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**UNECE – WHO  
EUROPE WORKSHOP ON SUSTAINABLE  
AND  
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**SUSTAINABLE MOBILITY POLICIES  
AND POLLUTION REDUCTION**

**GENOA CASE STUDY  
on  
Policy instruments and demand management techniques**

# Genoa Case Study UNECE / WHO

## Sustainable mobility policies and pollution reduction.

### Project Summary

Genoa's case study aims at describing some of the most relevant policies applied from 1999 till now, to reduce transport environmental impact and improve the maintenance of a healthier citizens life condition, especially in the city core area. The constant increase of urban traffic in the city centre and its linked pollution, drives local Municipality to define a better strategy to change the citizens attitude to use private transport means, trying to reduce the most important source of air pollutants: road transport. To strengthen the importance of this policy, a recent study of European centre for environment and health<sup>1</sup> (WHO) confirms the findings from several investigations worldwide which reveal that a proportion of many adverse health outcomes, including mortality, is due to air pollution.

The strategies applied to decrease pollution in the central area are different and involved all aspects of local mobility: testing access' restriction to the urban central area and park/road pricing strategies, strengthening and improvement of public transport service and the institution of a new integrated transport planning and control system.

The final result of all these actions is a drastic reduction of private transport use in the central city area and the resulting improvement of environmental indicators which reflect the new healthiness of the urban centre.

### Information about Genoa

The city of Genoa is the Provincial Capital of the Liguria Region in Italy. The city, characterised by one of the largest historical centres in Europe, is the core of the Italian Riviera. Genoa is located about 120 km south-west of Milan on the Gulf of Genoa.

The city of 650,000 inhabitants (over 240 squared km, of which only 75 inhabited) lies mainly on a 30 km long and narrow coastal plain extending through few narrow valleys (along rivers of torrential character) into the western steep slopes (reaching 1200 m high) of the Apennine Mountains.

Genoa is the main commercial port of Italy and is also a commercial and industrial centre. The town can be shown as an unique case study mainly because of the industrialized areas that, while at the beginning of 20<sup>th</sup> century developed in the western town boundary, during the years have been incorporated in highly populated residential suburbs, and thanks to its orographic peculiarity (especially lack of costal spaces) residential suburbs have been built in step hill areas where public transport can hardly access.

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<sup>1</sup> WHO, Regional office for Europe, **Health impact assessment of air pollution in the eight major Italian cities (Italy 2002)**

In spite of these problems in Genoa 29% of citizens use public transport.

## Good practices and lessons in Genoa

In 1999 the main urban problem in Genoa was the deterioration of the environment downtown Genoa where continuous and increasing overcoming of the maximum permitted pollutants levels were recorded, mainly due to the traffic flows in the central areas.

In order to achieve a more sustainable transport, the Municipality of Genoa has been carrying out some "traffic-environment" integrated politics, aiming at protecting the urban environment and introducing effective environmental sustainability measures, which are able to develop a new awareness of sustainable urban mobility.

Since road transport is the principal source of air pollution (CO, COV and Nox) the city of Genoa decided to implement coordinated strategies to know better the pollution trend surveyed in the city.

<b>Total annual emissions per sector (Council of Genoa) [ton/year]</b>			
	CO	COV	NOx
Power plant	0.37%	3.69%	39.25%
Combustion-Service industry and agriculture	1.41%	0.80%	4.60%
Combustion- Industry	30.11%	0.45%	14.05%
Production process	0.00%	0.88%	1.28%
Mining and distrib. Fossil Comb.	0.00%	7.33%	0.00%
Solvent use	0.00%	16.59%	0.00%
<b>Road transport</b>	<b>60.12%</b>	<b>59.12%</b>	<b>29.01%</b>
Other mobile sources	7.43%	8.11%	11.81%
Waste Treatment and removal	0.00%	2.31%	0.00%
Agriculture	0.00%	0.33%	0.00%
Nature	0.55%	0.39%	0.00%

This awareness allowed the best base to define a more conscious environmental and healthy transport system reducing the external effects of transport and traffic systems in the central area of Genoa improving citizens' health.

