Status concerning preparation of Plan for reduction of sulfur, nitrogen oxides, ammonia and volatile organic compounds emissions, until 2020 in Republic of Macedonia

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National Emission Reduction Plan of R. Macedonia currently, is in process of preparation for SO_2, NOx, VOC and NH_3 and determination of projections concerning reduction for the time period till 2020.

NERP covers:

-Trends of SO2, NOx, VOC and NH3 emissions including comparisons regarding reaching of the determined emission ceilings according Rulebook on the amounts of the emission ceilings of polluting substances

Emission ceiling 2010-2020

	SO_2 kilo tones	NO_x kilo tones	VOC kilo tones	NH_3 kilo tones
	130	39	20	17
GAINS-BL	15	19	14	7

'Currently projections of emissions until 2020 including measures for reduction, is in process of preparations

TRENDS OF SO2, NOx, VOC and NH3 EMISSIONS

IN REPUBLIC OF MACEDONIA IN THE PERIOD OF 2001–2009

- For the preparation of trends of SO2, NOx, VOC and NH3 emissions , data from NFR tables are used, which have been reported towards CLRTAP.

- Republic of Macedonia submits reports since 2001 (using NFR tables).

- For 2001, 2002 and 2003 emission amounts have been reported based on experts assumptions by the MOEPP (Ministry of environment and physical planning of R. Macedonia).

- For 2004 and further, it is reported based on Inventory according CORINAIR methodology.

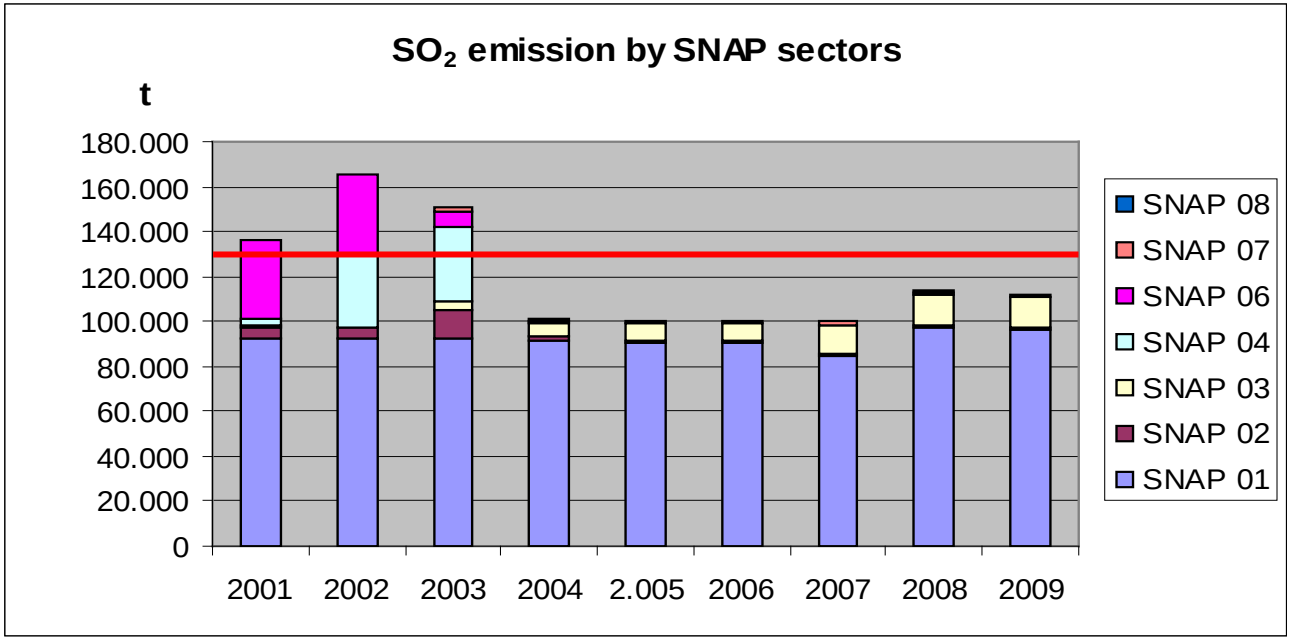
TRENDS OF POLLUTANT SUBSTANCES EMISSIONS SO_2, NOx, NH_3, VOC, IN REPUBLIC OF MACEDONIA BETWEEN 2001-2009

Sulfur dioxide (SO2)

- **Approximately 90% of SO_2 emission in R. Macedonia results from combustion of fossil fuels concerning electrical energy production in coal thermal power plants (2 thermal power plants),**
- **These thermal power plants have not incorporated desulphurization installation, neither use of additives for reduction of SO_2 emission,**
- **Furthermore, herein are the emissions from combustion of liquid fuels concerning production of heat and production process in refinery industry,**
- **Other amounts of emissions (around 10%) mainly result from combustion processes in industrial production and domestic heats, while the share of mobile sources is very small.**

TRENDS OF POLLUTANT SUBSTANCES EMISSIONS SO_2, NOx, NH_3, VOC, IN REPUBLIC OF MACEDONIA BETWEEN 2001-2009

Sulfur dioxide (SO2)



