedures are already described in the Grant Application, modified version as of 21st November 2011. The Grant contractor was the Slovak Hydrometeorological Institute as the national body included in the List of National Statistical Entities for providing information on air emissions and greenhouse gases.

The Statistical Office of the Slovak Republic was invited as the third party for the Grant participation. Two experts from the Cross-sectional Statistics Department of the Statistical Office of the SR (one expert in environmental statistics, one expert in energy statistics) were involved in the Grant. They were responsible for statistical and methodological support of grant project. The cooperation was realized by the agreement with these two experts.

The sub-contractor of the Grant was company Spirit – Informacne systemy, a.s., IT company responsible for software tools and databases. This company has been cooperating with the SHMU for longer time on the operational functions of the National Emission Information System – which is the database of the stationary sources of air pollution. The NEIS is operated by the SHMU according to the Act No 478/2002 Coll. on Air Pollution and maintained (software tools) by Spirit.

Directly after official approval of the Grant by the Eurostat, the SHMU established the working group for the fulfilment of the task identified in the Grant Application modified version. As was proposed by the Grant documents, the experts involved in this project were also members of the working group. The members were as follow:

- Grant coordinator (project leader) – Mr. Martin Kremler (SHMU)
- Expert for specific tasks – Ms. Janka Szemesová (SHMU)
- Expert for specific tasks – Ms. Blanka Fogelova (SHMU)
- Expert for support – Ms. Lucia Kalocaiova (SHMU, Apr. 2012 – Sep. 2012)
- Expert for support – Ms. Lydia Ostradicka (SHMU, Nov. 2012 – May 2013)
- Expert for support (financial) – Ms. Eva Kusendova (SHMU, Nov. 2012 – May 2013)
- Expert for statistical tasks (third party) – Ms. Eva Smelkova (SO SR)

- Expert for statistical tasks (third party) – Ms. Maria Lexova (SO SR)
- Sub-contractor – Mr. Tibor Kacsinecz (Spirit – Informacne systemy, a.s.)

The first task discussed within the working group was to adapt sources included in the national database of stationary sources to support the NACE Rev.2 classification reporting. As the Slovak Hydrometeorological Institute is exclusive supplier and legal body for providing environmental services within the air emissions information system in the Slovak Republic. The harmonization of the different type of reporting in air pollution and climate change was challenge for the Slovak team.

The one of the success of the grant is that the reporting within the frame of the Regulation No 691/2011/EC can be fully based on data included in the NEIS database. The classification of sources in the NEIS was based on the NACE Rev.1.1 which was rather different to the NACE Rev.2. The reclassification process was performed by the software converter and by the upgrading all tools and databases involved in the NEIS to solve specific tasks. This task was performed by the Spirit expert and following steps were incorporated into the bilateral contract between the SHMU and Spirit.

In frame of this project, the following tasks are proposed:

- Consultations, analysis and proposals for the extension of the module CU (central unit) of the NEIS database to adapt for NACE Rev.2 classification of the sources;
- The proposal for the converter of numbering categorization of the sources according to the Regulation No 356/2010 Coll.;
- Proposal for special software for conversion and aggregation of the emissions from the central unit of the NEIS to the NACE Rev.2 classification (NO_x, SO_2, CO, $PM_{2.5}$ a PM_{10}, NH_3, NMVOC);
- Realization of the outcome datasets for reporting, final report with description of the function and user manual.

The contract was finished and the outcomes were implemented in August 2012. The software converter was installed as the separate specific tool in the NEIS dbase. The converter was used by the allocation of emission sources from the NEIS into the National Accounts reporting questionnaires. The training workshop for the experts involved in the Grant was realized by the Spirit expert in September 2012. The

software is the property of the SHMU. Further detail of the methodology for converting of sources allocation is described in the Chapter Methodology.

Further task discussed in the frame of the working group was delegated to the experts of the SO SR. The elements of the work performed by the experts of the SO SR include the following:

- Ensuring consistency of work with the principles of policy for the official statistics of the SR and the Program of Statistical Surveys;
- Ensuring comparability of statistical information for assessment of development in the SR as from international point of view;
- Definition of the parts of methodology for the field of official statistics;
- Consultation with other members of working group regarding problematic methodological issues, methodological support;
- Checking and validation of data compiled by the SHMU experts into the Air Emissions Accounts questionnaire (data for 2008);
- Ensuring the publication of the final results of the Grant on the official web page of the SO SR or/and in the SO SR public database.

The role of the SHMU experts involved into the Grant was to manage work of the working group, proceeding of the project, financial management, development of the methodology, keeping harmonization with other reporting obligations and final evaluation of the project results.

The main outcome of the Grant is an implementation of the sustainable system for the fulfilment of the reporting under the Regulation No 691/2011/EC and providing consistent, complete, comparable, transparent and accurate data on air emissions and GHG in the future.

METHODOLOGY

Methodological background

Important methodological guide used in the project was Eurostat's Manual for Air Emissions Accounts (2009) which specifies the methodological standards for AEA.

Air Emission Accounts are important part of the Environmental Accounts. The Environmental Accounts have been developed in connection to the National Accounts and provide information on the links between the environment and economy. Environmental account constitutes a satellite accounting framework representing environmental data in a format compatible with the National Accounts economic data.

Air Emissions Accounts record physical flows of gaseous or particulate materials that originate from the national economy and which are released into atmosphere and remain suspended in the air for a substantial time period. Emissions originating from economic activities do not necessarily end up in the environmental system. They can be captured by technical means and be further processed within the economic system. Therefore the total of residuals originating from economic activities is referred to as the gross amount. The amount of air emissions which ends up in the environmental system is referred to as net residuals. Eurostat`s Air Emissions Accounts only record net air emissions.

The residence principle is an important accounting convention in National Accounts which also needs to be retained in Environmental Accounts. The national economic system is defined by its residents` economic activities independent of where those activities take place geographically. The concept of residence is not based on nationality or legal criteria. An institutional unit is said to be a resident unit of a country when it has a centre of economic interest in the economic territory of a country – that is, when it engages for an extended period (one year or more) in economic activities on this territory.

Air Emissions Accounts record only emissions stemming from the resident-unit's economic activities. Emissions by resident units abroad, essentially tourists driving abroad and companies engaged in international transport activities, are fully included in the Air Emission Accounts. Conversely, all emissions by non-resident entities on the national territory should be excluded.

In developing Air Emissions Accounts there are two main starting points as regards to the main data sources: national emission inventories or energy statistics/balances. Accordingly two generic compilation approaches are distinguishable: “inventory-first-approach” and “energy-first-approach”. Deciding whether to start with energy or emissions data is typically determined by what data can be obtained and what type of cooperation with national experts can be established.

In Slovakia, the national data for air emissions are available – so called national emission inventories. There are two types of national emission inventories:

1. Greenhouse Gas (the “**GHG**”) (CO_2, N_2O, CH_4, HFCs, PFCs and SF_6);
2. Air pollutant (NOx, CO, NMVOC, SO_2, NH_3, 9 heavy metals, 17 persistent organic pollutants (the “**POPs**”).

It is often the case that national emission inventories are the primary data source for compiling the Air Emissions Accounts.

GHG inventories aim at reporting emission data under the United Nations Framework Convention on Climate Change (the “**UNFCCC**”). The principles and methodology to compile GHG inventories is laid down in the IPCC Guidelines of which two versions exist: 1996 and 2006. The GHG inventories reported until today are still following the revised 1996 IPPC guidelines (in order to guarantee consistent time series and to monitor the Kyoto protocol). The 2006 IPPC guidelines will enter into practice with a post Kyoto regime. GHG inventories record the emissions of the 6 greenhouse gases by sources (and sinks). The sources are classified according to the Common Reporting Format (the “**CRF**”).

Air pollutant inventories aim at reporting emission data under the United Nations Economic Commission for Europe (the “**UNECE**”) Convention on Long-range Transboundary Air Pollution (the “**CLRTAP**”) and the EU National Emission Ceilings Directive. The principles and methodology to estimate air pollutant inventories are laid down in the EMEP/EEA air pollutant emission inventory guidebook. The European Environment Agency (the “**EEA**”) publishes the Guidebook, with the UNECE’s Task Force on Emission Inventories and Projections having responsibility for the technical content of the chapters. Air pollutant inventories record the emissions of a wide range of substances from sources (and sinks). Today, the sources are classified according to the Nomenclature for Reporting (the “**NFR**”).

When starting with energy statistics/balances the system boundaries need to be adjusted from geographic/territorial boundaries to economic system boundaries based on the resident principle. And the energy use needs to be assigned to industries and households according to the standard industry classification. After the energy use (both combustion and non-combustion uses, i.e. catalysts) has been adjusted and assigned, then emissions are calculated on an industry-by-industry and household basis often using industry-specific and technology specific emission factors for each energy carrier.