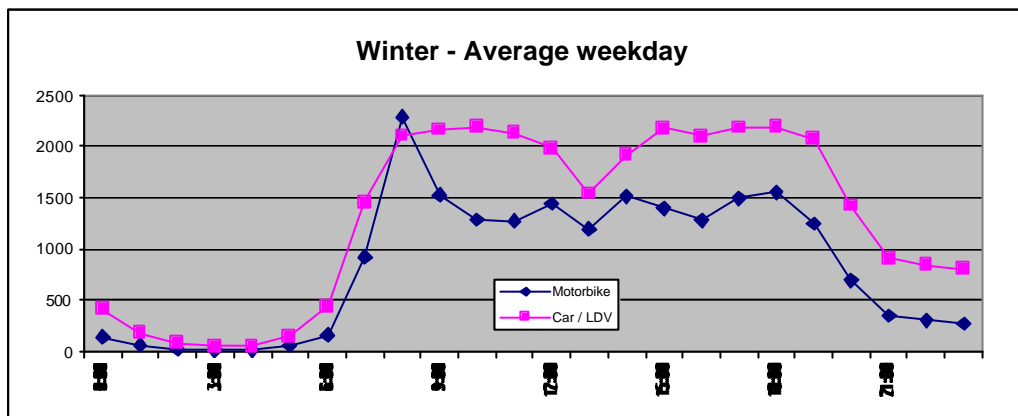
A lot of interventions on different aspects of mobility were carried out involving the essential tools of mobility in an integrated plan. The essential objective was to reduce drastically the private traffic in the urban centre and lower the surveyed pollution. These actions will create better conditions to more rational modal split in favour of low environmental impact means, in order to create a greater social utility.

To obtain wishes results, Genoa City Council has introduced parking and road parking strategies, joint with access restrictions in most of downtown obviously connected to improvement of public transport service.

### ROAD PRICING TEST

The access restriction in the central urban area represents an essential tool of Urban Traffic Plan. The experimentation of road pricing in the urban centre - as a part of the EU funded project PROGRESS - contributed on one side to know better traffic flows crossing the central area and on the other to evaluate the resistance of the citizens to this new "toll" necessary to enter downtown.

The road pricing test so grant a great number of indicators about traffic flows and access to the city. Actually we know that almost 47.000 total vehicles (40% are motor vehicles) enter in the tested area from 7 h. to 20 h with a registered peak between 8:00 to 9:00 of almost 2300 motorbikes .



These indicators are really useful to define a better strategy to manage transport demand and act consequently to propose more suitable intervention schemes. The expected effects of road pricing application are twofold, one is to force private drivers to use alternative routes not crossing the city centre and the other is to improve air quality and equi-accessibility in central areas. The first results of the experimentation are quite encouraging because the weekly entrances in the centre decrease of 26% with a linked reduction of pollutants concentrated in the city centre. At the end of PROGRESS trial, the Council of Genoa has asked the Ministry of the Environment funds to extend road pricing schemes. This project involves central city area in which about 150.000 people live. After the Ministry approval road pricing extension will start within 2004, as an integral part of the new Mobility plan.

### TRAFFIC MANAGEMENT

As for the traffic management, the introduction of a new urban traffic plan represents also a great instruments to define a better organization of transport flows. The plan introduces a limited transit areas and special park areas; it also introduces reserved lanes for public transport means, forcing transport fluxes out of the centre. Besides, the introduction of a road

pricing strategy in the central core area cut down total entrances. Thanks to the new integrated traffic plan in the area surveyed by Road Pricing system the vehicles circulating fell down of 17 million for year. The private traffic decreases with a remarkable intensity and public transport increases in the same proportion. So the global modal split in urban centre of Genoa changed radically from 1999 to 2002. Between 1998 and 2002, in this reference area the use of Public transport increases of 14%, with a absolute decrease of transits and arrivals to the centre. The definition of a new mobility and transit plan had a good effect on the traffic jam, the traffic decreases of almost 50%, with a complete change of downtown.

### **GOODS DISTRIBUTION WITH LOW-EMISSION VEHICLES**

Since 2002, the first project's phase of a new scheme of goods delivery in the historical centre of Genoa was completed. All central goods' deliveries are managed by only one society which uses low-emission vehicles (electric vehicles).

The project applies advanced technologies to optimise delivery process and it builds a data processing and telecommunication infrastructure to constantly manage and track the results. The system for goods distribution is located in a exchange centre, where all the goods directed to the Historical Centre are collected and then distributed.

