Agenzia Regionale
per la Protezione dell'Ambiente
della Lombardia

ARPA

The knowledge basis for Air Quality improvement in Lombardia, Italy

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The situation of air quality in Lombardia is, in general, affected by the type and quantity of emissions and by particular meteorological situation

Any policy ever done, and future policy aimed to comply with european regulation have to face with nature, weight, and capability of administration for intervention, taking into account technical, economical, social and natural factors

Purpose of this presentation is to set light on main themes to be considered, following our point of view, to understand reasons and trends of the quality of air in our region and, consequently, to define policies aimed to its improvement.

Goals to be obtained are those contained in Kyoto Protocol, in European Directives, in Italian laws arising from U.E. Directives, and in VI European Action Program

The environmental history in this presentation may contain useful information about problems that, in general, affects other U.E. Members State.

Particular arguments will be stressed: these are the drivers of air quality in Lombardy, or they are items stressed by studies and repesents a forefront in the field

Some information will be gave so to set a "scale factor" between Lombardia region and other european contexts

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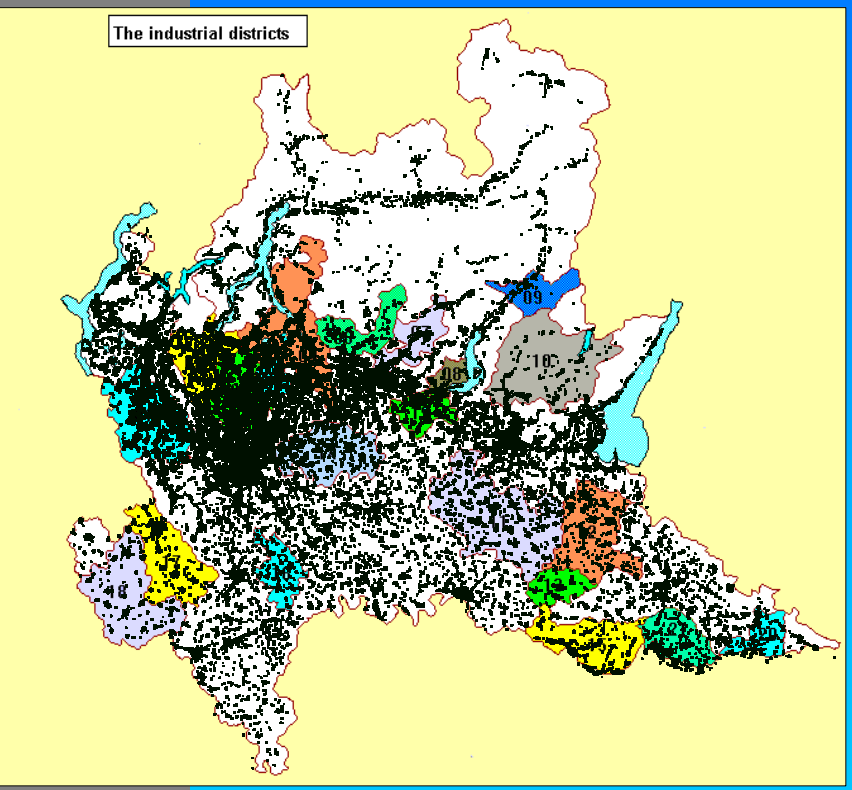
Regione Lombardia: orographic data



	Lombardia	Italia
Population	9,028,913	57,612,615
Density (Inhabitants/km²)	378.4	191.2
GDP per capita (k€)	20,4	15,8
GDP per labour unit (k€)	46,8	41,4

Po river basin ad related meteorology

AIR QUALITY PROBLEMS ARE SHARED BETWEEN ALL REGIONS ALONG PO RIVER BASIN

Meteorogy importance

Air Quality depends strongly over air mass change, helped by wind

Some comparison

1980-1989 – Annual Mean									
City	Nation	Temp.	Rain	Wind velocity		City	Nation	Temp.	Rain	Wind velocity
		°C	mm	m/s				°C	mm	m/s
Torino	**Italia**	**11.08**	**847**	**0.4**		Vienna	Austria	10.02	472	3.2
Lubiana	Slovenia	8.06	1222	0.9		Stoccolma	Svezia	6.01	435	3.3
Milano	**Italia**	**12.04**	**996**	**0.9**		Atene	Grecia	17.06	431	3.4
Bucarest	Romania	10.06	517	1.5		Genova	Italia	15.06	855	3.4
Napoli	Italia	15.07	1034	1.8		Anversa	Belgio	10.01	692	3.5
Zagabria	Croazia	9.09	800	1.8		Helsinki	Finlandia	4.06	542	3.5
Zurigo	Svizzera	8.09	900	1.9		Londra	Gran Bretagn	10.07	479	3.6
Madrid	Spagna	14.01	395	2.1		Palermo	Italia	18.06	623	3.6
Oslo	Norvegia	6.01	721	2.2		Parigi	Francia	10.08	520	3.6
Mosca	Russia	5.02	513	2.3		Birmingham	UK	9.03	522	3.7
Budapest	Ungheria	10.03	416	2.4		Berlino	Germania	9.03	435	3.8
Monaco	Germania	7.09	773	2.8		Goteborg	Svezia	7.01	706	4.0
Barcellona	Spagna	15.01	598	2.9		Lilla	Francia	10.00	566	4.0
Tolosa	Francia	12.09	538	3.0		Amsterdam	Olanda	9.05	625	4.8
Francoforte	Germania	9.07	515	3.2		Copenagen	Danimarca	8.00	453	5.1

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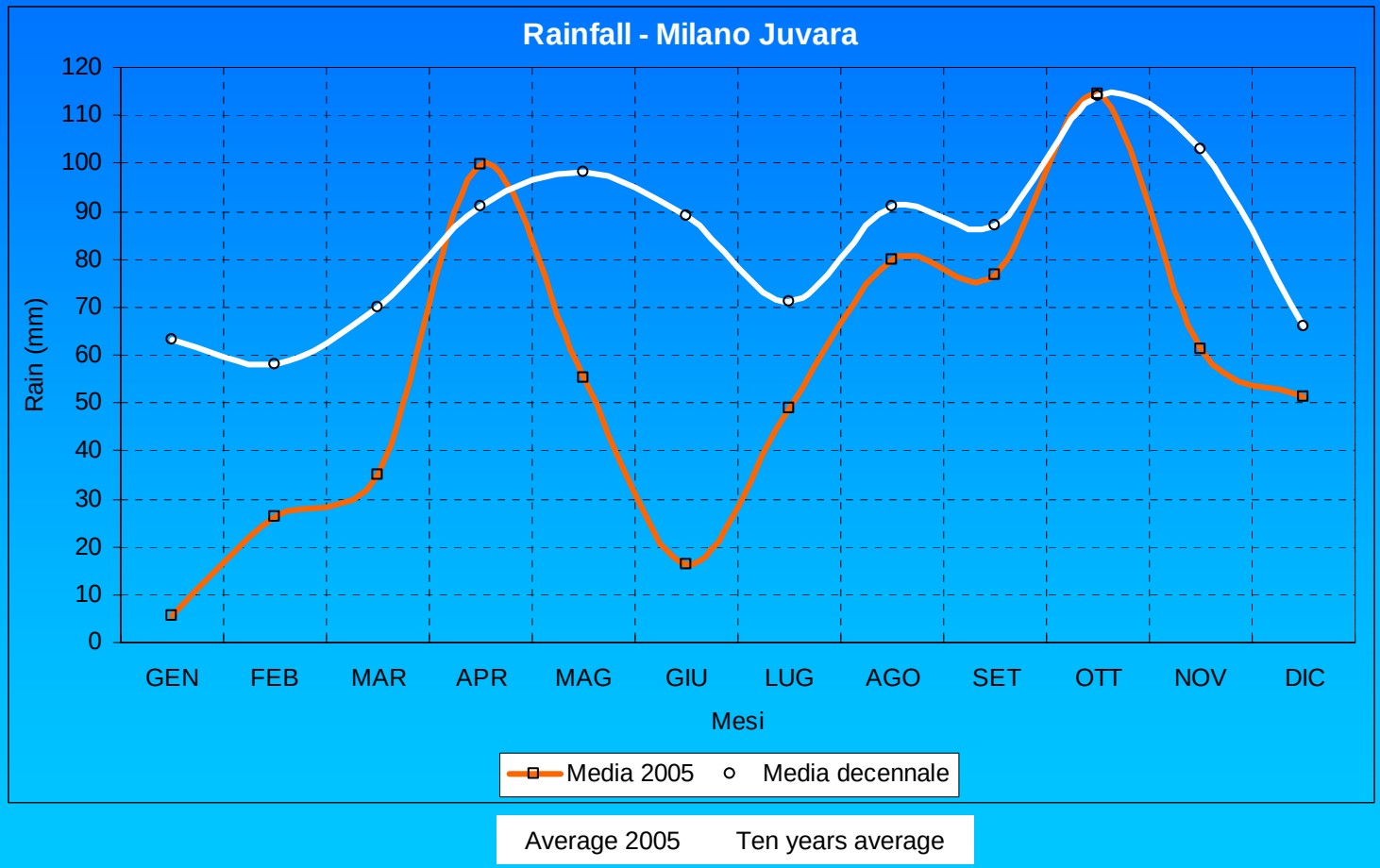
Climate changes..... Firsts signs?



