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Electric City Transport – Ele.C.Tra

## **D.2.1 Report on current mobility and network of Genoa**

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Demand mobility flows; Infrastructural and service network

Genoa

Genoa

## Electric City Transport – Ele.C.Tra.

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**Abstract:**

This document contents a summary about current demand flows, surveys results, infrastructural and transport services network for the city of Genoa, in consistence with the survey model and in order to highlight sustainable mobility issues and benefits. Finally, the Report will pay attention to the predisposition for electric vehicles use, in particular e-scooters.

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## 1. Introduction

In according to the Ele.C.Tra. project proposal and the 2.1 and 2.2 subtasks objectives, the deliverable D.2.1 named „Report on current mobility and network” represents the main result of the whole WP2 “Ante-operam analysis”. This deliverable is referred to the pilot city of Genoa.

In this light, D.2.1 would like to highlight:

- demand mobility flows:
  - to identify attractor places (parking, schools, commercial precincts,...) and the main elements about day trips number, trip hours, transport means and mobility reason, in order to acquire a specific and technical starting point for the model, contextualization and experimentations and not for having a complete framework of all day trips, that it’s not a real focus of the Ele.C.Tra project;
  - to systematize the actions already ongoing or planned in every city about mobility networks and local attractors, in consistence with what done in the Best practices task and analysing the main local planning documents ;
  - to point out the main elements about the current scooters mobility, thanks to ex-ante surveys done in each project city, without to extend the activities to target group individuation and stakeholders involvement, that are activities planned in the next WPs;
  - to point out the predisposition for the e-scooters use by the current traditional scooters users and for those not using scooters (mainly car users) and then aptitudes, issues perceived or identified by citizens and advice in terms of electric and sustainable mobility;
- infrastructural and service network:
  - to identify the main infrastructural bottlenecks in the road network in every city, paying attention to the parking and interchange nodes situation in the urban area that are more suitable for scooters;
  - to systematize the main characteristics of the local public transport service in the main interchange nodes.

## 2. Demand mobility flows

### 2.1. The Genoese area

The urban area of the city of Genoa is placed in a narrow area between the Apennines mountains and the Ligurian sea, along a seaside of about 40 km from the West (Voltri/Crevari) and the East part (Nervi/Capolungo) and two main valley expansions in the Bisagno and Polcevera valleys.

The whole city has got 603.560 inhabitants with a density of about 2.500 inhabitants per square kilometre and it’s the sixth biggest city in Italy for population (after Rome, Milan, Naples, Turin and Palermo)<sup>1</sup>.

<sup>1</sup> Source: ISTAT “Censimento generale della popolazione 2011”

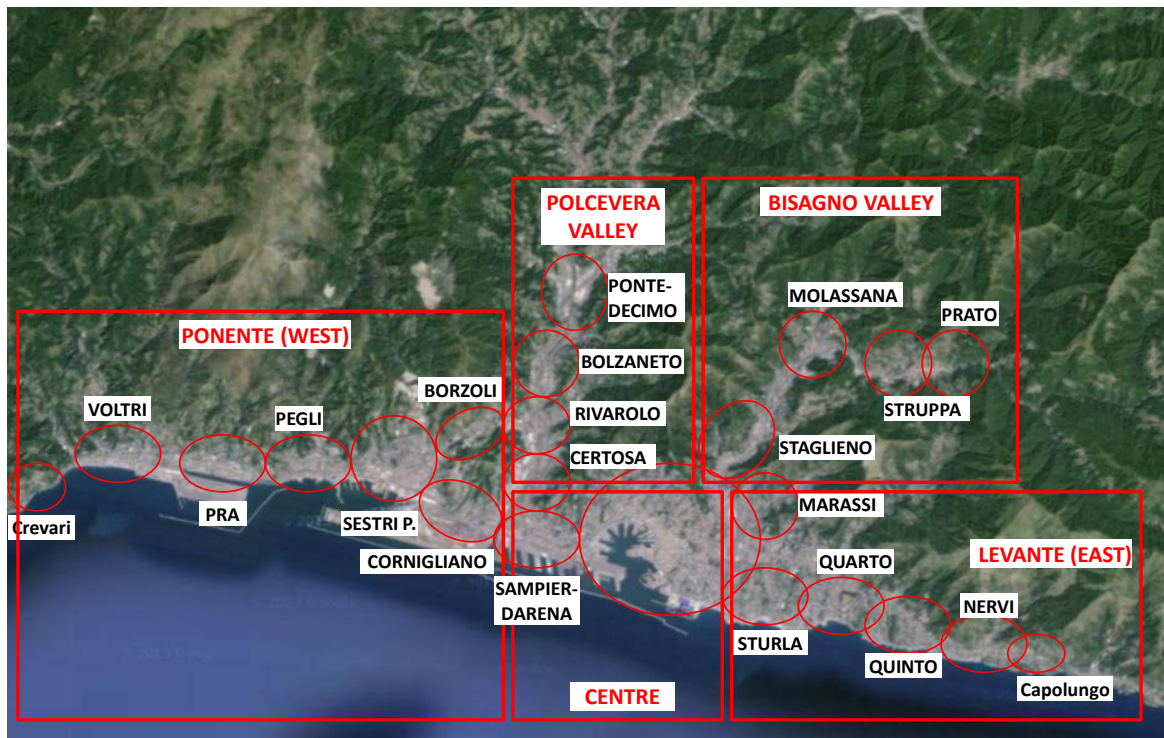
About 50% of the urban population is concentrated in the central part of the city and in its historical centre, more or less between Sampierdarena (West), Sturla (East) and Marassi (Bisagno valley), where there is the highest density of population.

Finally there are further smaller residential/industrial areas more peripheral, such as Borzoli, Voltri, Pontedecimo, S.Eusebio.

The general data of the Genoa context is:<sup>2</sup>

- land area: 257,39 square kilometres;
- urban area: 102,91 square kilometres.(40%);
- total number of dwelling: 301.898, of which 273.807 occupied (90%);
- total number of families: 277.627.

### LOCAL CENTRES AND AREAS IN GENOA<sup>3</sup>



In Genoa every urban quartier has got a strong identity, almost like a town, and own historical centres with pedestrian areas and a high concentration of shops and local attractors.



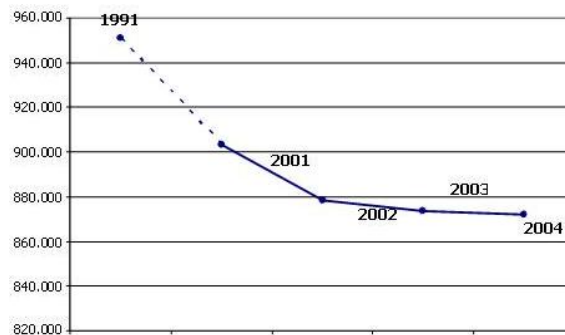
### PEDESTRIAN AREA IN SESTRI PONENTE (WEST PART IN GENOA)<sup>4</sup>

<sup>2</sup> Source: ISTAT data

<sup>3</sup> Source: TB on Google maps

Although the activities linked with the Genoese port, the first in Italy for goods moved (~50 tonnes in the year 2012<sup>5</sup>), and its good position respect to the Padana Valley and the bigger urban areas of Milan and Turin, the city of Genoa and its Province in the last 25 years has been characterized by a decrease of population, now slowed around 870.000 inhabitants.

**POPULATION TREND IN THE PROVINCE OF GENOA<sup>6</sup>**

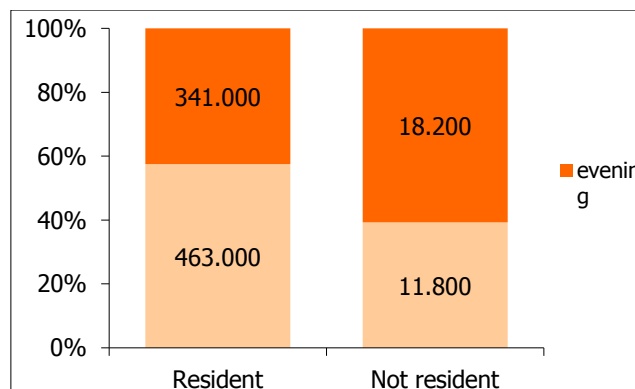


In consideration of its geographical configuration also, there are several issues in terms of urban accessibility and mobility inside the urban area with important and global congestion problem in case of reduction of infrastructural capacity, even temporary only, in one interchange nodes or in one road or line.

**2.2. Overview of the mobility current situation**

In terms of systematic trip (home based for work/school), the inhabitants of the city of Genoa create about 554.000 day trips and the Province ones about 250.000<sup>7</sup>. 58% of the total of day trips (834.000) is generated in the morning rush hours while the further 42% in the late part of afternoon. Then, a small rate of total day trip is generated by people who lives outside the Province of Genoa.

**NUMBER OF DAY TRIPS**



<sup>4</sup> Source: Google maps

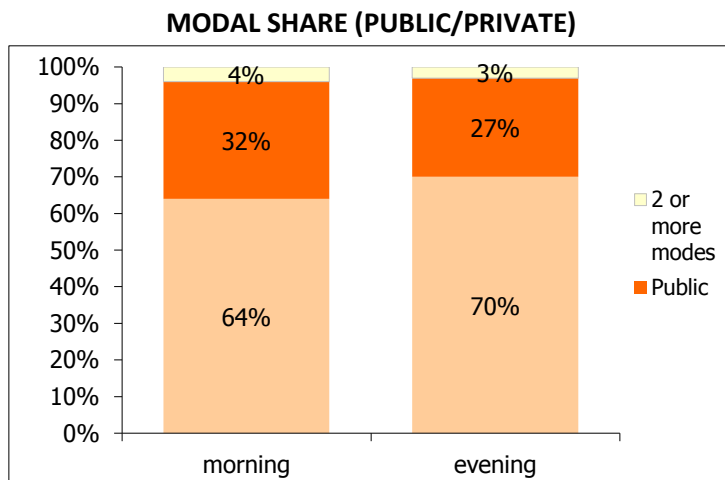
<sup>5</sup> Source: ASSOPORTI data

<sup>6</sup> Source: ISTAT data

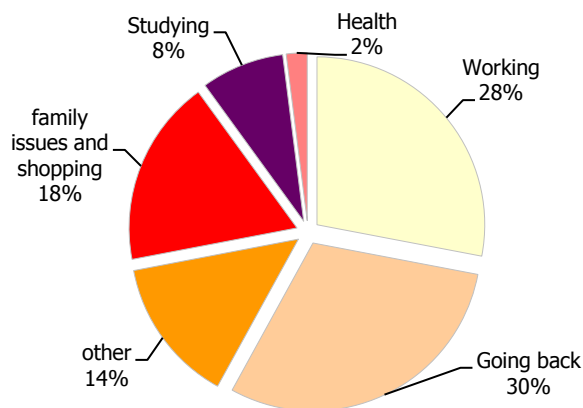
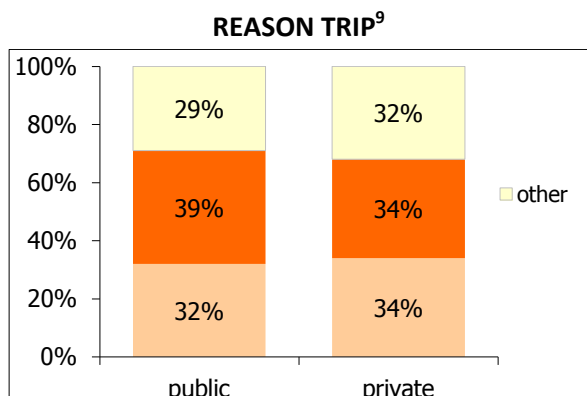
<sup>7</sup> Source: TB elaboration on ISTAT data



In Genoa context there is a good level of public transport use, with a modal share of 35% (about 279.000 day trips), that decreases in the evening (27%) respect to the morning rush hours. This positive data is confirmed by the low number of car per 100 inhabitants, that in Genoa is comparable with the European average (~50 veh/100 inhab.) and lower than the Italian one (~62)<sup>8</sup>.



In terms of trip reason, it's possible to realize the systematic rate, more than 1/3 of the total number of day trips, but also the occasional one, with values between 32 and 34% in consideration of the type of transport mode (public or private).