The results achieved are remarkable, such:

- Reduction of the environmental impact (atmospheric and acoustic pollutions)
- Reduction of the transit and stop area around the project zone;
- Environmental and economic improvement of the area involved;
- Improvement of the quality of logistics and definition of the services with new added values and new functionalities;
- Improvement of a rational use of intermodal transportation;
- Reduction of the goods distribution traffic in urban zones;

The most important characteristic is the agreement of shopkeepers and forwarding agents to respond to the Council's traffic limitation, which concerns the historical centre.

### **PUBLIC TRANSPORT IMPROVEMENT**

The strengthening of local public transport is based on the development of surface railway service in the urban area and the extension of the subway. Also the new experiences of demand responsive transport service and of collective taxi are instruments of particular interest. Public Transport Company has put into action a plan of interventions, in order to generate economic improvement that is leading to an increase in efficiency, even if service costs are however relevant.

## Forecast Public transport Supply

	2003	2004	2005	2006	2007	2008	2009
<b>Total bus service (Km 10<sup>3</sup>)</b>	30.600	30.450	29.700	29.700	27.800	27.800	26.900
<b>Total railway and underground service (Km 10<sup>3</sup>)</b>	1.860	2.290	2.715	2.715	3.350	3.350	3.900
<b>Total (Km 10<sup>3</sup>)</b>	32.460	32.740	32.415	32.415	31.150	31.150	30.800
<b>Seats per Km (million)</b>	3.400	3.400	3.400	3.450	3.450	3.500	3.600
<b>Passengers (million)</b>	150	154	157	158	163	165	170

### MOTORCYCLE CAMPAIGN

The global amount of vehicles which move around in Genoa highlights the intense use of motorbikes and mopeds. This flexible transport mean has a great success in Genoa and the preference is linked to the lack of park space and the facility in driving in the traffic jam.

Between 7h. and 20h the road pricing technology survey the entrance in the city core area of 19000 motorbikes (40% of the total amount) and between 8h – 9h. the motorbikes entrances rise to 2300. This new registered trend persuade local administration to evaluate better the pollution produced by this transport modalities analysing a sample of 494 vehicles and identifying the pollutants produced by different motorization (EURO 2,1,0 and two or four strokes engine) and at different speeds. This study was also helpful to provide a complete scientific base to decide a better national and local policy to rule two wheels traffic. One of the most debated theme related to this problem is the introduction of a periodical emission control of the two wheels vehicles.

The study bears out that two strokes engines represent one of the most important sources of benzene, unburned hydrocarbons, thin powders and particulates. There is a relevant responsibility of two wheels and two strokes engines to the total amount of HC produced by the transport vehicles. Two wheels are responsible for almost 60% of total benzene's emissions.

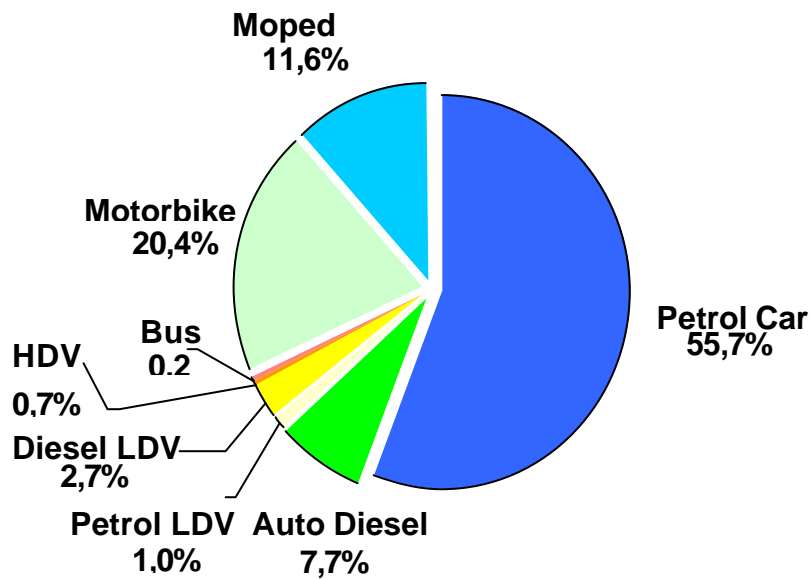
The study's results are on the same wavelength as the national Ministry of the Environment test campaign takes place on 2000 in 8 Italian city. The evidences are a clear responsibility of two stroke engines on air quality and the undefined indication of European Directive 97/24 about EURO 1 vehicles, necessary to reduce HC and PM10 emissions. The environmental data surveyed after three years in Italy highlight the need of a revision of the European Directive. Also the WHO's recent studies about Italian case<sup>2</sup>, confirm the health risk linked to motorcycle and moped traffic and in general to road traffic emissions.