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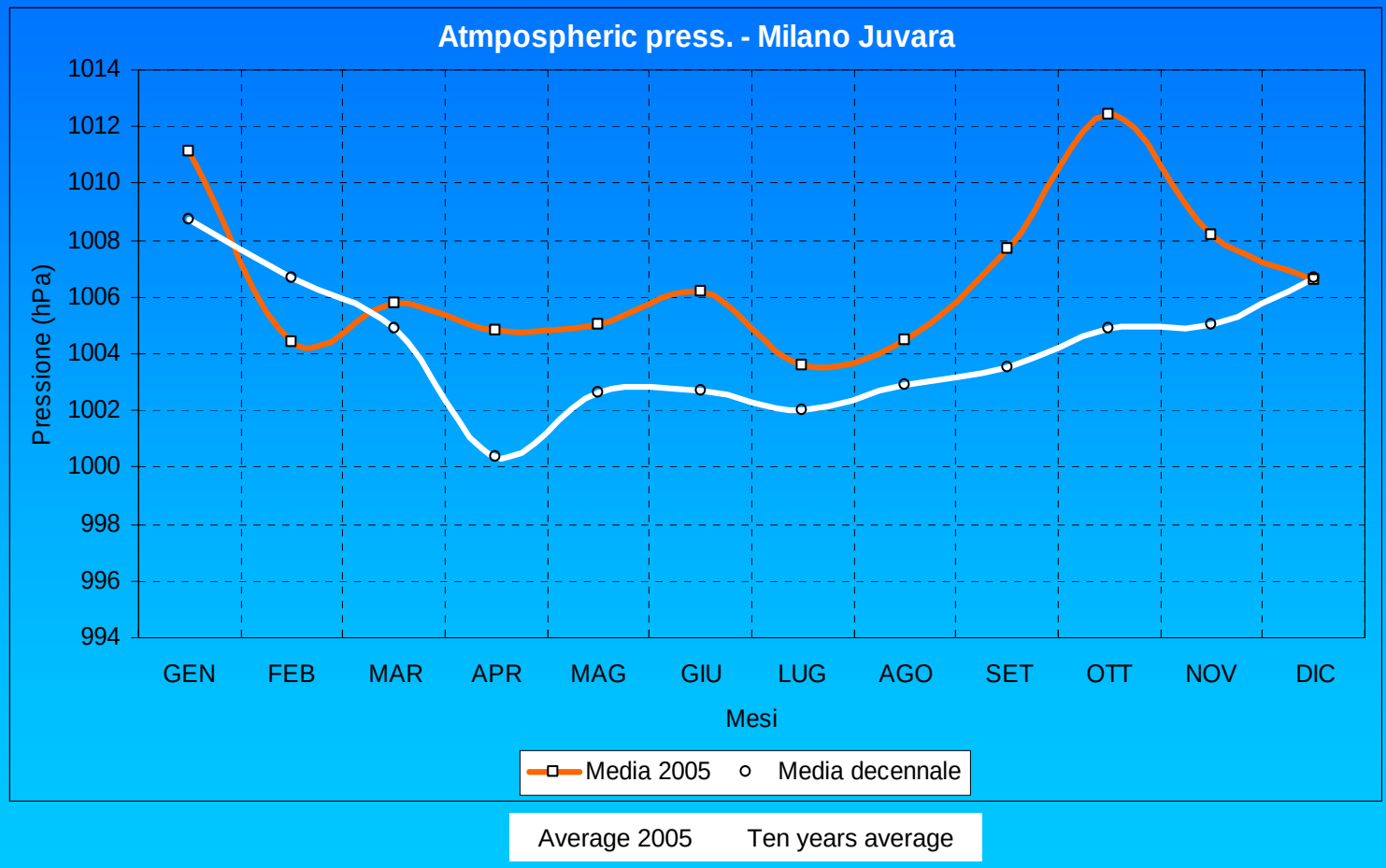