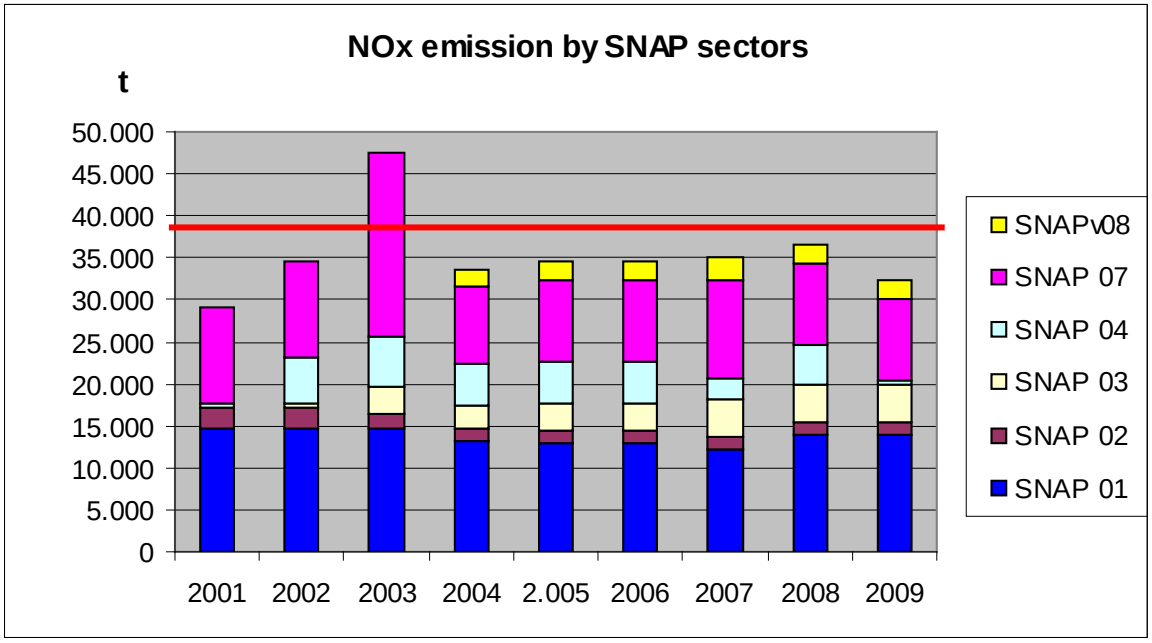
15 kt GAINS-BL

According national legislation which is in compliance with Directive 32008L0080 and 32008L0081, emission ceiling concerning the mentioned pollutant substance for 2010 is 130.000 t (red line). Emission amounts have not acceded this limit in the last years, and for 2008 is below for about 16,4 kt, and for 2009 below for 17,7 kt.

Nitrous oxides (NO_x)

Main source of NOx emissions are:

- ✓ **Combustion processes in thermo power plants (SNAP 01 with share of 39%),**
- ✓ **Transport accompanied with other mobile sources (SNAP 07+08 co 37%) .**
- ✓ **The rest share of 20% emissions, results from industrial production, equally from combustion processes (SNAP 03) and non-combustion processes (SNAP 04).**



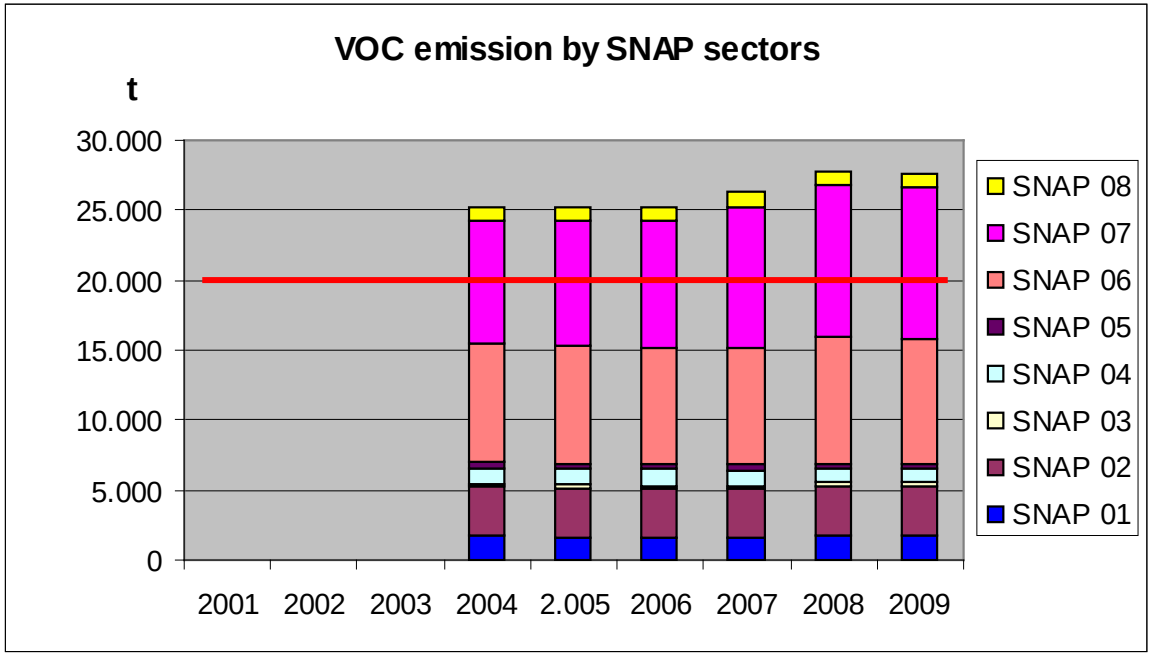
19 kt GAINS-BL

The ceiling of NOx emissions for 2010 is 39.000 t (red line). Emission amounts have not acceded this limit in the last years, and they are below for average amount of 4 kt. In 2009 emission amounts are below for 6,5 kt, which is mainly as result of inactive industries due to the world recession.