Analysing the day trips of the city of Genoa inhabitants both in the morning rush hours and in the evening ones, it's possible to highlight:<sup>10</sup>

- morning (463.000 trips):
  - 45% (213.000) for working;
  - 13% (60.000) for studying and going to school;
  - 23% (107.000) for family issues and shopping;

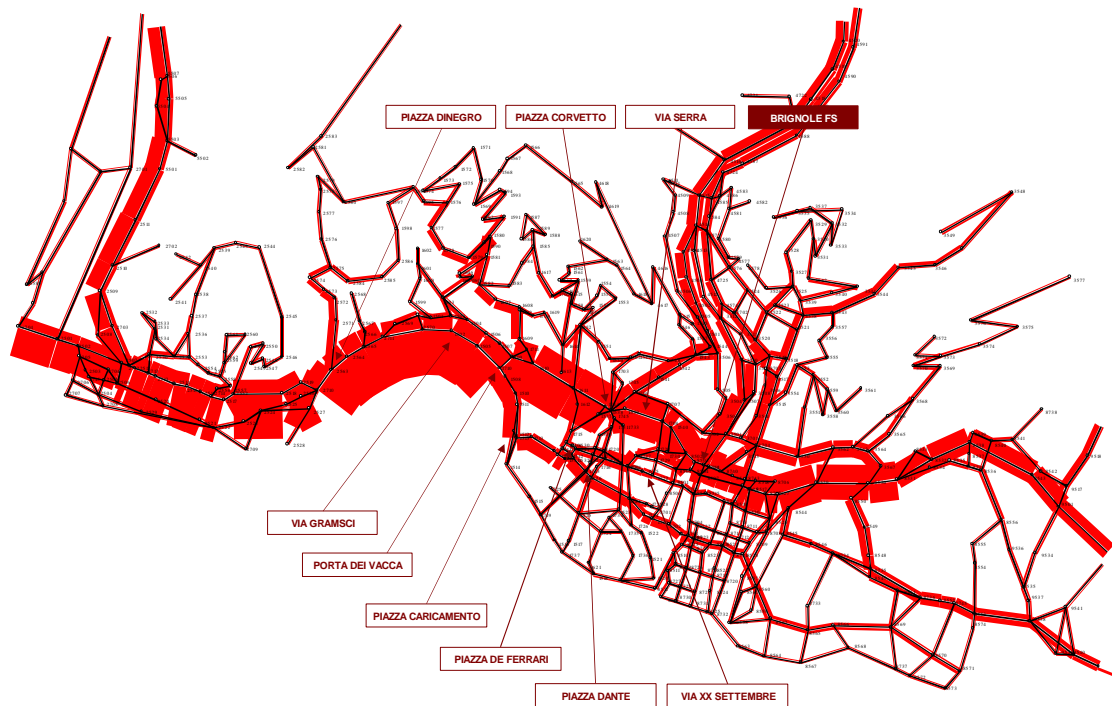
<sup>8</sup> Source: "Osservatorio Mobilità Sostenibile in Italia", Euromobility, 2013

<sup>9</sup> Source: TB elaboration on ISTAT data

<sup>10</sup> Source: TB elaboration on ISTAT data

- 18% (83.000) for other reasons;
- evening (340.000):
  - 3% (10.000) for studying and going to school;
  - 11% (37.500) for family issues and shopping;
  - 68% (231.000) for going back to home from offices and working places;
  - 18% (61.500) for other reasons.
  -

**MOBILITY FLOWS IN THE URBAN CENTRE OF GENOA<sup>11</sup>**



At a glance, Genoa is a big urban area with good mobility potentiality (high public modal share, high use of 2-wheeler vehicles, etc) but also strong issues linked to the geographical characteristics (shortage of flat areas, mountains by the city centre, etc) and the several infrastructural bottlenecks in urban area and in its neighborhoods regarding both roads and railways.

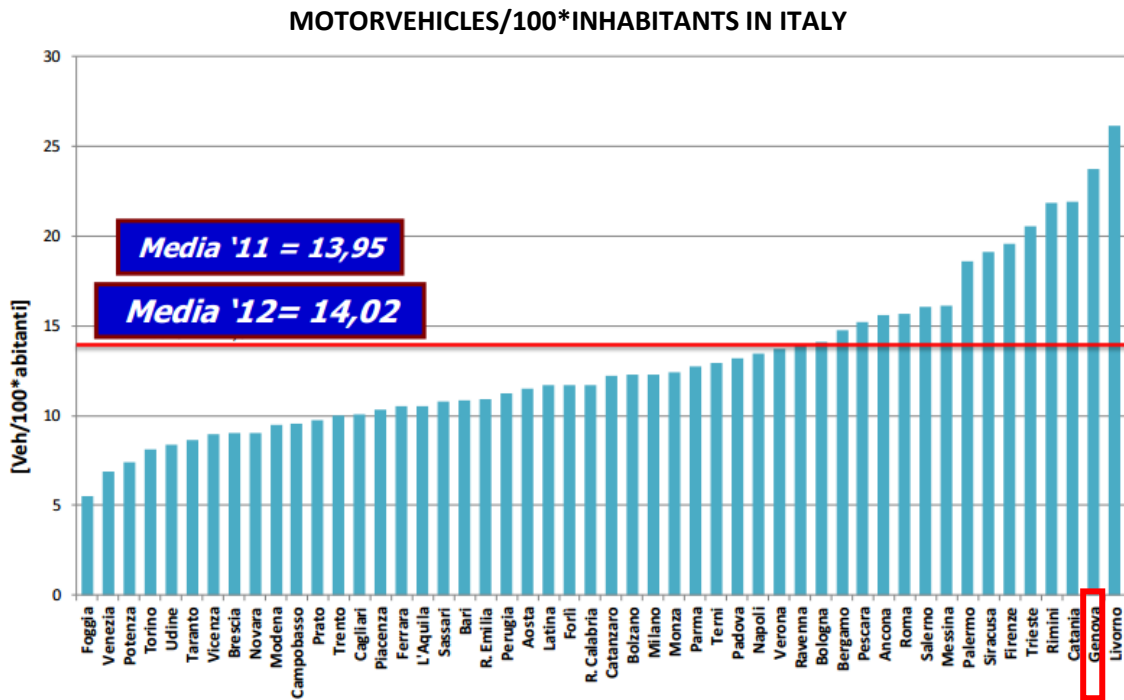
In this light, mobility flows in the central urban area is closely linked with the geographical characteristics of the city and then the most important demand mobility is concentrated in the main routes where there are the biggest quarters in Genoa:

- East (Levante-Centro) and West (Ponente-Centro) cost;
- Valpolcevera (north-west);
- Valbisagno (north-east).

<sup>11</sup> Source: TB elaboration on ISTAT data

### 2.3. Focus on the motorvehicle mobility

Genoa is the second city in Italy which of them there is the highest number of motorvehicles, with ~23 veh/100 inhab., after the city of Livorno, where the value is more than 25.<sup>12</sup>



The higher daily number of motorvehicles is concentrated in rush hours to go to schools or offices, but they are very used for other reasons not systematic also (e.g. shopping, leisure).

Focusing on the time slot 7.30-8.30 am of a working day and only for trips in the Genoa Municipality, identifying modes and reasons:

- to go to school:
  - By car: 3.155 day trips;
  - By motorvehicles: 5.352;
- to go to office:
  - By car: 43.810 day trips;
  - By motorvehicles: 22.834.

It's interesting to note the mobility by motorvehicles in the morning rush hours is higher than the one by cars for going to school (about +69%).

<sup>12</sup> Source: "Osservatorio Mobilità Sostenibile in Italia", Euromobility, 2013

## 2.4. Attractor places

Genoa is the most important attractor area for the whole Ligurian Region (except for some peripheral areas in the West by the France and Piedmont border lines). Then, the Genoese city is the reference mobility point for several Municipalities outside its Region, mainly involving the big Northern area between the Apennines mountains and the towns of Novi Ligure, Tortona, Ovada, Acqui Terme, now in the Province of Alessandria (Piedmont Region) and in the past strongly politically linked to the city of Genoa. In particular, the area where the day trips are mainly attracted by the Genoa attractor role (for working, to reach schools, University, for shopping, to go hospitals, etc) involves about 1,2 millions of inhabitants<sup>13</sup> in 3 different Italian provinces (Genoa, Savona and Alessandria) and in 2 Regions (Liguria and Piedmont).

In the Genoa urban area the main attractor places are concentrated in the central part of the city, between Sampierdarena and Brignole/San Martino area. It's possible to identify:

- the **central part of the city** (historical centre and its surrounding areas), where there's a spread network of offices, shops, theatres, museums, small and big schools and health centres, etc.;
- the **main railway stations**: Piazza Principe and Brignole and then Sampierdarena (west part);
- the **main underground stations**: Piazza Principe, Brignole and Brin, in the Certosa area in this light it's the "door of Polcevera valley" for whom to arrive from the centre;
- the **airport** in Sestri Ponente;
- the **main hospitals and health centres**: San Martino, Galliera, Gaslini, "Villa Scassi" in Sampierdarena, Sestri "A. Micone", Voltri "S. Carlo", Rivarolo "Celesia", Bolzaneto "Pastorino", Pontedecimo "Gallino";
- the **biggest factories and firms**, mainly in the Campi area in Polcevera Valley and in Sampierdarena-Sestri Ponente (west urban part);
- the **biggest commercial precincts**, such as Campi area, where there are the main malls and big shops in Genoa;
- the areas where there are **fair** and where **musical and sports events** are held (Foce and Marassi). In Marassi there is the biggest prison in Liguria Region too;
- the main historical urban **cemetery** in Staglieno (north-east).

<sup>13</sup> Source: TB elaboration on ISTAT data

THE MAIN ATTRACTOR PLACES IN GENOA<sup>14</sup>



Then, important attractor places are **schools**, mainly high schools and the University seats. Regarding high schools (in Italian “Scuole secondarie di II grado”), there are concentrated in 4 main areas:

- Sampierdarena;
- Central-western part (from Dinegro to Principe and Nunziata Square);
- Central eastern part (from Brignole-Carignano to Foce-Marassi);
- Sturla-San Martino.

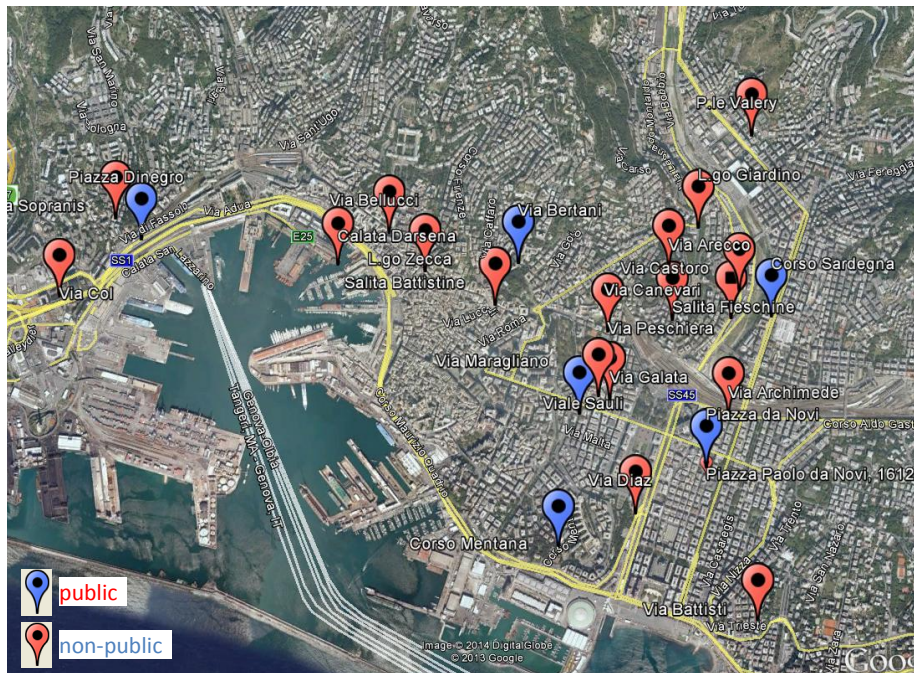
Then, there are further areas with important schools, for example in Voltri, Sestri Ponente, Molassana, Bolzaneto and Nervi.

In particular, there are in Genoa 56 public and 17 non-public high schools.

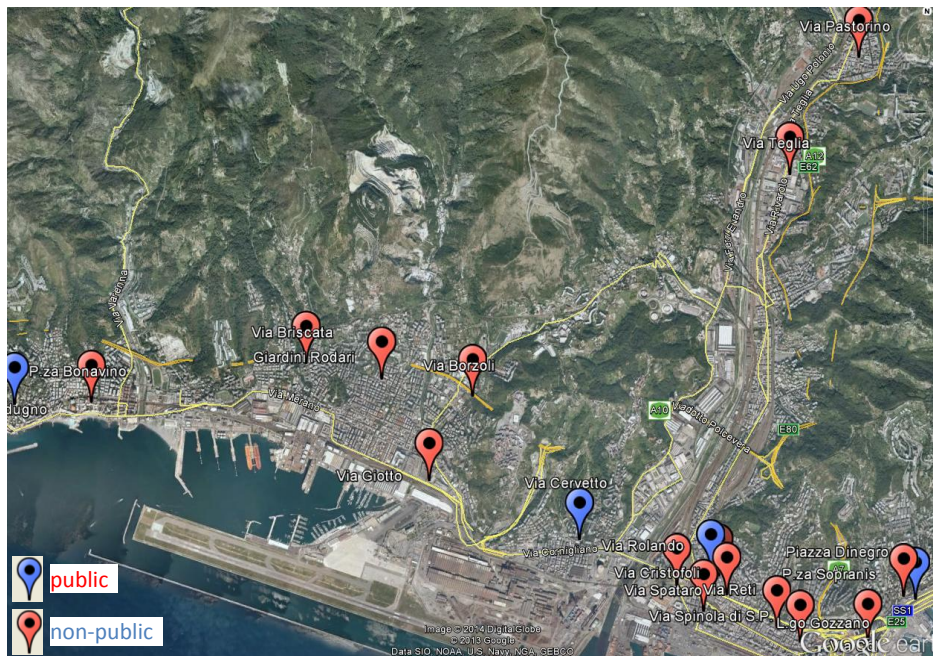
<sup>14</sup> Source: TB elaboration on Google maps



