D.3.2.4. Mobility needs and gaps in Venice

WP3 Understanding mobility needs and trends

A.3.2 Mobility needs and gaps in ICARUS region

AUTHORS: Giulia Gaita, Olga Irranca Galati, Andrea Ballarin
PP No.4 HZPP
PP9 CMVE
Status: Final document
Distribution: Public
Date: 30/05/2020

DISCLAIMER

This document reflects the author's views; the Programme authorities are not liable for any use that may be made of the information contained therein.

1 Table of Contents

Acronyms

PP	PP Partner
LP	LP Lead Partner
SC	SC Steering Committee
TMB	TMB Technical Management Board
FM	FM Financial Manager
PC	PC Project coordinator
PM	PM Project manager

2 Introduction

The area of the Metropolitan City of Venice counts on a very wide set of different situations, thus entailing a multifaceted picture of its mobility needs and gaps.
In this purpose, the present document has the double aim of both describing such territorial situation from the point of view of Public Transport facilities, available services and infrastructures as well as outlining a first interesting picture highlighted from the comments of mobility experts on the main priorities to be tackled.
Furthermore, the report contributes in underlining some of the main reasons launching the pilot activities and case studies to be developed in WP4 and that are consequently trying to give some answers to the highlighted needs.
At the same time the report contributes in describing in detail the main characteristics of the Metropolitan City of Venice, thus defining its main gaps and weaknesses with particular reference to mobility and connectivity themes.
Such picture is definitively ruled by the strong role played by the city of Venice, which is ultimately unique, and where different modes of transports as well as connectivity obstacles needs to be smartly tackled in order to ensure citizens with efficient mobility solutions.
Additionally, it has to be underlined how the widespread set of information contained therein is coming from a wider report that the Metropolitan City of Venice prepared in order to launch the process of defining its own Sustainable Urban Mobility Plan (SUMP) that is actually ongoing and which gave several interesting hints both to this report as well as to the comprehensive set of activities to be carried out within ICARUS timeframe. In this purpose it is to mention that several stakeholders contributed indirectly to the collection of data used into the report, thus testifying the strong synergies activated with territorial actors belonging not only to public administrations and to transport companies.
Moreover, considering its wide approach, this report will represent a starting point to launch future initiatives to be further discussed and included within a comprehensive action plan, thus contributing in defining main actions fostering the adoption of seamless transport solutions within Italy-Croatia Programme's area.

3 Identification of mobility gaps

3.1 Survey to users to identify mobility gaps

Considering the ongoing activities connected to the development of the SUMP of the CMVE and the joint efforts of the Municipality of Venice - which is also developing the same planning document – the more interesting approach was to collect feedbacks and information from transport experts in order to have a wider overview on the topics to be considered and further developed in the subsequent phases of the project.

In this purpose, CMVE identified indicatively 20 expert figures which were contacted and requested to provide feedbacks to the survey proposed on the basis of their good knowledge of the area and in relation to their potentialities of providing different point of views on the topic. Such solution allowed to collect not only specific comments from consolidated experts but also a comprehensive overview on the complex theme of mobility and transport planning and management.

The following paragraphs are resuming the main results of the survey which CMVE addressed to selected external experts and stakeholders.

3.2 Key Performance Indicators

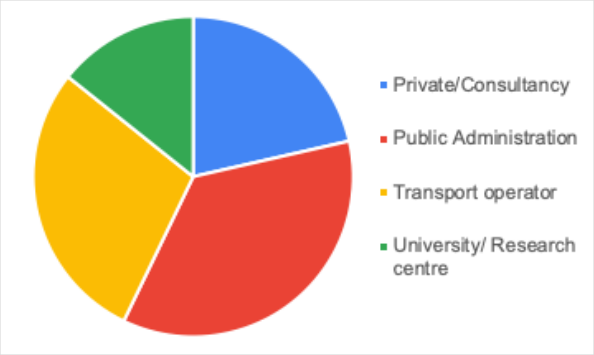
By analysing in particular the results of the “open” answers submitted by external experts consulted, some main potential key performance indicators could be highlighted. In particular it seems to be quite important to further and dynamically adapt the whole set of planning and management instruments considering:

ISSUE/TOPIC	EVALUTATION METHOD
COMMUNICATION to citizen/users to be monitored in terms of efficiency	Satisfaction, quality assessment
FREQUENCY/CAPILLARITY of services to be monitored and answering to effective mobility needs	Coverage %
Further development of ICT SOLUTIONS to easy the approach to public transport	Satisfaction or level information availability
Share of INVESTMENTS available to further modernize fleets as well as ancillary services and infrastructure for mobility	Increment of investment or turnover

3.3 Needs

CMVE received 14 contributions out of 20 direct requests to selected experts on transport themes. Among those experts there were mainly representatives of public administrations and transport operators, together also with experts and consultancy companies and research centres as reported in the following table.

Contributor	Nr.	%
Private/Consultancy	3	21,4%
Public Administration	5	35,7%
Transport operator	4	28,6%
University/ Research centre	2	14,3%
Total	**14**	**100,0%**



The answers to the question "***Which modes of transportation are available in your region?***" coming from the experts participating to the survey can be resumed by the following picture, where the green cells are highlighting the most cited modes of transport.

	Bus	Train	Ferry	Tram	Funicular	Water transport	Bike
Bus	14	13	8	2	1	1	1
Train	13	13	8	2	1	1	1
Ferry	8	8	9	1	1	0	0
Tram	2	2	1	2	1	0	0
Funicular	1	1	1	1	1	0	0
Water transport	1	1	0	0	0	1	0
Bike	1	1	0	0	0	0	1

Together with the wider and well-known utilization of bus and train services in this case, also the ferry services (i.e. Vaporetti) are considered among the most known and utilized transport modes of the area represented by the CMVE. Almost all the participants underlined that within the area there are three or more transport modes available supporting local mobility of passengers.

Existing transport modes	Nr.	%
2 or less	1	7,1%
3 or more	13	92,9%
Total	**14**	**100,0%**

It was interesting to notice how the question "***Do you know of any performed surveys indicating the usage of public transport in your region and/or defined bottlenecks in public transport? If yes, can you please indicate which ones?***" divided expertise basically in two parts: from one side experts who didn't know about specific surveys dedicated to such theme, and from the other side expertise who had some references in mind.

Knowledge on existing surveys	Nr.	%
NO	8	57,1%
YES	6	42,9%
Total	**14**	**100,0%**

Among the last ones, the surveys launched by both the Municipality of Venice and the CMVE for the realization of the two SUMPS were mentioned in particular. Moreover, also some more specific surveys launched by transport operators (e.g. ATVO) and other minor Municipalities (e.g. San Donà di Piave and Chioggia) in relation to specific planning were mentioned.

A completely different set of answers came out form the question "***Do you know of any incentives for the usage of public transportation in your region/country? Can you please specify which ones.***" In fact, all the answers (except one) confirmed to know specific incentives.

Knowledge on existing incentives	Nr.	%
NO	1	7,1%
YES	13	92,9%
Total	**14**	**100,0%**

Almost all the answers were making reference not only to the possibility to have some basic discounting initiatives (e.g. over 65 y.o., students, monthly/annual subscriptions…) but also to wider initiatives such as unified ticketing for specific areas (i.e. Unica Citypass) or specific connections (i.e. Padova-Venezia direction) as well as some discounted tariffs for residents of specific areas (i.e. Cavallino-Treporti).

The question "***Do you know of any management plans/policy documents supporting the usage of public transport? If yes, can you please specify which ones?***" allowed to highlight a quite wide knowledge of different levels of planning coming from 2/3 of interviewed experts.

Knowledge on existing management plans/policy documents	**Nr.**	**%**
NO	4	28,6%
YES	10	71,4%
Total	**14**	**100,0%**

In particular the most cited planning documents were related to both the regional level (i.e. Piano Regionale dei Trasporti) as well as provincial level (i.e. PTCP) and local level (PUMS). At the same time, the contributions coming from transport operators highlighted also another level of planning such as the local transport ones which is usually used for monitoring and financial purposes (i.e. Piano di Bacino).

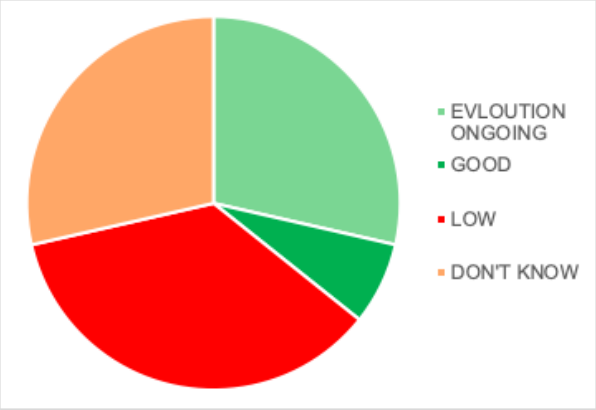
Question Nr. 7 of the proposed questionnaires was addressing "***Do you know of any existing regional/cross-border multimodal integrated tariff schemes and tickets? If yes, can you please specify which ones?***". In this sense, the role of the area of Venice as crossing point is evident and underlined by the fact that the majority of the experts are aware of these availabilities for passenger transports.

Knowledge on existing regional/cross-border multimodal integrated tariff schemes and tickets	**Nr.**	**%**
NO	3	21,4%
YES	11	78,6%
Total	**14**	**100,0%**

More into detail, transport operators in particular highlighted the existing commercial agreements already ongoing with several other transport operators which are allowing to reach Italian borders thanks to the connections with other services in different regions. At the same time also private companies were cited as an example (e.g. Flixbus) as well as the fact that within the proposed regional plan on transport to be approved at regional level, such theme is of high importance and is calling for upcoming new developments.

Experts were the requested to answer "***What is the status of ITS, ICT and Maas Solutions in your region? Are there any past studies***" highlighting that there is still a lot of work to do in this theme. In fact, only one third of the answers where drawing a satisfying situation, while the majority of the interviews revealed the need to further implement this topic.

Knowledge of status of ITS, ICT and Maas Solutions	**Nr.**	**%**
EVLOUTION ONGOING	4	28,6%
GOOD	1	7,1%
LOW	5	35,7%
DON'T KNOW	4	28,6%
Total	**14**	**100,0%**



In particular, the positive feedbacks are definitively related to the fact that experts are looking to the future technological development in an optimistic way. In this purpose, several initiatives were submitted for future financing of innovative piloting and testing in order to allow further improvements.

At the same time, the question related to available planners: "***Do you know of any online public transportation planners covering regional/national and/or cross-border routes? Can you please specify***" revealed a good awareness of a very complex and various list of planners, thus underlining the potential multiple origin of information that citizens can benefit from.

Knowledge of online public wide transportation planners	Nr.	%
NO	6	42,9%
YES	2	14,3%
YES, MORE THAN ONE	6	42,9%
Total	**14**	**100,0%**

The fact that indicatively one half of the interview declared to know more than one planner, underlines the fact that these kinds of services are well known. More in particular a lot of them are exemplified by singular initiatives of transport operators from one side (e.g. daAaB) and very “global” examples from the other side (e.g. Google Transit).

The last part of the questionnaire was then oriented to collect specific feedbacks in order to highlight the main perceived gaps of public transport from one side and to propose potential improvements to partially solve those gaps.