Volatile organic compounds (VOC)

VOC emissions are result of :

- ✓ **Mobile sources - SNAP 07+08 (41% of total emissions as result of anthropogenic activities),**
- ✓ **Use of solvents and other products - SNAP 06 (33%),**
- ✓ **Combustion of wood in sub-sector households (SNAP 020205 small combustion plants-ovens, fire-places, stoves... Where the combustion is incomplete) (25%).**



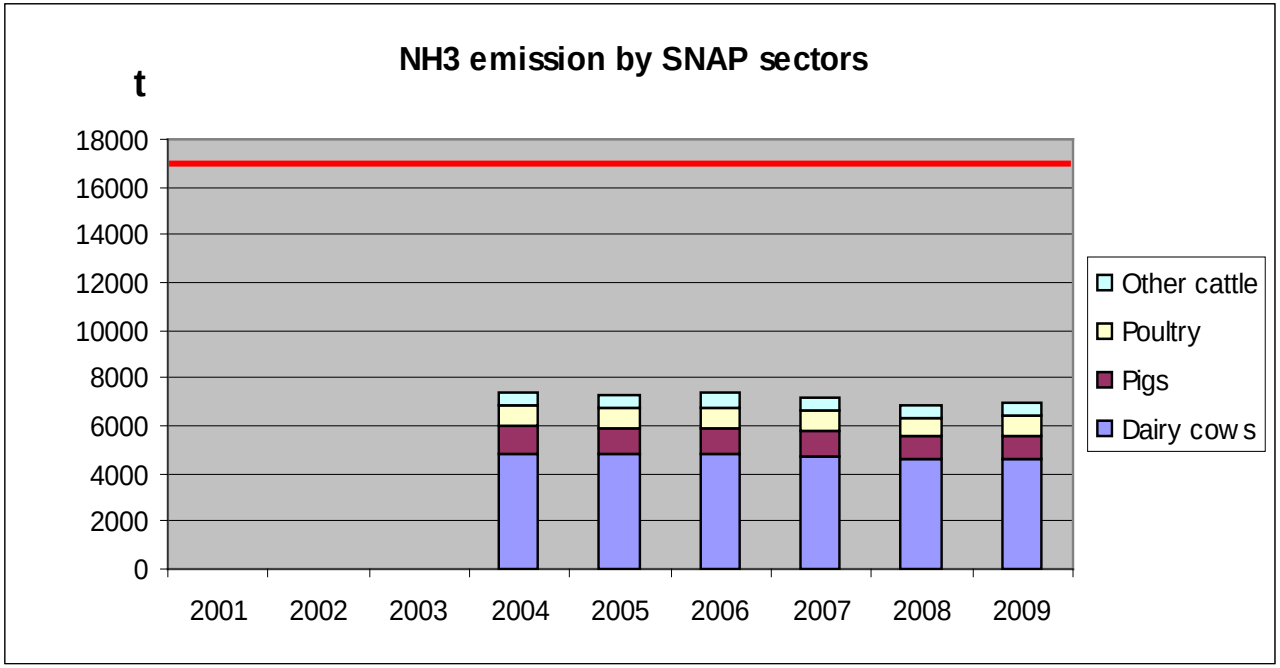
14 kt GAINS-BL

(Note: For 2001,2002 and 2003 is not reported for this substance). VOC emissions ceiling for 2010 is 17.000 t (red line). Amounts of emission for this period exceed this limit for average amount of 6,2kt. During 2007, 2008 and 2009 there is increase of VOC emissions for about 10% as result of increase of fuel use in transport sector.

Ammonia (NH3)

Main source of ammonia emission is sector Agriculture, thus SNAP 100500 (Manure management).

Emissions of: cattle (66%), pigs (15%), poultry (12%) and other cattle (8%).



9 kt GAINS-BL

(Note: For 2001,2002 and 2003 is not reported for this pollutant substance).

Ceiling of NH_3 emissions for 2010 is 17.000 t (red line). Amounts of emission for this period have not acceded this limit, and the values are bellow approximately for 10 kt. In the last two years of the mentioned period, there is a insignificant decrease of emissions, which is as result of decreased number of cattle.

PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

During the preparation of the projections many national development strategies, plans, programs, best available techniques for the certain sectors and etc. has been used. (Example: National strategy for sustainable development of R. Macedonia; Strategy for energy development in the Republic of Macedonia; Strategy for energy efficiency of Macedonia; National program for agriculture and rural development...)

With this presentation are given data which will be used for preparation of projections in Energy sector. These data are extracted from „Strategy for energy development in the Republic of Macedonia until 2020 with vision until 2030“

PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

Planning of energy needs in industry until 2020 is based on plans concerning economy growth and industrial production increase rate.