**HIGH SCHOOLS IN THE CENTRAL URBAN AREA<sup>15</sup>  
(FROM DINEGRO TO FOCE/MARASSI)**



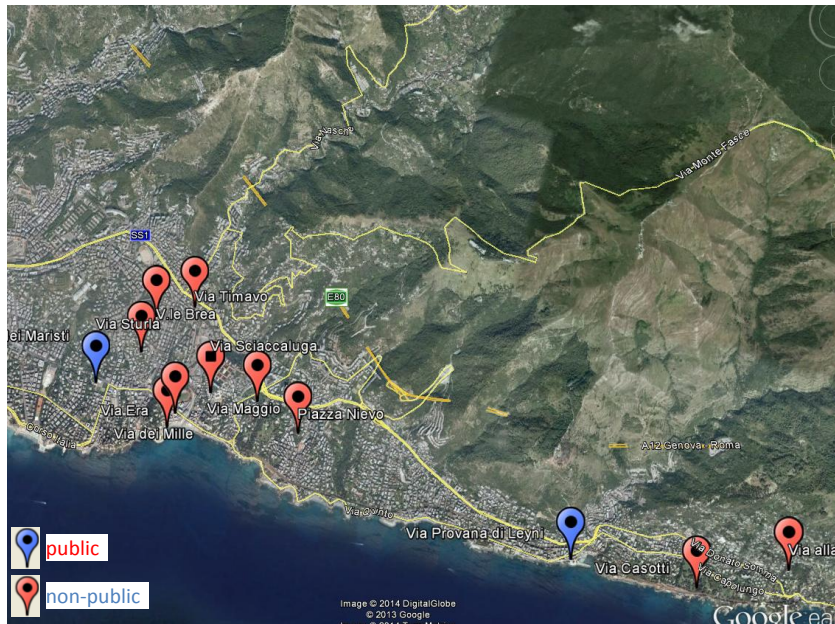
**HIGH SCHOOLS IN THE WESTERN AREA  
(SAMPIERDARENA, SESTRI P., PEGLI AND BOLZANETO)**



<sup>15</sup> Source: TB elaboration on „Ufficio Scolastico Regionale” data (Google Earth)



**HIGH SCHOOLS IN THE EASTERN AREA (STURLA, QUARTO, QUINTO AND NERVI)**



Regarding scooter mobility, analysis pays attention to nursery and children schools too. They are mainly concentrated in the central part of the city. In this light, in terms of municipal schools, there're:

- 30 nursery schools (“asili nido” e “scuole dell’infanzia”) with about 2.000 registered children;
- 8 primary schools (“scuole primarie”) with about 1.400 children;
- 4 secondary schools of the 1<sup>st</sup> level (“scuole medie”) with about 500 children.

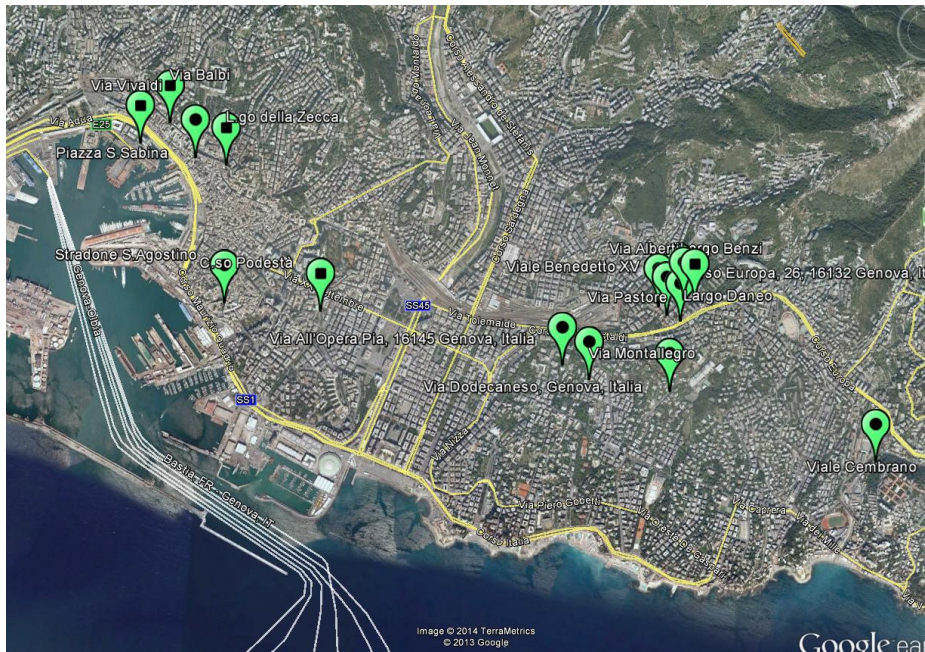
**MUNICIPAL SCHOOLS IN THE CENTRAL PART OF GENOA<sup>16</sup>**



<sup>16</sup> Source: google maps on Comune di Genova data

The main seats of the University of Genoa in the urban area are about 16, placed in the central part of the city (from Principe to Sturla). The bigger seat are in Via Balbi (by Principe railway station), Stradone Sant’Agostino (historical centre), San Martino Hospital and Via Montalegno (Albaro, east side). The project of the Engineering department upgrading will include the move of this faculty of the University in Erzelli hill (in the West part, in the Cornigliano area).

**UNIVERSITY SEATS IN GENOA<sup>17</sup>**



Not in terms of final day trip destination but also the main urban **parking places** are attractors in order to take bus/underground or reach schools and offices on foot.

In this light, the interchange parking places in Genoa (§ 5.1.3) are the most important attractors. Focusing on the motorvehicle mobility it’s possible to identify in terms of the scooters parking places more used in central part of the city:

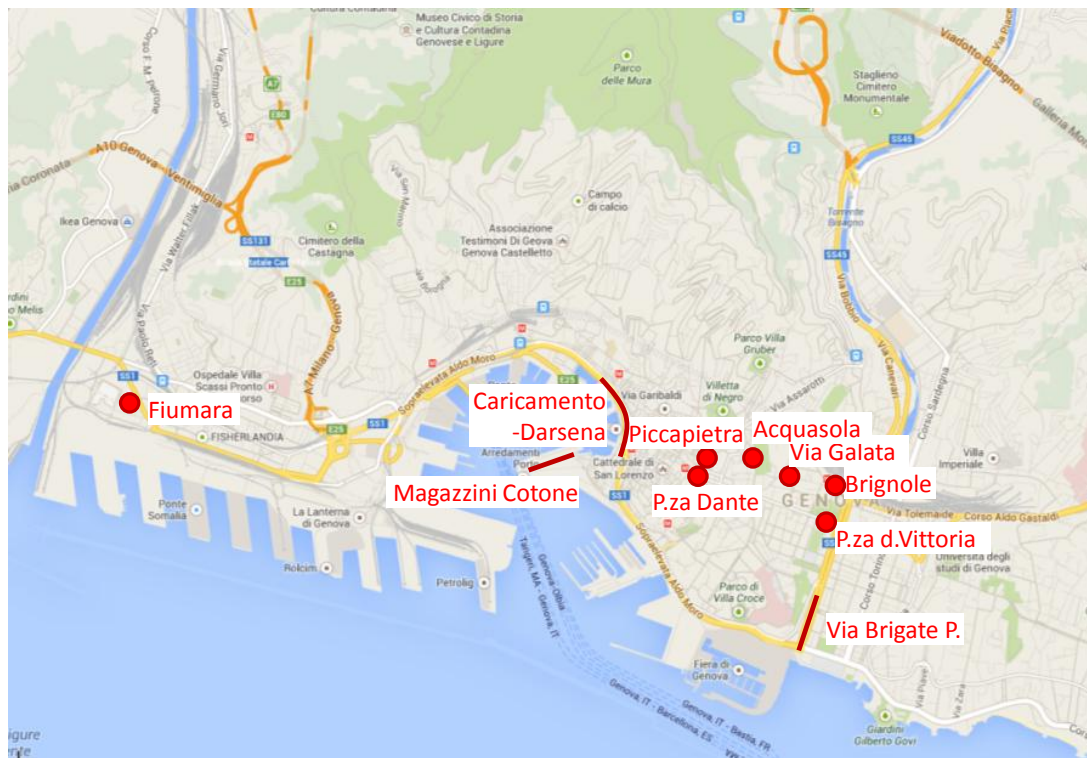
- Dante and De Ferrari squares and their surroundings;
- Della Vittoria Square, near Brignole;
- in the square of the Brignole (“Piazza Verdi”), at the sides of the railway station;
- Piccapietra Square area, between the Carlo Felice Theatre and Via XII Ottobre;
- near the Acquasola Park;
- Via Galata, between Brignole area and Via XX Settembre, the main big shops road;
- Via Brigade Partigiane, near the fair and in the Foce area;
- along the sea, between Caricamento and Darsena;
- in “Porto Antico”, in particular by the “Magazzini del Cotone”, where there’s cinemas, museums and children/touristic areas;

<sup>17</sup> Source: TB elaboration on Google Earth



- near the Fiumara commercial precinct, in Sampierdarena.

**THE MAIN SCOOTER PARKING PLACES IN GENOA<sup>18</sup>**



Analysis highlights there are in Genoa some area with a strong concentration of attractor places, such as Sampierdarena, Campi, Sestri Ponente, Marassi but the bigger part of the urban mobility demand (rate of 58% of the ante-operam surveys sample 58%)<sup>19</sup> is attracted by the city centre. Considering the whole Genoese mobility demand, about 35%<sup>20</sup> of the day trips is attracted by the central city area, with a lower rate linked to through city traffic flows (14%).

Regarding tourists, the main attractor urban area is Porto Antico where there’s a strong concentration of touristic events and places (Acquarium, museums, areas for children, ships docks for Cinqueterre and Portofino).

**2.5. Planning documents analysis**

The main starting point for the Genoa context analysis is the **Mobility Urban Plan (PUM)**, approved in 2010 by the Genoa Municipality.

The PUM general objectives can be synthetized by:

- internal and external travel costs decrease, through:

<sup>18</sup> Source: TB elaboration on Google Maps

<sup>19</sup> Source: TB analysis on ex-ante surveys results

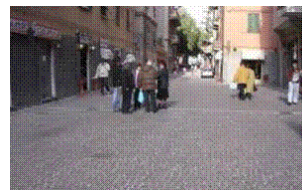
<sup>20</sup> Source: TB Elaboration on ISTAT data

- atmospheric pollution decrease, taking into account the sustainable transport means;
- road safety level increase, trying to promote new and modern vehicles;
- urban vehicle congestion and then day trip time decrease;
- life quality increase, enhancing what already done and planned by local stakeholders, such as Municipalities committees (named Centri Integrati di Via-CIV);

#### URBAN DEVELOPMENT PROJECT IN BOLZANETO (2004-2007)



**BEFORE**



**AFTER**

In terms of concrete actions, PUM promotes:

- collective transport enhance, identifying different levels of the transport services (frequency, day timetable, etc) and then verifying the effectiveness of every area/line of the urban network;
- infrastructural actions achievement, involving urban railways, underground line and port;
- local urban areas development;
- management parking system, in order to enhance the public transport use;
- sustainable mobility growth, mainly in terms of pedestrians and bikers safety;
- urban freight flows system enhance, creating where possible different routes for freight and passenger vehicles (e.g. port and motorway accessibility, through city traffic).

The PUM actions are based on 5 “priorities”:

1. urban central part development, decreasing car traffic by demand mobility regulation;
2. development of every local more peripheral centres, by pedestrian routes, reserved lanes for buses, restricted traffic zones;
3. collective transport enhance by intermodality development;
4. cableway transport development, considering Genoa configuration;
5. sustainable mobility promotion, mainly in terms of pedestrian/bike routes and e-vehicles.

Actions are included in 4 project alternatives/scenarios that is referred to short, medium or long termin periods:

- priority actions for all alternatives (e.g. railways upgrading and urban motorway);
- peculiarity actions that identify each alternative (e.g. specified parking policy, urban shuttle services).

Then, the Plan alternatives include a set of actions in order to enhance the effectiveness of every scenario, like the modernization of private vehicles and the promotion of innovative solution to use vehicles both 4 and 2-wheeled (e.g. sharing, electric cars or motorvehicles).

At a glance, the Mobility Plan promotes actions and policies strictly consistent with the e-vehicles and new solutions development. In this light, it's possible to point out:

- to decrease the car and traditional vehicle use in urban trips;
- to increase the road safety;
- to promote the parking interchange use between cars and other sustainable transport means.

The PUM alternatives are in particular:

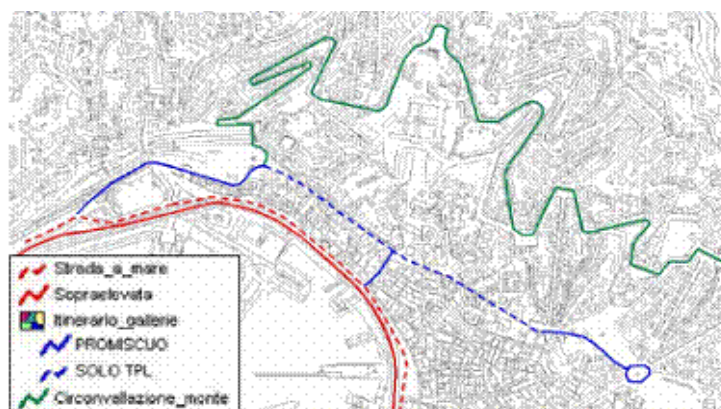
- basis scenario (RS), which represents the current scenario with the primary actions achieved;
- CM scenario, focused on mobility and parking systems regulation;
- MT scenario, to promote collective urban transport network, with new system like tramways too, and local peripheral centres;
- MTP scenario, paying attention to decrease the car mobility in the urban central parts.