Average 2005 Ten years average

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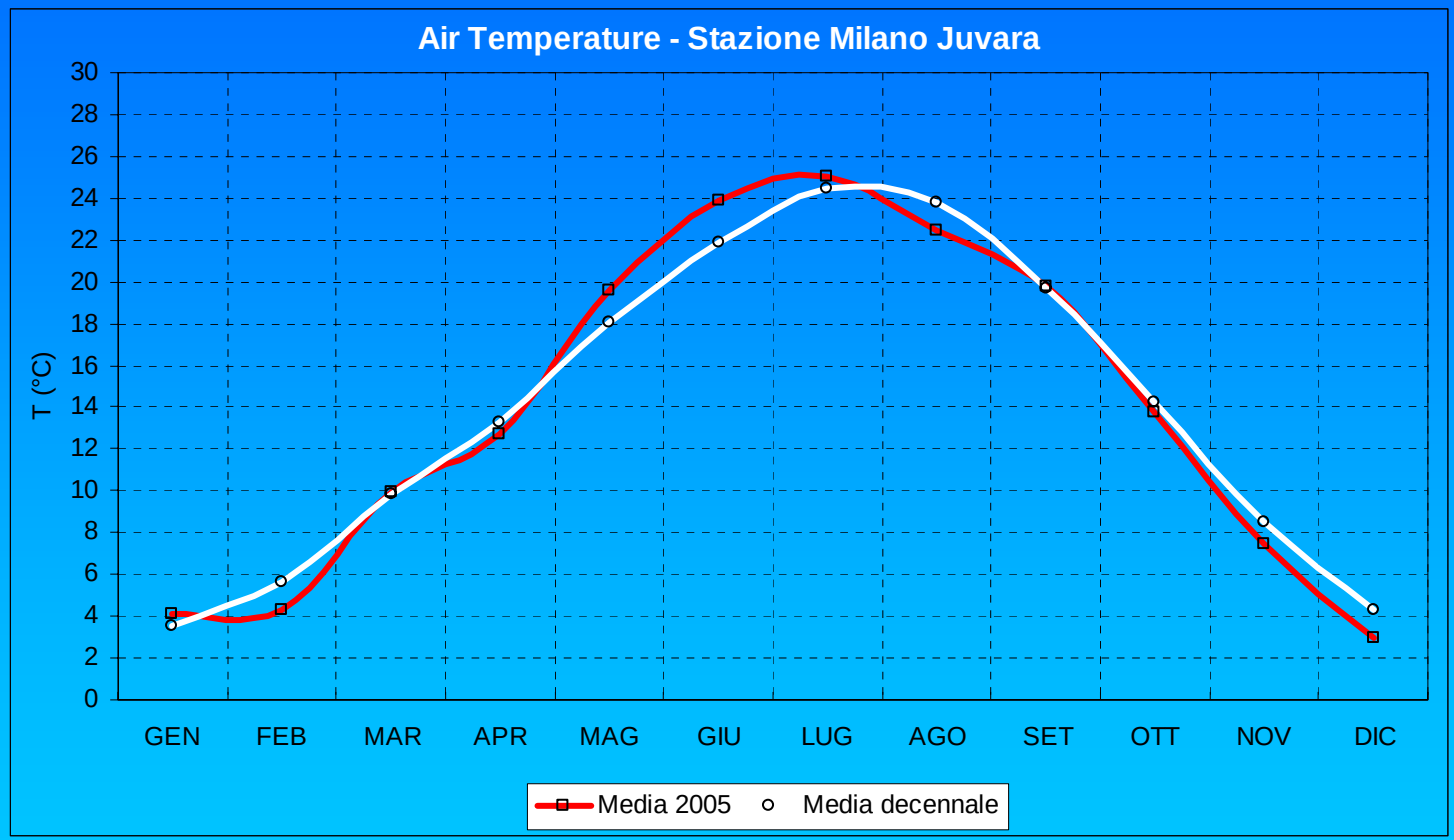
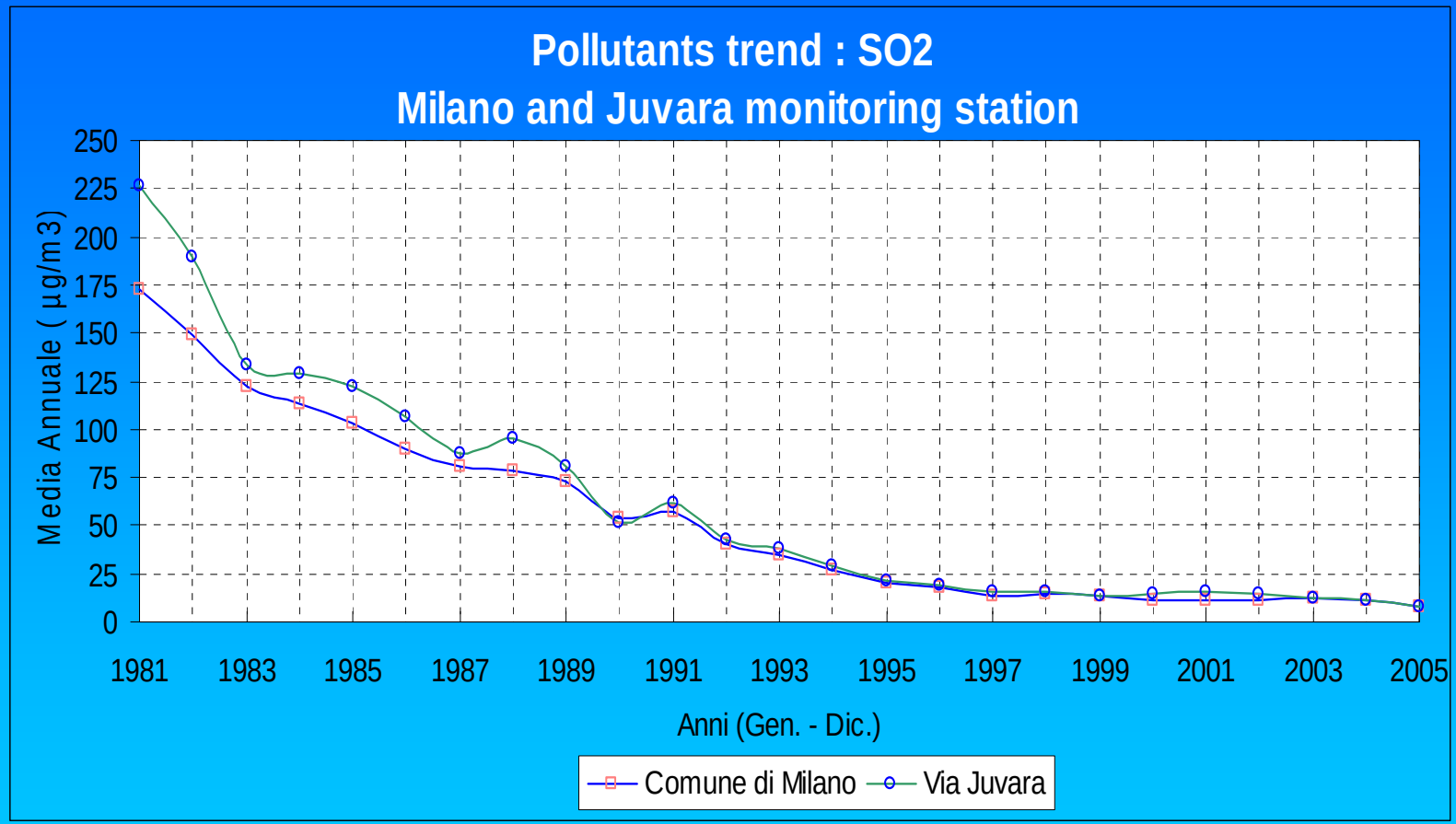


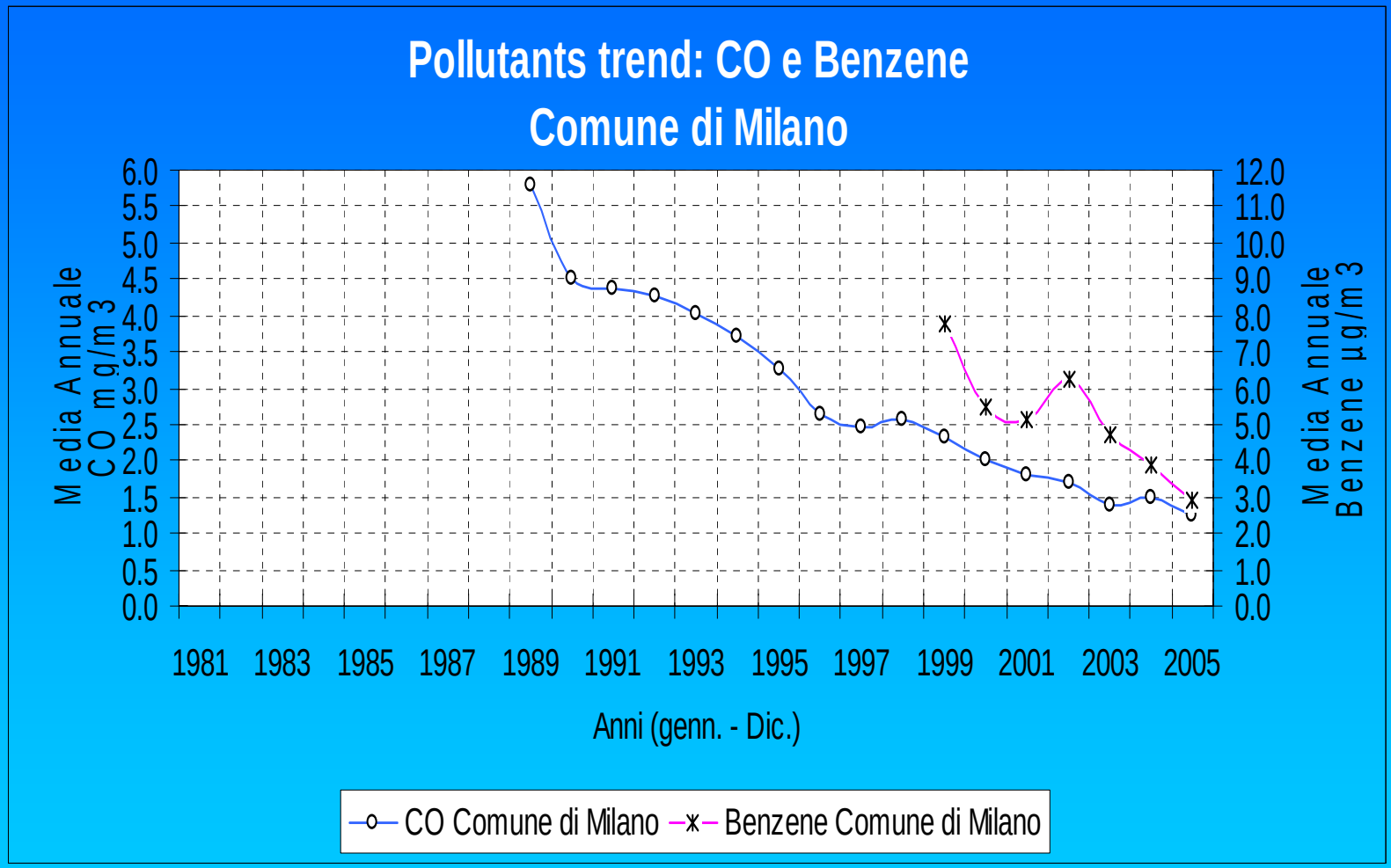
Average 2005 Ten years average

A Dynamic Picture:

