

# Air Quality Improvements with European Environment Policies: SO<sub>2</sub> Case Study in a Coastal Region in Portugal

M.C. Pereira, M.C.M. Alvim-Ferraz and R.C.Santos

## Objectives

To evaluate the first reflexes in the air quality of Oporto Metropolitan Area (Oporto-MA) of the "Auto-Oil" Directives implemented in Portugal. Therefore, SO<sub>2</sub> data from three selected monitoring sites: urban/traffic (Paranhos), industrial (Custóias) and rural (VN Telha), were analysed between 1999 and 2002.

## Oporto Metropolitan Area

Oporto is the 2<sup>nd</sup> Portuguese main city  
Close proximity of Atlantic Ocean with 50 km of coastline  
Population density: 540 hab/km<sup>2</sup>  
Most important stationary sources of atmospheric pollutants:  
one oil refinery, one petrochemical plant, one thermoelectric plant working with natural gas, one incineration unit and one international shipping port

## Results

### Exceedances of SO<sub>2</sub> hourly and daily limits for protection of human health according to EC legislation 1999/30/EC in Oporto-MA

site	Number of hours <sup>1</sup>				Number of days <sup>2</sup>			
	1999	2000	2001	2002	1999	2000	2001	2002
Urban/Traffic	4	0	*	*	0	0	*	*
Industrial	15	9	3	1	5	0	0	0
Rural	2	0	2	1	0	0	0	0

\* Not enough data for statistical treatment  
<sup>1</sup> hourly limit (350 µg m<sup>-3</sup>) not allowed more than 24 exceedances per year  
<sup>2</sup> daily limit (125 µg m<sup>-3</sup>) not allowed more than 3 exceedances per year

The recommended SO<sub>2</sub> hourly limit value was not surpassed between 1999-2002.

The hourly limit value in the industrial area was reached 15 times in 1999 against 1 time in 2002 showing a significant decrease in the number of high values along the years.

The daily limit value for protection of human health was exceeded once in 1999 in the industrial site not being exceeded presently.

## Conclusions

The improvement of fuel quality, the emission control programmes and the technological innovations in the past years are responsible for the significant decrease in the SO<sub>2</sub> concentrations and consequently the exceedances of EC SO<sub>2</sub> limits in Oporto-MA.

The potential human health risk still persists, particularly, in industrialized areas. It is expected that the tendency of SO<sub>2</sub> levels in ambient air of Oporto-MA will continue downwards in the coming years following the present European trends.

The "Auto-Oil" directives clearly improved the air quality of Oporto-MA but other pollutants namely PM<sub>10</sub> and O<sub>3</sub> are critical in the area and deserve special attention. **Policies based in the same principles are welcome to solve the problems related with these pollutants.**

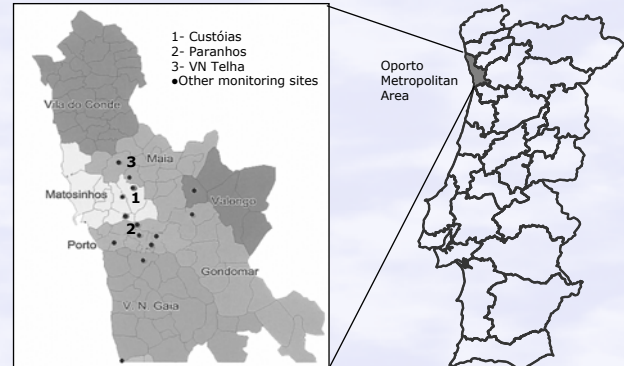
### "Auto-Oil" Directives

#### 98/69/EC

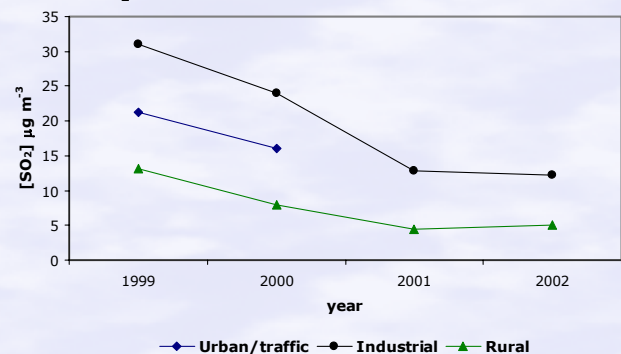
relating to measures to be taken against air pollution by emissions from motor vehicles

#### 98/70/EC

relating to the quality of petrol and diesel fuels



### SO<sub>2</sub> annual average concentrations in Oporto-MA



The annual averages of SO<sub>2</sub> concentration have decreased considerably for all types of monitoring sites.

For the industrial and rural sites the decrease was around 60%.

The rural site presented the lowest SO<sub>2</sub> annual concentrations and in the last two years the values are similar with those usually found in other rural areas of Europe.