### 5.1.1. Urban central part development

The development of the urban central part, between “Circonvallazione a monte”, the sea and “Foce”, is promoted by:

- the through city traffic flow concentration in specific routes, that become “quality routes” to ease the local traffic circulation in other areas;
- the restricted traffic zones development, increasing type and quality of their accessibility and accesses control;
- the road equipment quality monitoring and upgrading, in consistence with new circulation model.

THROUGH CITY TRAFFIC ROAD MODEL<sup>21</sup>

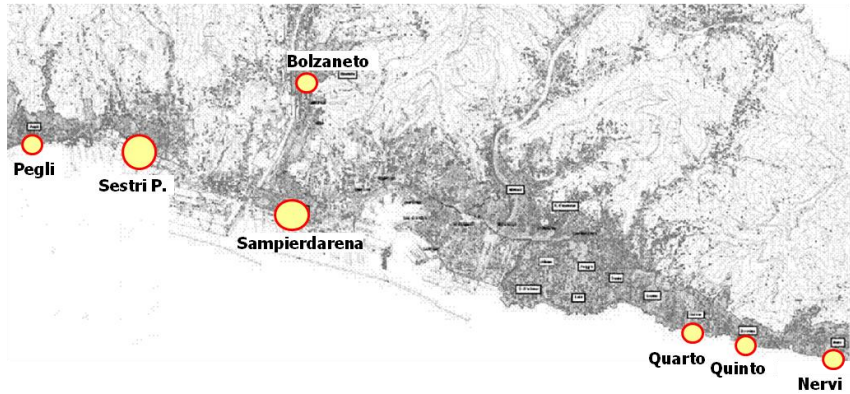


<sup>21</sup> Source: PUM Genova

### 5.1.2. Development of the local centres

The city of Genoa is a urban context with several local centres and with 9 Municipalities. To value quality of life of every urban centre and decrease the car use, PUM includes:

- creation of central areas in each local Municipality by pedestrian areas, restricted zones and parking policies;
- intermodality system promotion, in order to reach the Genoa centre by buses/trains/underground with a frequency of at least 15 minutes.

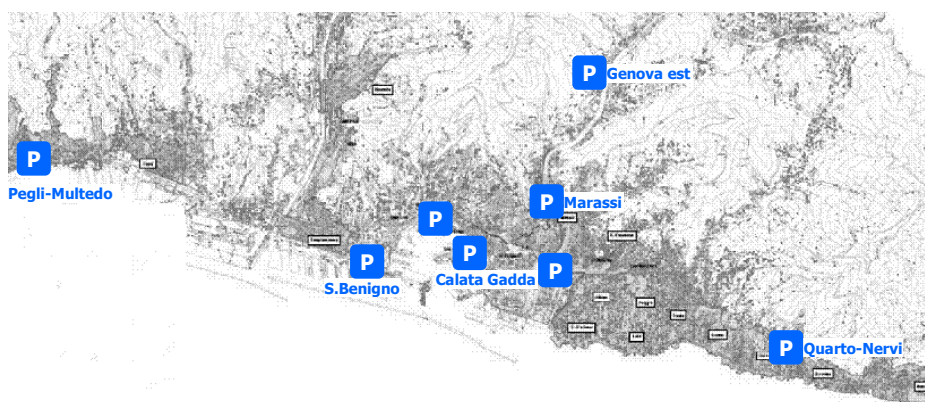


### 5.1.3. Collective transport enhance

The Mobility Plan includes in terms of public transport development for the long-term Scenario:

- the underground extension to San Martino hospital (east) and Rivarolo (north-west);
- the tramways lines achievement along the main urban mobility routes and between the bigger railway stations (Sampierdarena, Principe e Brignole);
- the rationalise of buses lines, to enhance connections and intermodality with railway services;
- the service “Navebus” growth, to enhance the sea-service between Pegli (west) and Porto Antico, with extensions to west (Voltri) and east (Nervi) sides;
- the interchange nodes upgrading, in terms of infrastructures (e.g. buses stops, stations) and accessibility system, according to which peripheral parking places are very important.

#### INTERCHANGE PARKING PLACES<sup>22</sup>



<sup>22</sup> TB elaboration on PUM data



The Plan promotes in particular a new collective transport system focused on interchange nodes and “service levels” (frequency, timetable, stops,...), according to which each bus line is characterized.

In this light, the urban collective transport network is made by:

- fast services, to reach the centre with more peripheral areas (railways and underground);
- services to reach every area with the nearest interchange node (main bus line, tramway);
- secondary bus services between local centres and the primary network or the main interchange parking.

**TRAMWAY (RED) AND UNDERGROUND (ORANGE) PROJECTS**



**5.1.4. Cableway transport development**

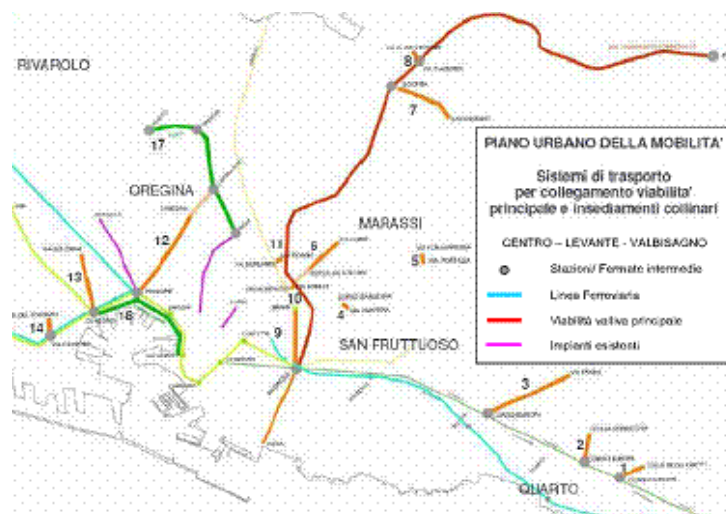
The set of actions, that promotes the urban cableway system, will allow to decrease buses services in hill and peripheral areas where now public transport frequency is low.

This infrastructure aims to:

- stop bus lines where there will be the cableway system;
- reduce the bus service where it's more difficult to offer a good transport level;
- increase the collective transport frequency in hill areas and reduce travel time to reach the city centre.

The main infrastructures included in the Mobility Plan are between:

- Corso Europa and Borgoratti;
- Corso De Stefanis and Marassi;
- Brignole station and Piazza



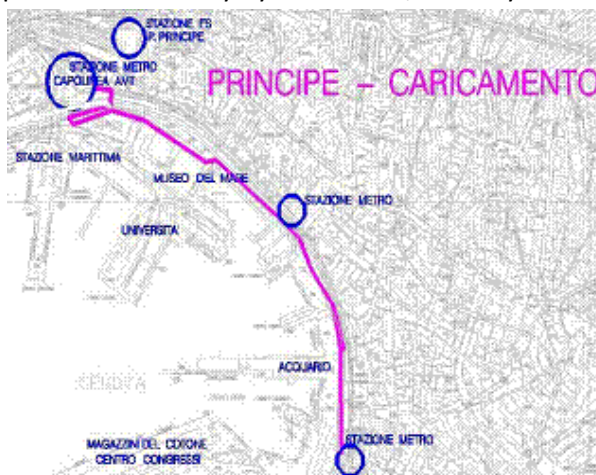
Manin

- Principe station and Oregina
- the airport, Cornigliano and Erzelli hill.

### 5.1.5. Sustainable mobility promotion

The Mobility Plan takes into account mainly the pedestrian mobility by two routes, not only for inhabitants but also for tourists:

- along the sea from Lanterna to Brignole station;
- in the Foce areas, connected the fair area with Brignole station and Bisagno valley.



**PEDESTRIAN ROUTE BETWEEN PRINCIPE STATION AND CARICAMENTO**

## 5.2. Survey results: the urban mobility

### 5.2.1. Sample characteristics

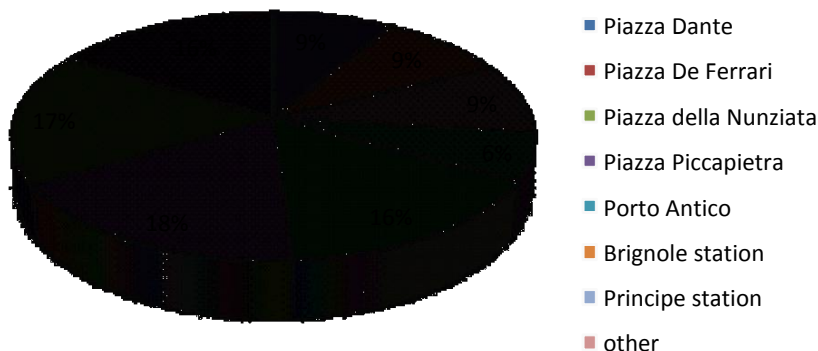
In consideration of the main attractor places, the ante-operam survey in Genoa has done in the central urban area and in particular near the two railway stations of Principe e Brignole, in Piazza De Ferrari, Piazza Dante, Piazza Piccapietra, Porto Antico (near the Acquarium) and Piazza della Nunziata. In this way, it has been possible to collect 604 face-to-face interviews.

**MAIN ATTRACTOR PLACES WHERE INTERVIEWS HAVE BEEN DONE**



Then, interviews are been done in other urban places, such as Fiumara, Via San Lorenzo, Via Balbi and in some Bisagno Valley squares.

**RATE OF INTERVIEWS COLLECTED FOR PLACE**

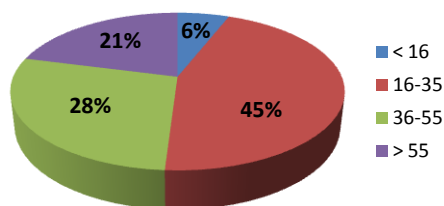


The sample, differentiated by personal data (gender and age) and type in terms of inhabitant or tourist, is composed by 604 interviewees, 301 men and 303 women, 553 inhabitants and 51 tourists.

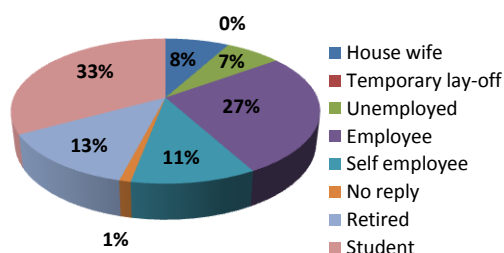
It is characterized by:

- the main age range includes young people, from 16 to 35 years (45%), who are more careful to mobility and environmental issues;
- more than 50% of the whole sample includes students (33%) and employees (27%), highlighting the high rate of systematic day trips for working and going to schools;
- about 61% of the sample has not declared own annual income, because there was a lot of students (33%) and retired (13%).