pollutants trend

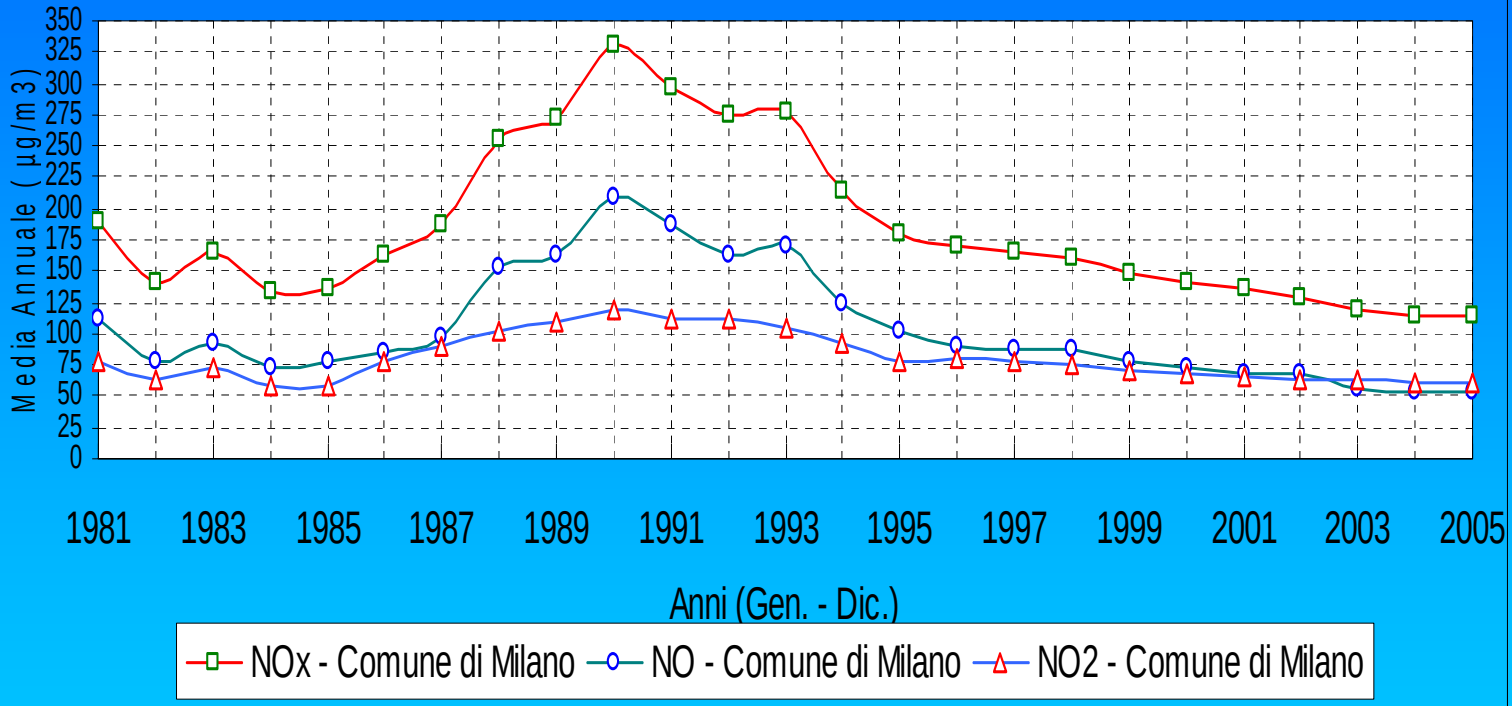


The remarkable effects on sulfur dioxyde of sulfur level reduction in fuels and the progressive increase of methane usage in heating and power plants.



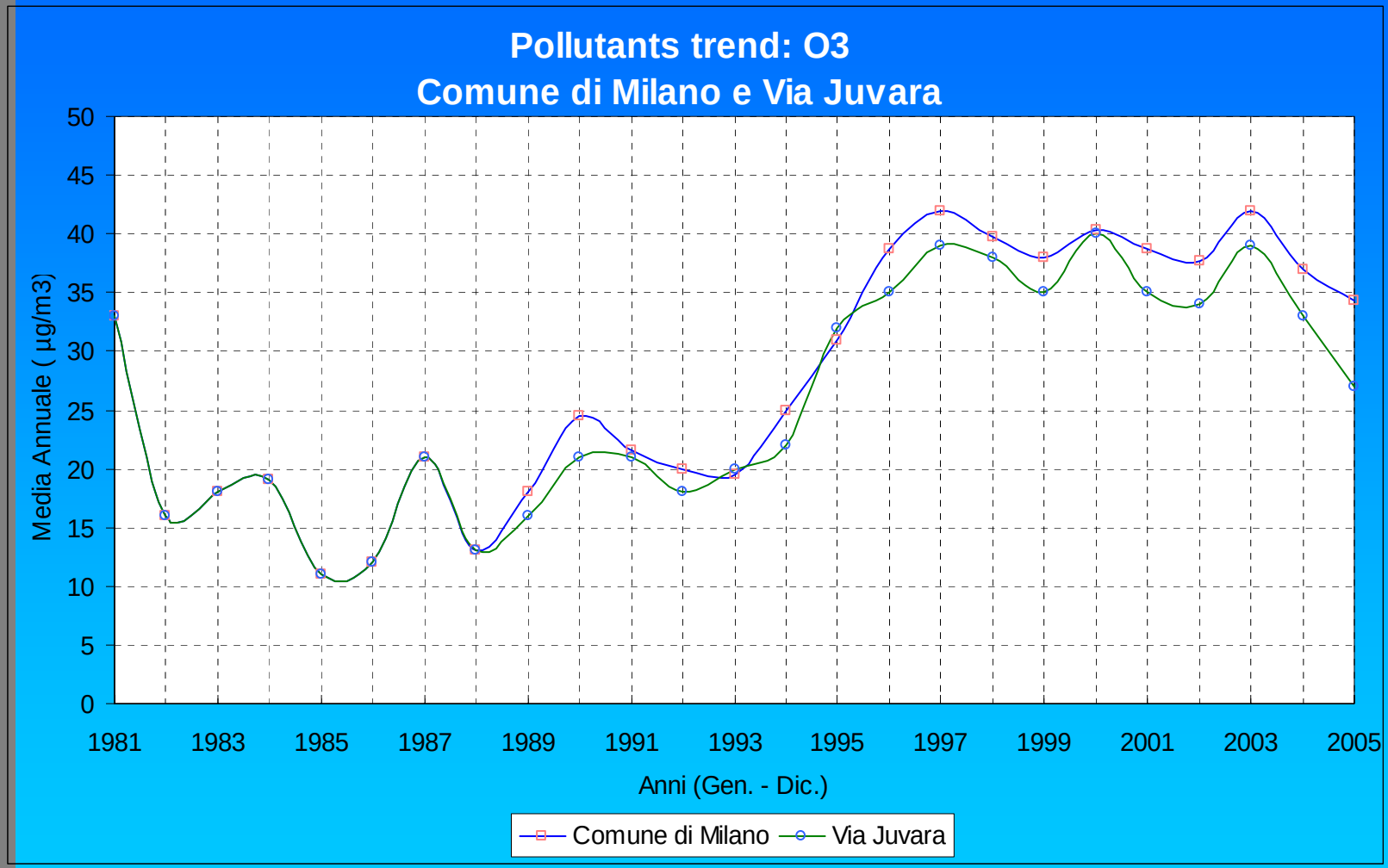
Reduction as effects of engine ad fuel evolution

