

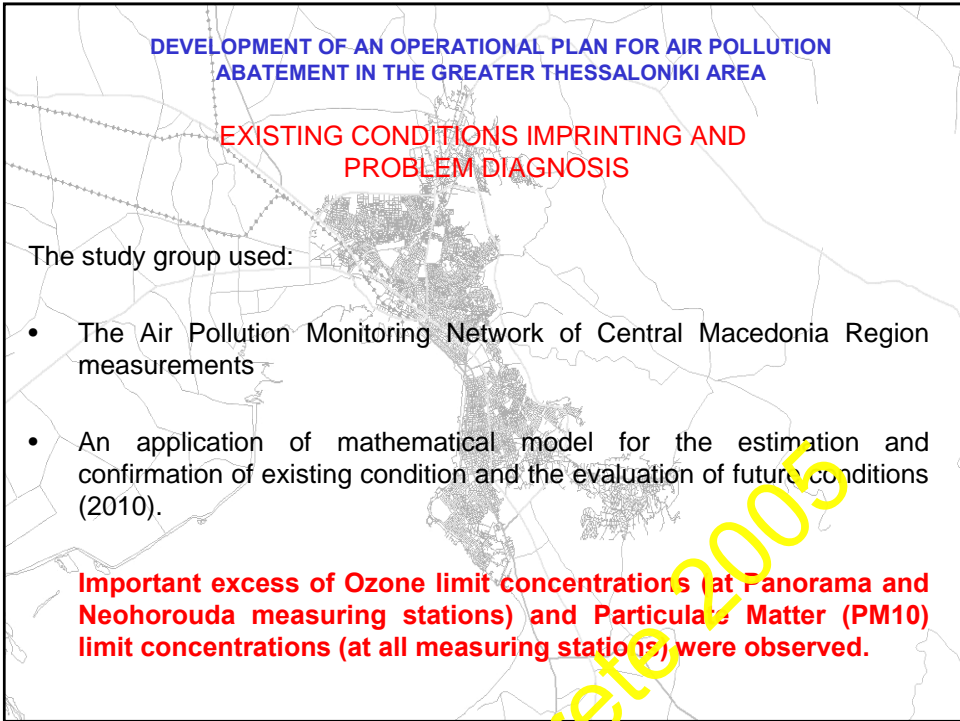
**DEVELOPMENT OF AN OPERATIONAL PLAN FOR AIR POLLUTION
ABATEMENT IN THE GREATER THESSALONIKI AREA**

**EXISTING CONDITIONS IMPRINTING AND
PROBLEM DIAGNOSIS**

The study group used:

- The Air Pollution Monitoring Network of Central Macedonia Region measurements
- An application of mathematical model for the estimation and confirmation of existing condition and the evaluation of future conditions (2010).

Important excess of Ozone limit concentrations (at Panorama and Neohorouda measuring stations) and Particulate Matter (PM10) limit concentrations (at all measuring stations) were observed.



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ESTIMATION OF FUTURE SITUATION