So Council of Genoa is preparing a special act which aims to extend actual traffic limitation (concerning all non catalysed vehicles, every weekday, from 8 to 11 a.m.) to motorbikes and mopeds equipped with two strokes engine.

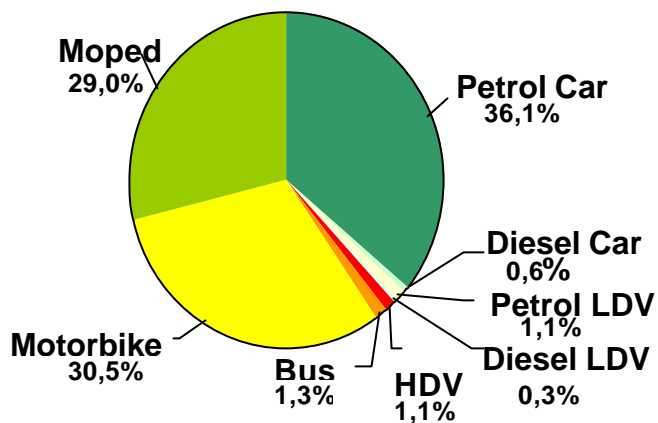
<sup>2</sup> WHO, Regional office for Europe, **Health impact assessment of air pollution in the eight major Italian cities (Italy 2002)**

WHO, Regional office for Europe, **Environmental Health impact Assessment of two-strokes engine motorcycles and policy implications: an Italian case study**

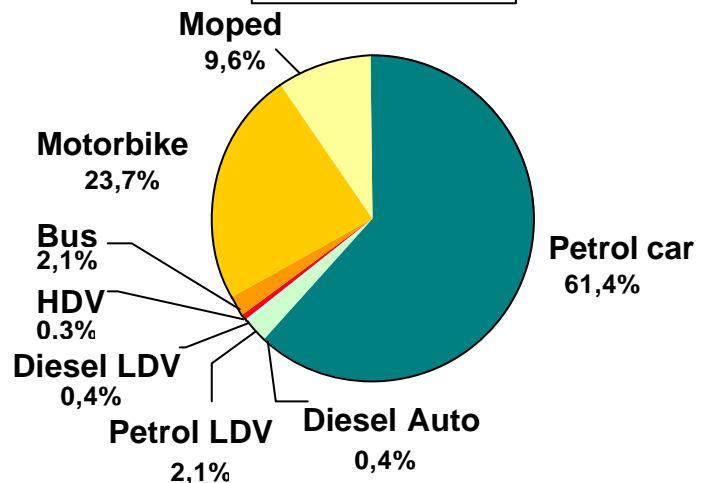
## AIR POLLUTION PER VEHICLES IN 2001



### HC EMISSION



### CO EMISSION



Another important result points out by the study is the presence of a small percentage of two wheels vehicles which produce more pollutants than the average emission of all the vehicles.

These relevant evidences were really useful to consider also two wheels transport not only an handy mean of transport characterized by a limited a pollution, but an important element in the total pollution surveyed in the urban centre. The better knowledge about the real reduction of pollution deriving by the newest motorization (euro 1 or 2 related to euro 0 and new scooter compared with the old moped), it's important to change the conviction that two wheels can resolve the problem of traffic jam in the urban centre without limited external costs. The municipality of Genoa has already agreed some possible mobility interventions to reduce moto's impact on citizen's health as for instance:

- access restrictions for most polluting two wheels vehicles,
- institution of periodical emission control to test the real environmental impact.

## INSTITUTION OF A NEW TRANSPORT AGENCY

Considering the important result achieved, the Municipal Administration decided to continue to extend the benefits of these policies defining a global project. The objective is to establish a new integrated transport planning and control system. This mobility project should reinforce the positive experience tested in the urban centre and it also represents an instrument to rationalize and improve all the planning transport politics interventions in the whole metropolitan area of Genoa.