As for the first question "***In your opinion what are the 3 main mobility gaps preventing the more extensive usage of public transportation in your region? Please explain***” a very wide set of answers were proposed. Nonetheless it was possible to group feedbacks in some main topics.

More into detail, among the most mentioned ones is the weak **accessibility** and **capillarity** of public transport services within an area with a very high urbanization degree. This is particularly connected also to the **frequency** of these services which is considered inadequate, underlining the **unbalance between demand and supply** of public transport services. Furthermore, the survey underlined a weak point in **interconnection between train and bus services** in train stations, thus calling for **inadequate interchanges** between two or more modes of transports.

At the same time, it was deemed fundamental to **further invest financial resources** in the renovation of bus **fleets**, in the development of new and **innovative services** (beside the classic ones) as well as in new **ICT** services and related development.

All of these hints are outlining a picture that underlines a **lack of competitiveness** of public transport, mainly in consideration of a general **lack of clear information** on the available services and of their functionalities (lines, timetables, info point) as well as in the light of some hampering obstacles related to the absence of **unified tariffs** and ticketing as well as other technical barriers to (e.g. equal distribution of dedicated bus lanes in every urban area and **security** of stations).

Experts answered also the second open question "***In your opinion, what improvements would make the usage of public transportation easier and more acceptable?"*** with different points of view which are basically recalling the main problems highlighted.

Therefore, some main similar topics may be emphasized among the suggestions received.

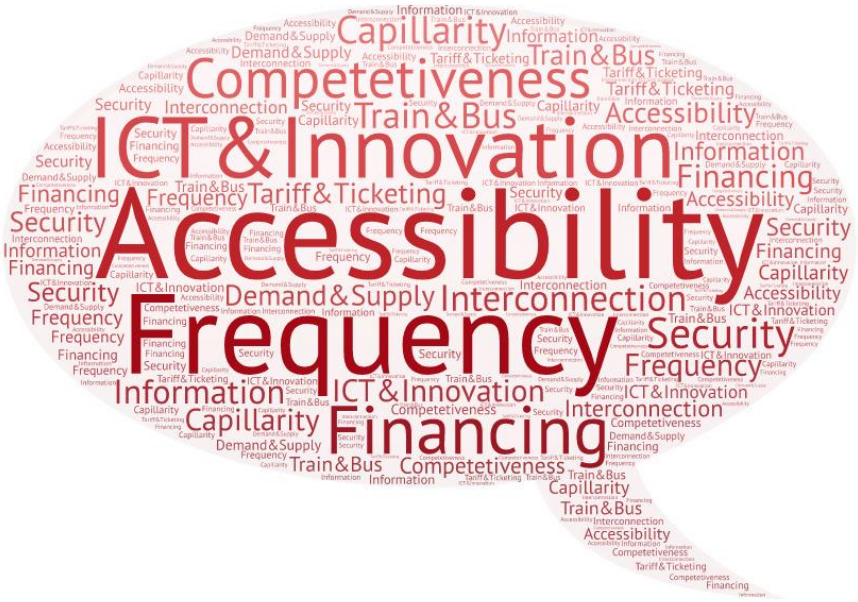
More in particular a double approach stressing the possibility to see these improvements from both a short-term and medium/long term perspective. Among the last ones, for sure the possibility to have a **unique tariff and ticketing** system would be appreciated together with the possibility to **unifying the way of selling tickets** in the same way and through the same channel at regional level. This will also call for a **standardization of the way of enlarging information** to citizens (also in terms of graphics outlook) and will include also the necessity to convey information and **vending system** by using a **unique app or ICT tool allowing to plan trips** also at interregional level.

Useless to say that **intermodal solutions** and connections between the different modes of transport, with particular reference to train/bus, should be **empowered** also by providing additional **ancillary infrastructures** to attract and easy their access (e.g. parking areas).

At the same time, it is considered fundamental to ensure **more frequent services** during particular periods of the year as to attract more users to specific destinations (e.g. seaside) also in terms of **variable timetables**.

A particular effort is then expected in terms of **financial support** to be ensured to transport operators not only in terms of **fleet renovation** but also in terms of **technological innovation** to be in case ensured on the basis of specific checks on quality of the services provided.

Considering the strong synergy and parallelism between the gaps and proposed solutions, the following graph is resuming the main priorities highlighted as result of the survey.



3.4 Involved public and private bodies and their role

The main types of stakeholders involved during this first phase are indirectly the same that were involved for the purpose of developing the necessary evaluations for the preliminary document realized for the SUMP of the Metropolitan City of Venice that can mainly grouped in the following table.

Type of stakeholder	***Stakeholders and brief description***	***Role in implementation plan***
Public authority/decision makers	• *Metropolitan City of Venice* • *Veneto Region* • *Local Municipalities*	*They all collaborated in both data and info collection for the purpose of the preliminary document of the SUMP of the Metropolitan City of Venice as well as gave some further comments and advices on the main priorities to be tackled in order to promote the future development of mobility plans within the area.*
Main Private/public operators	• *ATVO S.p.A.* • *ACTV S.P.A.* • *Arriva Veneto S.r.l.*	
Citizen/Associations	• *Association Vivilabici* • *Private consultants*	
Research centres	• *University Ca' Foscari* • *University IUAV*	

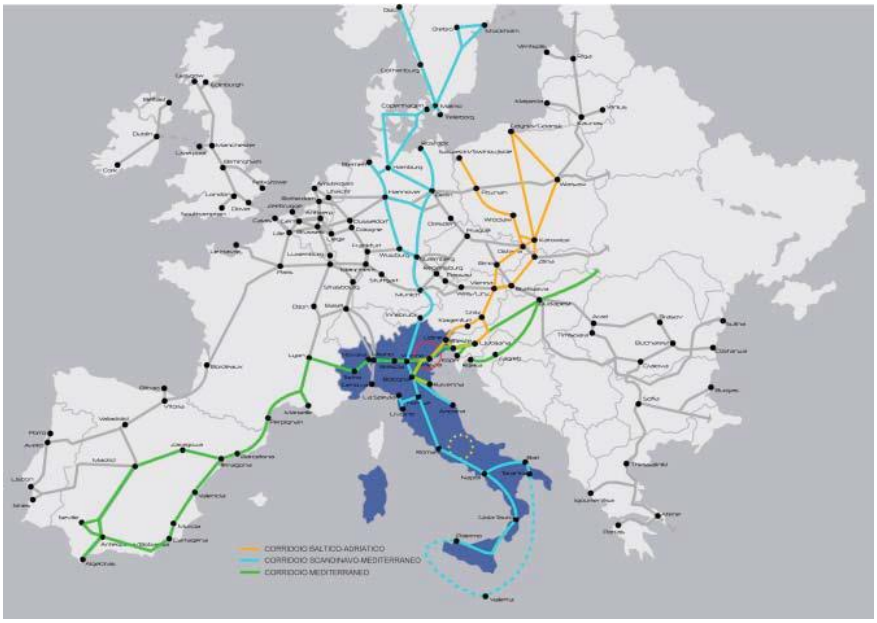
4 Current transportation's status in the area

In general terms, a transportation system is always affected by various strong interrelations and mutual impacts with other components (settlement patterns, economic system, environmental, etc.) of the regional socio-economic context. This is particularly true in the case of the Metropolitan City of Venice, given its peculiar geographic and urban context along with the positioning at the crossroad of relevant transnational corridors.

In particular, a clearly polycentric structure also associated with urban sprawl can be ascertained with particular reference to the central part of the Metropolitan area, characterised by a complex and widespread system of relationships with neighbouring areas, which is not bounded by administrative delimitations. However, it is also to consider the presence extra-urban peripheral areas, especially in the Southern and Eastern portions of the Metropolitan City, as well as a particularly peculiar context along the coastal area, such as the Venice Lagoon. The centre itself, the City of Venice, is characterised by unique features as well as by a dual characterisation due to the co-existence of the historical centre in the island of Venice along with the main settlement in the mainland (Mestre).

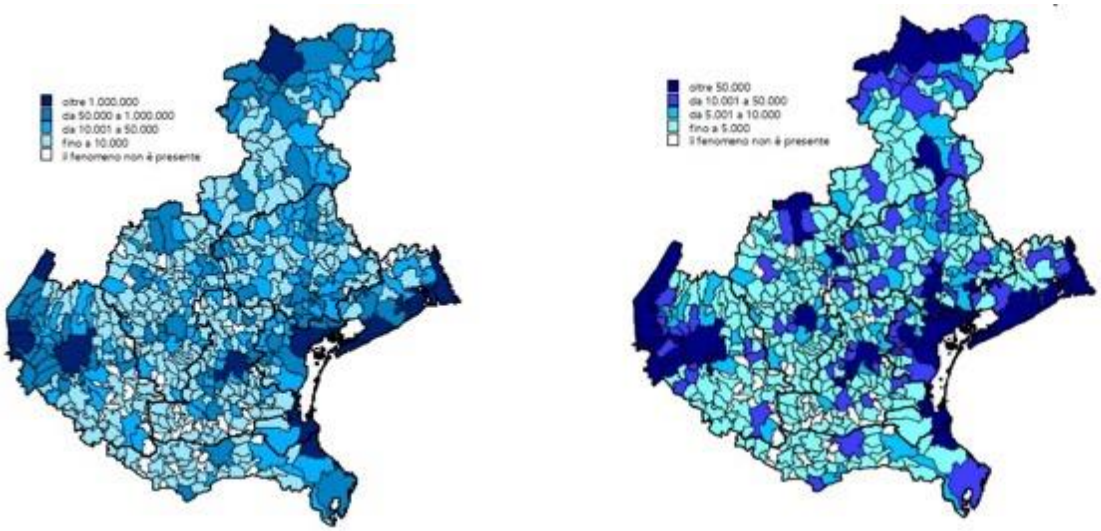
On the other hand, the Metropolitan area is crossed by two TEN-T Core Network Corridors (namely the "Baltic- Adriatic" and the "Mediterranean") and endowed with nodes playing the role of key gateway to the external (esp. the port and the airport in Venice).

TEN-Tec map (INEA) with evidence of the Core Node of Venice and major Core Network Corridors passing in its surroundings.