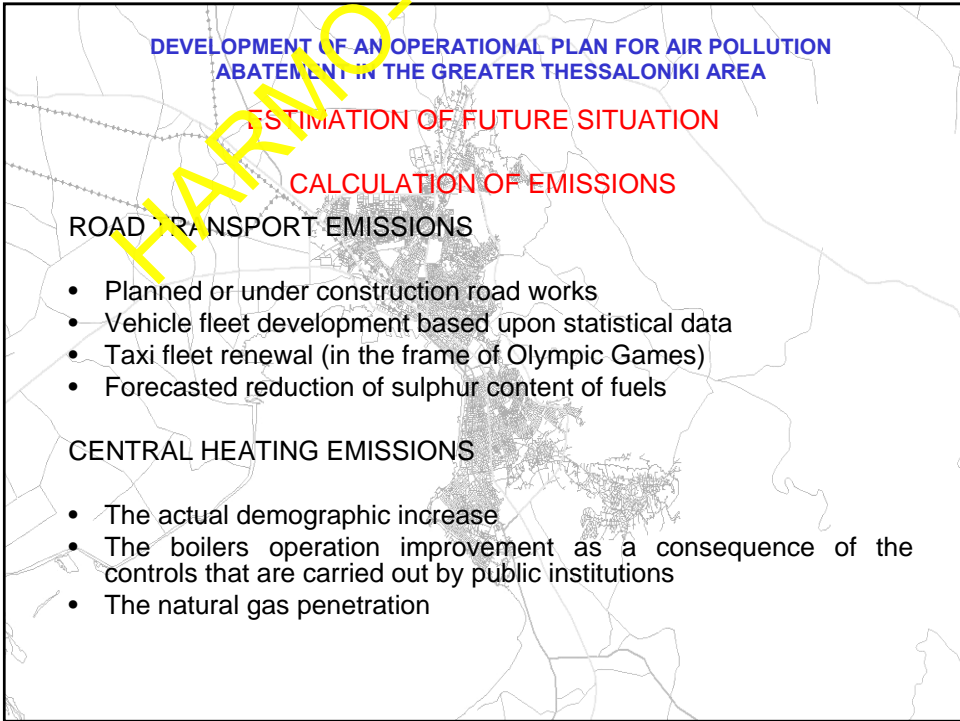
CALCULATION OF EMISSIONS

ROAD TRANSPORT EMISSIONS

- Planned or under construction road works
- Vehicle fleet development based upon statistical data
- Taxi fleet renewal (in the frame of Olympic Games)
- Forecasted reduction of sulphur content of fuels

CENTRAL HEATING EMISSIONS

- The actual demographic increase
- The boilers operation improvement as a consequence of the controls that are carried out by public institutions
- The natural gas penetration



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ESTIMATE OF FUTURE SITUATION

CALCULATION OF EMISSIONS

INDUSTRY EMISSIONS

- Planning of new industrial units and the extension of existing units
- Substitution of oil by natural gas as the main fuel in the industry
- Application of techniques aiming the optimisation of production process and the reduction of losses (maintainance of steam networks, compressed air, etc)
- Expected reduction of energy consumption, in corresponding EU energy saving policies.

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DEVELOPMENT OF AIR POLLUTANT EMISSIONS

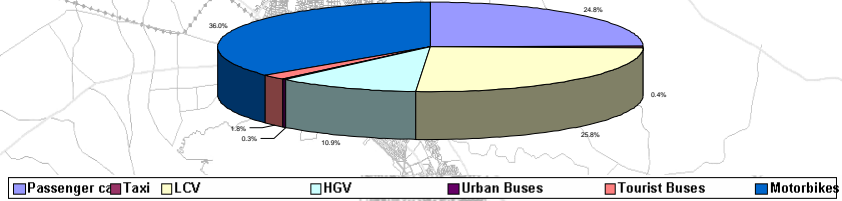
Total air pollutant emissions from the main sources in Greater Thessaloniki region for the years 2002 and 2010

	NO_x	NM VOC	CO	PM10	SO₂
2002	20551	15491	95857	5383	10378
2010	18076	11941	75905	1859	2468
% DIFFERENCE	-12%	-23%	-21%	-65%	-76%

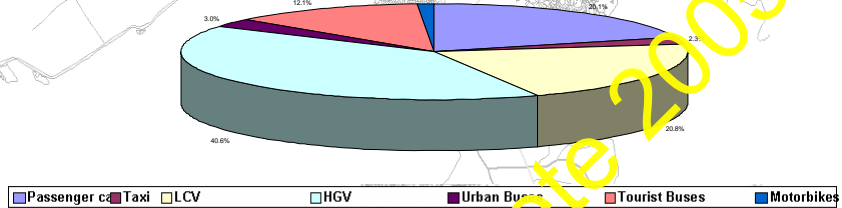
DEVELOPMENT OF AN OPERATIONAL PLAN FOR AIR POLLUTION ABATEMENT IN THE GREATER THESSALONIKI AREA