GHG emissions

GHG emissions are inventorying and reporting under the UN Convention on Climate Change and the Kyoto Protocol (the "**KP**") according to the IPCC methodologies published in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 1997), the IPCC Good Practice Guidance (IPCC, 2000) and the IPCC 2006 Guidelines (IPCC, 2006). GHG emissions are consistent since 1990 in CRF format. The allocation of GHG emissions into CRF categories is based on the detailed national methodology implemented since 1990 on the principle of TACCC – transparency, accuracy, consistency, comparability and completeness. Due to the methodology used for GHG emissions estimation, it was not possible to disaggregate emissions on the lower level of categories in the NACE C, G and I-S. The disaggregation of several detailed NACE subcategories was provided based on allocation of CO emissions. These emissions are available directly on plant level and therefore it is possible to report them on the plant specific NACE. The chemistry of CO and CO_2 emissions is similar and this simplification allows us to report CO_2 emissions in every NACE category.

The CRF categories are not comparable with the NACE Rev.2 classification and therefore following methodological changes were used in the submission of the AEA.

Emissions of CO_2

Sheet CO_2 reports emissions from the following sectors – energy (fuel combustion in stationary sources, transport, households and fugitive emissions from natural gas and oil), industrial processes (mineral production, chemical production and metal production), solvent use and waste (waste incineration).

Emissions of CO_2 from biomass

The trend in biomass consumption is increasing, however in 2008, the consumption of biomass in energy sector was not important in comparison with other fuels. Sheet biomass CO_2 reports emissions from energy sector for fuels wood and biogas with the same methodology as explained for CO_2. Major sources of CO_2 from biomass combustion are electricity and heat production (CRF 1.A.1a, NACE D) manufacturing and industry (CRF 1.A.2, NACE C), residential heating (CRF 1.A.4b, residential heating) and commercial/institutional sectors (CRF 1.A.4a, NACE O). The special category is road transportation (CRF 1.A.3b) included in the NACE H49 which contains blended biofuels (gasoline and diesel oil).

Emissions of CH_4

Sheet CH_4 reports emissions from the following sectors – energy (fuel combustion in stationary sources, transport, households and fugitive emissions from solid fuels, natural gas and oil), industrial processes (chemical production and metal production), agriculture (enteric fermentation and manure management) and waste (solid waste disposals, wastewaters and composting) with the same methodology as explained for emissions of CO_2 with some small modifications.

Emissions of N_2O

Sheet N_2O reports emissions from the following sectors – energy (fuel combustion in stationary sources, transport, households and fugitive emissions from solid fuels, natural gas and oil), industrial processes (chemical production), solvent use, agriculture (manure management and agriculture soils) and waste (wastewaters, waste incineration and composting) with the same methodology as explained for emissions of CO_2 with some small modifications.

Emissions of HFC, PFC and SF_6

Sheets HFC, PFC and SF_6 report emissions from industrial processes sector, category Consumption of halocarbons and SF_6 (CRF 2F and 2FP).

Emissions of NMVOC

NMVOC emissions are inventorying and reporting under the Convention on Long-range Transboundary Air Pollution and their protocols according to the EMEP/EEA Air Pollutant Emission Inventory Guidebook and in coincidence with requirements of the

respective of working group for emission inventory (UN ECE Task Force on Emission Inventories and Projections) based on the EMEP/CORINAIR methodology. NMVOC emission inventories are consistent since 2000 in the NFR09 format.

Emissions of NMVOC are reported from the following sectors – energy (fuel combustion in stationary sources, transport, households and fugitive emissions from solid fuels, natural gas and oil), industrial processes, solvent use, agriculture and waste. Combustion emissions from the NFR 1.A.2.fi: Stationary Combustion in manufacturing industries and construction and NFR 1.A.4.ai: Commercial/ Institutional: Stationary are disaggregated to several NACE division upon the data from the dbase National Emission Information System.

Emissions of basic pollutants (CO, NH_3, NO_x, SO_x and PM)

Categorization of sources is the basic classification of air pollution sources in the NEIS database. This categorization and the NACE Rev.2 categorization differ considerably, therefore simple transformation of data from the NEIS database to format convenient for reporting of the Air Emission Accounts was impossible.

A special software converter had to be programmed. It was implemented in the form of editable table. The converter enables to assign NACE code to each category of sources. Converter data are saved in database tables of the central NEIS database.

Software generates on the base of this converter and a yearly database of emissions from the NEIS database an excel report. This report has more worksheets; each worksheet is specific for reported air pollutants (CO, NH_3, NO_x, SO_x, PM_{10} and $PM_{2.5}$).

RESULTS

The main result of this project is establishment of a sustainable system that will help in compiling of the Air Emissions Accounts questionnaires in this and the following years in the frame of the Regulation No 691/2011/EC.

During the project, data for the year 2008 in Air Emissions Accounts – questionnaire version 2013 have been compiled. Excel file with filled data for the year 2008 will be attached to this report. Complete Air Emissions Accounts – questionnaire version 2013 (for the years 2008 – 2011) will be submitted in September 2013.

The plan is to make data in the Air Emission Accounts for the Slovak Republic available for public in near future. Experts from the Cross-sectoral Statistics Department of the Statistical Office of the SR will explore the possibility to extend the public database SLOVSTAT by information and data available in the Air Emission Accounts. The SLOVSTAT dbase is a time series statistical database administrated by the Statistical Office of the SR. The data access is realized through the navigation tree which includes particular statistical themes divided into statistical branches. Data in SLOVSTAT are accessible for registered users and are free of charge.

Since data compiled in Air Emission Accounts questionnaire are too detail, the intention is publish only aggregated data in the SLOVSTAT database – data on particular air pollutants by NACE Rev.2 economic activities on section level (sections A – U). The time series will include data since 2008 onward and it will be regularly (annually) updated.

The main results of analysis of emissions from the Slovak economy in the year 2008 are presented in the following subchapters of this report.

Emissions of greenhouse gases

The greenhouse effect of the atmosphere is similar effect to that which may be observed in greenhouses; however the function of glass in the atmosphere is taken over by the greenhouse gases. Short wave radiation is transmitted freely through the greenhouse gases, falling to the earth's surface and heating it. Long wave (infrared) radiation, emitted by the earth's surface, is caught by these gases in major way and partly reemitted towards the earth's surface. As a consequence of this effect, the

average air temperature near the surface is 33°C warmer than it would be without the greenhouse gases.

The most important greenhouse gas in the atmosphere is water vapor, which is responsible for approximately two thirds of the greenhouse effect. Carbon dioxide (CO_2) contributes to the greenhouse effect by more than 30%. Methane (CH_4), nitrous oxide (N_2O) and ozone (O_3) are the next greenhouse gases. The group of man-made artificial substances – chlorofluorocarbons (CFC), their substitutes, hydrofluorocarbons (HFC) and others such as perfluorocarbons (PFC) and SF_6, also belong to greenhouse gases, but their presence in the atmosphere in contrast with previously mentioned gases, is caused exclusively by anthropogenic activity.

The distribution of greenhouse gases emissions in the year 2008 according to the economy categories is shown in the table 1 and the share of the individual economy categories on the total GHG emissions of the Slovak Republic in the year 2008 is shown in the table 2. Figures 1-7 show structure of the greenhouse gas emissions in the economy of the Slovak Republic in this year.

More than one half of the carbon dioxide emissions comes from manufacturing, around 18% come from electricity, gas, steam and air conditioning supply, 12% from households and 9% from transportation. The share of the households on the total emissions of the biomass CO_2 is enormous (almost 90%) in contrast with the share on the N_2O, CH_4 and HFCs emissions (2.4%, 1.1% and 1.6%). The most important economy sectors in Slovakia in terms of N_2O emissions are agriculture, forestry and fishing (more than one half of the total emissions) and manufacturing (more than one third). Water supply, sewerage and waste industry is responsible for the half of the methane emissions, other important sectors are agriculture and transportation.

The most contributing industry to the Slovak HFCs emissions is manufacturing (almost 71%) and transportation (around 21%). The only source of PFCs and SF_6 emissions in Slovakia is manufacturing industry.