Pollutants trend: NOx
Comune di Milano



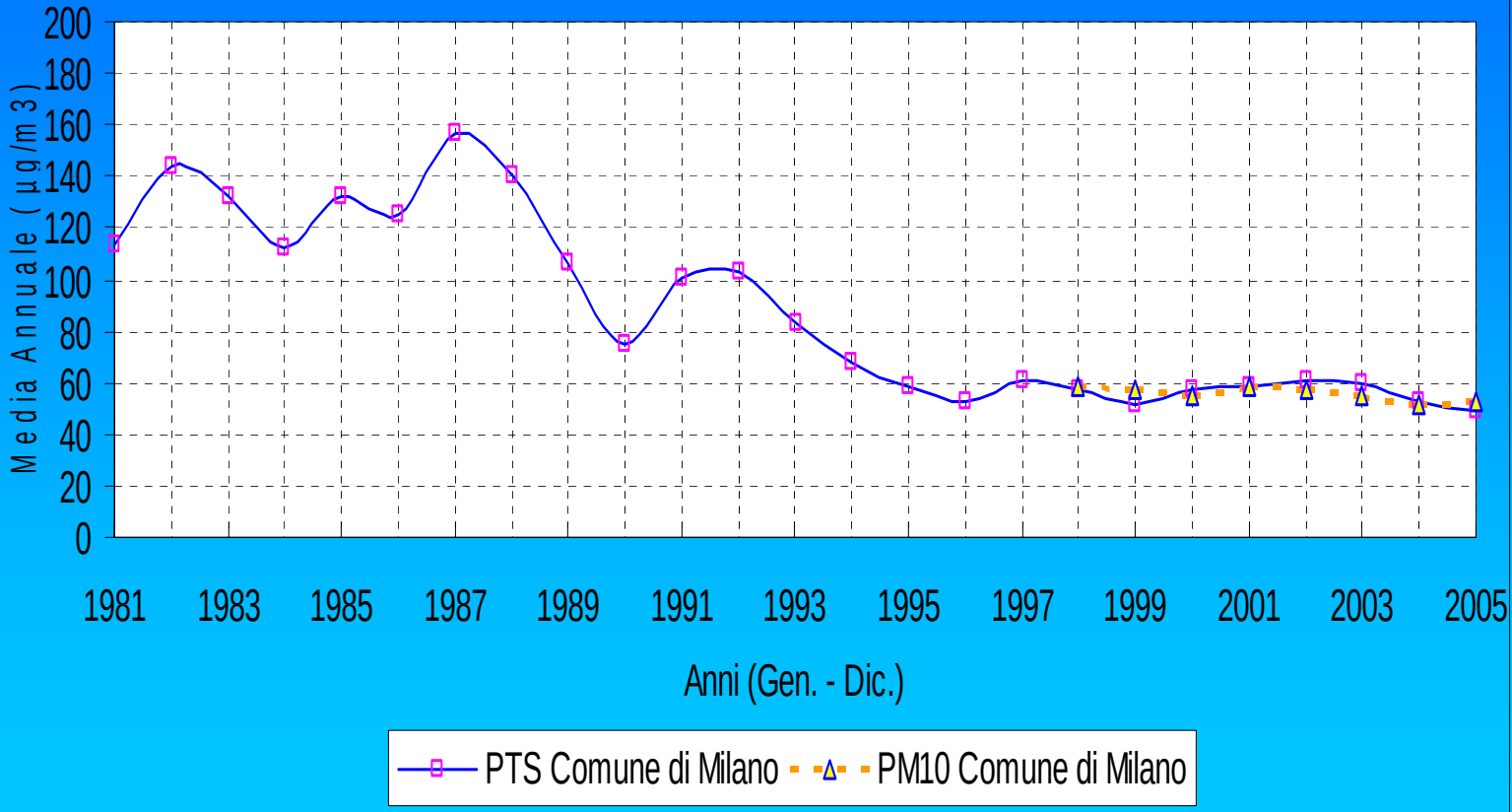
1980 – 1990: the concurrent effects of new vehicles technology and miles driven increase.

From 1991 reduction effect due to engine evolution prevails (unleaded gasoline +catalytic converter)



Pollutant increase possibly due to reduction of chemical reaction with other pollutants

Pollutants trend: PTS e PM10
Comune di Milano



The decrease of Total Suspended Particle (TSP) may be attributed to:
-the reduction of primary pollutants (SO_2 and NOx) emissions
- the displacement of factories outside the Milan area

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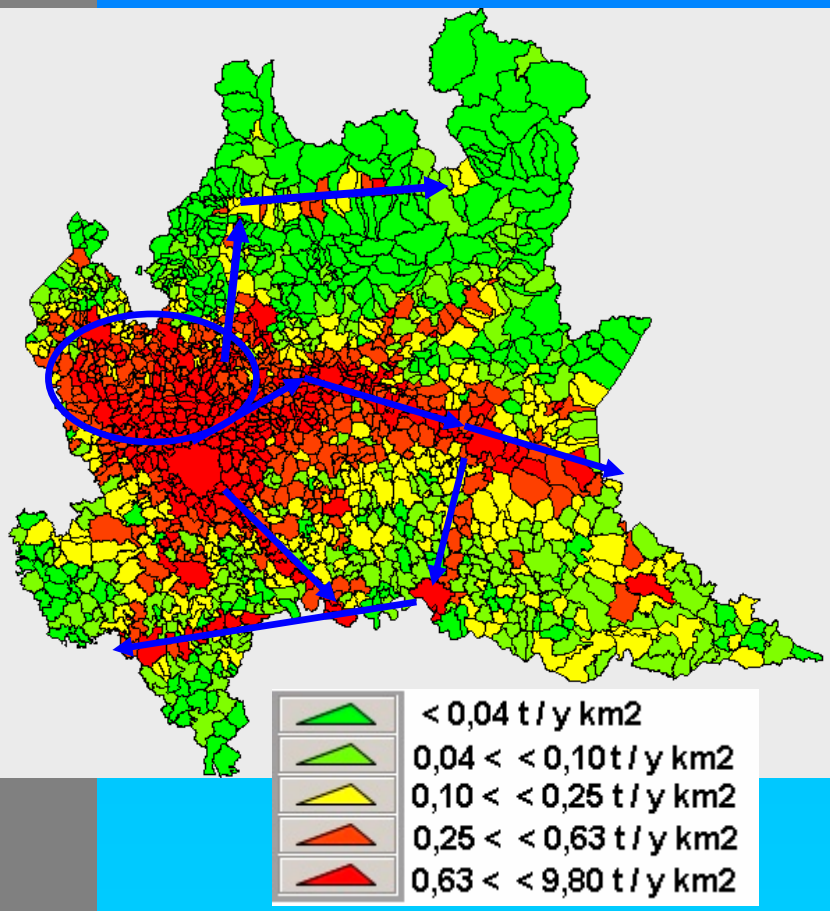
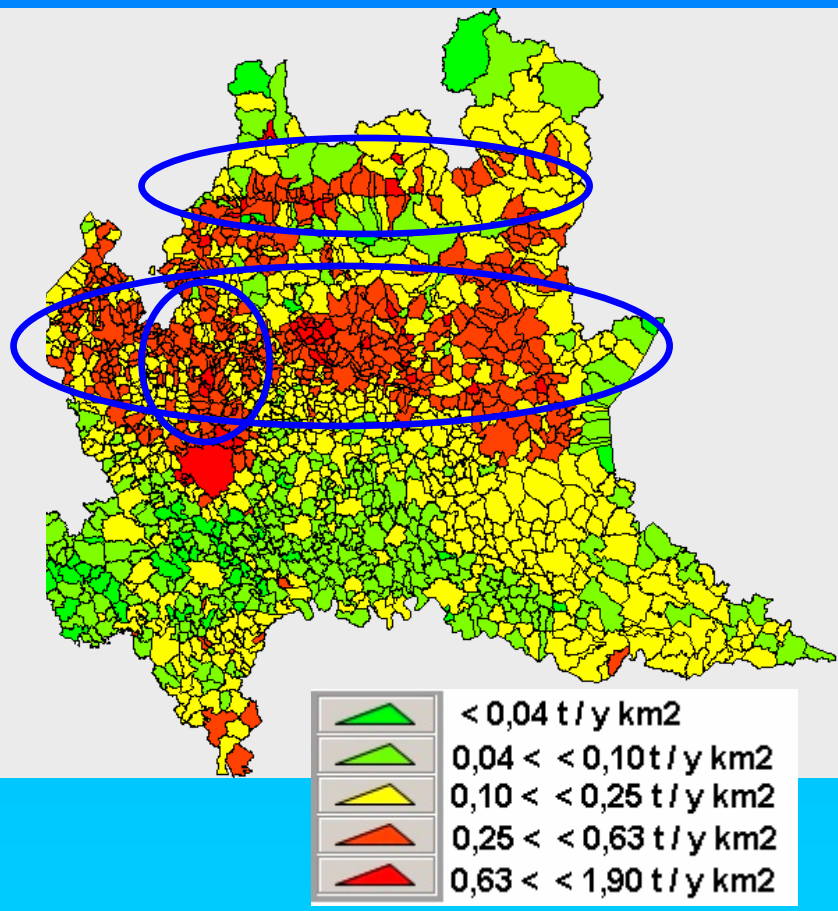
A powerful instrument in support to Policies