DEVELOPMENT OF GAS POLLUTANT EMISSIONS

Percentage of NMVOC emissions per vehicle category of the Road Transports emissions in Thessaloniki in year 2010



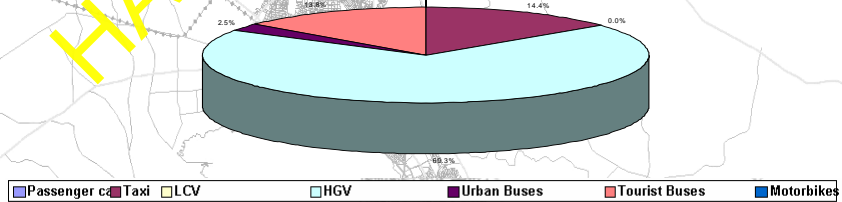
Percentage of NOx emissions per vehicle category of the Road Transports emissions in Thessaloniki in year 2010



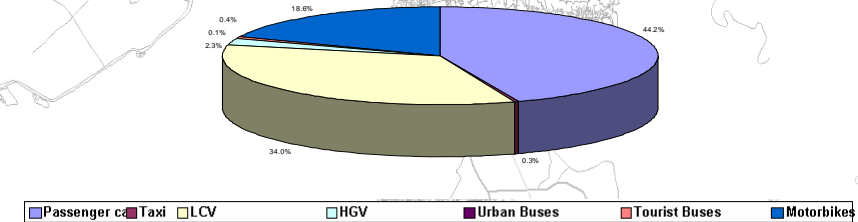
DEVELOPMENT OF AN OPERATIONAL PLAN FOR AIR POLLUTION ABATEMENT IN THE GREATER THESSALONIKI AREA

DEVELOPMENT OF GAS POLLUTANT EMISSIONS

Percentage of PM10 emissions per vehicle category of the Road Transports emissions in Thessaloniki in year 2010



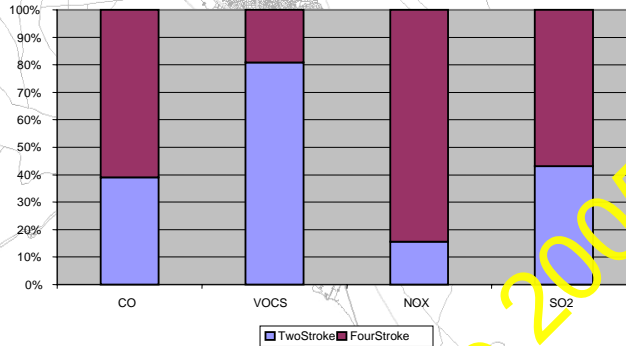
Percentage of CO emissions per vehicle category of the Road Transports emissions in Thessaloniki in year 2010



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DEVELOPMENT OF GAS POLLUTANT EMISSIONS

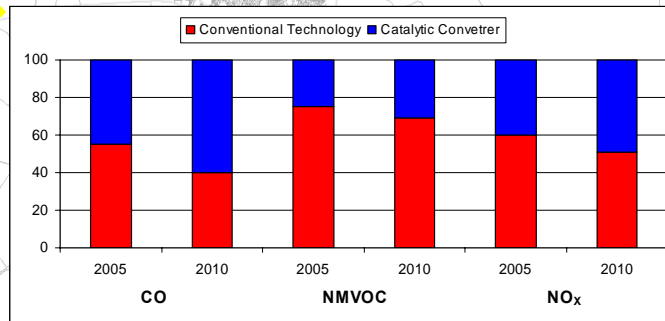
Contribution of two-stroke and four-stroke motor-bikes as a percentage of the total motor-bike emissions for the year 2010.