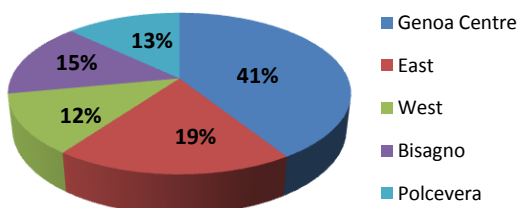
**AGE**



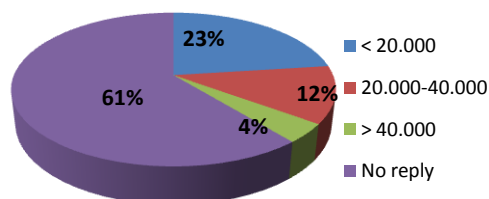
**STATUS**



**AREAS WHERE INTERVIEWEES LIVE**



**ANNUAL INCOME**

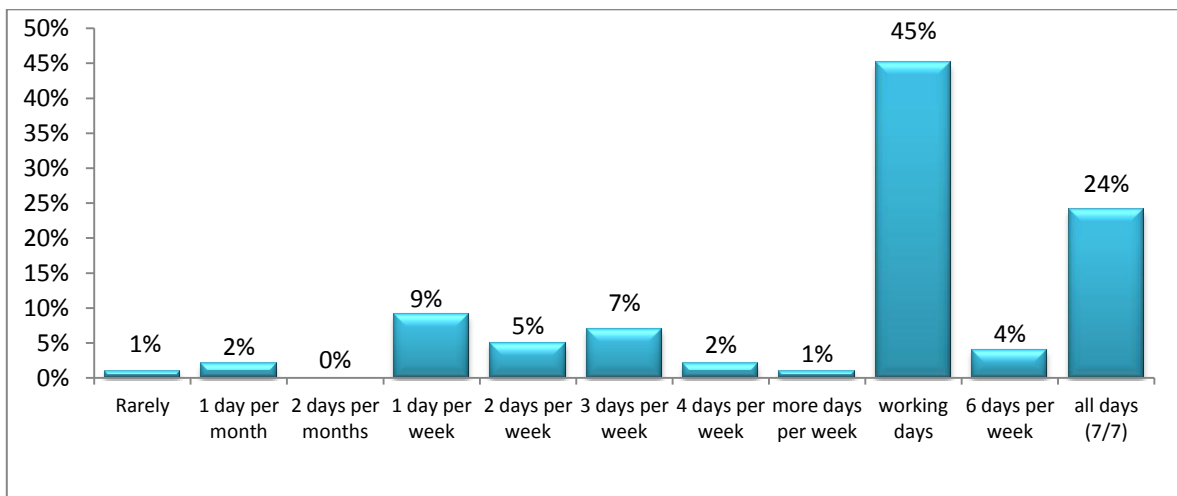


### 5.2.2. Focus on residents

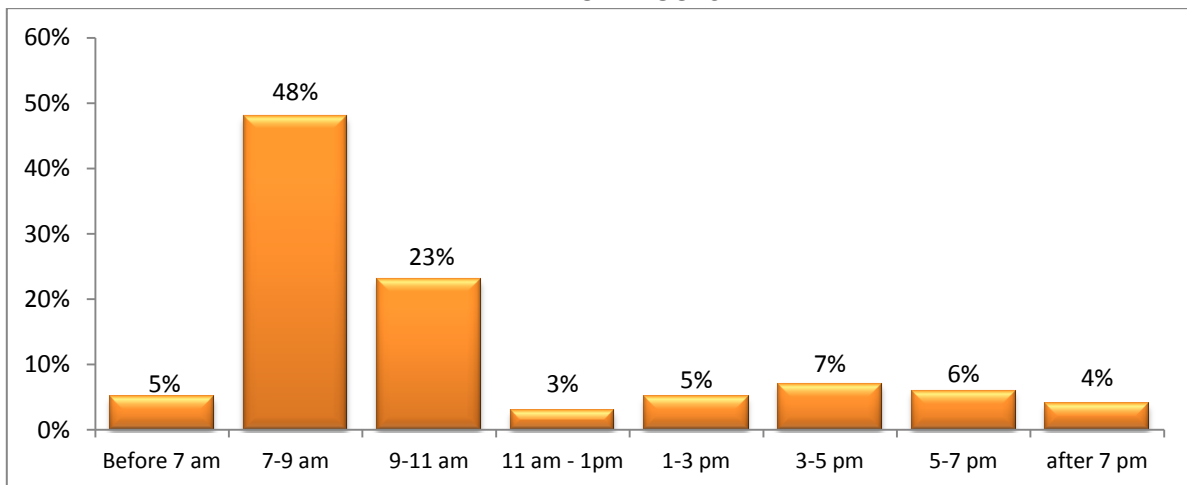
The surveys have analysed 527 day trips, with the following aspects:

- Almost 50% of the whole sample begins own day trips at the morning rush hour, with a relevant rate regarding 9-11 am time band (23%);
- 24% is referred to trips done all week days (from Monday to Sunday), highlighting their not-systematic reason (work or school);
- 80% includes short day trips (max 30 minutes).

**FREQUENCY**

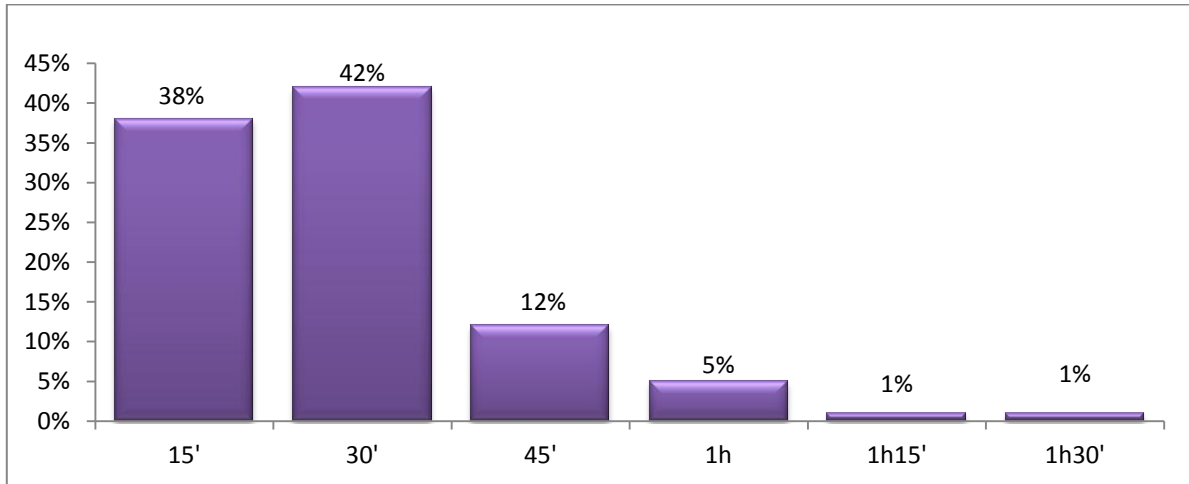


**DEPARTURE HOURS**

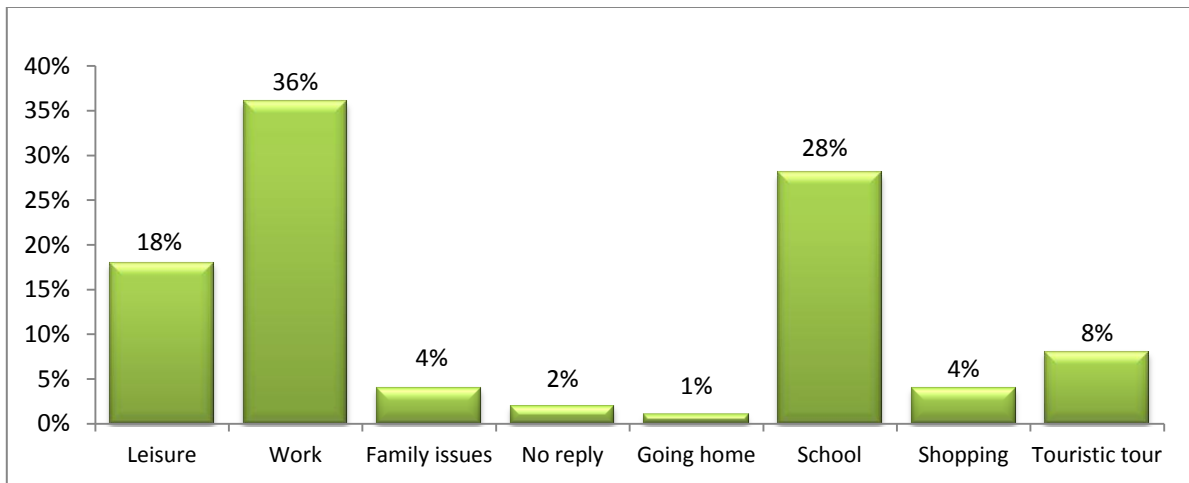




**TRIP DURATION AVERAGE**



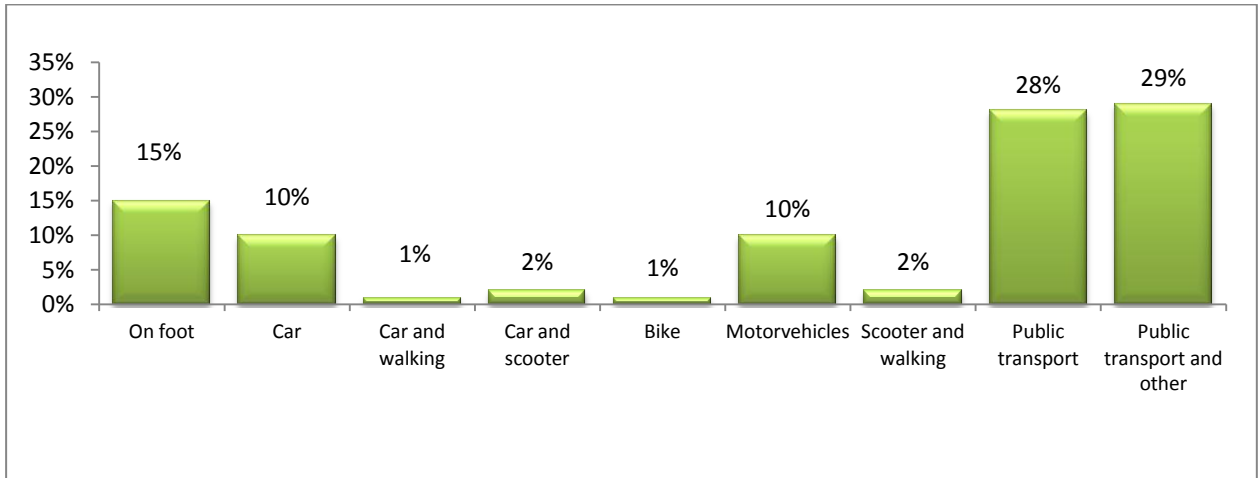
**DAY TRIP REASONS FOR RESIDENTS**



The modal share analysis of the EleCTra Genoese sample highlights:

- local public transport is used by more than 50% of the interviewees, both unique mean used and with other means (car, 2-wheeler vehicles, walking,...);
- the day trips on foot represents an important rate of the whole urban mobility in Genoa (about 15%), in according with the short average duration of trips;
- in this light, there is the modal share of scooters and motorcycles, that is 10% for the ante-operam sample;
- for urban mobility, car modal share in terms of unique transport mean used is not very high. Only 10% of the sample, indeed, uses car and not other means. Then, 1/3 of the sample uses car to travel alone.

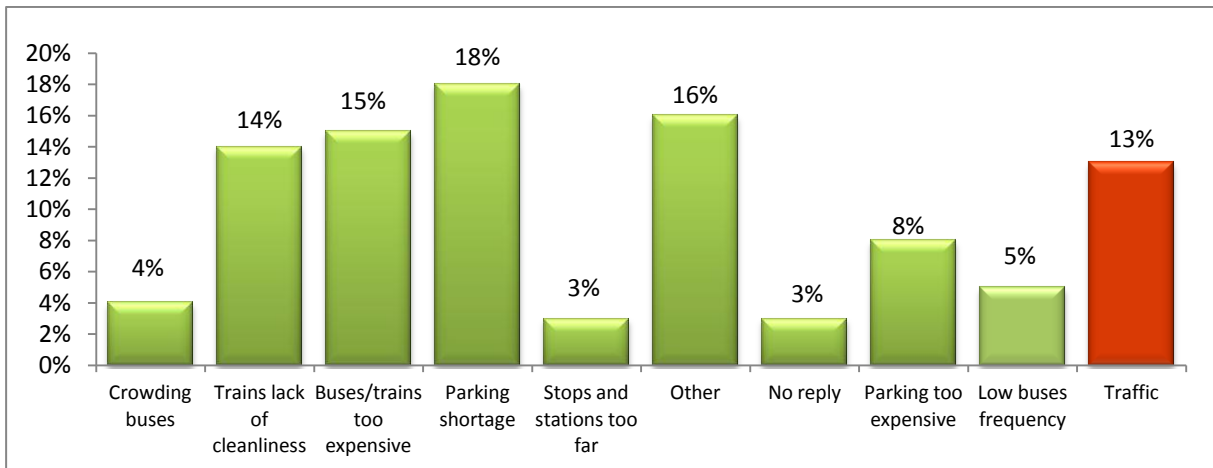
**MODAL SHARE FOR RESIDENTS**



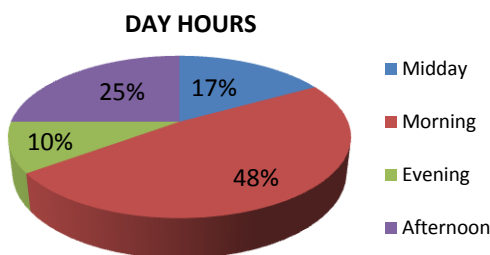
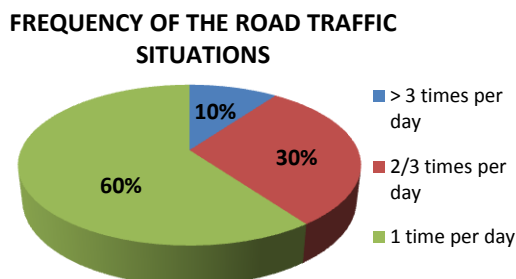
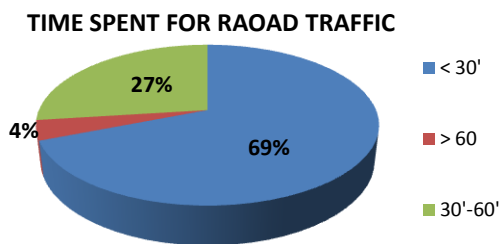
In terms of critical mobility issues, ante-operam survey highlights:

- parking shortage (18%);
- high parking charges in urban areas (8%);
- high urban public transport fares (15%) and lack of cleanliness on the urban buses (14%);
- traffic and car congestion situations (13%), mainly to go to work/school in the morning (48% of those who declares traffic as the main problem), for a maximum of 30 minutes (69%) and one time per day (60%);
- Low frequency (5%) and crowding (4%) of the urban buses.