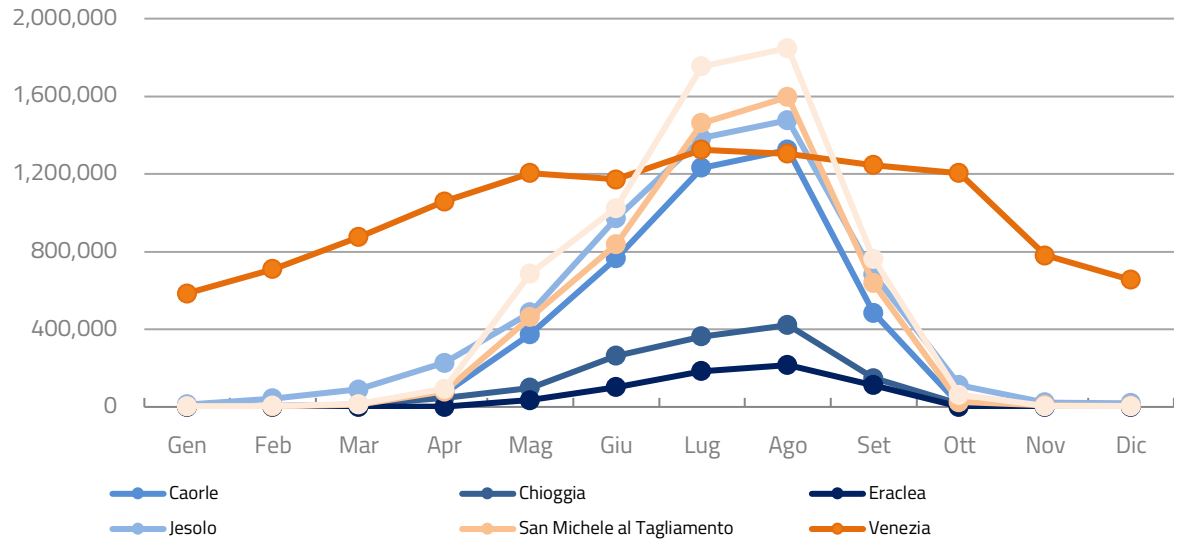
More general overview of the TEN-T Core Network Corridors

Furthermore, it is to consider the presence of remarkable touristic destinations, such as the historical city of Venice and the coastal area, which makes the Metropolitan area the core of Veneto, the first touristic region in Italy.



Number of tourist arrivals (left) and overnight stays (right) in each municipality (Veneto Region, 2017)

In this purpose, it is to consider that while Venice is characterised by remarkable flows throughout the year, the beach tourism is affected by relevant peak in summer season, thus implying concentrated flows and congestion phenomenon in specific periods.



Number of tourists in the main destinations within Metropolitan City of Venice (2018) (Veneto Region, 2018)

As a consequence of such overall framework, the metropolitan transportation system is characterised by relevant complexity due to the dynamics of both the local intra-regional mobility and the long-distance crossing traffic. In order to cope with such heterogeneous and demanding needs an articulated multimodal transport system, encompassing all modes of transport, has been developed throughout the years.

Nonetheless, relevant issues and criticalities to be dealt with are still to be reported. In particular, it is to report recurrent congestion taking place along the main motorways network and in correspondence of main urban areas. On the other hand, lower accessibility level is affecting some peripheral areas. Among interventions to be taken into account, a particular deal must be paid to fostering multimodal transport and modal shift. In this purpose, specific attention must be paid to all the aspects called-in for ensuring a full public transport service integration and development (e.g. ranging from increased capacity of performances of specific rail link and nodes, to the development of cycle routes and interchange points to the application of innovative ITS solutions and tools).

4.1 Current transport situation

A clear understanding of transport demand represents a fundamental aspect for understanding the current situation of a transport system. In this purpose, a key issue is represented by the availability of adequate data sources for analysing the mobility needs of people carrying out trips in whole Metropolitan City.

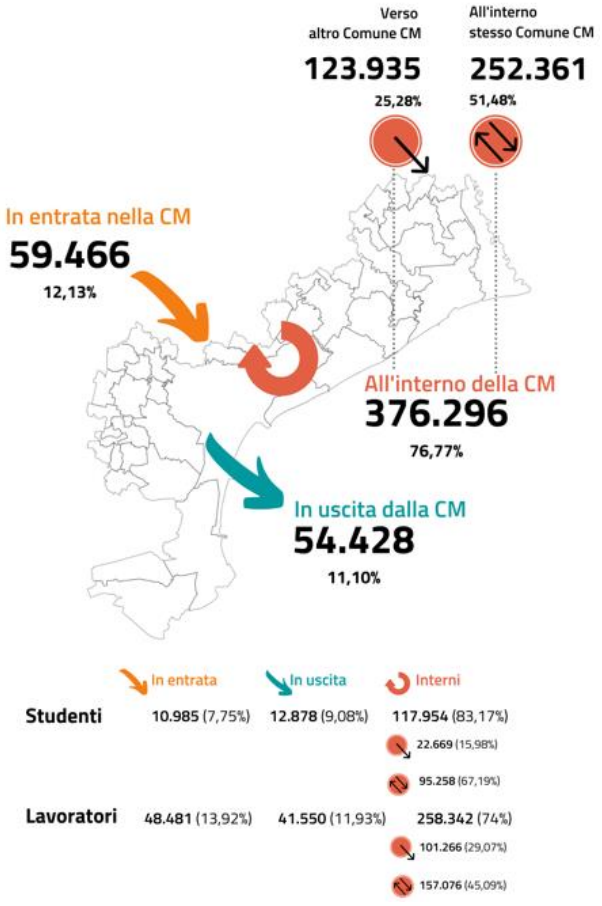
Obviously, among the different components making-up the overall transport demand, a particularly relevant one is represented by (daily) systematic mobility, mainly corresponding to commuting for work or study purposes. In this regard, the results from the 15th National Census (carried out by ISTAT in 2011) provide a rich source of information based on a survey covering the whole population.

The resulting picture shows about 490,000 people in the metropolitan city of Venice travelling every day to their place of work or study (namely, 70% for work, the remaining 30% for study).

Just over half of these journeys (about 252,000) take place within the same municipality of residence, while approximately 25% go to another municipality belonging to the metropolitan city.

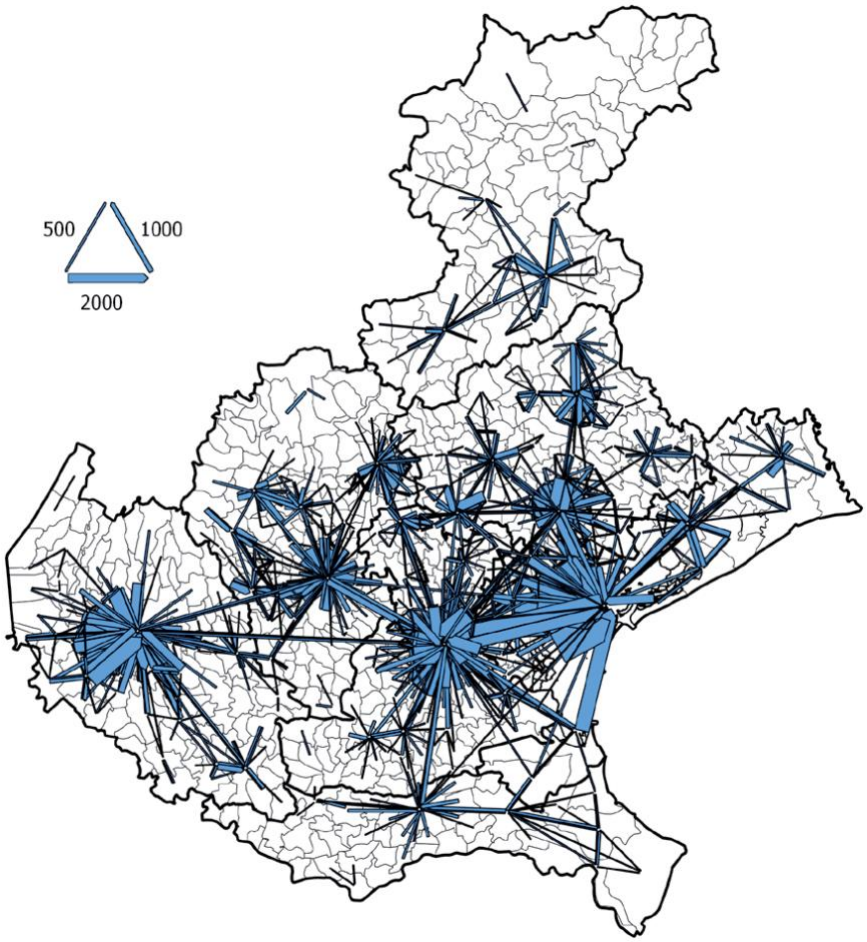
Focusing on mobility for work purposes (corresponding to about 348.000 trips), Venice is the municipality that gives the greatest contribution - over 90,000 trips - followed by Chioggia and San Donà di Piave, which generate more than 15,000 journeys. On the other hand, the majority of the municipalities of the metropolitan city (28 out of 44) originate less than 5,000 journeys.

With reference to the mobility for study (corresponding to about 142.000 trips), 67% of the journeys takes place within the same municipality.



Again, Venice shows the highest value (over 35,000), while only 3 other municipalities (Chioggia, San Donà di Piave and Mira), generate more than 5,000 movements daily.

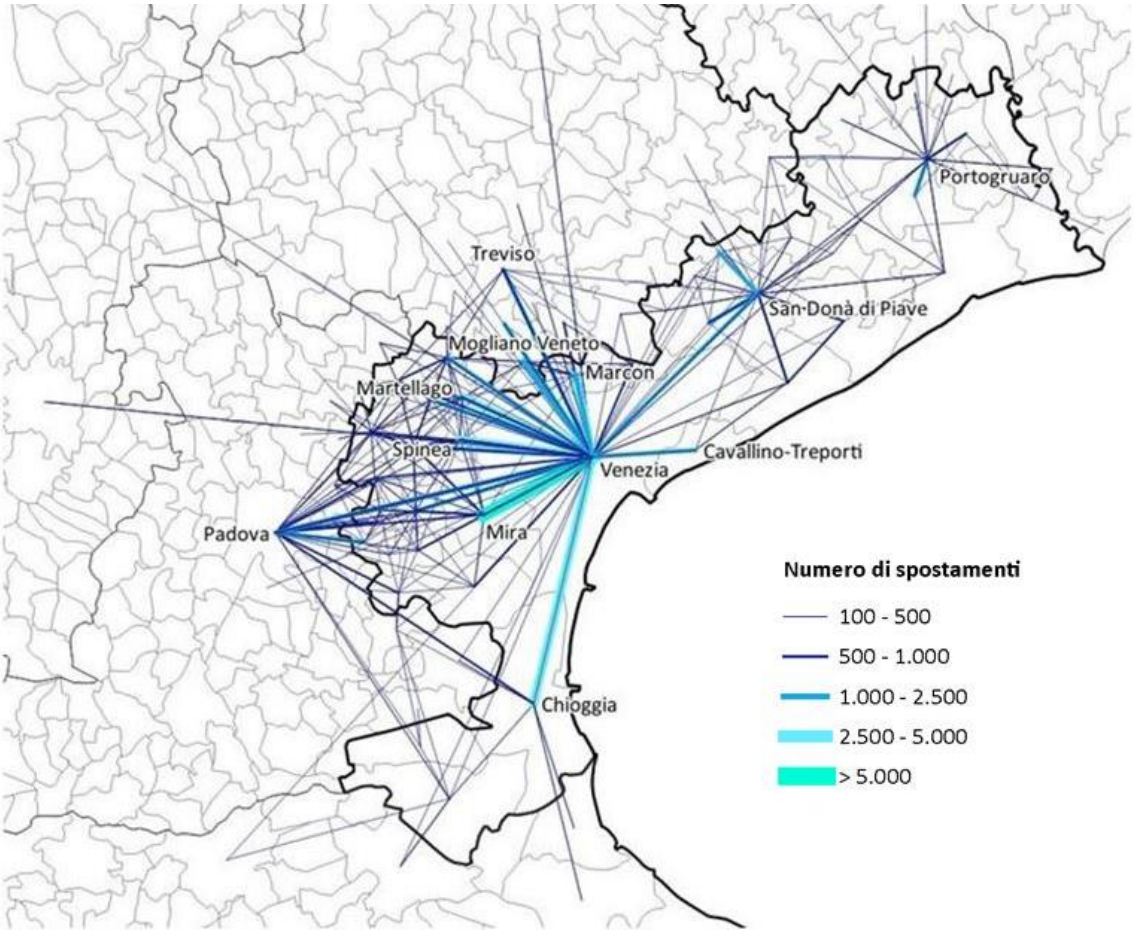
Trips, whose Origin and Destination belong to different municipalities, are evident in the following figure, where the relations accounting for more than 100 daily journeys are highlighted.