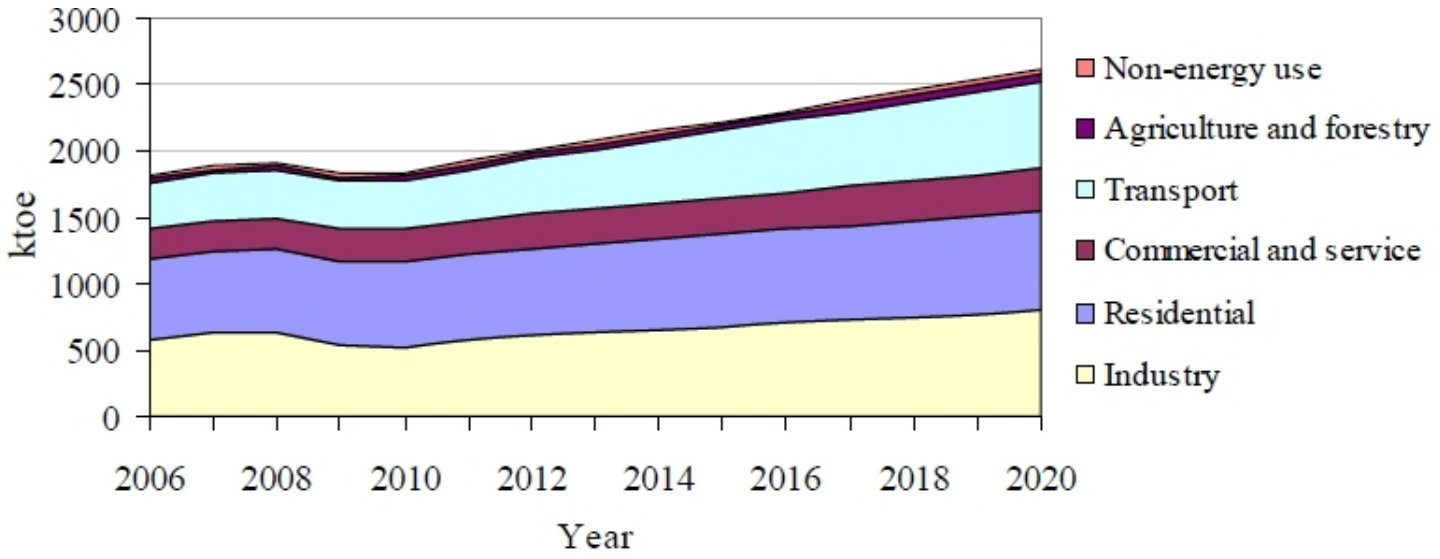
Two scenarios regarding annual rate of energy consumption increase in industry :

- ✓ **Baseline scenario,(with average annual rate of energy consumption increase of 3%),**
- ✓ **Scenario involving strengthened energy efficiency measures (with average annual rate of energy consumption increase of 2,5%)**

PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

Basline scenario – without measures used

Figure presents total final energy needs till 2020 by sectors according baseline scenario.

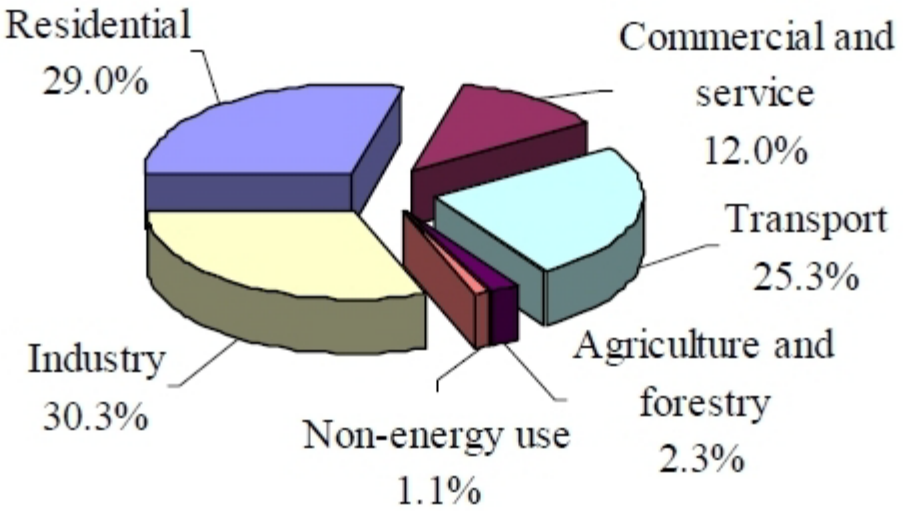


The total final energy consumption until 2020, between 210-2020 will grow with an average annual rate of 2.6% and in 2020 it will be 2618 ktoe. The total growth is 43,9%, i.e. compared to 2006 the demand will be 798 ktoe higher. The largest growth can be seen in transport sector and in agriculture and forestry, with around 90% compared to 2006.

PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

Basline scenario – without measures used

Figure presents percentage share of the sectors in the final energy demand in 2020 – baseline scenario.