Table 1: Distribution of the GHG emissions according to the economy categories in the year 2008

	NACE Rev.2	CO_2 [Gg]	Biomass CO_2 [Gg]	N_2O [Mg]	CH_4 [Mg]	HFC [Mg]	PFC [Mg]	SF_6 [Mg]
A-U	**Total industries**	**35 720.40**	**540.62**	**12 181.40**	**207 317.70**	**329 914.07**	**36 161.74**	**18 511.32**
A	**Agriculture, forestry and fishing**	102.51	3.66	6 826.66	49 997.11	-	-	-
B	**Mining and quarrying**	633.26	-	2.75	15 948.68	-	-	-
C	**Manufacturing**	20 961.69	183.71	4 510.98	561.25	237 690.39	36 161.74	18 511.32
D	**Electricity, gas, steam and air conditioning supply**	7 414.92	103.67	90.33	86.37	-	-	-
E	**Water supply; sewerage, waste management and remediation activities**	1 307.96	29.92	496.20	105 373.90	-	-	-
F	**Construction**	87.67	-	38.71	25.91	1 440.85	-	-
G	**Wholesale and retail trade; repair of motor vehicles and motorcycles**	879.10	-	0.70	14.22	-	-	-
H	**Transportation and storage**	3 677.63	180.15	160.17	35 195.34	71 030.99	-	-
I	**Accommodation and food service activities**	11.80	-	0.06	1.12	-	-	-
J	**Information and communication**	1.24	-	0.01	0.12	-	-	-
K	**Financial and insurance activities**	2.32	-	0.01	14.91	-	-	-
L	**Real estate activities**	41.03	-	0.19	14.91	-	-	-
M	**Professional, scientific and technical activities**	23.87	-	0.11	14.91	-	-	-
N	**Administrative and support service activities**	3.81	-	0.02	14.91	13 222.84	-	-
O	**Public administration and defence; compulsory social security**	157.80	39.50	0.74	14.91	-	-	-
P	**Education**	314.74	-	1.47	29.75	-	-	-
Q	**Human health and social work activities**	78.37	-	52.20	7.41	6 529.00	-	-
R	**Arts, entertainment and recreation**	10.18	-	0.05	0.96	-	-	-
S	**Other service activities**	10.49	-	0.05	0.99	-	-	-
T	**Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use**	-	-	-	-	-	-	-
U	**Activities of extraterritorial organisations and bodies**	-	-	-	-	-	-	-
Household		**4 772.51**	**4 656.86**	**294.64**	**2 205.73**	**5 252.21**	-	-
Total		**40 492.91**	**5 197.49**	**12 476.03**	**209 523.43**	**335 166.28**	**36 161.74**	**18 511.32**

Table 2: Share of individual economy categories on the total GHG emissions in the year 2008

	NACE Rev.2	CO_2 [%]	Biomass CO_2 [%]	N_2O [%]	CH_4 [%]]	HFC [%]	PFC [%]	SF_6 [%]
A-U	**Total industries**	**88.2**	**10.4**	**97.6**	**98.9**	**98.4**	**100.0**	**100.0**
A	**Agriculture, forestry and fishing**	0.3	0.1	54.7	23.9	-	-	-
B	**Mining and quarrying**	1.6		0.02	7.6	-	-	-
C	**Manufacturing**	51.8	3.5	36.2	0.3	70.9	100.0	100.0
D	**Electricity, gas, steam and air conditioning supply**	18.3	2.0	0.7	0.04	-	-	-
E	**Water supply; sewerage, waste management and remediation activities**	3.2	0.6	4.0	50.3	-	-	-
F	**Construction**	0.2	-	0.3	0.01	0.4	-	-
G	**Wholesale and retail trade; repair of motor vehicles and motorcycles**	2.2	-	0.01	0.01	-	-	-
H	**Transportation and storage**	9.1	3.5	1.3	16.8	21.2	-	-
I	**Accommodation and food service activities**	0.03	-	0.0004	0.001	-	-	-
J	**Information and communication**	0.003	-	0.00005	0.00006	-	-	-
K	**Financial and insurance activities**	0.01	-	0.0001	0.01	-	-	-
L	**Real estate activities**	0.1	-	0.002	0.01	-	-	-
M	**Professional, scientific and technical activities**	0.1	-	0.001	0.01	-	-	-
N	**Administrative and support service activities**	0.01	-	0.0001	0.01	3.9	-	-
O	**Public administration and defence; compulsory social security**	0.4	0.8	0.01	0.01	-	-	-
P	**Education**	0.8	-	0.01	0.01	-	-	-
Q	**Human health and social work activities**	0.2	-	0.4	0.004	1.9	-	-
R	**Arts, entertainment and recreation**	0.03	-	0.0004	0.0005	-	-	-
S	**Other service activities**	0.03	-	0.0004	0.0005	-	-	-
T	**Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use**	-	-	-	-	-	-	-
U	**Activities of extraterritorial organisations and bodies**	-	-	-	-	-	-	-
Household		**11.8**	**89.6**	**2.4**	**1.1**	**1.6**	-	-
Total		**100**	**100**	**100**	**100**	**100**	**100**	**100**

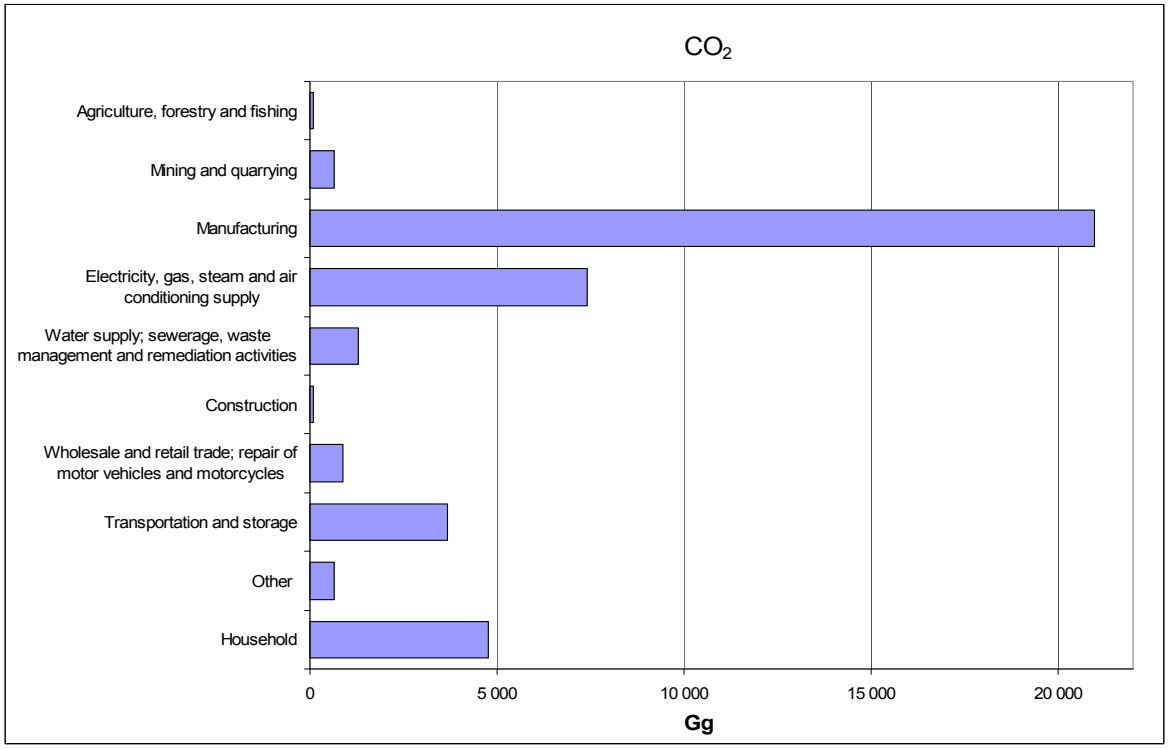

Figure 1: The structure of CO_2 emissions in the economy of the SR in the year 2008