Commuters between municipalities with more than 100 movements/day (Veneto Region, 2011)

In this purpose, it is to underline the highest values between the city of Venice and nearest provincial capitals of Padova and Treviso.

Focusing on trips having both Origin and Destination within the Metropolitan city, the highest values belongs to the relation between Venice and other relevant centres, starting from Mira relation (more than 7.100 daily trips), followed by Chioggia, Spinea, Martellago and Marcon (2.500-5.000 daily trips). Then other relevant relations can be ascertained between San Donà di Piave as well as Portogruaro and neighbouring centres.

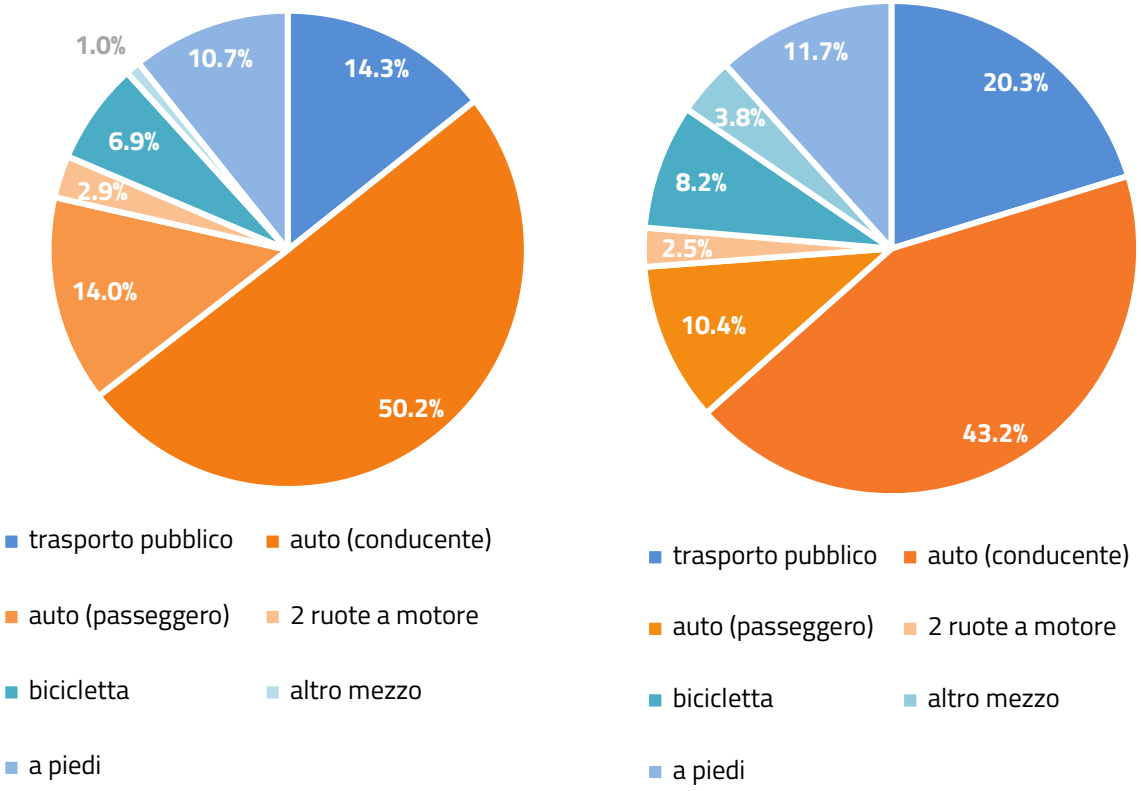


Commuting trips between different municipalities in the Metropolitan City of Venice (own elaboration on ISTAT database 2011)

Concerning modal split, in comparison with the overall regional context, it is to register (in relative terms) a higher share of sustainable modes of transport. Nonetheless, the usage of the car (either as driver or as passenger) remains the prevalent option.

More in detail, at regional level about 64% of the commuters chooses/uses the car (50% as driver, 14% as passenger) while 14% choose the collective means of transport (such as train, tram, buses etc.); another 3% use two-wheel motor vehicles (motorbike, moped and scooter) and 7% use bicycles.

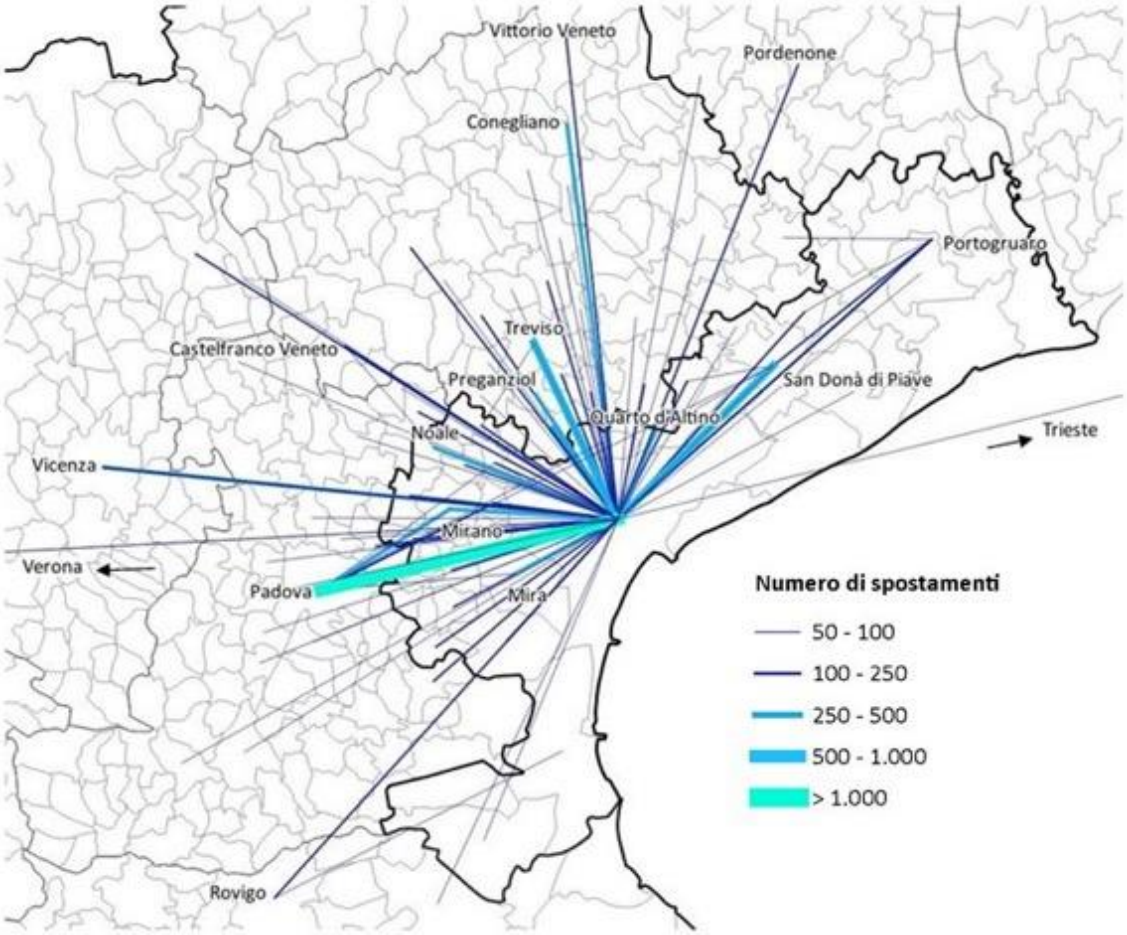
In the metropolitan city, instead, a (relatively) lower usage of the car equal to about 53% (43% as driver and 10% as passenger) is to be reported. Correspondingly, 12% of journeys on foot and a higher use of public transport (20%) as well as, to a lesser extent, of bicycle (8%) are to be underlined.



Percentage distribution of different means of transport in Veneto Region (on the left) as well as in MCVE (on the right). (MCVE SUMPS preliminary document 2020)

In order to provide a more complete picture, a focus on the specific means of public transport used by the commuters is provided in the following paragraphs.

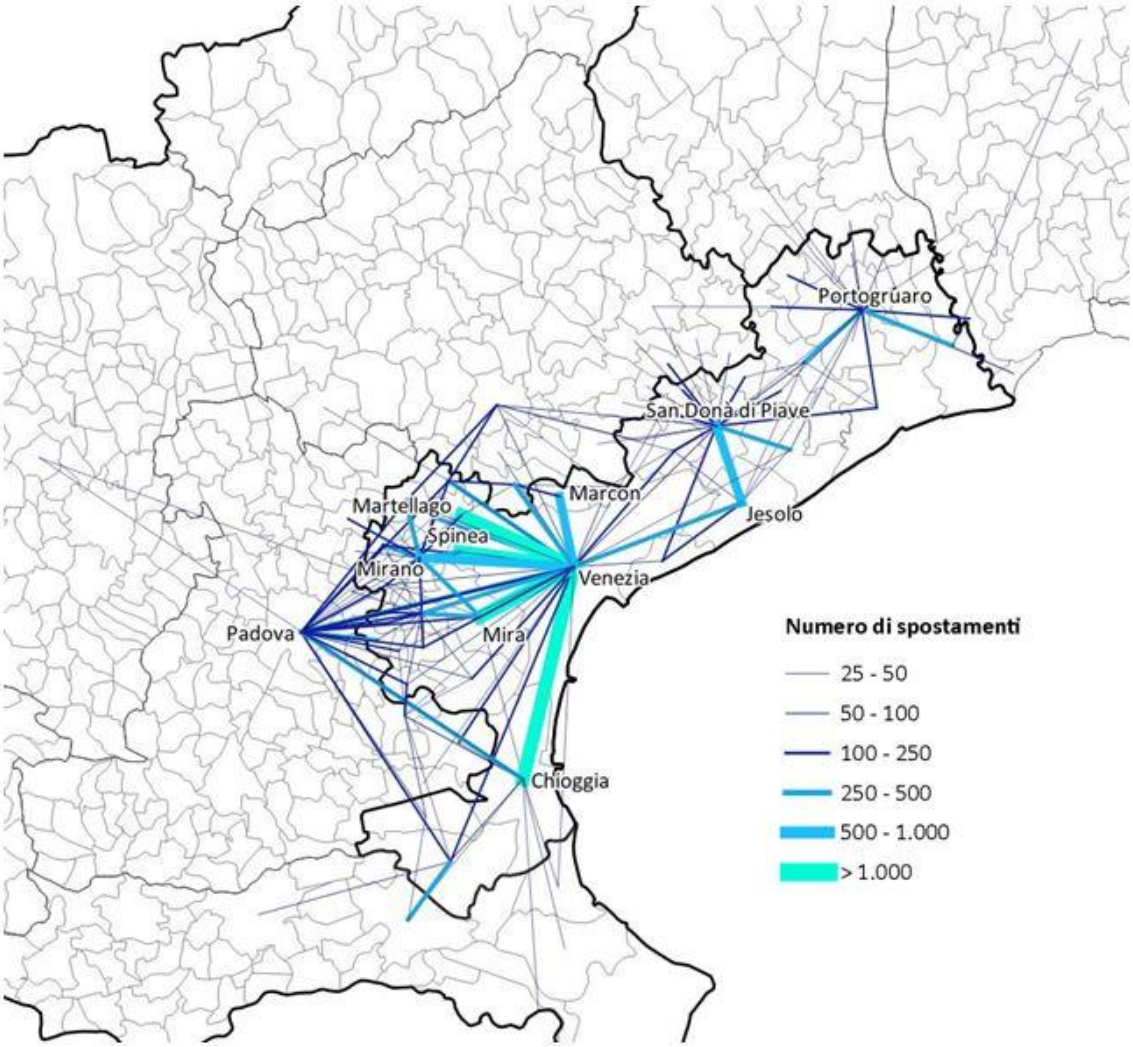
Concerning **train users**, the Venice-Padua connection stands out with 1,383 journeys, followed by the relations between Venice and Treviso, Mogliano Veneto as well as San Donà di Piave (all in the range between 500 and 1,000 units).