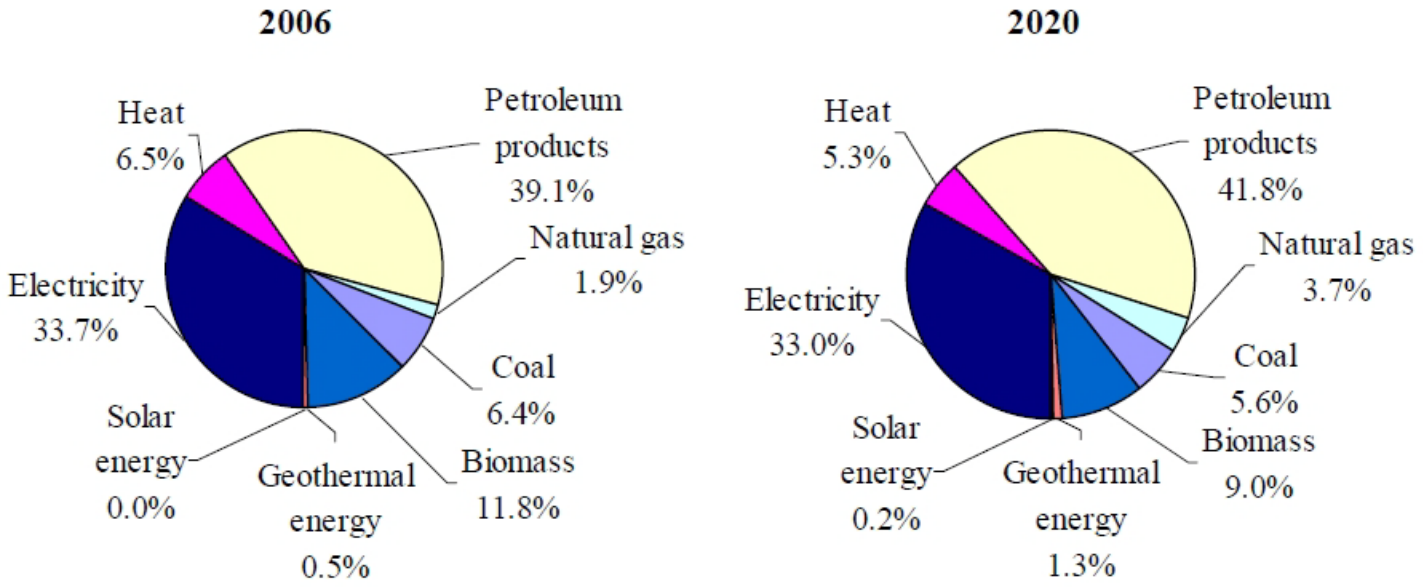


In 2020 the industry and the residential sector have largest energy demand with a share of 30% each. They are followed by the transport sector with around 25% and commercial and service sector with 12% and the agriculture and forestry with 2% and the other demand in other non-energy sector with 1%.

PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

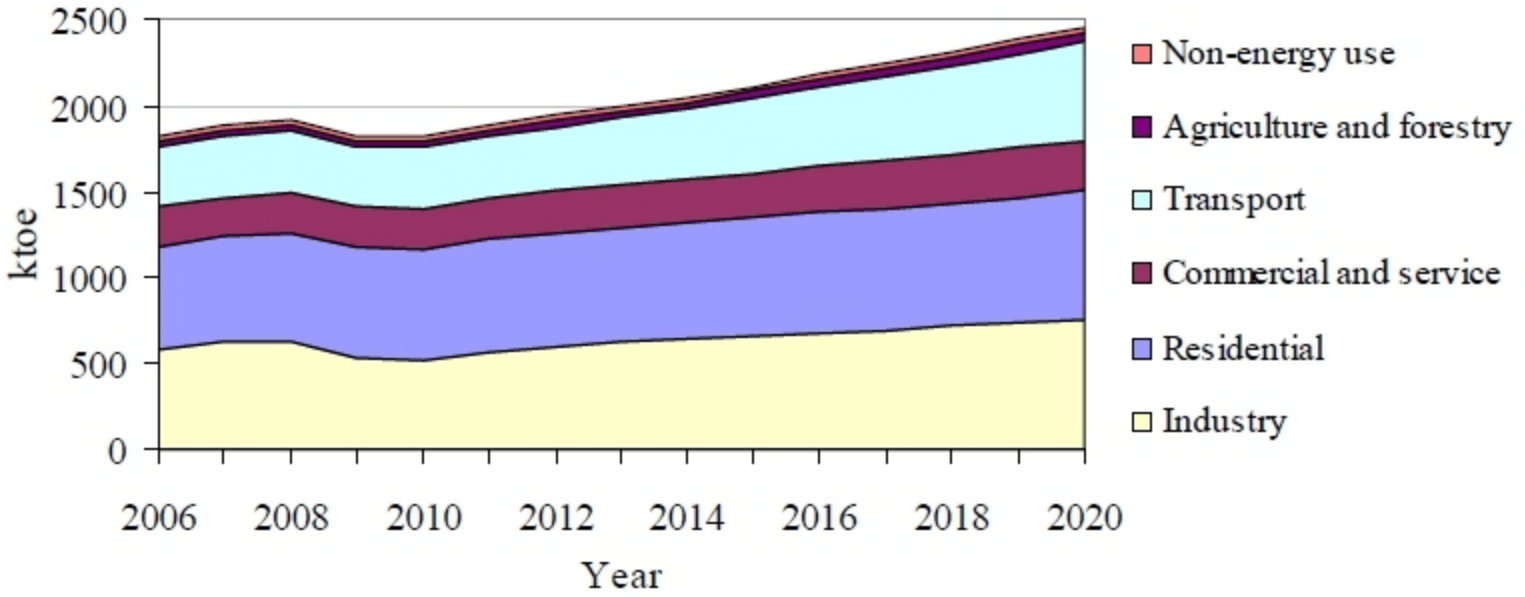
Basline scenario – without measures used

Figure shows percentage distribution of the final energy demand in 2020 according to fuels in the baseline scenario



Scenario with measures

Final energy demand until 2020 according to the Scenario with strengthened energy efficiency measures is presented in this Figure.