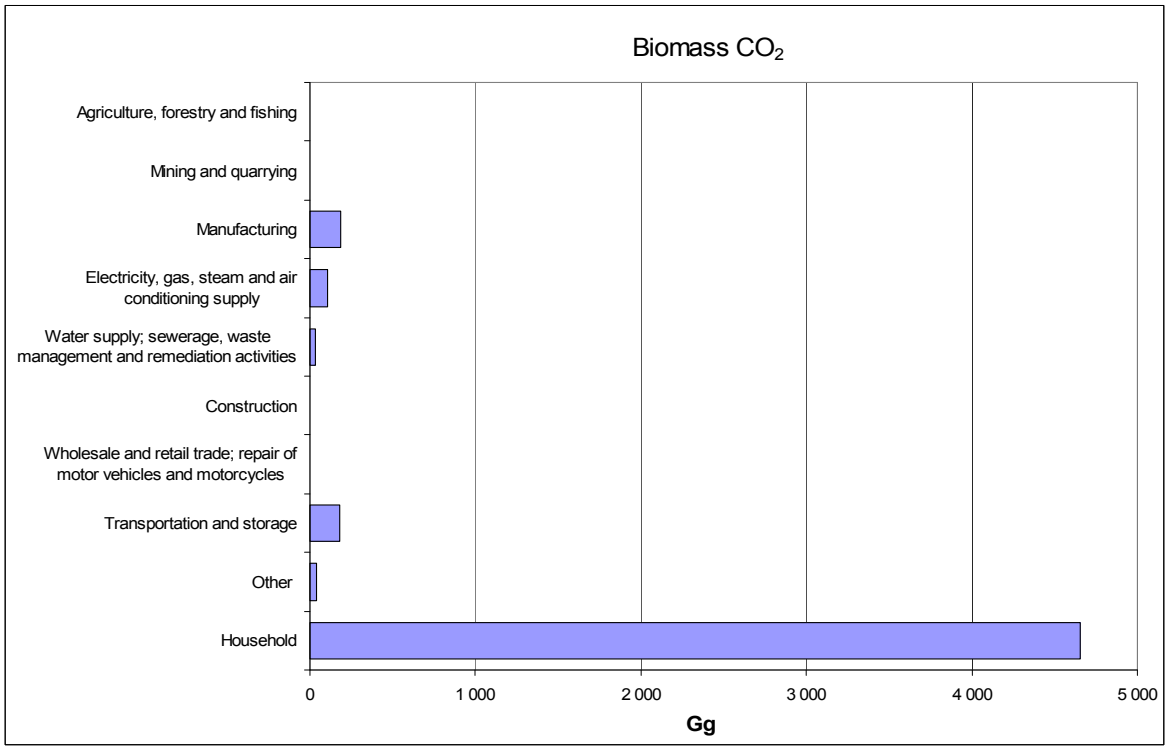

Figure 2: The structure of CO_2 emissions from biomass in the economy of the SR in the year 2008

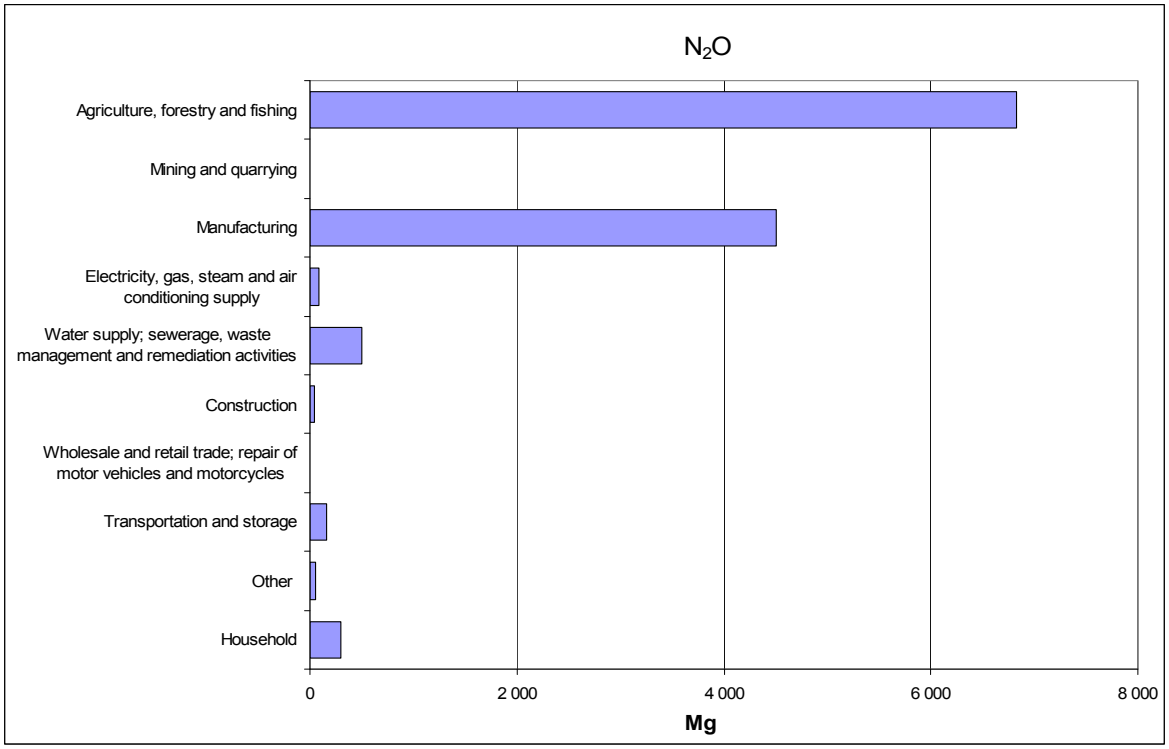

Figure 3: The structure of N_2O emissions in the economy of the SR in the year 2008

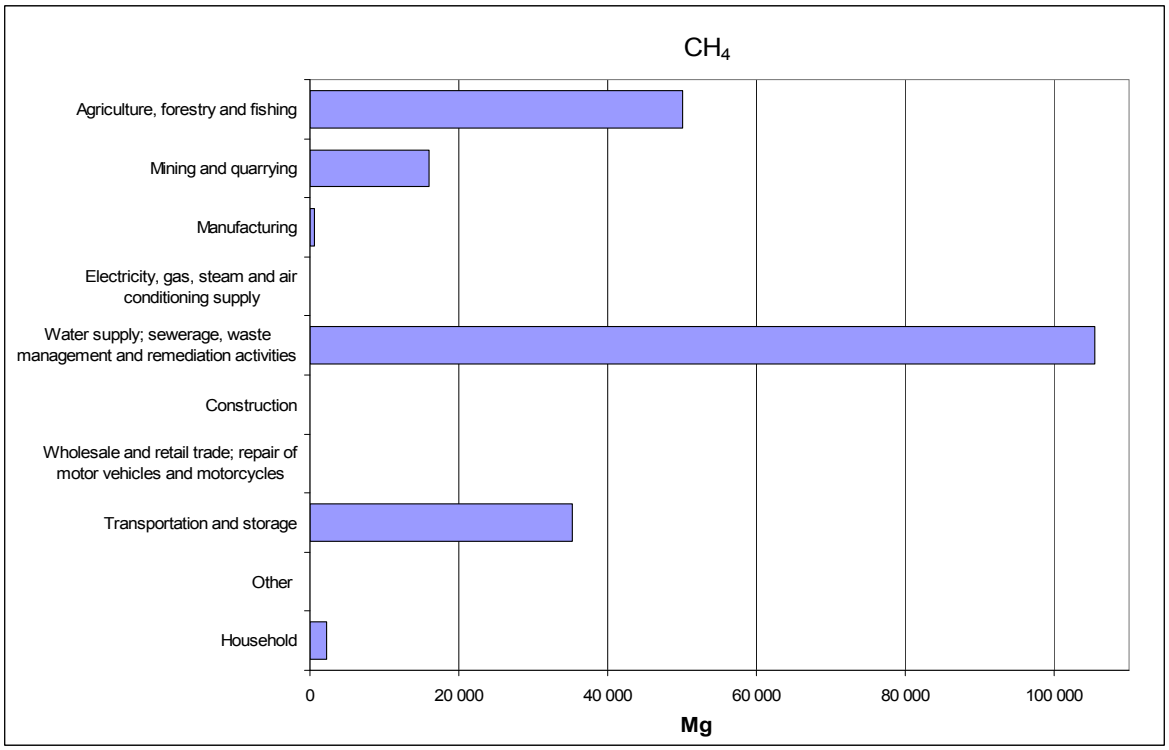

Figure 4: The structure of CH_4emissions in the economy of the SR in the year 2008