Commuting trips between different municipalities in the Metropolitan City of Venice moving by rail (own elaboration on ISTAT database 2011)

As regards to **public road transport**, the main relations are those of Venice with Chioggia, Mira, Spinea and Martellago (greater than 1,000), as well as with Mirano and Marcon (between 500 and 1,000). The connection with Padua remains very strong, even though with the corresponding one by train.

In the eastern portion of the metropolitan city, San Donà di Piave constitutes a polarity in its own with more than 500 trips to / from Jesolo; this phenomenon can be ascertained, though with smaller value, also for Chioggia, Portogruaro and Mirano.

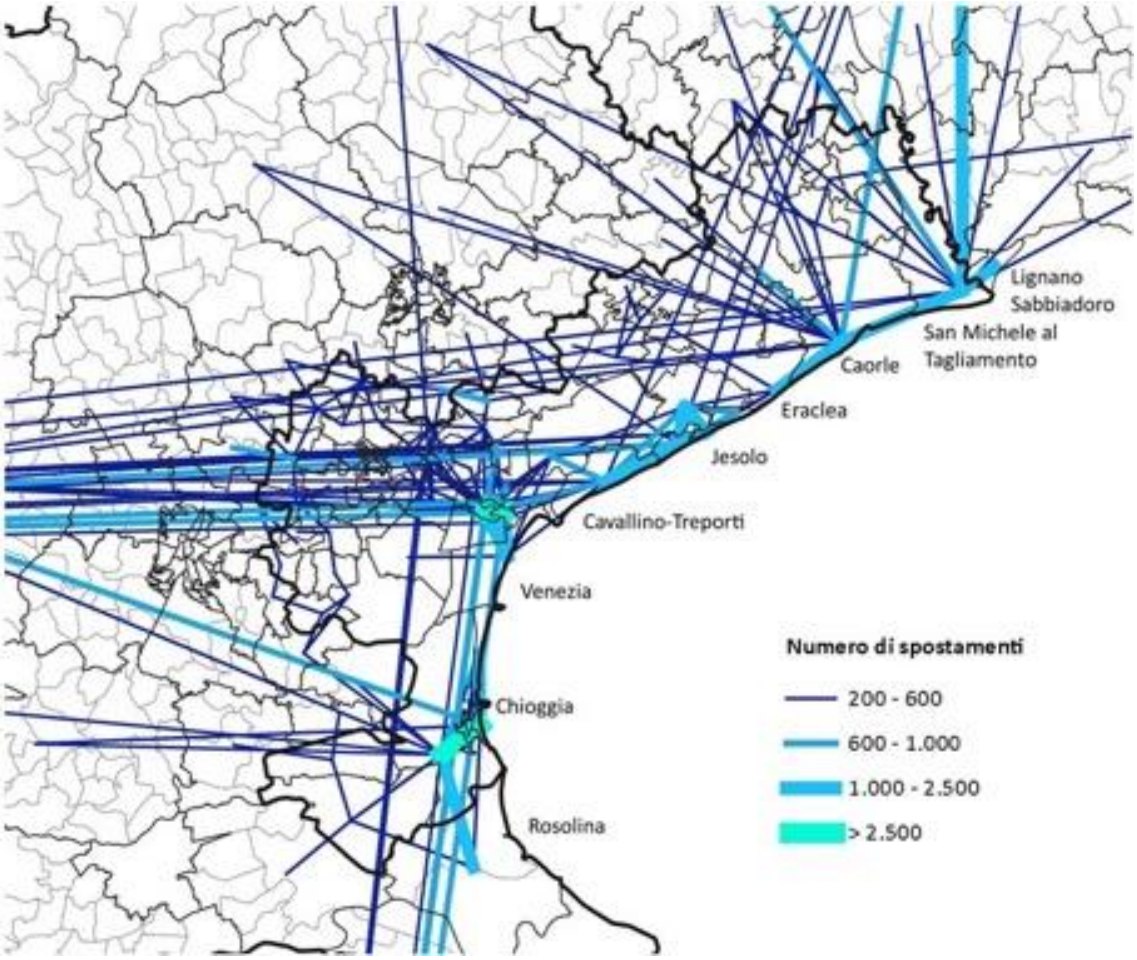


Commuting trips between different municipalities in the Metropolitan City of Venice moving by bus (own elaboration on ISTAT database 2011)

In addition to the census data, the exploitation of other and innovative data sources allows to widen the range of the analysis to the different hours of the day, days of the week, periods of the year, and, most importantly, all the different component of mobility. This implies addressing, in addition to commuting, all the other kind of trips (either systematic or occasional).

In this purpose, the metropolitan city has recently, acquired and analysed aggregate data coming from the localisation of mobile phone users (nowadays corresponding to almost the totality of the population), based on the recording their presence in the different cells of a telecommunication operator network.

Among other things, this innovative data source allows to assess the transport demand for touristic purposes during summertime. In this purpose, it is to underline the relevant flows affecting the coastal areas during holidays.

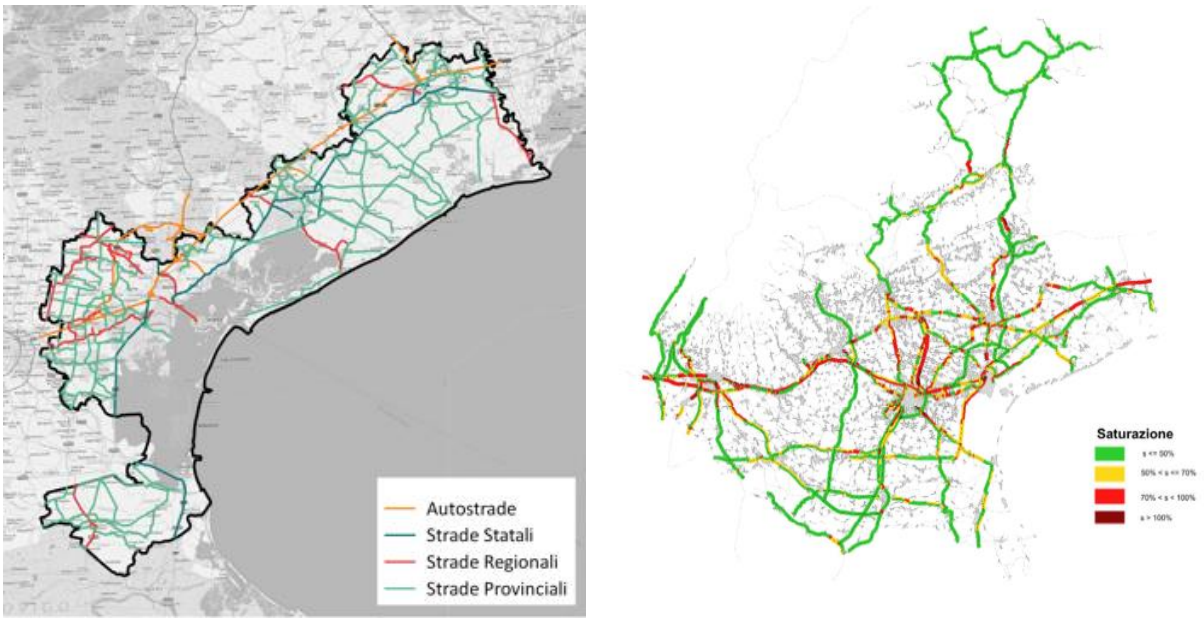


Priority movements during summertime with origin and destination within the Metropolitan City of Venice (own elaboration on ISTAT database 2011)

4.1.1 Transport networks and services: ROAD

The MCVE territory encompasses both motorways as well as relevant national and regional roads ensuring connectivity between main regional centres and neighbouring regions. More in detail, it includes:

- 90 km of motorways, managed by different operators;
- 139 km of national roads, managed by the Italian government-owned company ANAS;
- 174 km of regional roads, managed by Veneto Strade S.p.a.;
- 786 of provincial-level roads managed by the Metropolitan city administrations;
- Other municipal level roads



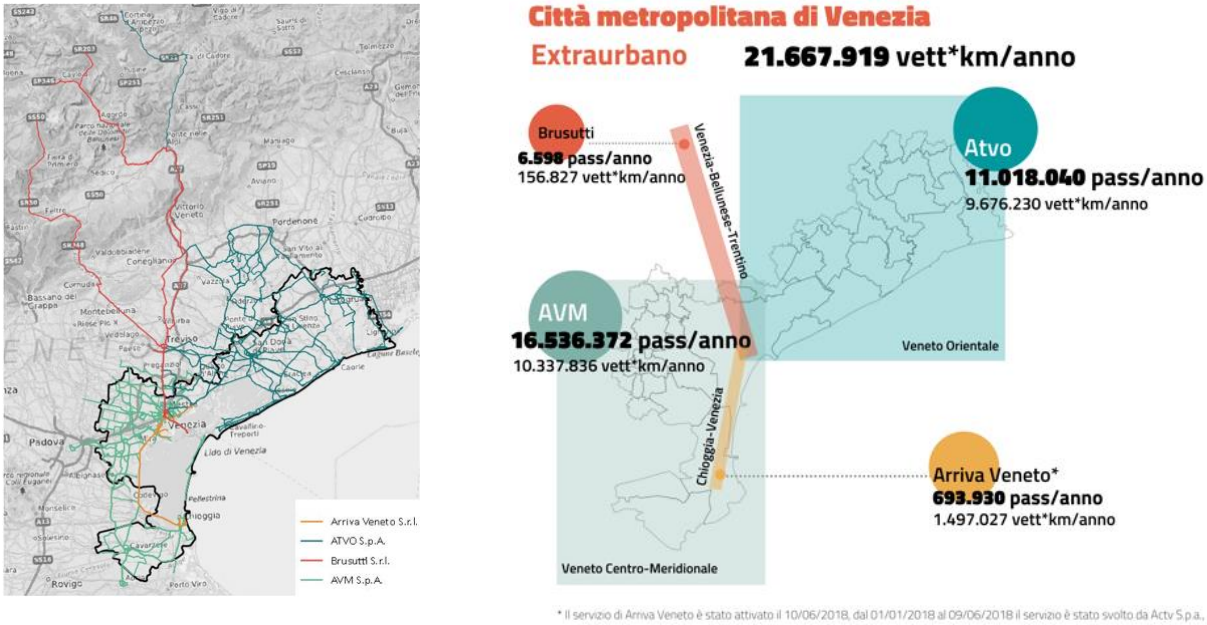
Road network links classification (left) and level of congestion (right). Source CMVE SUMPS preliminary document (2020) and Veneto Region PRT (2019)

As anticipated in the previous chapter, the network, is affected by different components of traffic, including long-distance ones (esp. as regards to freight transport). The resulting situation of level of traffic is depicted in the previous figure above. In particular, traffic volumes reach remarkably high values along the A4 motorway (east-west direction). There are also significant traffic levels, especially in relation to certain arteries (e.g. The regional road “SR 11” along the “Riviera del Brenta” and the national road SS 309 “Romea” reaching Mestre from the Southern areas along the coastal are), leading to frequent congestion phenomena in particular in correspondence with inhabited centres and intersections.