**CRITICAL MOBILITY ISSUES**

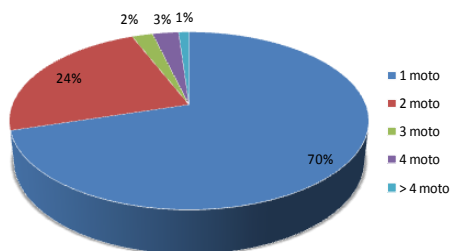


**“TRAFFIC” DETAIL**

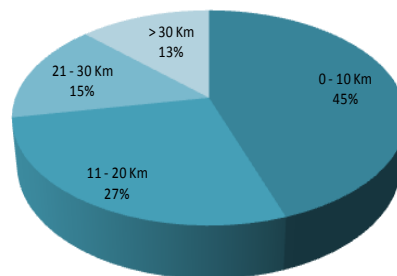


Focusing on motorcycle mobility, the rate of 32% of inhabitants interviewed has declared to be owner of at least 1 motorcycle, that represents the only motorcycle in own family for 70% of the owners. Then, 45% of the owners uses motorcycles for short trips (max 10 km) and 27% uses ones for trips between 11 and 20 km.

**NUMBER OF MOTORCYCLES IN OWN FAMILY**



**KM FOR EACH TRIP BY MOTORCYCLE**



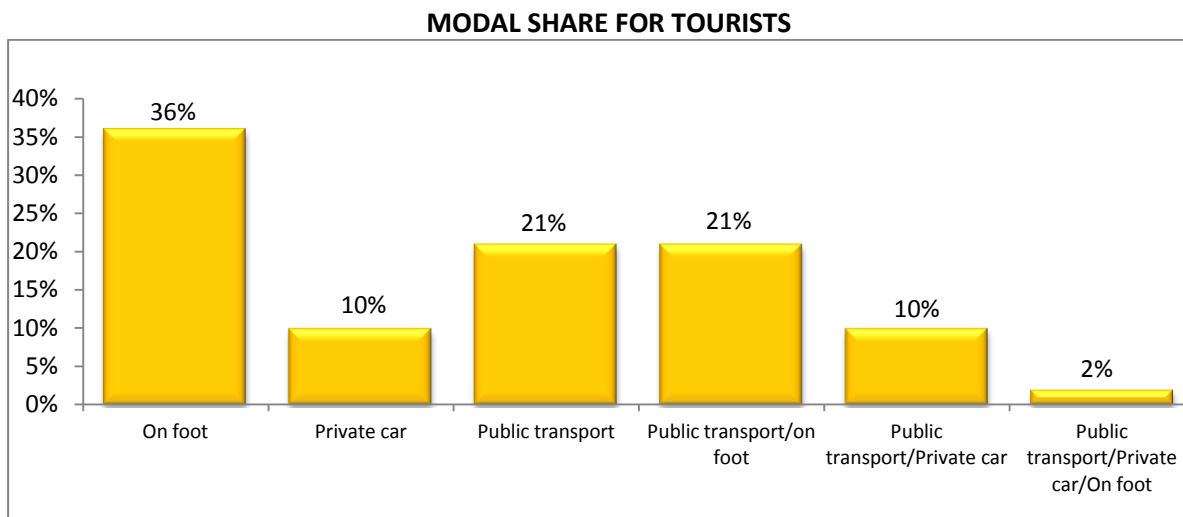
**5.2.3. Focus on tourists**

The ante-operam surveys has payed attention to mobility tourists to identify the main issues and needs and not to create a complete framework of the touristic mobility in Genoa, because of surveys characteristics In this light, the tourists sample is composed by 42 interviewees.

Regarding the day time slot, 43% is referred to 9-11 am and 17% to 11 am-1 pm.

As already noted for inhabitants, the day tourists trips are very short (52%: max 15 and 73% max 30 minutes).

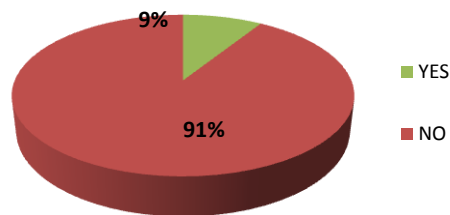
It's interesting to highlight the 36% of the tourists sample prefers only to walk or to use other transport means with a part on foot (59%). The public transport system is also used by tourists (21% and 54% considering the other means use after or before).



### 5.3. Survey results: focus on e-vehicles

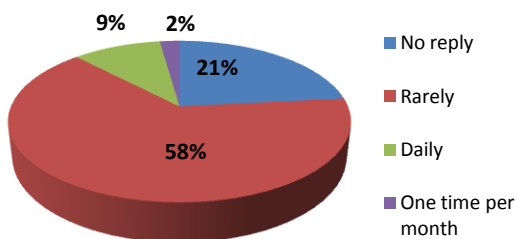
The current situation is characterized by a very low information level about e-vehicles. In particular, 91% of the sample has never tried or used any electric vehicles.

Then, the e-vehicles more used or tried aren't scooters but cars (about 50% of those who has declared to know e-vehicles) and bykes (30%). E-scooters have been used by 14% of the interviewees.

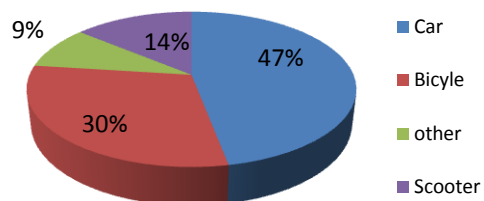


#### "YES" DETAILS (only 9%)

##### E-VEHICLES USE FREQUENCY



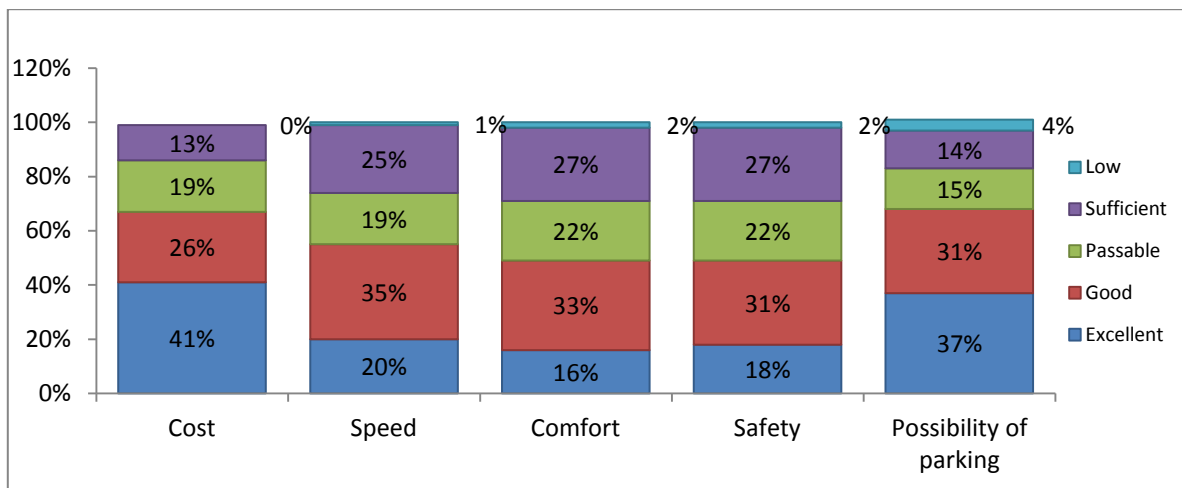
##### TYPE OF E-VEHICLE USED



More in-depth surveys questions analysis has highlighted information of citizens about e-vehicles are made by impressions and not real experiences and knowledge. In this light, e-vehicles are evaluated like small and slow transport means.

E-scooters weaknesses for citizens are high costs (41% of the sample has given a low evaluation to this aspect for e-scooters) and the shortage of parking (37%), that is a critical issue for the whole Genoese mobility too. On the other hands, strengths are comfort (for 27% of the sample is “good”) and safety (27%).

**EVALUATION OF E-VEHICLES ASPECTS**

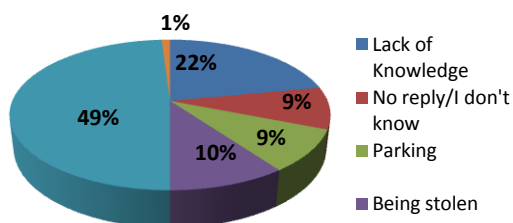


In terms of critical issues, for those who could use e-vehicles it’s very difficult to find electric charging points (50%) and then it’s very slow the information level about these types of transport means (22%). This aspect is highlighted in several surveys elements and in particular in the last section about suggestion of sustainable mobility.

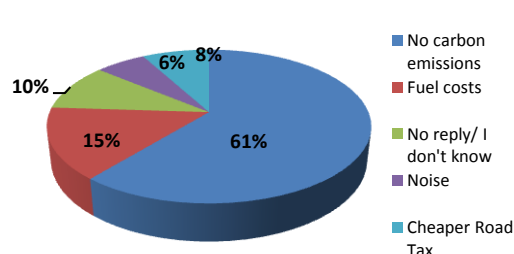
Other problems for citizens are risks of theft (10%) and scooters parking shortage (9%).

Maybe for the low information level regarding e-vehicles, 60% of the people interviewed are declared like benefits achievable by e-mobility the atmospheric pollution reduction. In the second position (15%) there’s the decrease of travel costs, linked to fuel cost, and then the lower ownership vehicle tax (8%) and finally the decrease of the noise pollution (6%). 10% of the sample hasn’t declared any answer.

**E-VEHICLES URBAN USE ISSUES**

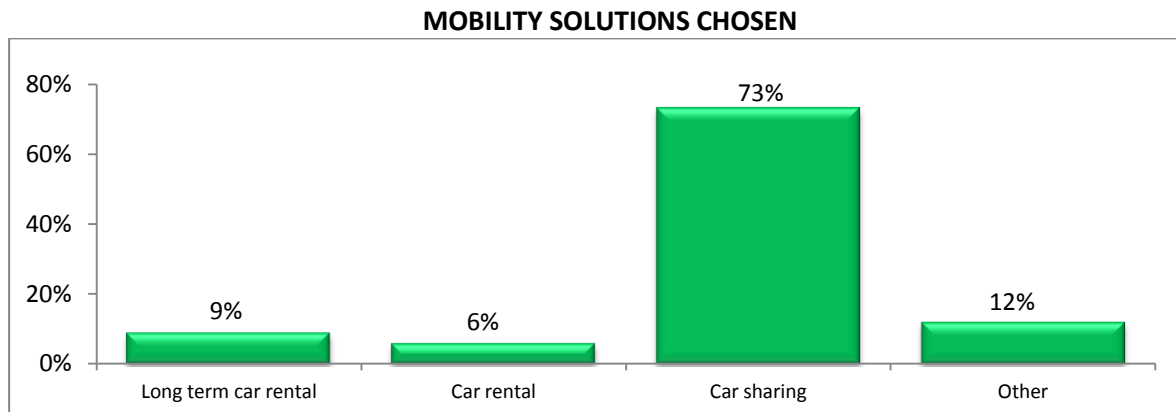


**BENEFITS BY E-VEHICLES USE**



**5.4. Survey results: predisposition for innovative solutions and e-vehicles**

Only 22% sample has declared to consider innovative mobility solution and give up to buy a vehicle, mainly in terms of cars. In particular, 73% of those takes into account car sharing, ~15% rental, 16% other solutions.



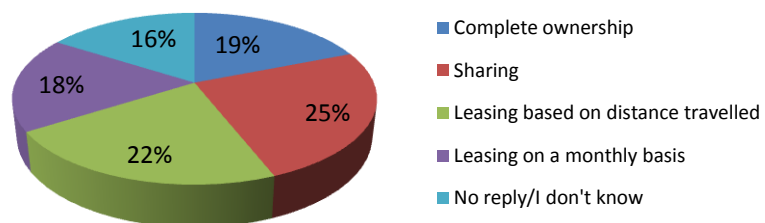
Focusing on motorvehicles, 6% (10) of the owners don't consider buying only but also sharing and rental. It's interesting to highlight the good predisposition for the scooters use by tourists (22% of the tourists sample) even if they prefer buying a vehicle rather than using other solutions.

In terms of the new mobility solutions, the main target highlighted by surveys is young people (16-35 years).

The good predisposition to use e-vehicle is confirmed by 67% of the sample, that declares intentions to buy/try an e-vehicle in the future mainly in consideration of environmental benefits.

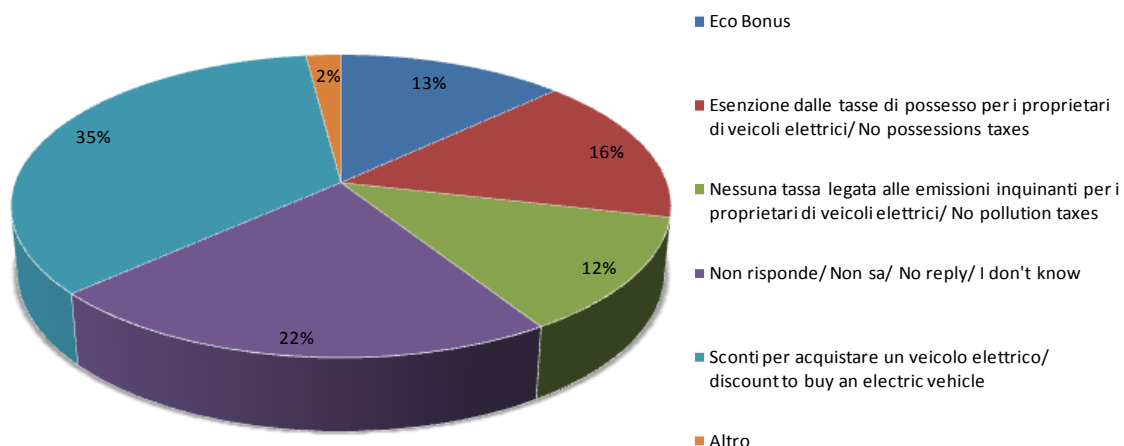
The main solution to acquire and use e-vehicle is sharing (25%), with an interesting rate about mileage rental (22%). However, buying is the solution preferred and this aspect appears from several questions, maybe by the low information level about innovative mobility solutions.