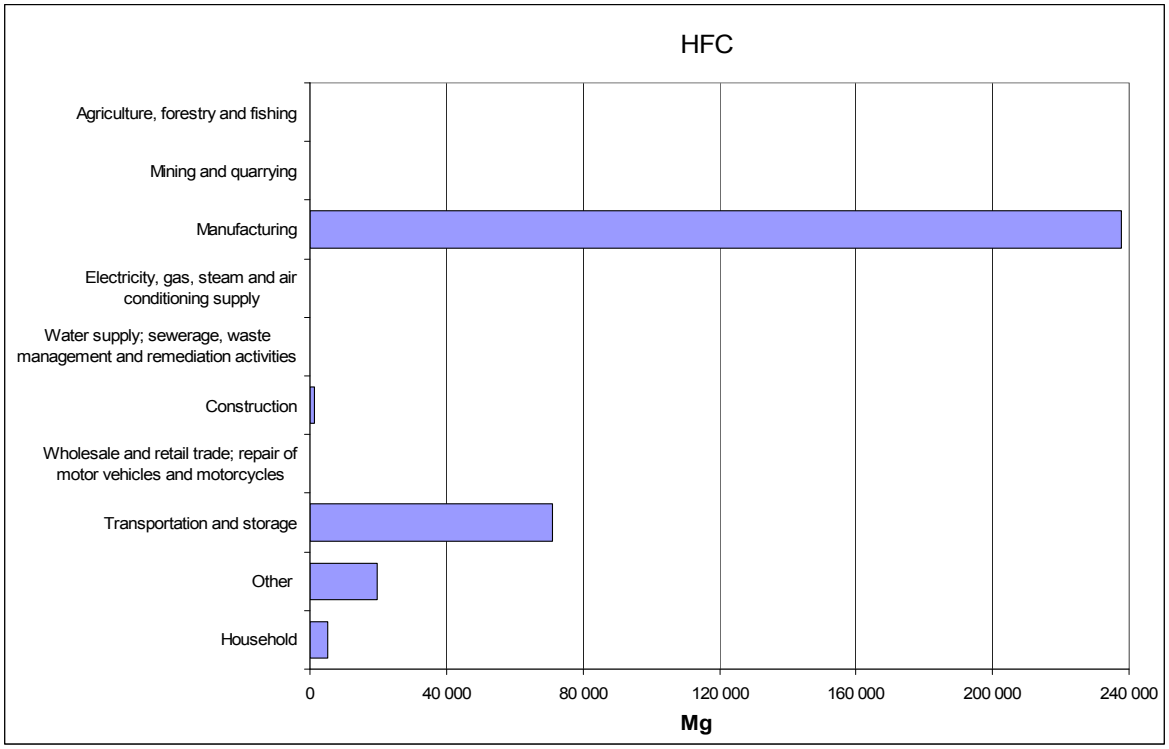

Figure 5: The structure of HFCs emissions in the economy of the SR in the year 2008

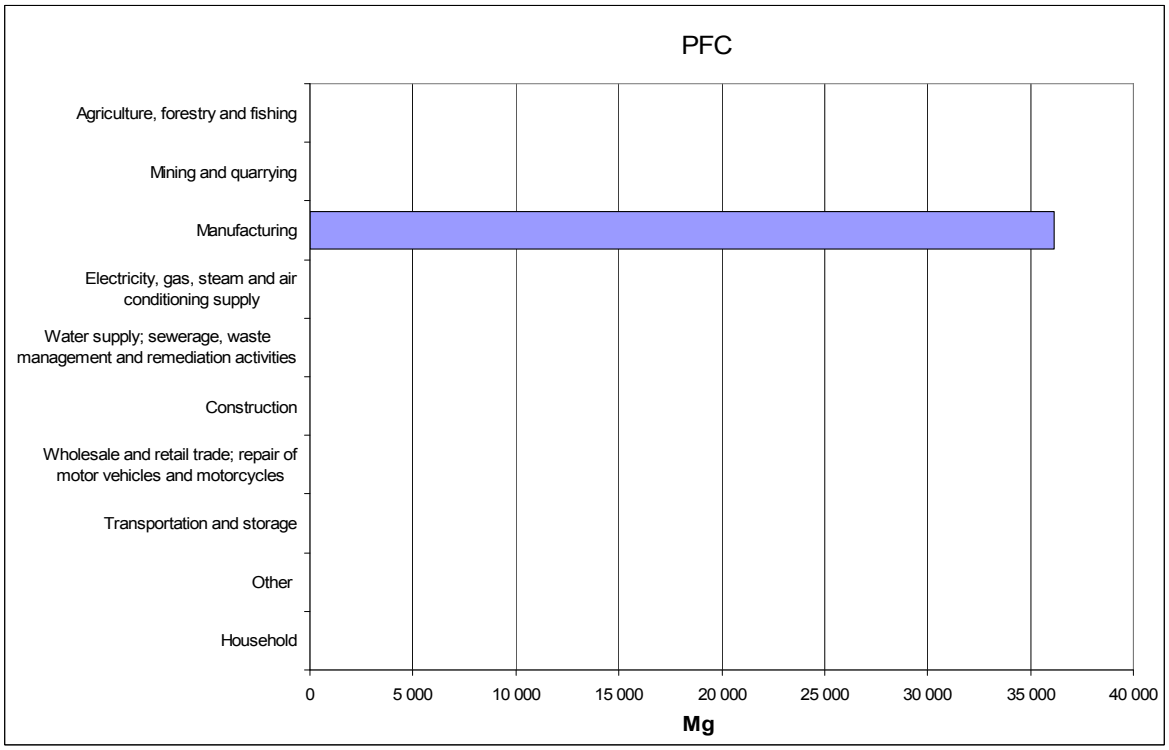

Figure 6: The structure of PFCs emissions in the economy of the SR in the year 2008

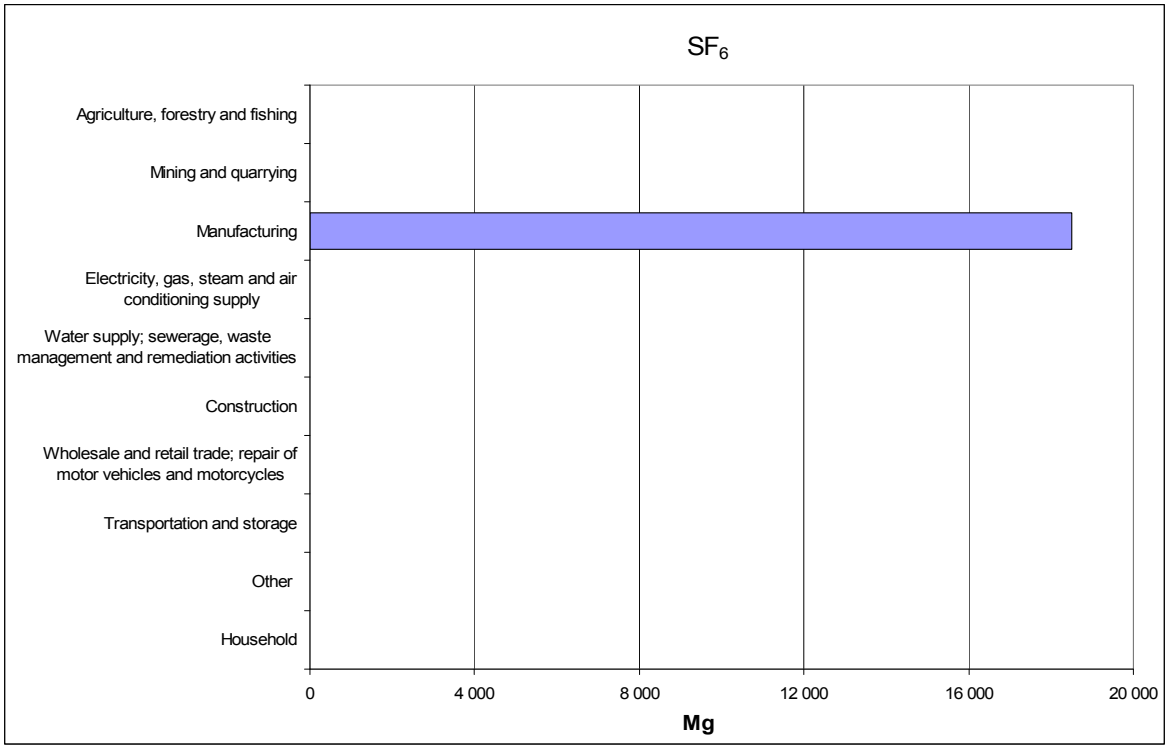

Figure 7: The structure of SF_6 emissions in the economy of the SR in the year 2008

Emissions of NO_x, SO_x, NH_3, NMVOC, CO, PM_{10} and $PM_{2.5}$

The distribution of the NO_x, SO_x, NH_3, NMVOC, CO, PM_{10} and $PM_{2.5}$ emissions according to the economy categories in the year 2008 is shown in the table 3 and the share of the individual economy categories on the total emissions of these pollutants in 2008 is shown in the table 4. Figures 8-14 show the structure of the NO_x, SO_x, NH_3, NMVOC, CO, PM_{10} and $PM_{2.5}$ emissions of the Slovak Republic in 2008.

More than one third of nitrogen oxides emissions comes from transportation (36.4%), manufacturing 27.4%, households 14% and electricity, gas, steam and air conditioning supply 13.6%. Electricity, gas, steam and air conditioning supply (more than two thirds of the total emissions), manufacturing (almost one quarter) and households (approximately 5%) sectors are the most polluting sectors for SO_x emissions in Slovakia. The agriculture and forestry sectors emitted NH_3 emissions in total by 95.5%, the household contribution is negligible. Manufacturing has the highest percentage of NMVOC emissions (44%), households contribute with 31.5%, transportation and storage with 11.7% and administrative and support service activities with 6%. Manufacturing (56%), households (almost 31%) and transportation (around 10%) sectors are significant for CO emissions in 2008. The household sector is the most important source of PM_{10} and $PM_{2.5}$ emissions (82% and 84.3%).