DEVELOPMENT OF AN OPERATIONAL PLAN FOR AIR POLLUTION ABATEMENT IN THE GREATER THESSALONIKI AREA

DEVELOPMENT OF GAS POLLUTANT EMISSIONS

Percentage of CO, NMVOC, NOx emissions from conventional technology and catalytic converter fitted passenger cars in years 2005 and 2010

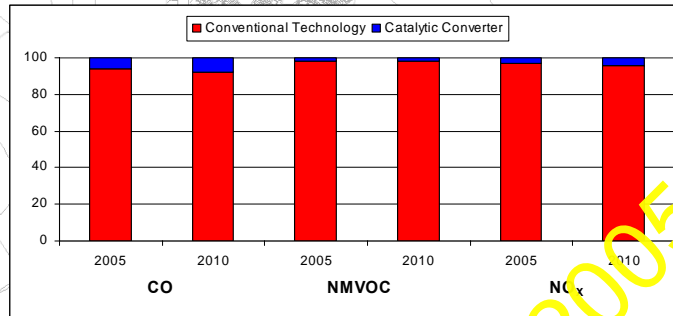


Even in 2010, the emissions from conventional technology passenger cars will constitute 69% of total emissions of passenger cars. This percentage in 2005 is reaching 75%.

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DEVELOPMENT OF GAS POLLUTANT EMISSIONS

Percentage of CO, NMVOC, NOx emissions from conventional technology and catalytic converter fitted Light Commercial Vehicles (LCV) in years 2005 and 2010

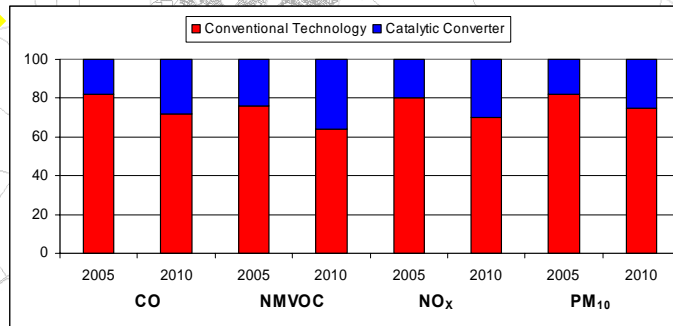


Both three air pollutants have presented the similar behavior, the high emissions level is caused mainly by the use of conventional technology Light Commercial Vehicles. Emissions percentage for the year 2010, is 92% for CO, 98% for NMVOC and 96% for NOx.

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DEVELOPMENT OF GAS POLLUTANT EMISSIONS

Percentage of CO, NMVOC, NOx and PM 10 emissions from conventional technology and new technology Heavy Goods Vehicles (HGV) in years 2005 and 2010

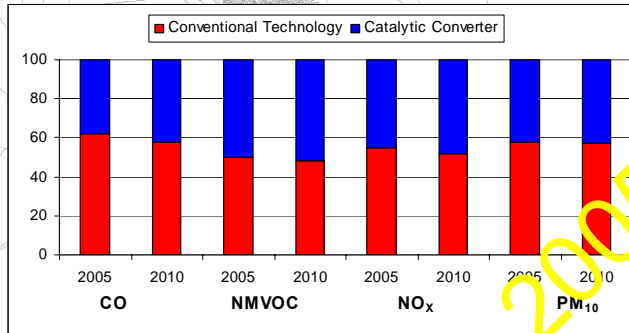


Both four air pollutants have presented the similar behavior, the high emissions level is caused mainly by the use of conventional technology Heavy Goods Vehicles. Emissions percentage for the year 2010, is 75% for CO, 65% for NMVOC 70% for NOx and 78% for PM10.