INEMAR (EMission INventory in AiR, managed by ARPA)- Primary PM10

Traffic emissions, per sq. km



Heating emissions, per sq. km



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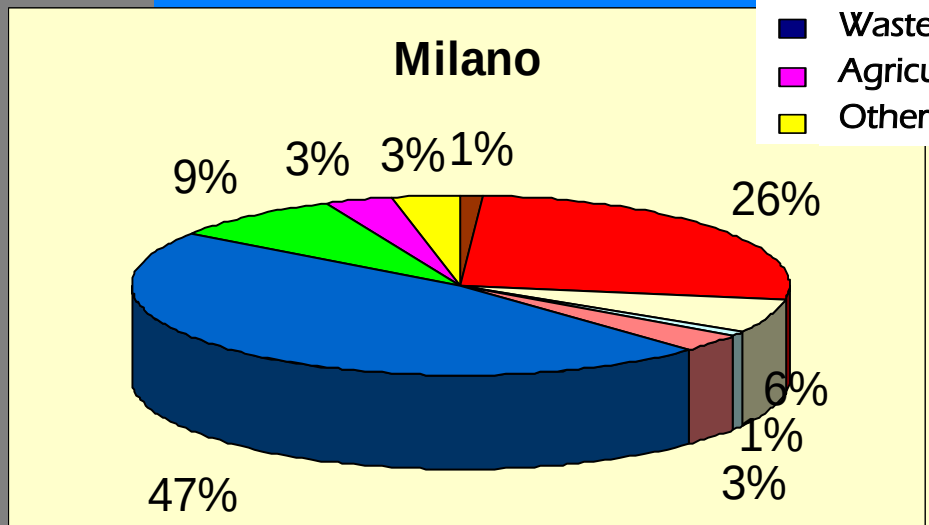
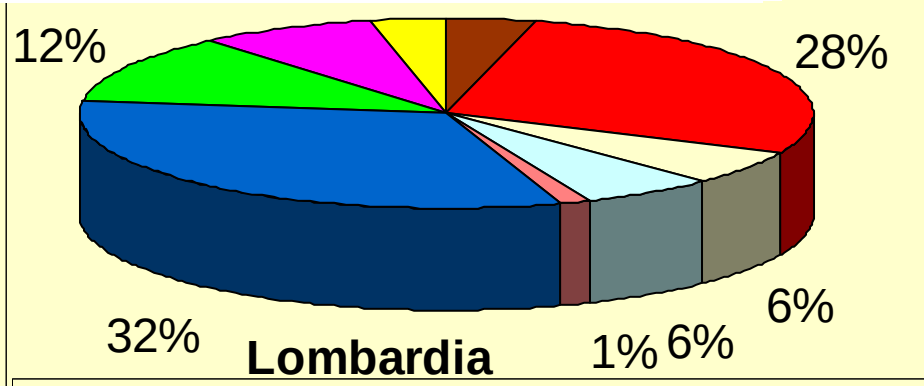
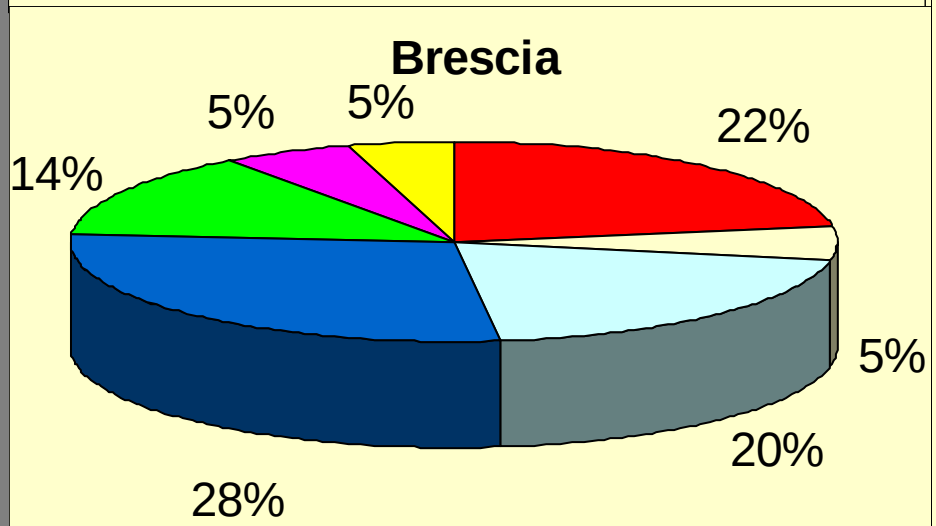
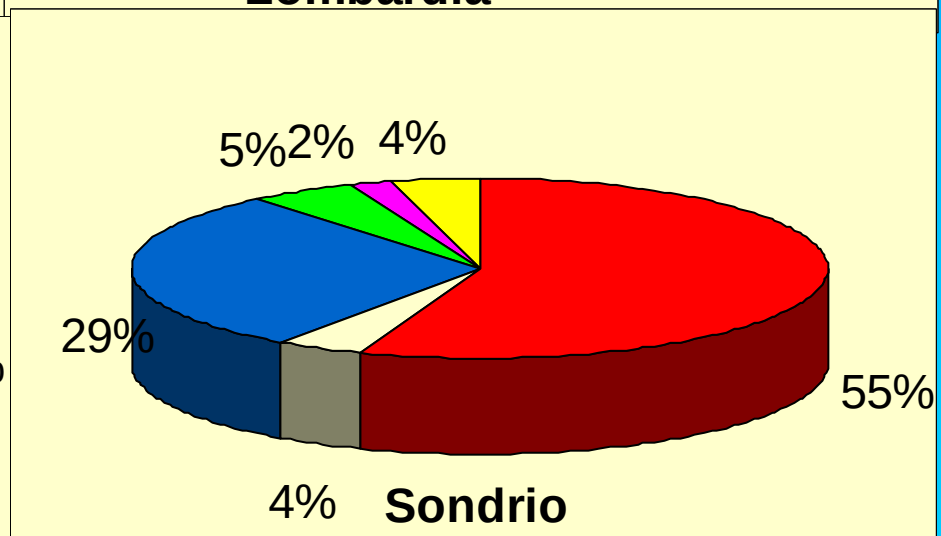
Primary PM10 Emission per Province - INEMAR

- Energy prod. and fuels transf
- Heating
- Industry combustions
- Industry processes
- Fuel extraction and distribution
- Solvent use
- Road transport
- Other mobile sources and machinery
- Wastes treatment and disposal
- Agriculture
- Other sources

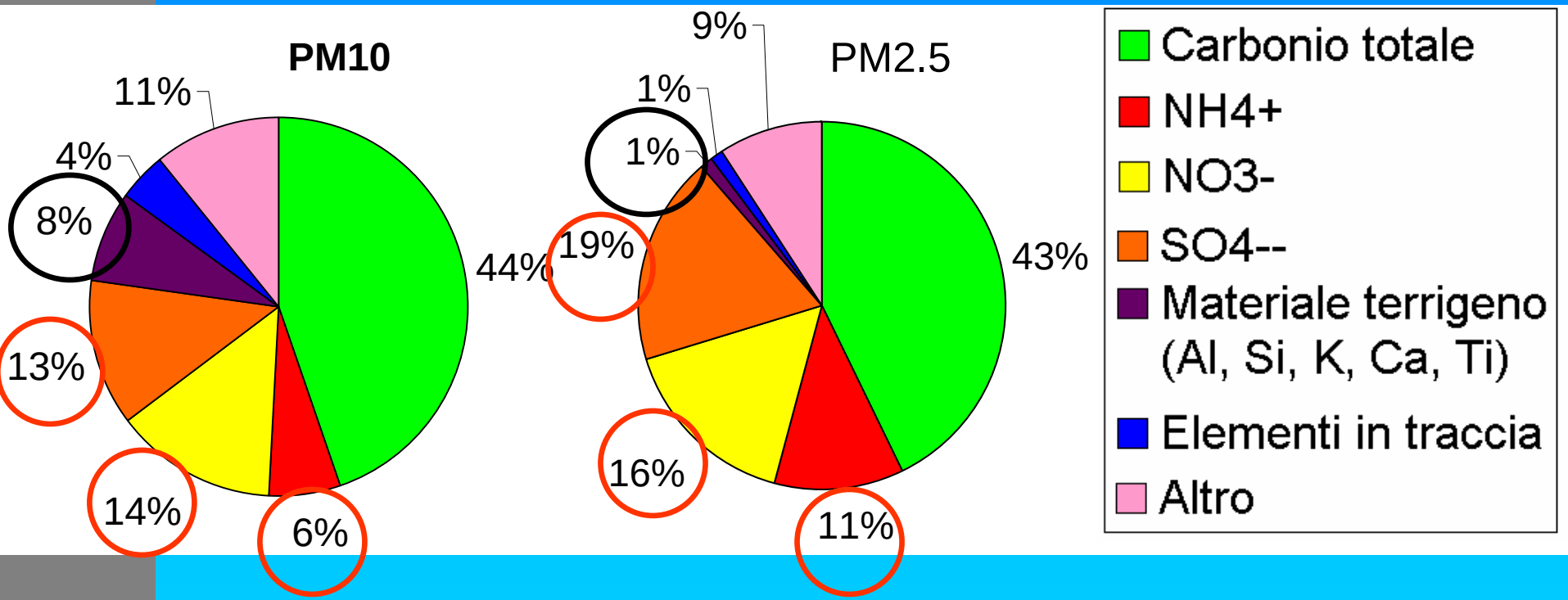








PM10 and PM2.5 composition
Milano, monitoring station of via Messina
(background, urban centre)