Table 3: Distribution of the basic pollutants according to the economy categories in the year 2008

	NACE Rev.2	NO_x [Mg]	SO_x [Mg]	NH_3 [Mg]	NMVOC [Mg]	CO [Mg]	PM_{10} [Mg]	$PM_{2,5}$ [Mg]
A-U	**Total industries**	**80 344.14**	**65 495.30**	**24 844.07**	**46 108.75**	**167 822.40**	**5 772.04**	**4 324.75**
A	**Agriculture, forestry and fishing**	53.88	25.53	24 096.60	444.77	106.02	47.83	25.07
B	**Mining and quarrying**	108.04	1 350.40	2.68	9.55	469.25	43.60	12.59
C	**Manufacturing**	25 619.34	15 980.95	346.92	29 783.25	135 965.70	2 665.68	1 841.32
D	**Electricity, gas, steam and air conditioning supply**	12 675.55	47 547.77	1.79	172.46	2 778.72	825.31	677.11
E	**Water supply; sewerage, waste management and remediation activities**	203.51	111.43	62.32	176.37	117.29	15.94	11.54
F	**Construction**	30.48	7.29	-	204.84	191.50	8.37	3.56
G	**Wholesale and retail trade; repair of motor vehicles and motorcycles**	7 079.98	51.67	122.16	2 728.94	2 492.46	395.57	309.03
H	**Transportation and storage**	33 986.69	173.85	199.98	7 893.30	24 859.82	1 681.20	1 383.70
I	**Accommodation and food service activities**	22.54	2.95	-	0.01	15.15	1.91	1.73
J	**Information and communication**	4.04	0.28	-	0.001	1.59	0.24	0.24
K	**Financial and insurance activities**	7.39	0.05	-	0.003	2.98	0.46	0.38
L	**Real estate activities**	86.27	11.41	0.78	0.05	52.67	9.18	8.38
M	**Professional, scientific and technical activities**	26.76	2.19	0.24	0.03	30.64	4.68	3.83
N	**Administrative and support service activities**	10.06	0.72	6.96	4 194.50	4.90	0.88	0.71
O	**Public administration and defence; compulsory social security**	89.28	84.32	3.01	0.19	202.56	18.17	10.30
P	**Education**	155.49	116.84	0.49	0.37	404.02	34.05	19.86
Q	**Human health and social work activities**	148.30	25.23	0.02	0.09	100.60	14.36	11.25
R	**Arts, entertainment and recreation**	13.86	1.68	-	0.01	13.07	1.91	1.76
S	**Other service activities**	22.69	0.77	0.12	500.01	13.46	2.71	2.39
T	**Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use**	-	-	-	-	-	-	-
U	**Activities of extraterritorial organisations and bodies**	-	-	-	-	-	-	-
Household		**13 097.25**	**3 895.87**	**379.32**	**21 177.73**	**74 928.14**	**25 447.29**	**23 215.03**
Total		**93 441.39**	**69 391.18**	**25 223.39**	**67 286.48**	**242 750.54**	**31 219.34**	**27 539.79**

Table 4: Share of individual economy categories on the total basic pollutants emissions in the year 2008

	NACE Rev.2	NO_x [%]	SO_x [%]	NH_3 [%]	NMVOC [%]	CO [%]	PM_{10} [%]	$PM_{2,5}$ [%]
A-U	**Total industries**	**86.0**	**94.4**	**98.5**	**68.5**	**69.1**	**18.5**	**15.7**
A	**Agriculture, forestry and fishing**	0.1	0.04	95.5	0.7	0.04	0.2	0.1
B	**Mining and quarrying**	0.1	1.9	0.01	0.01	0.2	0.1	0.05
C	**Manufacturing**	27.4	23.0	1.4	44.3	56.0	8.5	6.7
D	**Electricity, gas, steam and air conditioning supply**	13.6	68.5	0.01	0.3	1.1	2.6	2.5
E	**Water supply; sewerage, waste management and remediation activities**	0.2	0.2	0.2	0.3	0.05	0.1	0.04
F	**Construction**	0.03	0.01		0.3	0.1	0.03	0.01
G	**Wholesale and retail trade; repair of motor vehicles and motorcycles**	7.6	0.1	0.5	4.1	1.0	1.3	1.1
H	**Transportation and storage**	36.4	0.3	0.8	11.7	10.2	5.4	5.0
I	**Accommodation and food service activities**	0.02	0.004	-	0.00002	0.01	0.01	0.01
J	**Information and communication**	0.004	0.0004	-	0.000002	0.001	0.001	0.001
K	**Financial and insurance activities**	0.01	0.0001	-	0.000004	0.001	0.001	0.001
L	**Real estate activities**	0.1	0.02	0.003	0.0001	0.02	0.029	0.03
M	**Professional, scientific and technical activities**	0.03	0.003	0.001	0.00004	0.01	0.015	0.01
N	**Administrative and support service activities**	0.01	0.001	0.03	6.2	0.002	0.003	0.003
O	**Public administration and defence; compulsory social security**	0.1	0.1	0.01	0.0003	0.1	0.1	0.04
P	**Education**	0.2	0.2	0.002	0.001	0.2	0.1	0.1
Q	**Human health and social work activities**	0.2	0.04	0.0001	0.0001	0.04	0.05	0.04
R	**Arts, entertainment and recreation**	0.01	0.002	-	0.00002	0.01	0.01	0.01
S	**Other service activities**	0.02	0.001	0.0005	0.7	0.01	0.01	0.01
T	**Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use**	-	-	-	-	-	-	-
U	**Activities of extraterritorial organisations and bodies**	-	-	-	-	-	-	-
Household		**14.0**	**5.6**	**1.5**	**31.5**	**30.9**	**81.5**	**84.3**
Total		**100**	**100**	**100**	**100**	**100**	**100**	**100**

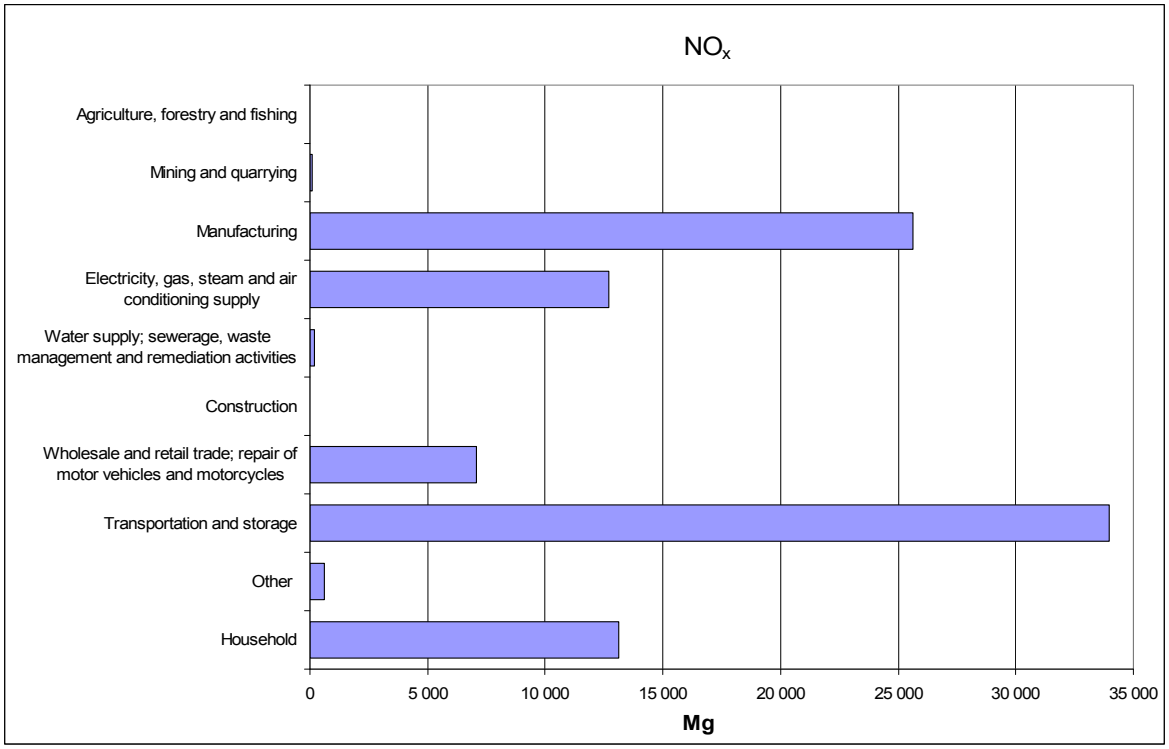

Figure 8: The structure of NO_x emissions in the economy of the SR in the year 2008