**SOLUTION TO ACQUIRE AND USE E-VEHICLES**



Indeed, this aspect is confirmed by the answers regarding incentives to promote e-vehicle use. In this light, the first incentive is linked to e-vehicle buying (35% "discount to buy it") and then "no ownership tax" (16%) and "eco bonus" (13%). Again, it's clear the low information level on e-vehicle sector because of 22% has indicated "I don't know" or it hasn't given reply.

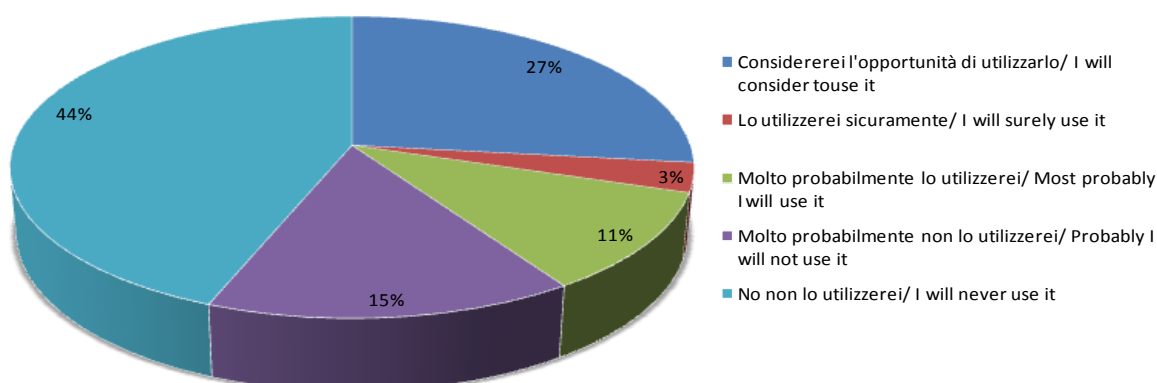
### INCENTIVES TO PROMOTE E-VEHICLES USE



Paying more attention to scooter sharing service, if in Genoa there was it:

- ~60% of interviewees has given a negative response
- 38% could use it;
- 3% will certainly use it.

### IF IN GENOA THERE WAS A SCOOTER SHARING SYSTEM...



### 5.5. Survey results: sustainable mobility advice

The last question has concerned advice and suggestions by citizens and tourists about the development of sustainable mobility.

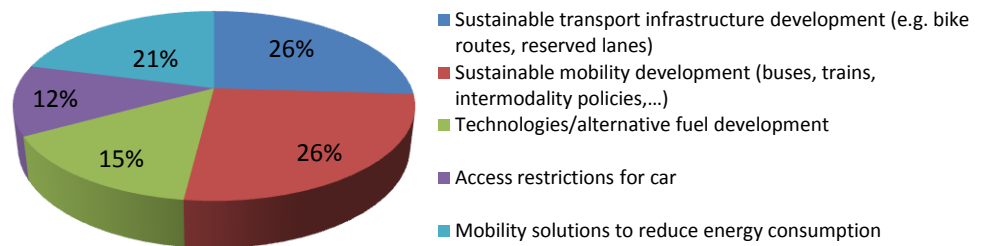
The options more chosen are:

- collective transport systems development (26%);
- sustainable mobility infrastructure development (26%);
- mobility model creation and dissemination in order to decrease energy consumption and pollution by vehicles (21%).

Then, it's possible to highlight the following suggestions:

- to give more information to citizens about sustainable mobility;
- to create interchange parking to promote the public transport use in the urban area;
- to enhance electric buses and shuttles.

### SOLUTIONS FOR THE SUSTAINABLE MOBILITY DEVELOPMENT IN GENOA



#### 5.6. Survey results: focal points

In consideration of the ante-operam surveys, it's useful to highlight the following focal points for Genoa:

- mobility aspects:
  - main Attractor places: urban central part (58%) and Porto Antico for tourists;
  - day time slot when trips increase: 7-9 am (~50%) and 11-13 am (23% inhabitants and 43% tourists);
  - raison: work+school (~50%);
  - main Transport mean. Good potentiality for sustainable mobility in Genoa: public transport is used by 36% of the sample (but it's not the global share mode because the survey is focused on current and future scooter users). Tourists prefer walking (36%). Cars are used like unique day mean by 10% of the sample and its 67% declares to travel with at least 2 people;
- current mobility critical points:
  - parking shortage (18%);
  - public Transport use (14% for high fares and 14% for poor cleaning);
  - traffic (13%);
- focus on motorvehicles:
  - owner: 70% of the sample;
  - short day trips: 45% max 10 km;
  - low information level (and then low current predisposition) regarding alternative solution to use vehicle (not only buying them);
  - good predisposition to use scooters by tourists;
- focus on e-vehicles:
  - low information level regarding real features and benefits of e-vehicles, that are currently evaluated like slow and small-size vehicles;
  - good predisposition to use them in the future, if there will be convenient conditions;



- solutions more chosen: sharing (25%), mileage rental (22%), buying (18%). However, buying is the solution preferred and this aspect appears from other several questions too;
- incentives: discount to buy them (35%), reduction of the ownership taxes (16%), ecobonus (13%);
- e-vehicles perception by citizens:
  - weaknesses: high cost (41%), parking shortage (37%);
  - strengths: comfort (26%) and safety (26%);
  - benefits: atmospheric pollution decrease (60%), travel costs linked fuel decrease (15%);
  - critical issues: recharge points shortage (50%), low information level (22%);
- users e-scooters target:
  - young people: 16-35 years;
  - mainly students;
  - short trips (80% of the sample: max 30 minutes and 45% of the motorvehicle owners interviews: max 10 km);
- priorities for citizens about sustainable mobility:
  - public transport development, sustainable vehicle and intermodality enhance (26%);
  - infrastructure for sustainable mobility development and incentive policies and actions, such as reserved lanes, bike routes, etc;
  - alternative solution promotion to use vehicles (e.g. sharing);
  - innovative transport means enhance (electric and hybrid) (15%).

## 6. Infrastructural and service network

The Genoese network is composed by several types of infrastructures and, in considering of the territorial and geographical aspects, they are concentrated in narrow bands between sea and mountains or in populated valleys.

The situation of the infrastructural Genoese network points out several bottlencks and critical elements.

## 6.1. Electric charging points

In the current situation, in Genoa there are 17 electric charging points (public columns) already operating and 3 electric points planned by Enel.

**ELECTRIC CHARGING POINTS IN THE CENTRE OF GENOA<sup>23</sup>**  
(GREEN: OPERATING; RED: PLANNED; BLUE: MAINTENANCE)



The charging points already operating are in the most important attractor places in Genoa (Porto Antico, near Principe and Brignole railway stations, De Ferrari Square and its surroundings, Fiumara in Sampierdarena, San Benigno) but it could be possible increase them, planned new ones in other important urban places (mainly University seats, hospital and schools).

## 6.2. Main infrastructural bottlenecks

### 6.2.1. Road network

In the Genoa Municipality the urban road network is composed by 4 main routes and 4 motorways:

- “Aurelia” along the sea, from the name of the ancient Roman route that links Rome to France today too and goes across the whole metropolitan contest (from Nervi to Voltri);
- “Corso Europa”, that links Levante (east part of the city) with the urban centre;
- “Bisagno valley”, composed by two roads on the left and on the right of the Bisagno River. It’s important to reach the hill and the local centres (e.g. Staglieno, Sant’Eusebio, Molassana, S.Felice) along the Bisagno route with the centre;

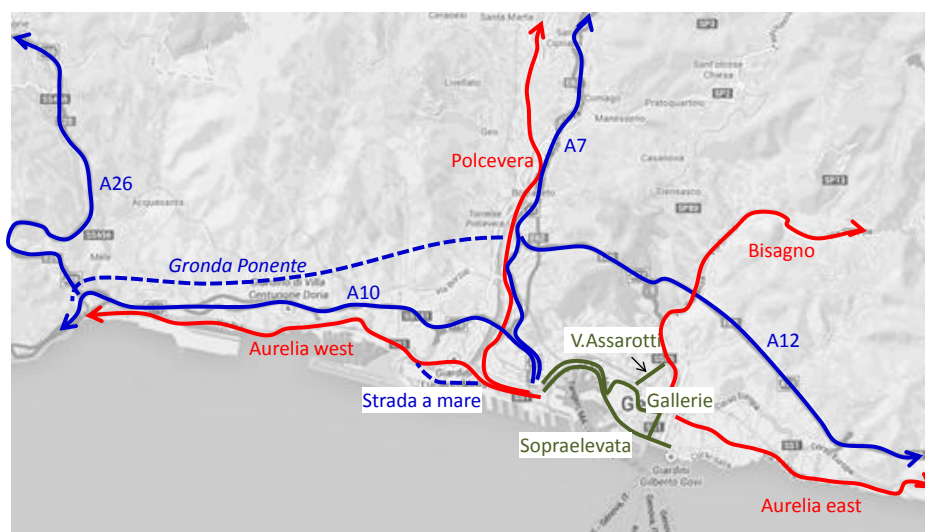
<sup>23</sup> Source: „Enel Drive” website

- “Polcevera valley”, composed by two roads on the left and on the right of the Polcevera River. It’s important to reach the hill and local centres (e.g Rivarolo, Bolzaneto, Begato, Certosa) along the Polcevera route with the centre;
- “A7 Milano-Genova motorway” links the northern part of the city (Bolzaneto and Polcevera valley) with the central part of Genoa;
- “A10 Genova-Ventimiglia-France motorway” links port and centre with the Airport and the West neighborhoods (Pegli, Voltri,...);
- “A12 Genova-Livorno motorway” links the central part of the city with the East urban area;
- “A26 Genova-Alessandria-Gravellona Toce” links the West urban part (Voltri) with the Stura valley and the Turchino crossing place.

Finally, there is the set of routes in the central part of the city, that can be synthetized in:

- “Sopraelevata”, that goes across the whole central part along the sea and represent the most used road connection to join the West with the East side;
- “Gallerie Garibaldi-Bixio”, that joins with two tunnels in the central part of the city Principe with Brignole area. It’s strongly linked with the urban traffic flows, going across very populuos central area in Genoa;
- “Via Assarotti”, between Corvetto square (on the “Gallerie” route) and Bisagno valley. In the morning rush hours there is often vehicle congestion cases.

#### THE MAIN ROUTES IN GENOA<sup>24</sup>



In consideration of the territorial and geographical situation of the city of Genoa, the most important bottlenecks are linked to the mix of different traffic flows types and specific vehicle congestion cases, mainly during rush hours.

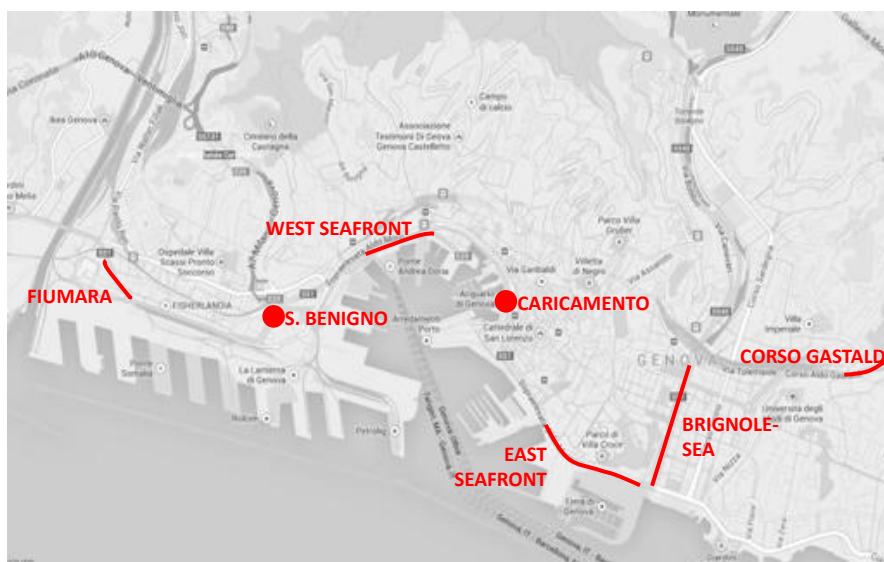
In particular, regarding the most important urban bottlenecks in Genoa, it’s possible to identify<sup>25</sup> going from west to east:

<sup>24</sup> Source: TB elaboration on Google maps

<sup>25</sup> Source: TB elaboration on Comune di Genova data

- “Fiumara precinct” in Sampierdarena (West of the city), with particular attention to Via Pacinotti, mainly for the mall area and for the vehicle flows mixed (local inhabitants, freight flows, ....);
- “west seafront” by Dinegro-Principe areas;
- “San Benigno”, where there are junctions with motorways and the roads for the West part of the city;
- “Caricamento” square, where are the more used urban parking places and touristic places (Acquarium, museums, ...);
- “east seafront” between Caricamento and the fair, both on the Sopraelevata and the road along the sea;
- “Brignole-sea” between the Brignole railway station and the Foce area, where there’re the fair and the junctions with the Sopraelevata and the seafront roads;
- “Corso Gastaldi”, that is the main roputes to reach Brignole with the Eastern part of the city and the bigger hospital in Genoa, named “San Martino”.