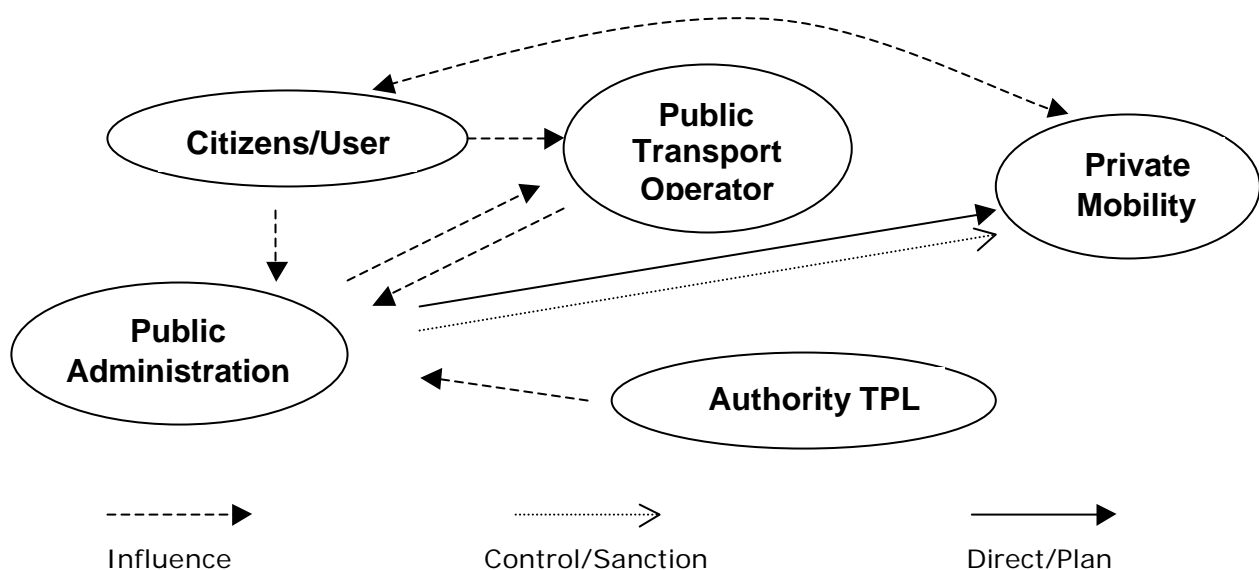
The new aim will be the improvement of mobility integration of all transport modalities, the development and rationalization of the transport net, a better access to the transport services and at least the control and reduction of pollutants emissions. All these aspects create the right condition to redefine clearly, not only transport politics but also the whole organization of urban mobility.

The public administration gives the essential politic inputs, while a technical institution (Agency) plans and acts according to these instructions, granting an organized system to all users and citizens. The planning and definition of a traffic plan can't be an isolated process and action but it must involve in a combined process all the aspects related to urban mobility, as a shared mobility plan. (Art. 22, L. 340 /2000)

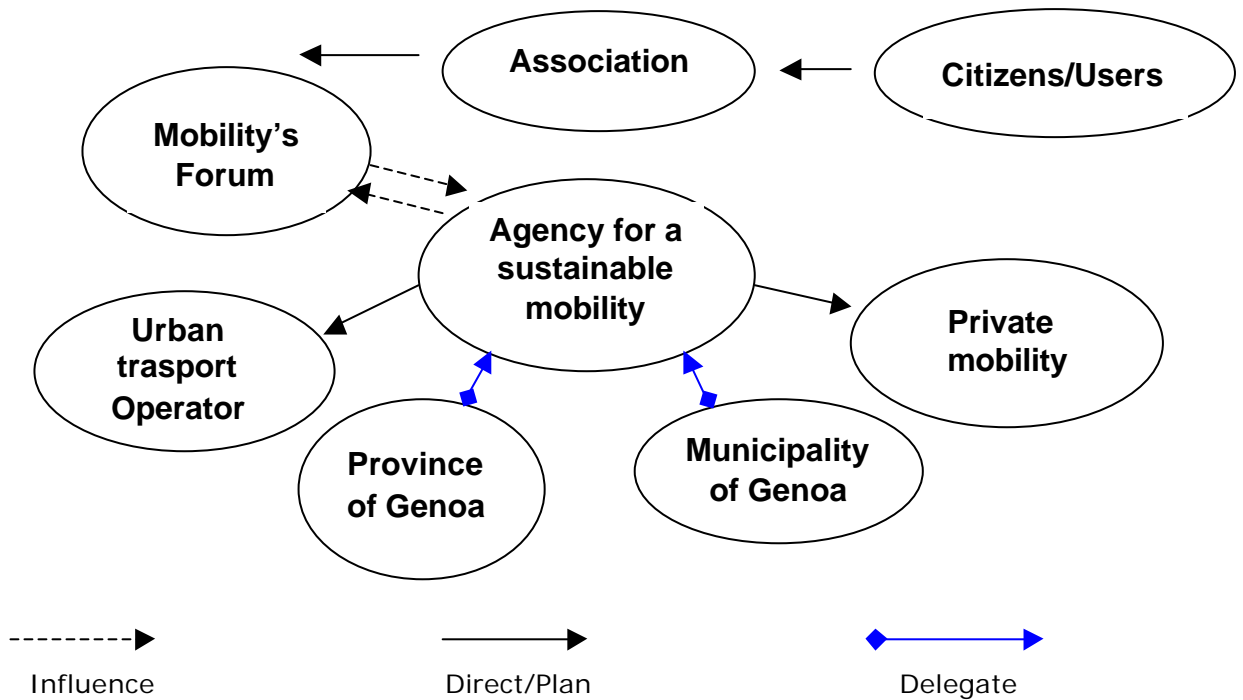
The analysis of the governance's model of the Genoese mobility, considers the actual situation, the past and what is overlooks till the constitution of the agency with the global division between the public operator and the transport Agency.