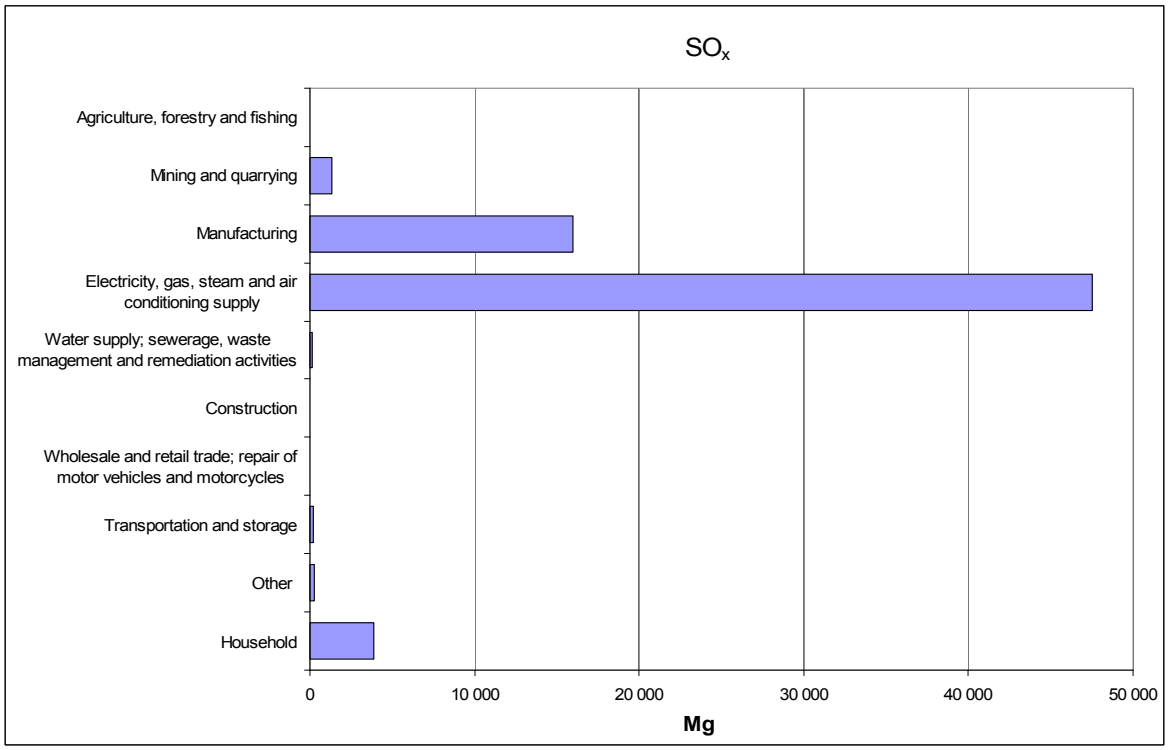

Figure 9: The structure of SO_x emissions in the economy of the SR in the year 2008

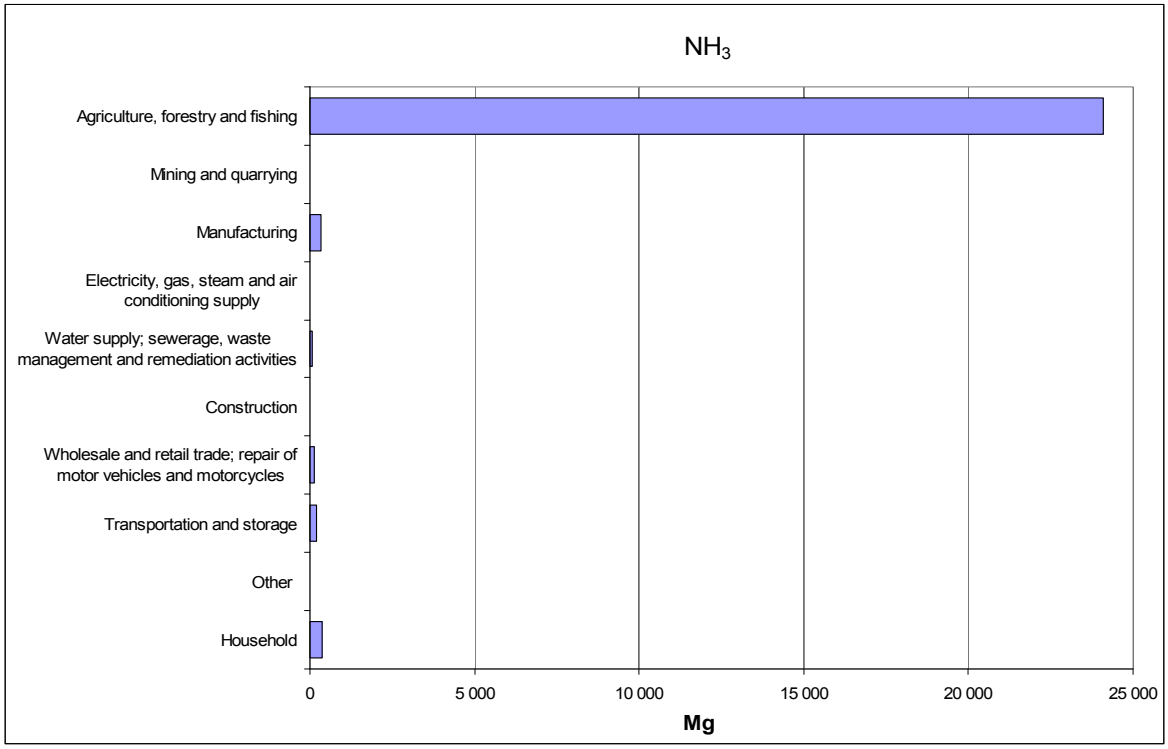

Figure 10: The structure of NH_3 emissions in the economy of the SR in the year 2008

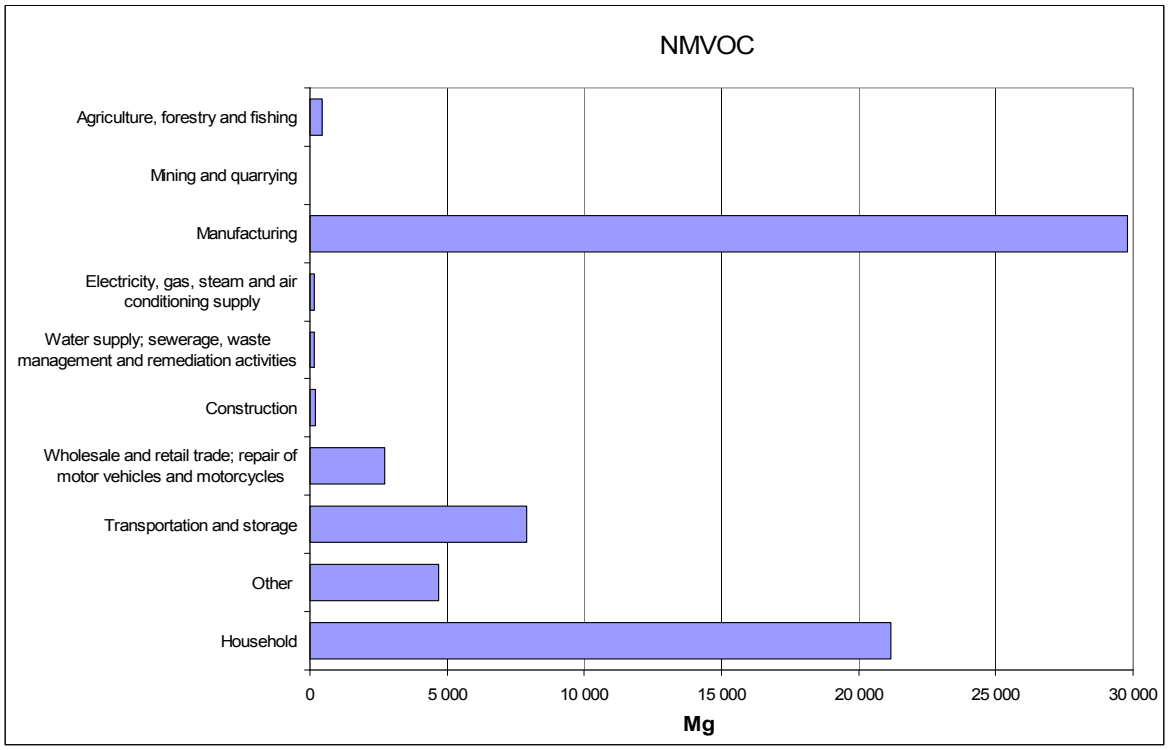

Figure 11: The structure of NMVOC emissions in the economy of the SR in the year 2008