Within the regional framework, the MCVE local public transport system is characterised by a certain relevance testified by higher values of indicators quantifying the ratio between the provided PT services and the number of inhabitants as shown in the previous figure. In fact, as already mention while analysing the transport demand, it also corresponds to higher value in the modal share with respect to the regional-level average values. Furthermore, it is to highlight the peculiarity given by the presence of a relevant waterborne local public transport service in Venice.

Local public transport includes both **urban** and **extra-urban services**, where a relevant share of passenger service corresponds to bus services as well as waterborne services (in particular, in the city of Venice), while the extra-urban bus services are tendered by the Governance Body of Local Public Transport (jointly made up by the Metropolitan City and the City of Venice administrations), and operated by the following operators:

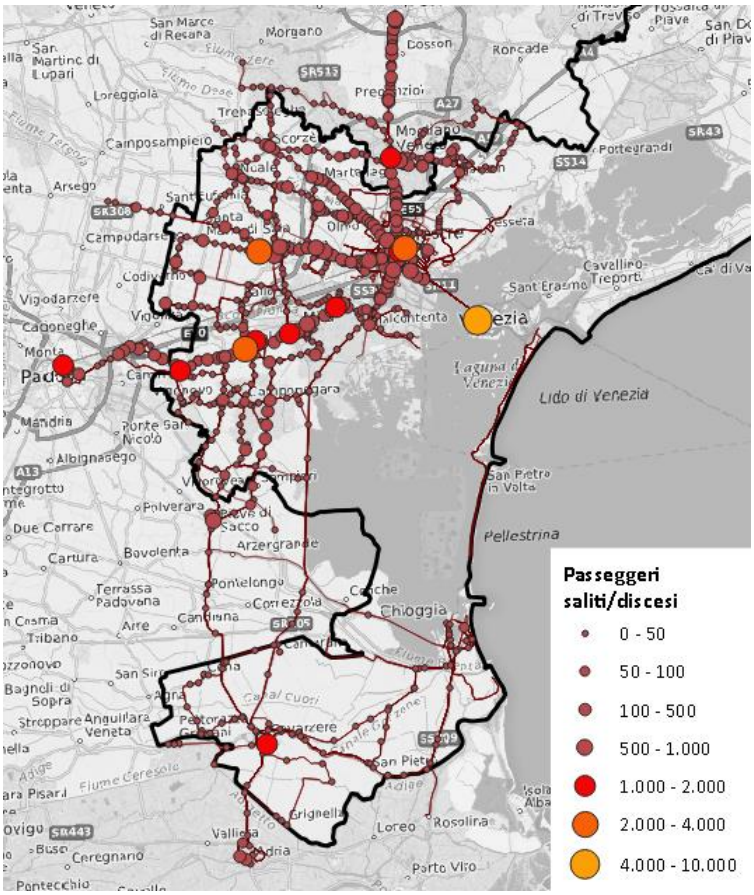
- AVM S.p.A., operating extra-urban in the Central and Southern portion of the MCVE;
- Arriva Veneto S.r.l., to which has been tendered the line connecting Chioggia and Venice.
- ATVO S.p.A., operating extra-urban in the Eastern Venetian area (as well as urban services in the municipalities of Caorle, Cavallino Treporti, Jesolo e San Donà di Piave).
- Brusutti S.r.l., providing connections between Venice and destinations in the mountainous areas belonging to the provinces of Belluno and Trento.



Extra-urban road public transport services of the CMVE. Source: MCVE SUMP 2020

As regards the usage of Local Public Transport services, an overview is provided with regard to the data collected in 2019-2020 during the counting of boarding and alighting at the bus stops and station served by the extra-urban services managed by AVM S.p.a. and ATVO S.p.a.

With reference to the central and southern area, the surveys conducted by AVM are represented in the following figure which is showing the central role played by the City of Venice (with the higher value registered in Venice - Piazzale Roma bus station), which also associated with a distribution of remarkable values along the main radial thoroughfares (esp. the two connecting, respectively, with Padova and Treviso).



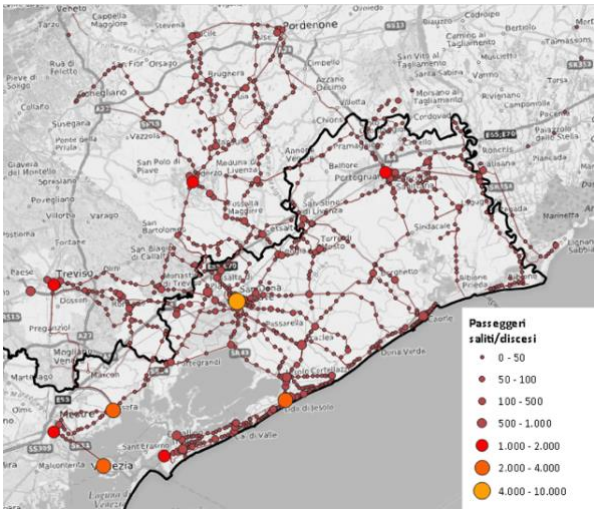
Counting of passenger boarding and alighting at bus stops (Own elaboration on AVM data 2020)

Concerning the Southern area, in general, lower values are registered, with the (relative) maximum (ranging between 1000 and 2000) registered in Cavarzere. However, in this purpose it is to recall that the reported survey does not include the Chioggia-Venice line (operated by Arriva Veneto S.r.l.).

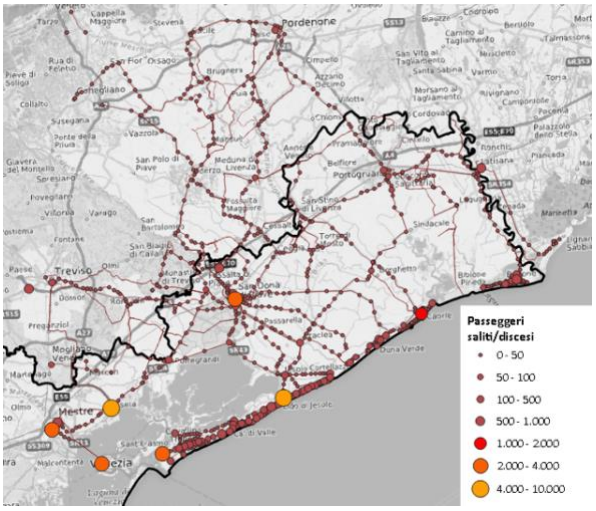
With regards to the service operated by ATVO (in the Eastern part of MCVE), two separate surveys have been carried out: one during the period November 2019 and the other in summertime (June-August 2019).

The results of the survey carried out in November are shown in the following figure. In comparison with those related to the central area, stops with high boarding and alighting values are more scattered and infrequent. Obviously, this fact consistent with the specific urban-settlement characterization of the analysed area. More in detail, the absolute highest values are at the San Donà di Piave bus station, the only case in which there is a figure higher than 4000. The immediately lower category (2000-4000) has three cases: Venice - Piazzale Roma, Venice airport and in Jesolo bus station. Finally, the 1000-2000 category presents three cases in the metropolitan area and two in the Treviso area.

With regard to the summer holiday period, there is an increase in the weight of the coastal strip and a marked decrease in the importance of the hinterland locations. In particular, in this case there are no longer any important cases in the Treviso area.



Counting of passenger boarding and alighting at bus stops in the ATVO network (own elaboration on ATVO 2020)



Counting of passenger boarding and alighting at bus stops in the ATVO network during festivities in summertime

Lastly, in order to provide a comprehensive picture of passenger transport in CMVE, it must be recalled, in addition to the scheduled public transport services, also the presence and relevance (esp. in touristic areas and key hub as airports) of non-scheduled transport passenger services (e.g. taxi or car-and-driver hire) as well as other regular services of commercial/touristic character (e.g. Flixbus).

