



**THE PROBLEM OF LOW EMISSION  
RESULTING FROM COAL BURNING IN URBAN  
AGGLOMERATIONS**

*The influence of the economic transformations  
on the air quality in the Silesia region*

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## *Conditions of air quality in Silesian Voivodeship*

- Area 12.294 km<sup>2</sup>
- Population 4.865 mln
- Population density 395 people/km<sup>2</sup>
- Upper Silesia Industrial Region 3.4 mln
- Towns 90%



## Emission of dust and gases from harmful plants

Substance	Emission (thousand tons)	Contribution in national scale
Dust	41.8	21.2%
Carbon dioxide	33361,7	16,2%
Sulfur dioxide	199.5	16.9%
Carbon monoxide	117.5	36%



## Emission of dust and gases from coal consumption

- Dust 98.800 tonnes per year
- Sulphur dioxide 52.300 tonnes per year
- Carbon monoxide 470.000 tonnes per year



## *The changes in air quality in a period 1980-2000*

- Structural changes in the industry
- Increase of environmental consciousness
- Integration with the European Union



## Average concentration of air pollutants

Centre of GOP ( $\mu\text{g}/\text{m}^3$ )				
Year	PM-10	SO <sub>2</sub>	NO <sub>2</sub>	B/ $\alpha$ /p
1981	276	55	73	0,109
1985	249	92	107	0,180
1997	81	35	45	0,036
1998	68	30	36	0,024



# Decrease of air pollutants concentration in GOP

Centre of GOP (in %)				
Years	PM-10	SO <sub>2</sub>	NO <sub>2</sub>	B/α/p
1981-1990	~45	no	no	~40
1991-1999	~55	~50	~50	~65



# *Condition of the atmosphere in the Silesian agglomeration as compared to EU Standards*

Directive 1999/30/EC	Dust PM-10 $\mu\text{g}/\text{m}^3$	SO <sub>2</sub> $\mu\text{g}/\text{m}^3$	NO <sub>x</sub> $\mu\text{g}/\text{m}^3$
now	40	20 125 for 24 h	40
2010	20	20	30



## *Directions of actions to be undertaken in the Silesian agglomeration to improve air quality*

- Replacement of low-efficiency boilers with boilers fired using the city gas
- Replacement of low-efficiency boilers with low-emission boilers (CCT technology)
- Increase of the amount of heat from the heating network
- Production of smokeless fuel
- Use of renewable energy



# *Technical, economic and social aspects of reduction of low emission from coal combustion*

- Substitution of gas for coal
- Replacement of low-efficiency boilers and household furnaces by low-emission equipment
- Development heat distribution networks



# *Technical, economic and social aspects of reduction of low emission from coal combustion*

- Prices of fuels
- Availability of heat distribution networks
- Workplaces



## *Renewable energy sources*

- Biomass energy in the range of burning sewage sludge, green mass from the organised green areas (parks, squares), biogas from waste water cleaning plants and municipal waste dumps
- Geothermal energy through collection of heat from the ventilation air of mines and underground mine water



## Conclusions

1. The cities of GOP are endangered by joint influence of the industrial, transport and low emissions that determine the condition of the air in their area, differing from values in the EU directive.
2. Further important reduction of the concentrations of dust,  $\text{NO}_x$ ,  $\text{SO}_2$ , CO in the air can be achieved through decreasing the low emission from stationary sources.



## Conclusions

3. The technical actions within the programme of reducing the low emission should proceed mainly in the direction of using CCT and should be assisted by development of heat distribution networks
4. When constructing the local programmes for low-emission reductions, one should take into account both technical and economic reasons, including also the effect of the changes proposed on the local labour market