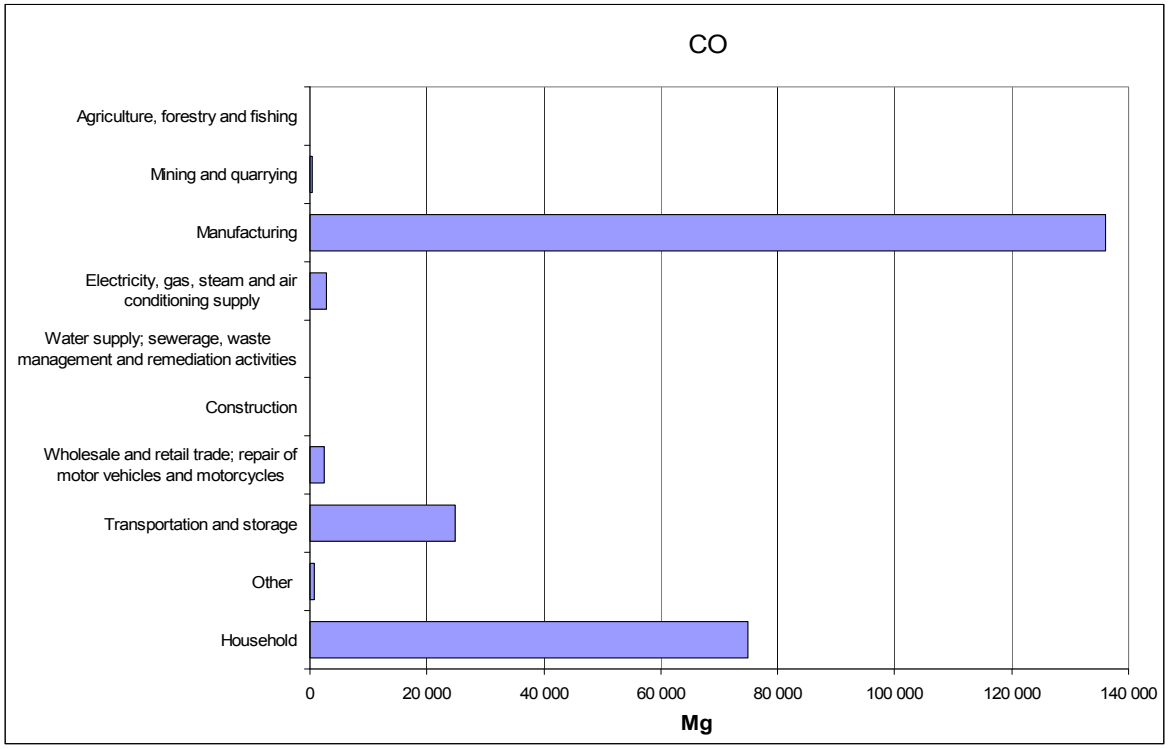

Figure 12: The structure of CO emissions in the economy of the SR in the year 2008

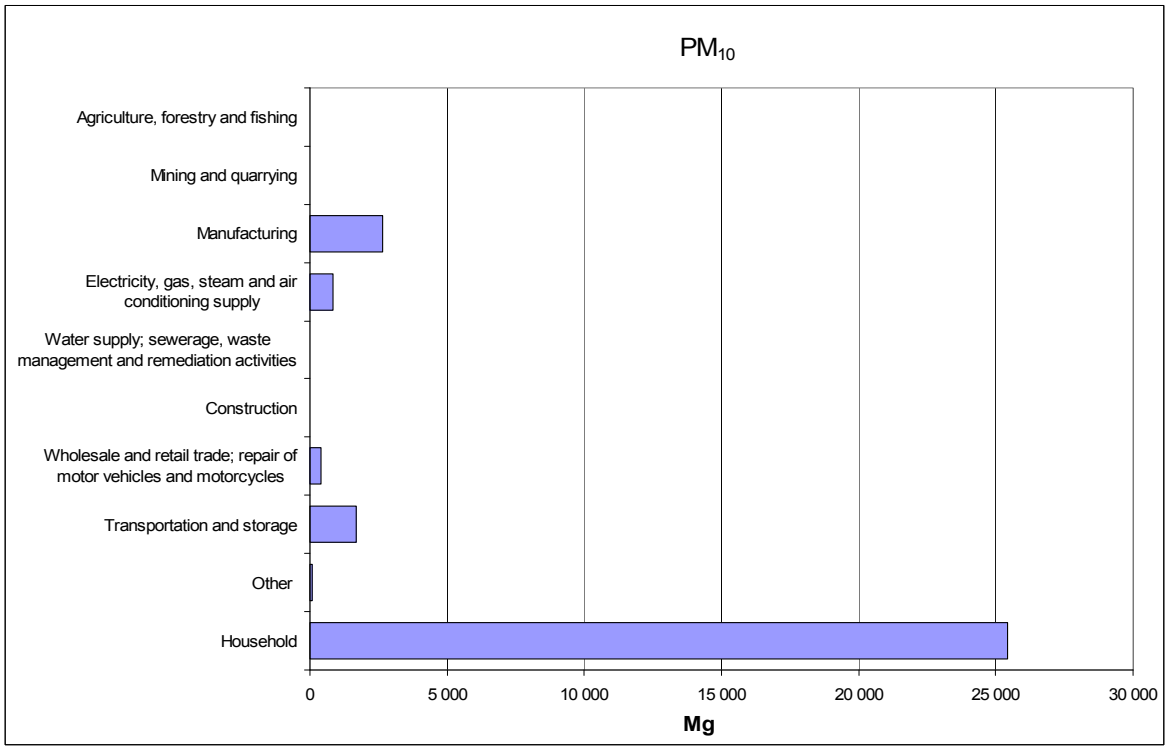

Figure 13: The structure of PM_{10} emissions in the economy of the SR in the year 2008

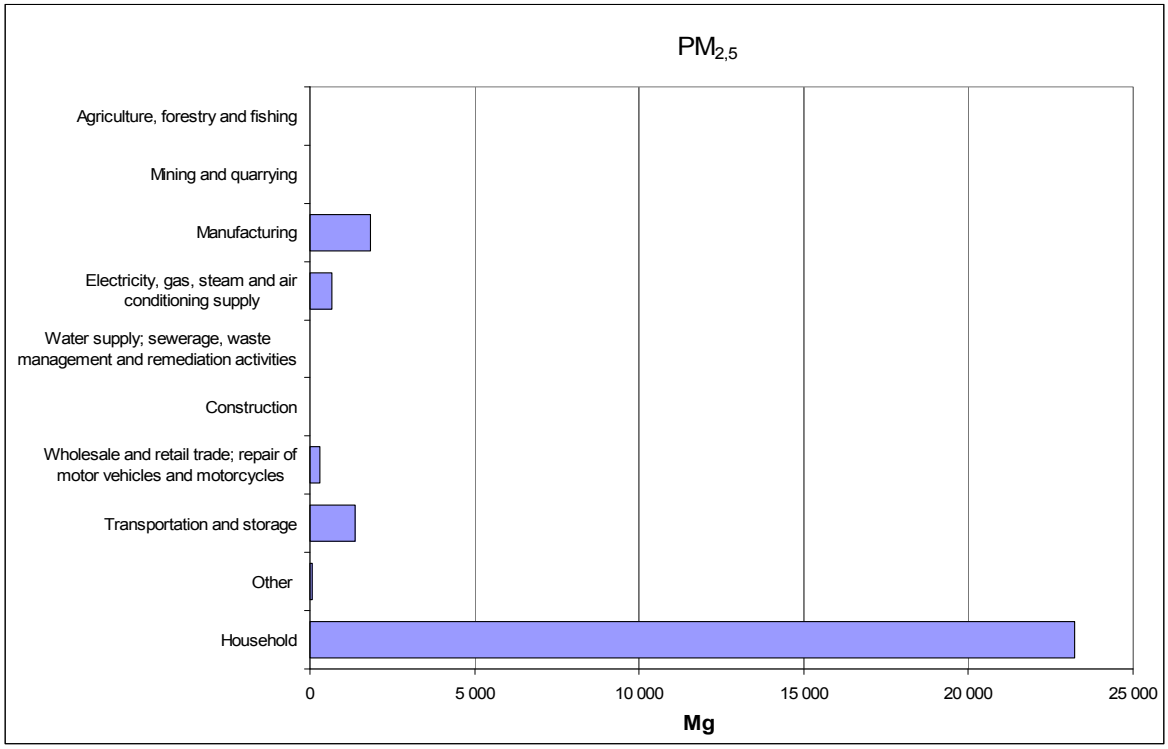

Figure 14: The structure of $PM_{2.5}$ emissions in the economy of the SR in the year 2008

CONCLUSION

The grant project was very useful and important instrument for implementation of the Air Emissions Accounts in the Slovak Republic. Project outputs were useful for establishment of the national system for regular compiling, dissemination, reporting, and publishing emissions data of the Slovak Republic on national level in good quality in the frame of the Air Emissions Accounts questionnaire and according to the Regulation No 691/2011/EC.