4.1.2 Transport networks and services: RAIL

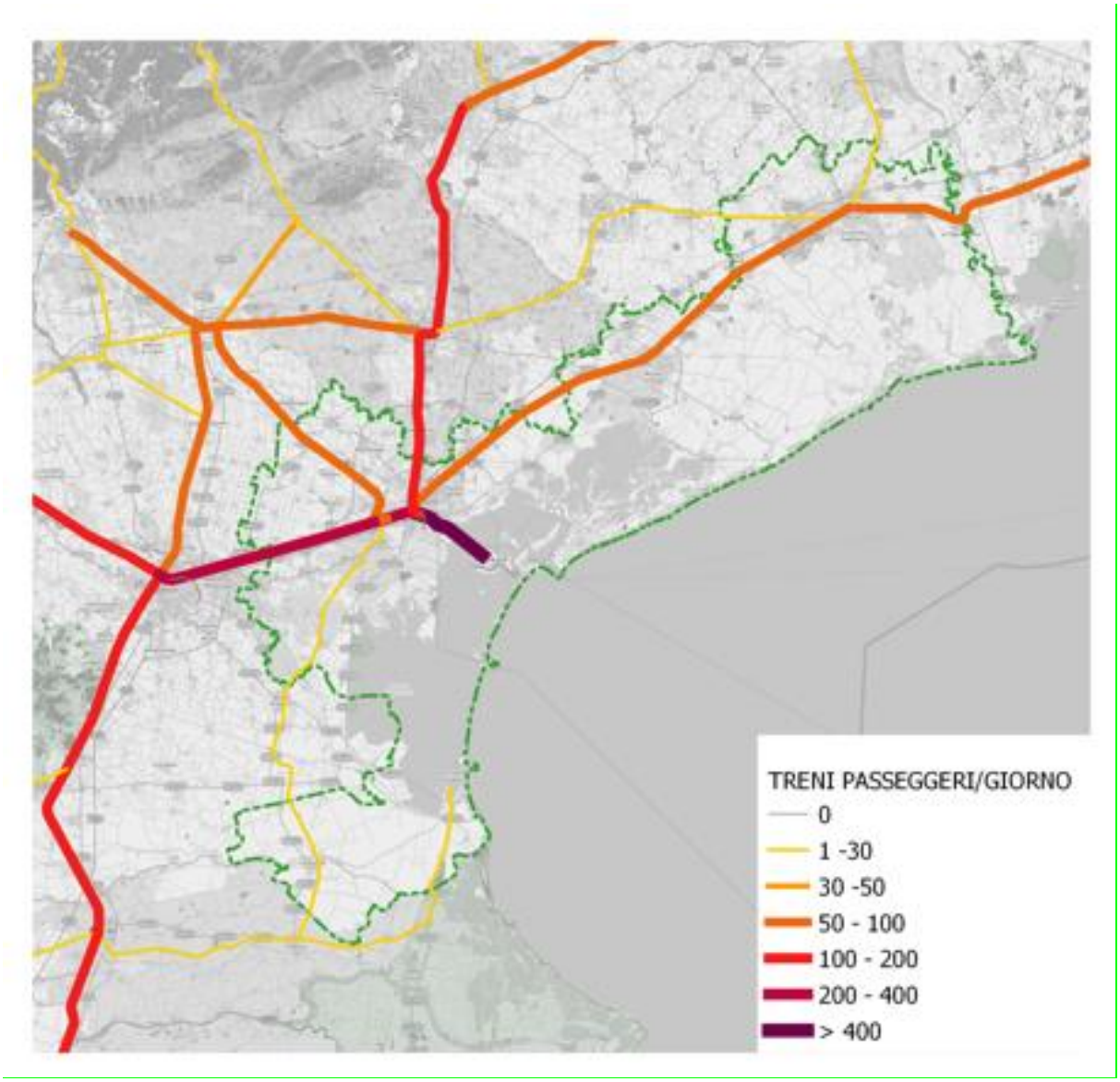
With reference to rail transport, it is to register the presence of “fundamental” lines of the national rail network manager, RFI, converging on the node of Venice (see, respectively, the red and purple lines in the left of the following picture). Additional, various “complementary” lines (see blue and green lines in the left of the following picture) is to be reported as well, thus leading to a total 112,400 km managed by RFI.

Furthermore, a 39 km line connecting Mestre and Adria is managed by Sistemi Territoriali S.p.A. as concessionaires of the Veneto Region.

Rail network belonging to RFI (on the left) and the line Adria-Venice (on the right) managed by Sistemi Territoriali. (Source: MCVE SUMP preliminary document, 20209.

The analysis of existing flows in the different links of the rail network (see following figure**Error! Reference source not found.**) allows to highlight, in particular, the high values of passenger trains / day along the radial lines converging to the Mestre junction and then to Venice Santa Lucia. In fact, taking also into account the freight flows making use of the same network, in many cases, a very small residual capacity, is posing a limit to further developments. Hence, considering the growing perspective advocated to future scenarios pivoting on modal shift from road transport, various infrastructural interventions are required to enhance the currently available

capacity as well as for improving functional performances of specific links characterised by lower number of daily trains (e.g. Mestre-Adria).

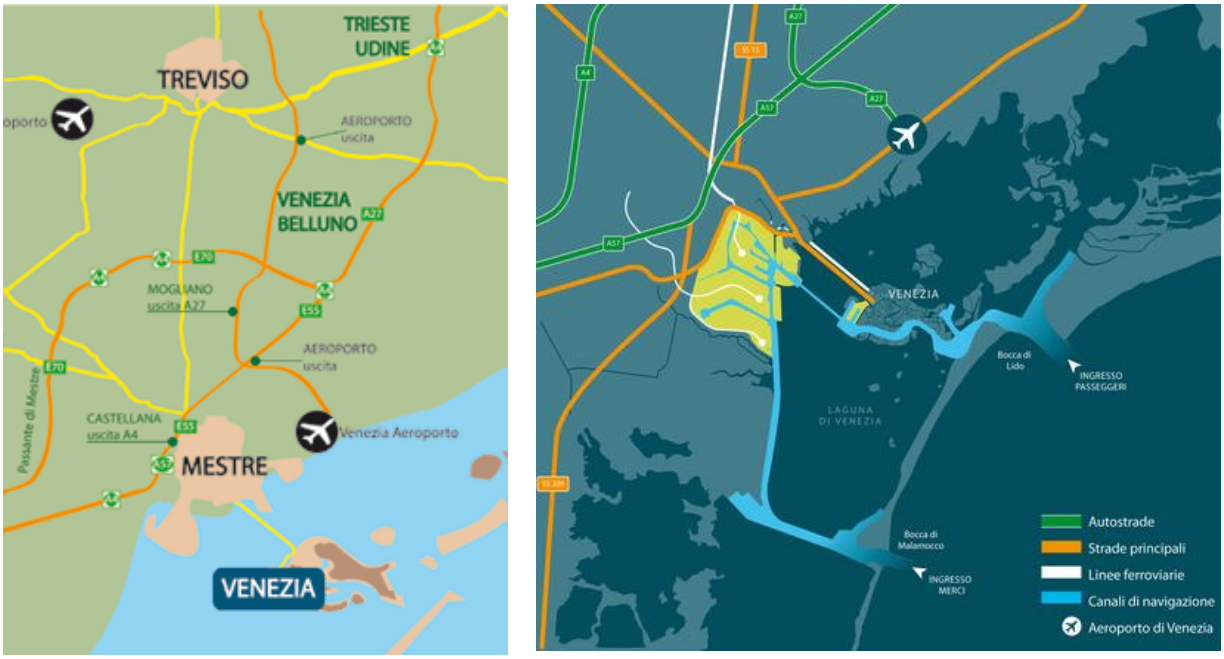


Total Passenger train in the rail network links during a weekday (bi-directional value)

4.1.3 Airport, port e inland waterways

The metropolitan airport system consists of a comprehensive hub comprising the airports of Venice and Treviso, recorded over 14.3 million passengers in 2018, confirming the already consolidated ranking as third Italian airport system after Rome (Fiumicino and Ciampino) and Milan (Malpensa, Linate and Orio al Serio).

Venice Marco Polo airport, an intercontinental gateway together with Rome and Milan, has an extremely important international role; the domestic segment represented 14% of the total, while the international segment accounted for 86%. At Canova Airport in Treviso, specialized in low cost carriers, the subdivision between national and international connections is made up of 33% and 67%. This strategic hub and relate remarkable flows provide relevant gateways to touristic flows and are served by specifically dedicated bus services.



Main accesses and connections to the area of the port of Venice and of the two main airports of Venice and Treviso

Moreover, another strategic gateway is provided by the ports, especially with regards to touristic flows related to ferry and cruise services. In this purpose it is to mention the key relevance of Venice as cruise port. On the other hand, it must be recalled the importance of Venice as commercial port, certainly an important stopover within the Adriatic basin, acting as a gateway for commercial flows from and to Asia.

Following the recently introduced national regulation, the Port of Venice and the second port in the regional context (Chioggia) are jointly managed under the North Adriatic Sea Port Authority. A remarkable feature of this port system is the connection with main inland waterway in Italy (connecting Mantua to the Adriatic Sea).

In this purpose, it is to recall, more in general, the presence of remarkable waterways in the MCVE due to the obvious geomorphological reasons as well as a relevant historical background. Among other things, it also implies remarkable opportunities also for touristic purpose along the (es. houseboat) that can be synergically coupled with other forms of slow-mobility, such as cycle-tourism by promoting an intermodal approach.

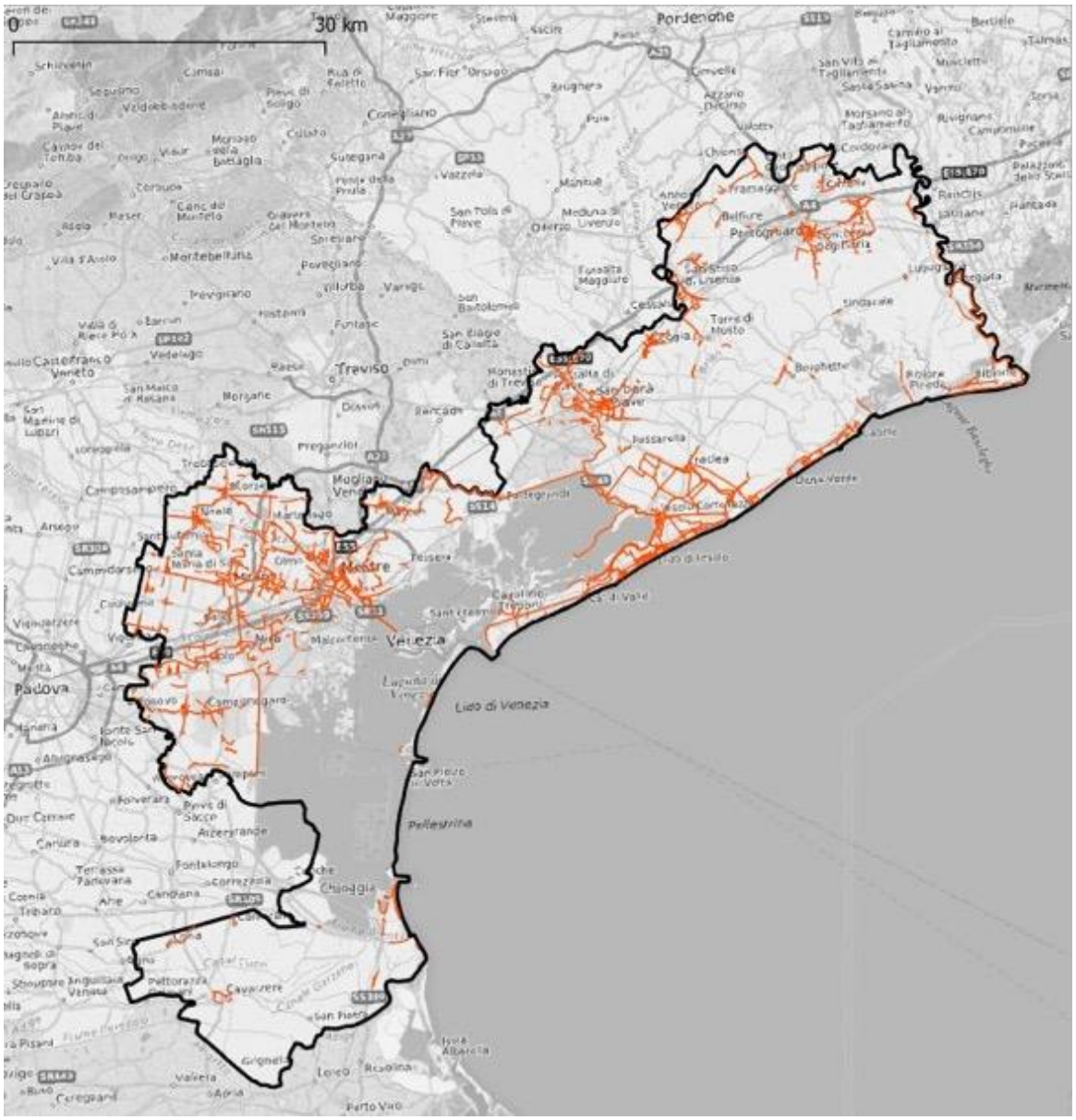
4.1.4 Cycleways & cycle paths

Furthermore, it is to consider the strategic role testified by the presence of relevant itineraries, which are acknowledged among the national level touristic cycleway (according to the Decree 517/2018)

In particular, it is to mention the “Ven-to” cycleway, Venezia – Torino, mainly developed along the Po river (while, after Rovigo reaches Chioggia an then, the islands of Pellestrina and Lido di Venezia), the ”Adriatica” linking Gargano (in Apulia Region) with Lignano Sabbiadoro (in Friuli Venezia Giulia Region) as well as the cycleway “Trieste-Lignano Sabbiadoro-Venezia”. In this purpose, it also to recall the relevance of paid at EU level, since those connections are also through the Eurovelo 8 (esp. for the portions of the cycleways in the MCVE).