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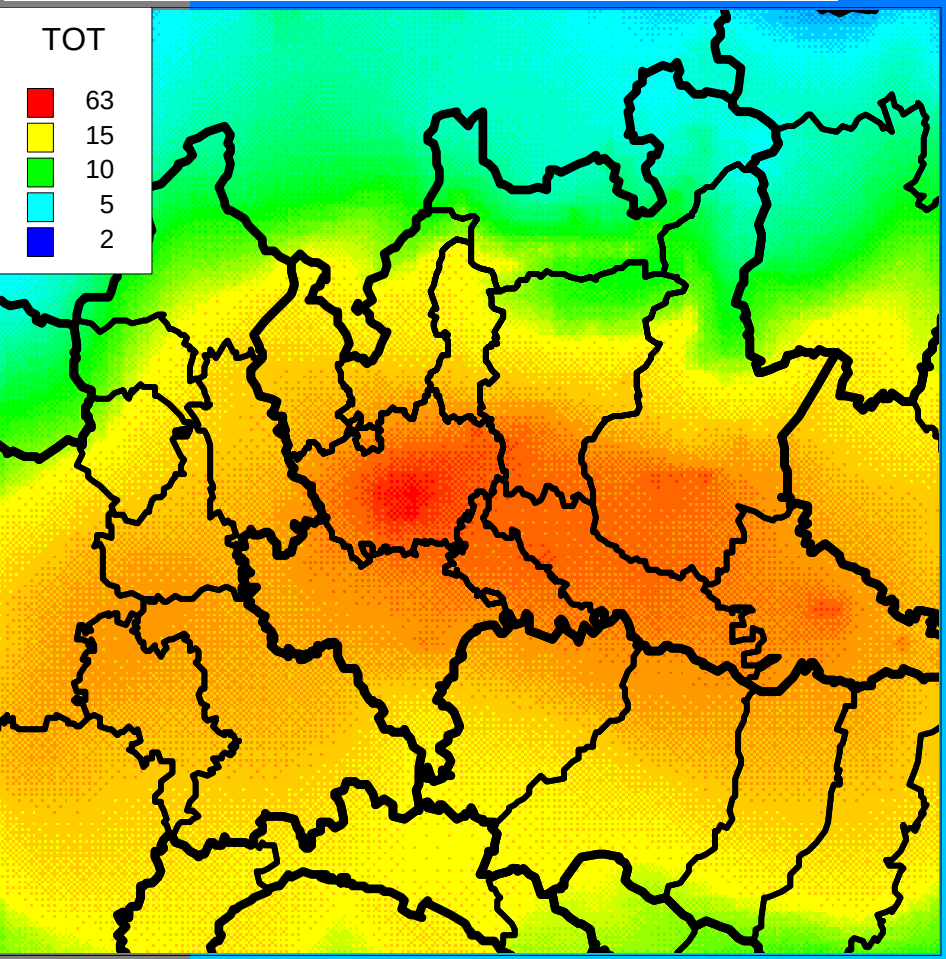
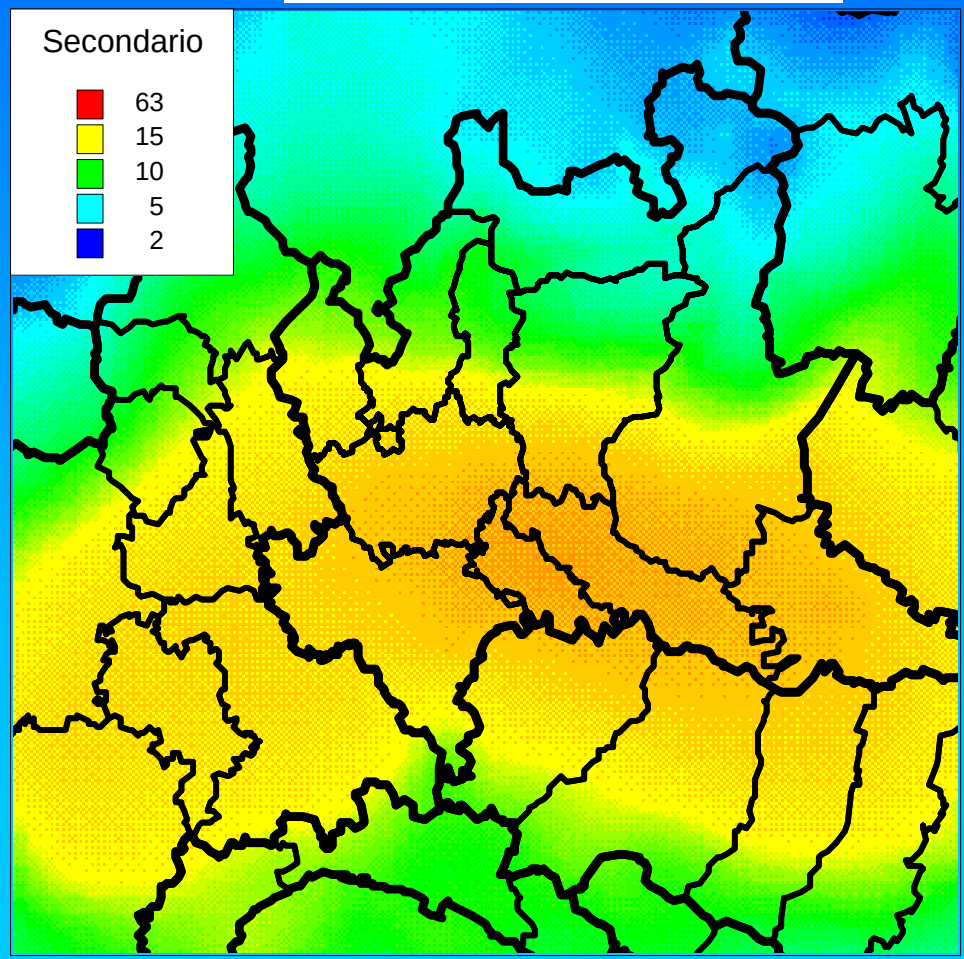
PM 10: only direct emissions?