To our intention is possible to define briefly the stakeholders and actors involved in the government scheme of the mobility in Genoa analysing what was, are and will be the relations and function between them in this period characterized by the national reform of PT. In the past model there is a lack of cohesion in the relationships among the different actors and stakeholders. The agency model actually discussed in Genoa creates a new point of coordination among the involved subjects for a unitary system to plan and regulate all the mobility functions in a organic way.

The applied governance model changed from a not always co-ordinated system with multiple relationships:



To a more organic system in which the mobility decisions linked to private and public transport are coordinated and planned by a main institution with the technical competence necessary to govern all the aspect related to the mobility:



Finally it will develop a strategic plan to transform based on the following main issues:

- Division between politics, technical and planning and administration functions (P.A.; Agency; Management)
- All the technical aspects of the metropolitan mobility (public and private) in an only public interlocutor will be joined in only one institution.
- Coordination between environmental and mobility politics
- Development of a new relationship between citizens/users to reduce the conflicts and to satisfy all the social exigencies to be informed and to have the chance to communicate their own needs.

### ENVIRONMENTAL CONSEQUENCES

Today the results of these mobility politics are remarkable: the reduction of pollutants and the modal split are evident consequences of these new measures; they are a clear signal of the beginning of turning point time in Genoa mobility administration.

HC	2001	2003	Variation %
Brignole (city centre)	95.2	26.86	-71.8%

HC concentration peak/hour ( $\mu\text{g}/\text{m}^3$ )

CO	1999	2002	Variation %
XX Settembre	21.07	7.44	-64.7
Brignole	15.11	9.27	-62.9
Quarto	9.39	9.39	0
Firenze	10.65	6.98	-52.6
Bolzaneto	15.57	9.85	-58.1

CO concentration peak/hour ( $\mu\text{g}/\text{m}^3$ )

NO <sub>2</sub>	1999	2002	Variation %
XX Settembre	212.18	203.71	-4.2
Brignole	190.55	179.78	-5.9
Quarto	199.1	148.07	-34.5
Firenze	283.17	183.37	-54.4
Bolzaneto	190.55	183.77	-3.7

NO<sub>2</sub> concentration peak/hour ( $\mu\text{g}/\text{m}^3$ )



Even if the global HC value cuts down, the data surveyed by the two stations are contradictory if compared with the data surveyed by passive detectors collected (on behalf of Province of Genoa) by IST (Istituto Nazionale per la Ricerca sul Cancro - National institution for cancer research). These data point out a strong relevance of PM10 and benzene in the peripheral areas, which are open to motorized traffic flows and where car use is still relevant, while in the central area the emission's reduction is more evident, due to specific mobility policies we have said before.

The data gathered with the Road Pricing system (installed into the central area) well explain the good results achieved: the private traffic decreases with a remarkable intensity and public transport increase in the same proportion. So the global modal split in urban centre of Genoa changed radically from 1999 to 2002.