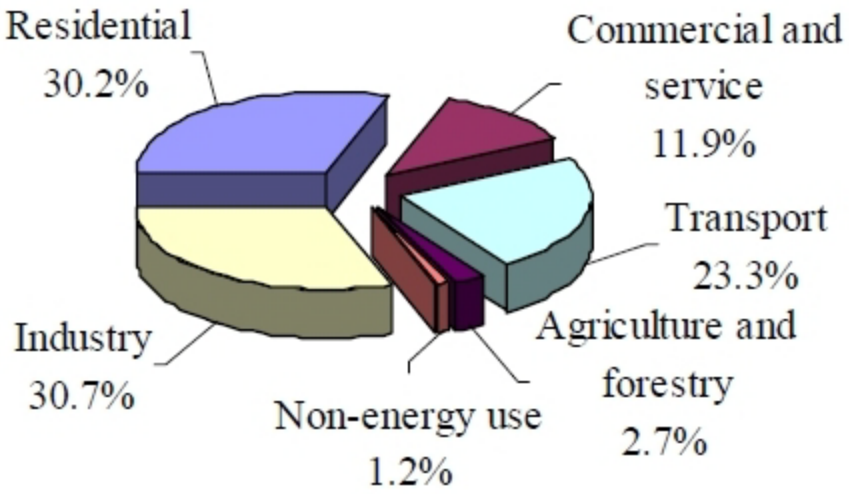
According to the Scenario with strengthened energy efficiency measures the final energy demand will grow with an average annual rate of 2.2% and in 2020 they will reach 2466 ktoe which is 648 ktoe more than in 2006.

The highest total growth of the demand in 2020 compared to 2006 can be seen in the agriculture and forestry with around 80%, followed by the transport sector with around 65%.

PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

Scenario with measures

Percentage share of the sectors in the final energy demand in 2020 – Scenario with strengthened energy efficiency measures, is presented in this figure.

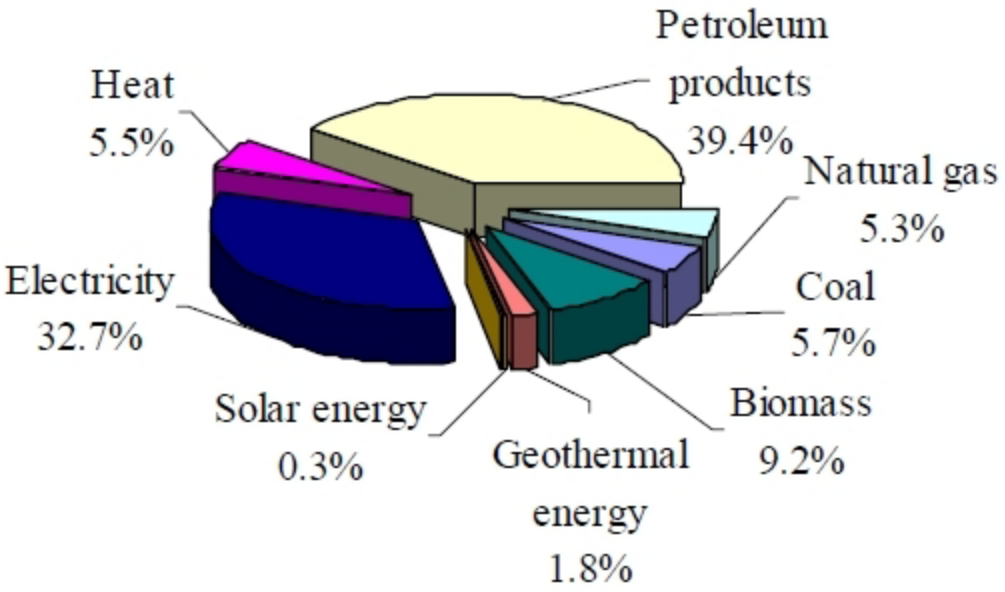


It can be noted that in 2020 the industry and the residential sector have largest energy demand with a share of 30% (30,2% and 30,7%). They are followed by the transport sector with around 23,3% and commercial and service sector with 12%. Agriculture and forestry are with smallest share of 2,7% and the other demand in other non-energy sector with 1,2%.

PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

Scenario with measures

Percentage distribution of the final energy demand in 2020 according to individual sectors in the Scenario with strengthened energy efficiency measures, is shown on this figure



The petroleum products have the largest share, again, with 39%, followed by the electricity with slightly less than 33%, biomass, 9%, coal, 6%, heat, 6%, natural gas, 5%, geothermal energy, 2% and solar energy, 0.3%.

PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

MEASURES FOR REDUCTION OF ENERGY IMPACT ON THE ENVIRONMENT

There are many measures concerning pollutants emission reduction from thermal power plans. In R. Macedonia, from the aspect of applicability of the measures, and according EU policy regarding energy and environment, as applicable measures are the following:

- ✓ **Energy efficiency. This is most efficient measure for reduction of hazardous substances emissions. Improvement of energy efficiency in industry, development and application of new technologies with low specific energy use, reduced energy use regarding heating via improvement of isolation for heating and etc. are as part of reduction measures concerning specific use of primary energy, and along with that the pollutant substances emission for which there is wide space in R. Macedonia.**

- ✓ **Change of the primary source of energy structure. Intensive activities towards increased use of natural gas and long lasting strategy for use of alternative sources of energy will contribute to the current state of lignite and residual oil domination.**

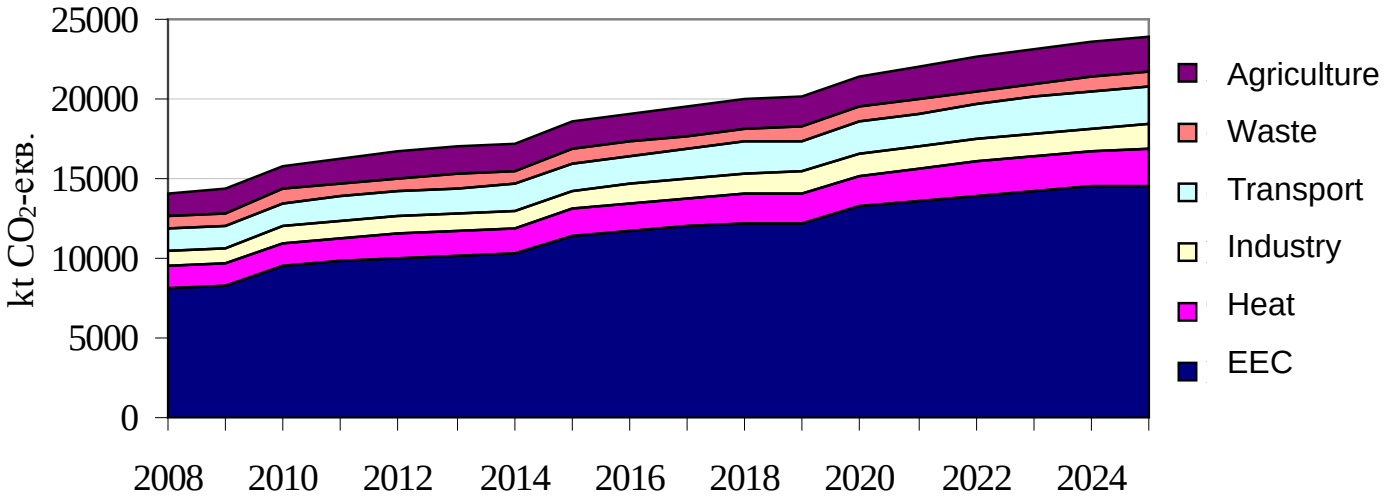
- ✓ **Efficiency of thermal power plants. Increasing the coefficient of profitable activity of the thermal power plants, use of fuel consumption and the pollutant emission is reduced. New technologies developed concerning coal use (including lignite) in thermal power plants, as supercritical combustion of coal dust, combustion in fluidized layers and integrated gasification including combination of cycles, can reach coefficient of profitable activity from 40 - 45% with tendencies of further growth even over 50%. The same ensure as well low NOx и SO2 emission.**

PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

MEASURES FOR REDUCTION OF ENERGY IMPACT ON THE ENVIRONMENT

Energy strategy (Chapter – Environmental impact) presents projections of GHGs until 2025 according: baseline and environmental scenario (scenario with measures)

Figure shows sectoral and total emissions of green hose gasses according baseline scenario. According these projections, GHGs emissions will increase significantly in 2025, in comparison with predicted values for 2008 (absolute value, approximately 9.900 kt CO2-eq, or relatively 71%), if the common practices are used without putting on request for emission reduction (without measures).

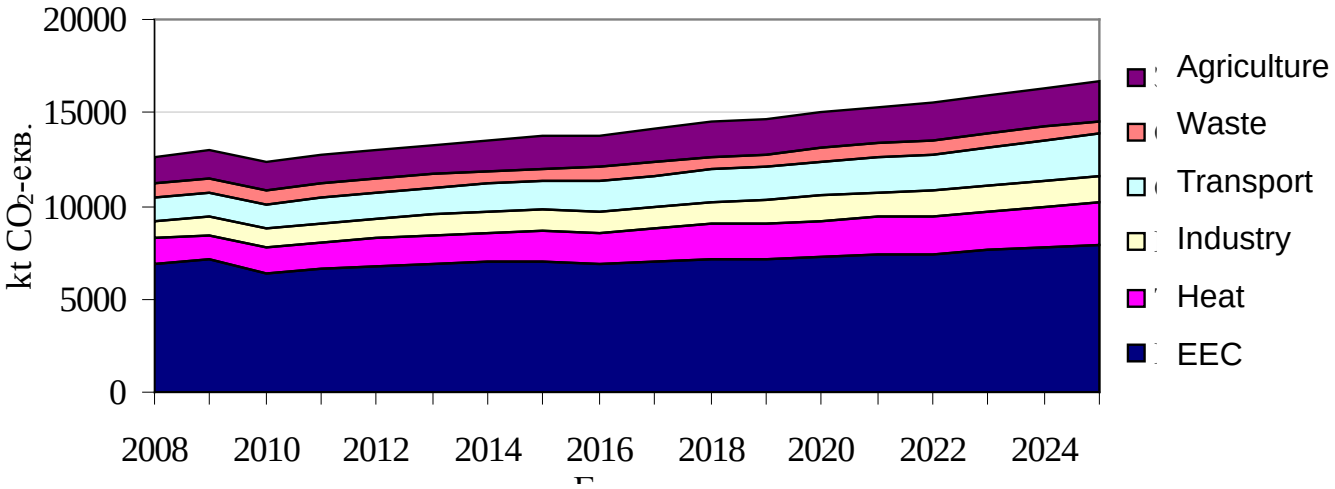


PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

MEASURES FOR REDUCTION OF ENERGY IMPACT ON THE ENVIRONMENT

The state will be improved if measures for reduction of emissions are included (environmental scenario). This contributes with increase of 32% in 2025 comparing with emissions in 2008, or absolute difference of 4.000 kt CO2-eq)