PM10: secondary component estimates through mathematical modelling

Total PM10 (primary + secondary)



Only secondary PM10



PM10 annual average concentration (mg/m$^{3)}$ estimated by ARPA (CAMx model)

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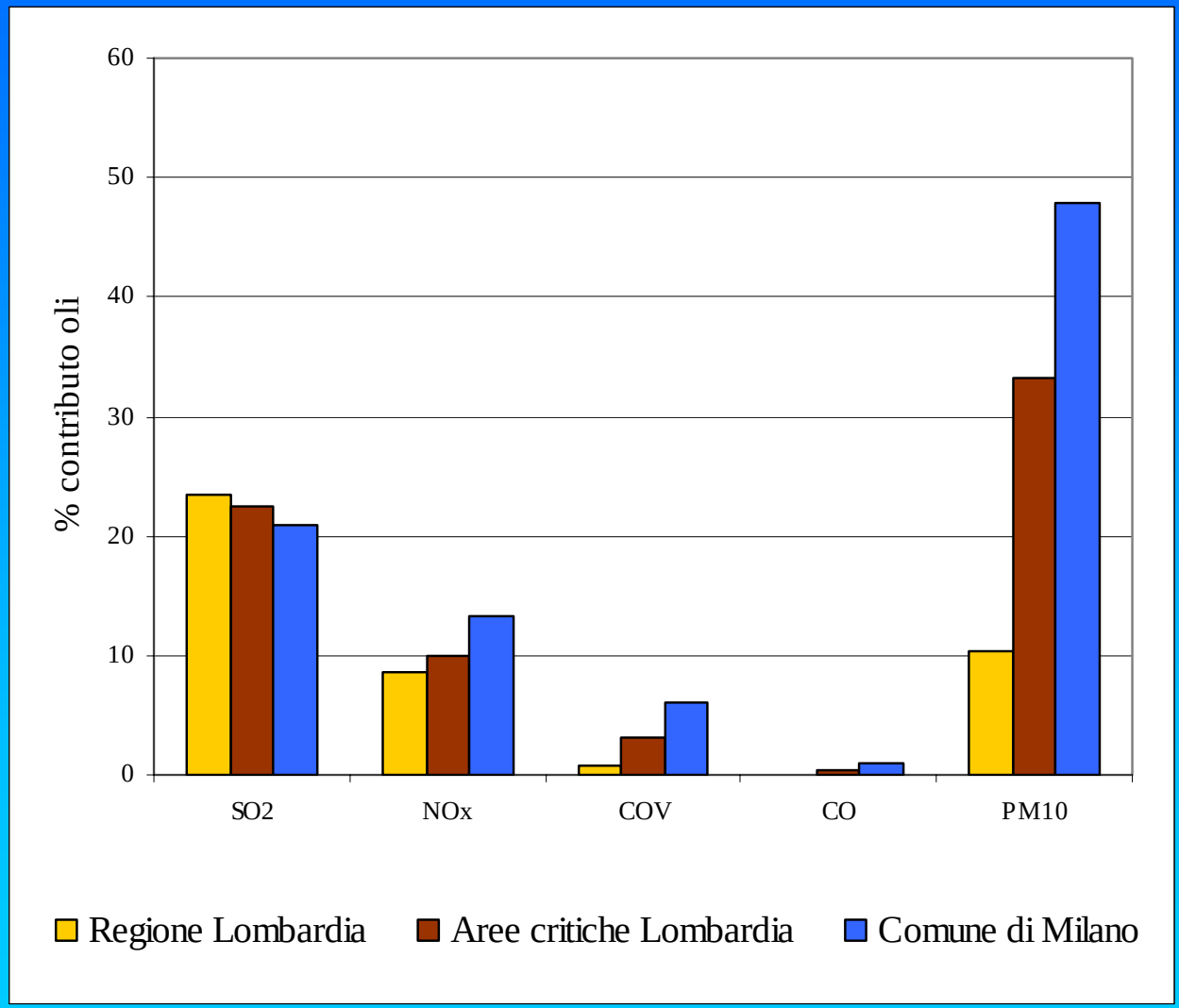
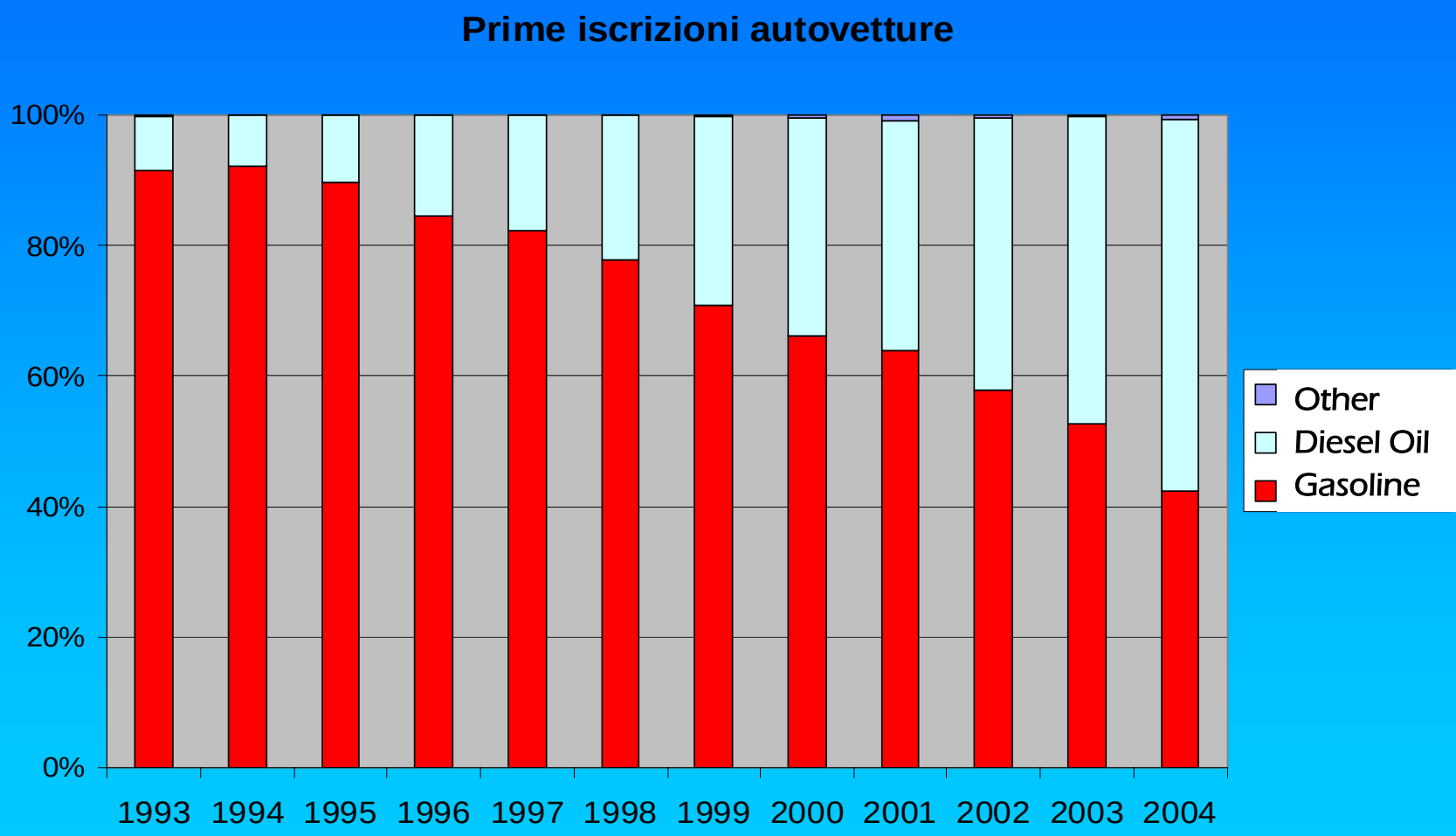
Oil Heating component for multiple pollutants



Road Transport as PM10 maker

			Primary PM10 emissions (mg/km)			
Type	Class	Fuel	Total PM10 Emission	Only exaust PM10	Brake, tyres, abrasion PM10	NOx Emissions
Cars	pre - Euro	Gasoline	**46**	23	23	2,575
Cars	EURO 4	Gasoline	**24**	0.8	23	49
Cars	pre - Euro	Diesel oil	**217**	195	23	810
Cars	EURO 4	Diesel oil	**46**	24	23	240
Cars	EURO 4 FAP	Diesel oil	**26**	3	23	240
Light trucks < 3.5 t	pre - Euro	Diesel oil	**330**	298	31	1,417
Light trucks < 3.5 t	EURO 4 FAP	Diesel oil	**35**	4	31	474
Heavy trucks > 3.5 t	pre - Euro	Diesel oil	**672**	571	101	7,648
Heavy trucks > 3.5 t	EURO 4 FAP	Diesel oil	**107**	6	101	1,260

New car sales in Italy per fuel type: tr



Ripartizione prima iscrizione autovetture al PRA – totale nazionale – fonte ACI

What to do?

Information about pollution levels, their trends, quality and intensity of sources consitute the primary basis for air protection policy.

Only a multifactor approach, proportionated to intensity of pollution sources can adequately support any air protecion policy

What of existing industrial techniques, devices and products have to be modified or subsitute?

How lifestyle will be affected in prospective of air protection (and energy saving)?

What in short, medium , long term can to be planned?

Sustainability is a word to be applied to the development or to environment pratices?