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DEVELOPMENT OF GAS POLLUTANT EMISSIONS

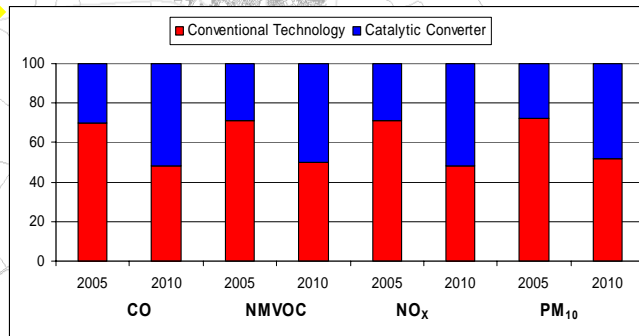
Percentage of CO, NMVOC, Nox and PM 10 emissions from conventional technology and new technology urban buses in years 2005 and 2010



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DEVELOPMENT OF GAS POLLUTANT EMISSIONS

Percentage of CO, NMVOC, Nox and PM 10 emissions from conventional technology and new technology tourist buses in years 2005 and 2010

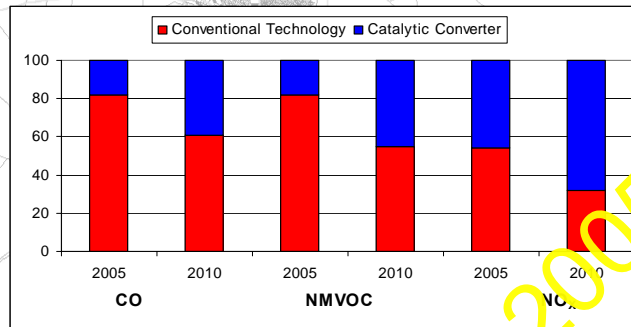


All air pollutants emissions of the conventional tourist buses have the same contribution that is about 70 % for year-2005 and 50% for year 2010.

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DEVELOPMENT OF GAS POLLUTANT EMISSIONS

Percentage of CO, NMVOC, NOx emissions from conventional
technology and catalytic converter fitted bikes in
years 2005 and 2010



The contribution of conventional technology bikes is relatively high especially for the CO and NMVOC emissions for both years 2005 and 2010.

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POLLUTION LEVEL CALCULATION

For the calculation of pollution levels the Urban Airshed Model (UAM) was used. UAM is a 3D Photochemical cell model.

This model has been applied internationally on an operational base for urban regions and was also used by the Atmospheric Pollution Operational Centre for the Greater Athens Area.

- Excess of the Ozone and PM10 limit levels are expected to continue for the year 2010
- At the year 2010 the concentrations of PM10 will not exceed the level limits at the measuring stations of Sindos and Panorama.
- On the contrary, marginal excess of level limits are expected at the measuring stations of Agia Sofia (city centre) and Eleftherio-Kordelio.

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**PROPOSAL OF ALTERNATIVE SOLUTIONS FOR OZONE LEVEL
DIMINUATION**

In the framework of the vehicle fleet renewal with the datum that conventional technology vehicles by the year 2010 will be at least 20 years old and the conventional technology motor-bikes will be at least 7 years old, two alternative scenarios for the vehicle fleet replacement with modern technology vehicles were examined.

The two following scenarios were examined the:

- Replacement of passenger cars and light commercial vehicles as well as replacement and/or circulation prohibition of two-stroke motor-bikes.
- Application of intensive control and maintenance monitoring system for passenger cars and light commercial vehicles.

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PROPOSAL OF ALTERNATIVE SOLUTIONS FOR PM 10 LEVEL REDUCTION

The alternative solutions proposed for the achievement of PM10 level limits, are the followings:

- Renewal rate acceleration of Heavy Goods Vehicles fleet
- Greater penetration of Natural Gas for use in Central Heating.

Additional measures for further reductions in the industrial sector gas pollutant emissions were not examined, since PM10 emissions from the industries is expected to be reduced considerably with the penetration of natural gas and the EU directives and relative legislation application.