### THE MAIN BOTTLENECKS IN GENOA<sup>26</sup>



Finally, the Genoese mobility situation is very critical in case of temporary decrease of road level capacity, for example in case of accidents or work on the road.

In order to decrease the main traffic critical issues there are two important road projects in Genoa:

- “Strada a mare” in Cornigliano area, to ease the traffic flows separation between local/urban and freight/ through traffic flows. In particular, the freight/ through traffic flows could use the new route, directly linked with motorways. Now, the work is in progress;

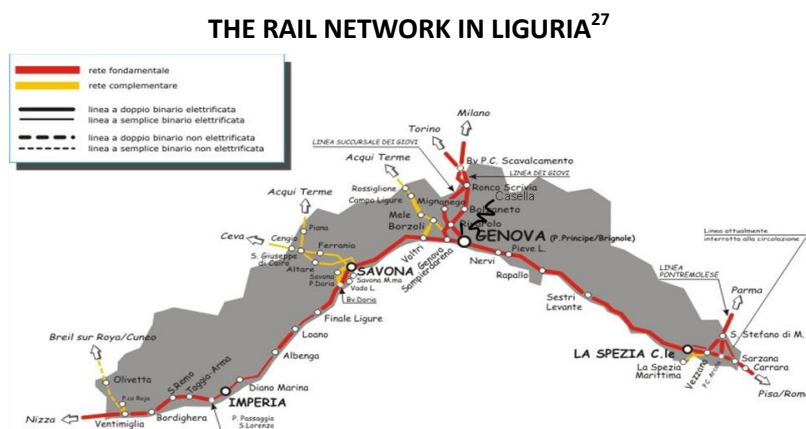
<sup>26</sup> Source: TB elaboration on Google maps

- “Gronda di Ponente” in the western part of the city and now it’s in planning. It will be possible to route the through city traffic in the new route, more external than the city. In this way, the current A7 motorway will be mainly used by local/urban traffic flows.

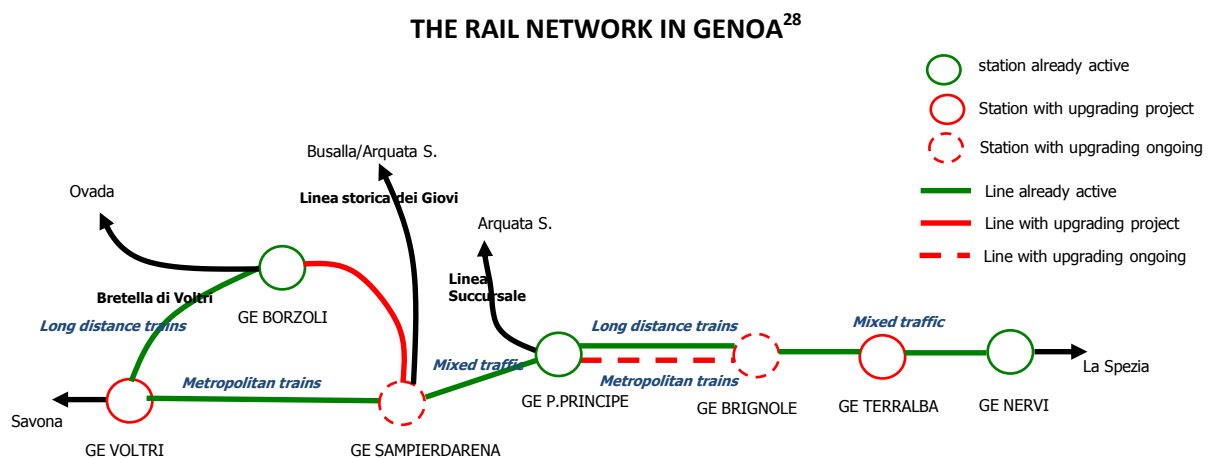
### 6.2.2. Rail network

In the Ligurian Region, the rail infrastructural network is long 525 km with two infrastructure managers:

- RFI-Rete Ferroviaria Italiana, the national railway manager (500 km of which about 70 km in the Genoese urban context);
- Ligurian Region, in consideration of the local touristic line Genoa-Casella (25 km).



In particular for Genoa, the rail infrastructural network is composed by several passengers and freight lines, now with an important upgrading work that involves all the urban rail network. The scheme below shows the urban rail network highlighting the lines involved in the upgrading actions and the type of traffic.



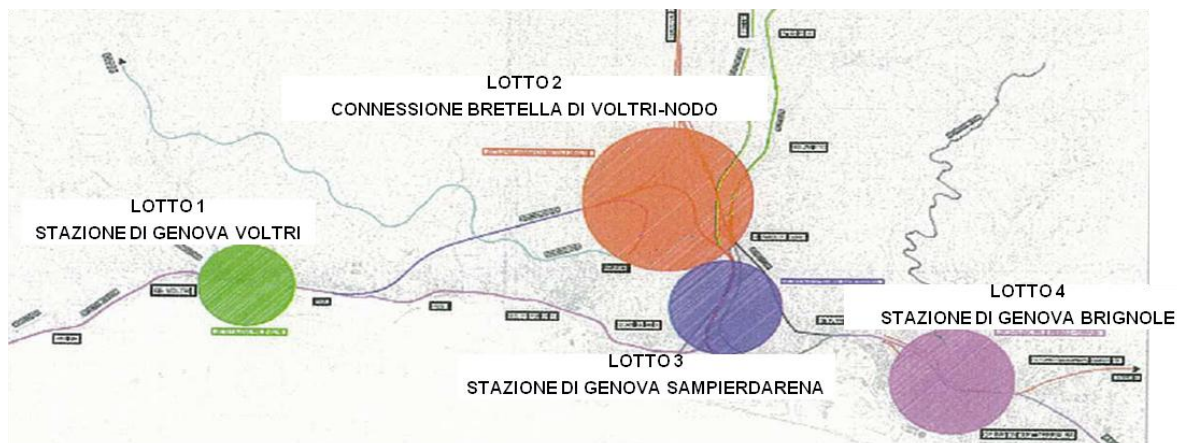
<sup>27</sup> Source: TB elaboration on RFI

<sup>28</sup> Source: TB elaboration on RFI data



The rail Genoese node is in a central position compared to the development European guidelines of the **TEN-T** Trans-European Network Transports project. In this light, it's involved in a set of upgrading actions with a total cost of 622 millions €. The project is composed by 4 work allotments.

### THE UPGRADING PROJECT OF THE GENOA RAIL NETWORK<sup>29</sup>



Considering the scenario with the Genoese node completed (about 2017), the critical infrastructural points are:

- Levante line, between Brignole and Nervi, that isn't involved by any upgrading project in short-term period;
- urban line Sampierdarena-Principe, where several rail traffic types will continue use the same short line between two railway stations.

### 6.3. Local public transport service in the interchange nodes

Regarding the intermodality development, in particular to enhance the scooters mobility, and in consideration of the AS-IS analysis results, the main interchange nodes are:

- Brin underground stop, for the passenger flows from the Valpolcevera valley and the northern part of the metropolitan area;
- Sampierdarena railway station, to reach the centre of the city from the West urban part;
- Principe railway station, for people who arrives in Genoa by train;
- Brignole railway station, as above;
- Genova est/Staglieno cemetery parking for the Bisagno valley;
- Parking places near Caricamento and the Acquarium, mainly for tourists;
- Nervi railway station, for the Eastern part of the Province of Genoa.

<sup>29</sup> Source: TB elaboration on RFI data

The local public transport services in each interchange node is highlighted by the scheme below:

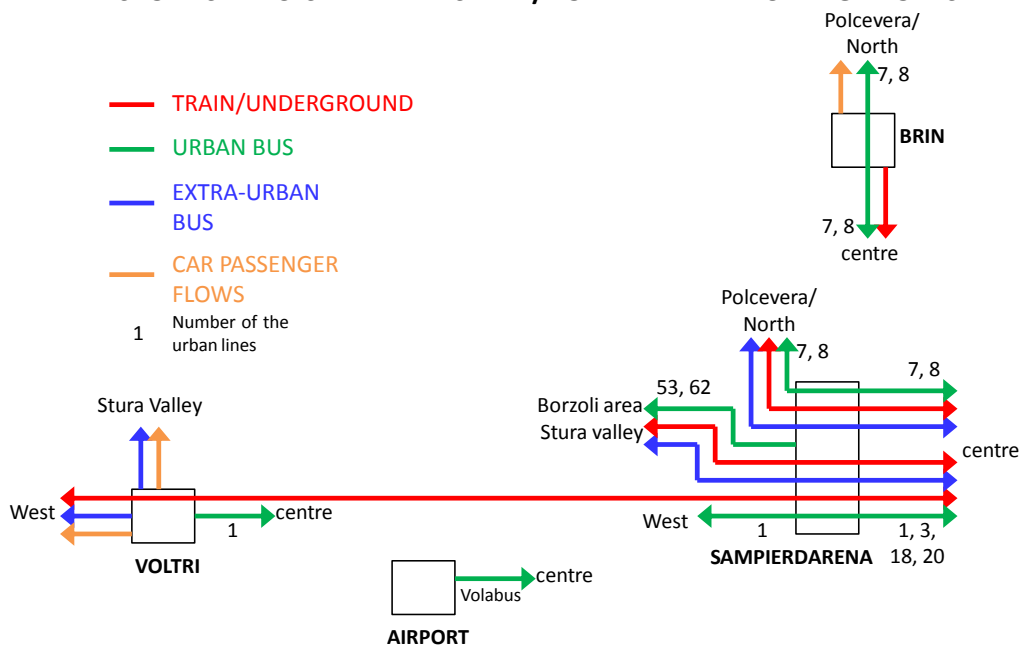
**THE INTERCHANGE NODES IN GENOA<sup>30</sup>**



In the future, the role of the San Benigno parking could be enhanced, in terms of urban accessibility from motorways.

The nodes in the Western and Northern parts of Genoa have got a good level of accessibility by public transport (bus and train services). Voltri and Brin represents the main “door-nodes” to reach the central part of Genoa from external zones.

**TRANSPORT SERVICES IN THE WESTERN/NORTHERN INTERCHANGE NODES<sup>31</sup>**

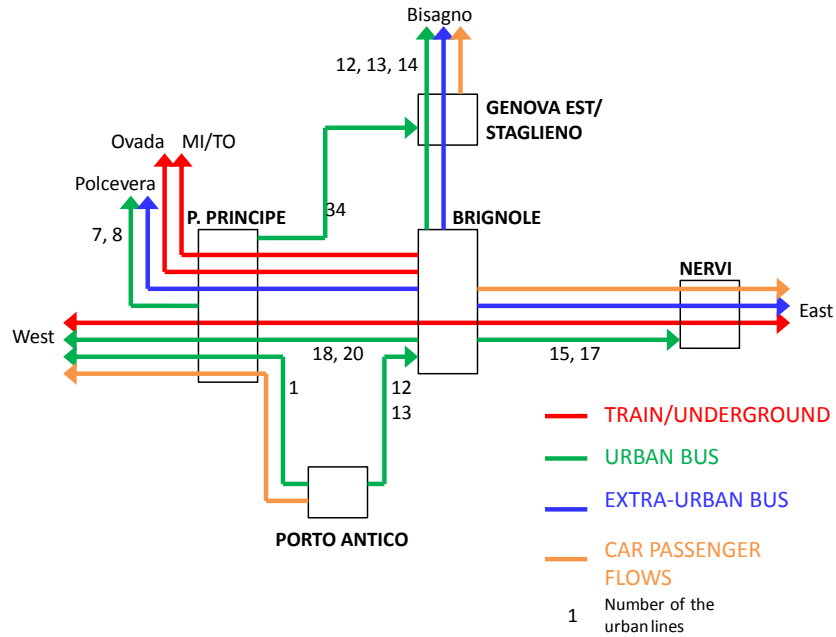


<sup>30</sup> Source: TB elaboration on Google maps

<sup>31</sup> Source: TB elaboration

In the Central and Eastern parts the route with the most critical situation is the Bisagno valley because there isn't any railway or underground services. In this part of the city the parking place near the Staglieno Cemetery is the main interchange nodes but now is not very used by citizens because of the lack of a fast public transport line to reach the city centre. In the current situation, the Nervi railway station is not an interchange node, because there aren't useful connections between rail and bus services.

**TRANSPORT SERVICES IN THE CENTRAL/EASTERN INTERCHANGE NODES<sup>32</sup>**



<sup>32</sup> Source: TB elaboration