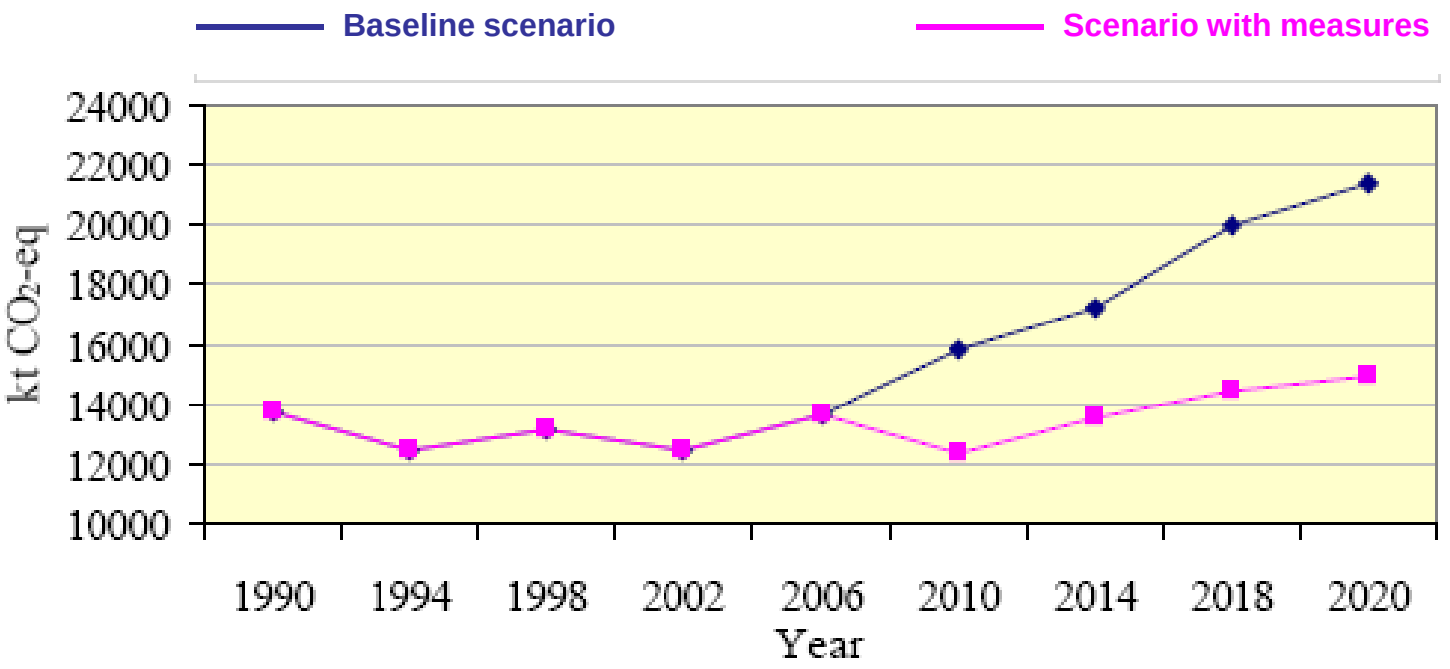
The most important gain in the environmental scenario is concerning electro energy sector. Hence, relative increase of emissions in this sector is reduced to 14% as result of implementation of facilities which incorporate mixed production, reduction of electrical energy use of the largest users and increased use of alternative energy sources.



PROJECTIONS OF POLLUTANT SUBSTANCES EMISSIONS UNTIL 2020

MEASURES FOR REDUCTION OF ENERGY IMPACT ON THE ENVIRONMENT

Figure presents comparison of GHGs emission projections until 2020 in accordance with baseline scenario and environmental scenario (scenario with measures-mitigation scenario)



Conclusions:

1. **In Republic of Macedonia, according National Action Plan for implementation of Gothenburg protocol, National Emission Reduction Plan for SO_2, NOx, VOC and NH_3 has been prepared , with regard to determination of reduction for the period until 2020.**

2. **Based on the trends of pollutant substances emissions SO2, NOx, NH3, VOC, projections of emissions until 2020 will be prepared which will include environmental measures concerning reduction.**

Next steps:

According Action Plan the following will be covered:

- ✓**Preparation of Plans for reduction of emissions from large combustion plants**
- ✓**Preparation of Strategy for reduction of unwanted effects from acidification, eutrophication and photochemical pollution**
- ✓**Program concerning introduction of optimal use of public transport in urban environments**
- ✓**Continuous inventorying according EMEP/CORINAIR methodology by the use of relevant software tools**

Thank you for your attention

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