The national tourist cycleways. Source: “Connettere l’Italia”, 2017

Moving to the local level the cycling network of the MCVE, as shown in the following are quite heterogeneous and unevenly distributed.



The cycling network of the MCVE. Source: MCVE SUMP preliminary document, 2020.

4.1.5 Intermodal focus on pilot area

In order to appropriately foster intermodality, a particular deal has to be paid to interchange points. In this purpose, in the following figures a representation of interchange opportunity at rail stations and stops with reference to the connectivity to the coastal areas (whose relevance for sustainable tourism has been already clarified) is provided.

In particular, along the line **Portogruaro/Caorle-Mestre** all the station, with the only exceptions of Lison and Venezia Carpenedo, are endowed with park and ride facilities. Some of them, as for instance Gaggio Porta Est (Marcon), are located in correspondence of commercial areas, far from the actual city centre (to which are also connected through Public Transport services)

Schematic representation of the rail connection between Portogruaro and Caorle-VE

Along the analysed line, Portogruaro/Caorle and S. Donà di Piave/Jesolo are to be considered strategic interchange nodes addressing different modes of transport (rail-car-PT-bike).

Among the others, also the **Adria-Mestre** line is particularly strategic.

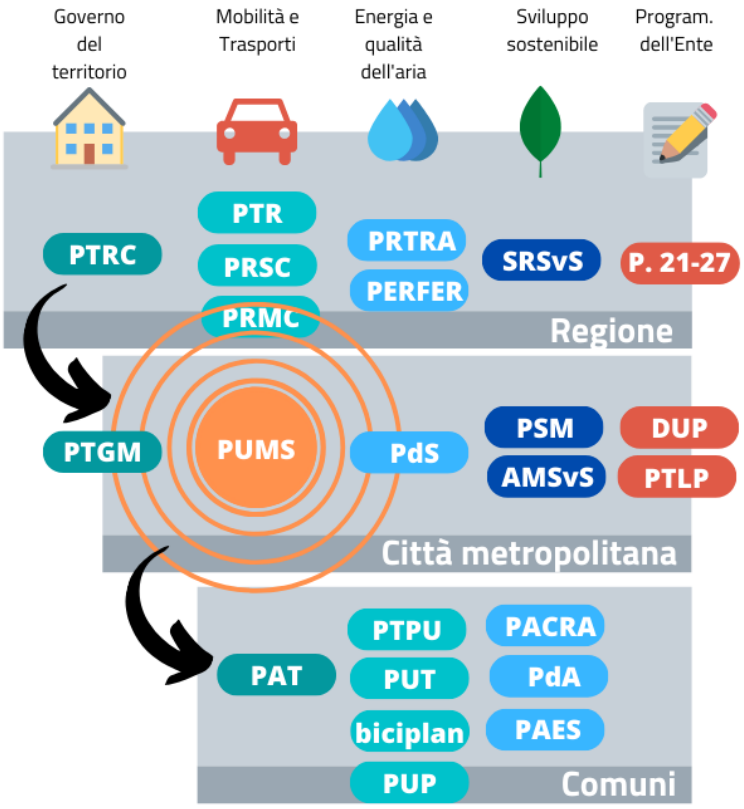
Schematic representation of the rail connection between Adria and Mestre-VE

In order to complete the overall picture, the following interchange nodes in the coastal area are to be mentioned as well:

- **Cavallino-Treporti**, a key interchange node for waterborne transport, car, PT and bike allowing to connect Venice Lagoon with the eastern costal;
- **Chioggia**, terminus of a railway line linking to Adria and Rovigo in a centre characterised by various interchange points (PT and bike);
- **Jesolo Lido**, allowing interchanges between car and PT, especially in correspondence of the main bus station;
- Last but not least the **Venice airport**, which also provide a key interchange node between different modes (plane, car, buses and waterborne transport).

4.2 Planning and policy documents

The overall picture of main planning documents concerning transport and interlinked thematic areas is depicted in the following figure. In this purpose, it is to emphasise the key role played by the Sustainable Urban Mobility Plan (reported with the Italian acronym, PUMS, and represented in orange colour in the following picture), whose development is currently ongoing: given its interdisciplinary and strategic character, it is interlinked with different programming documents belonging to different thematic fields. Moreover, it is also to highlight that together with the strategic framework set-up by the SUMP specific sectoral document are providing more detailed indications with reference to particular aspect of sustainable mobility such as public transport, logistics and cycling. Furthermore, it is to consider the relations between different administrative levels (National/regional/provincial/municipal). In this purpose, as regards to transport planning at regional level, it is to mention the recently developed Regional Transport Plan (PRT). With reference to the municipal level, among others, it is to consider municipal-level SUMPs as well as medium and short-term planning documents on urban mobility.



Schematic representation of the different levels of planning and policy instruments with particular reference to the role of the SUMP

4.3 Multimodal integrated tariff schemes and tickets

Even though a full integration of tariff scheme is not available at present some relevant progresses and interesting initiatives have been developed. In this purpose, it is recall that Veneto Region is actively committed the development of integrated ticketing and tariff at regional level, thus including also the Metropolitan City of Venice.

In particular, it is to mention the recent introduction of the Smartcard UNICA VENETO in which different tickets, related to different operators can be jointly stored. This is based on the acquisition of a shared tool, based on the contactless technology and the related standard CALYPSO, by the various operators under the coordination of the regional offices.

Main smart cards: Veneto Unica (left) and Venezia Unica City Pass (right)

Moving to the local level, a relevant example is represented by the “Venezia Unica City Pass” (a contactless card with RFID), which is providing a comprehensive tool for using public transport as well as touristic opportunities and services to visitors and residents in the Venice area. This card has been developed by the local public transport operator AVM.

Furthermore, it is to recall the usage of ITS solutions such as apps allowing to acquire and store e-tickets through a smartphone. A relevant example is provided, for instance, by the info-mobility tool DaAaB (described in the following paragraph), which is also allowing to acquire the ticket for the operators directly involved in the initiative (ATVO, AVM, ATV, FAP, ALILAGUNA and MOM). A peculiar aspect of this solution is represented by the feature allowing the ticket inspector to verify its validity simply through the screen of the users’ smartphone (therefore with no need for further devices, such as handhelds etc.).

Hence, the aforementioned tools are fostering the development of the whole set of aspects requested for achieving a full integration (of services, of ticketing of fares). On the other hand, they are also somehow coping with the key user’s need for a seamless acquisition of the overall

set of tickets requested for a chain of (intermodal) trips, somehow bypassing the existing gaps in tariff and ticketing integration.

However, a growing number of positive examples is to report also with reference to integration between specific services. In this purpose, it is to mention the improved integration of the service from Treviso to Venezia pooled services, jointly organised between MOM ("Mobilità di Marca"), operating in the province of Treviso, and AVM, operating in Venice.

Another example is the ACTIVO interoperable system, jointly developed by MOM and ATVO (public transport company operating in the Eastern part of the Venetian area). ACTIVO, through an electronic card, allows both companies to issue each other's ticket. Hence, a single ticket is now needed for the connection Treviso-San Donà di Piave.

In other cases, the integration is related to the provision of a comprehensive ticket, such as Venezia Metropolitana 24, which allows to carry out trips during a whole day throughout the lines of the two main transport operators in the Metropolitan City of Venice (AVM and ATVO).

As regards to the integration between different operators and modes of transport (bus/rail), it is to mention the integrated ticketing in cooperation of the regional railway company Sistemi Territoriali and of the national operator Trenitalia, with reference to the services linking to Venice, in cooperation with AVM/ACTV.

Hence, this not exhaustive list of examples allows to underline relevant improvements taking place in the analysed context.

4.4 ITS, ICT & MaaS solutions

The state-of play of ITS implementation in the Metropolitan City can be described through the following list of achievements:

- The (ongoing) realisation, by the Municipality of Venice, of a Smart Control Room providing a unified control centre for real-time monitoring and emergency management also including advance features for carrying out predictive analyses and supporting improved planning;
- The set-up of dedicated portals across relevant roads for traffic management and vehicle monitoring purposes;
- The set-up of temporary as well as permanent traffic monitoring devices along the main national, regional and provincial level roads of Metropolitan City

Available ITS services and tools within the MCVE

As regards to Local Public Transport fleet AVM/AVL (Automatic Vehicle Monitoring/Automatic Vehicle Location) that allow to real-time monitoring and gathering different data on the vehicles position, status and movements.

Furthermore, it is to recall here various apps for information provision (e.g. Web Mapp Venezia) also including the ICT tools supporting integrated ticketing described in the previous chapter (such as DaAaB and AVM Venezia Official app supporting the VeneziaUnica card).

Furthermore, it is to recall parking-related features of different apps (e.g. Sostafacile, EasyPark e MyCicero) actively covering 7 municipalities of the Metropolitan City: Venezia, Chioggia, Portogruaro, Caorle, Jesolo, Mirano e San Donà di Piave.

In perspective, the availability of ITS tools is also favouring the further development of sharing mobility, belonging to the different typologies, including:

- Bike sharing
- Car sharing
- Demand responsive social public transport for elderly and impaired users
- Demand responsive school bus services

Furthermore, though a full Maas implementation is currently not available, the mentioned developments are setting the ground for possible further improvements towards this approach.

4.4.1 FOCUS: Sharing mobility

Sharing mobility definitively represents one of the most recent interesting phenomena that is investing transport from both sides of demand and supply. If from one side it implies a change in the users' habits in favour of a temporary access to mobility services versus the utilization of their own means of transport, from the supply side, it implies the necessary full exploitation of ICT services and tools thus making those service more efficient and attractive for users. Among the main sharing mobility services available in CMVE:

Bike sharing was introduced to reduce the use of private cars within the city centres thus reducing environmental impacts and pollution. **VeNice in Bike** service has 18 hubs with 70 bikes between Mestre, Lido e Malamocco sites. Furthermore, similar services are available in Jesolo (19/ 120 bikes), San Donà di Piave (5/40 bikes), Cavallino Treporti (not yet active) and Marcon (1/12 bikes) where the additional service "**C'Entro in Bici**" was activated in order to make available other bike sharing services in Portogruaro (2/16 bikes), Abano Terme, Castelfranco Veneto, Conegliano, Este, Feltre, Montebelluna, Montegrotto Terme, Padova, Pieve di Soligo, Preganziol, Rovigo, Verona, Vittorio Veneto.

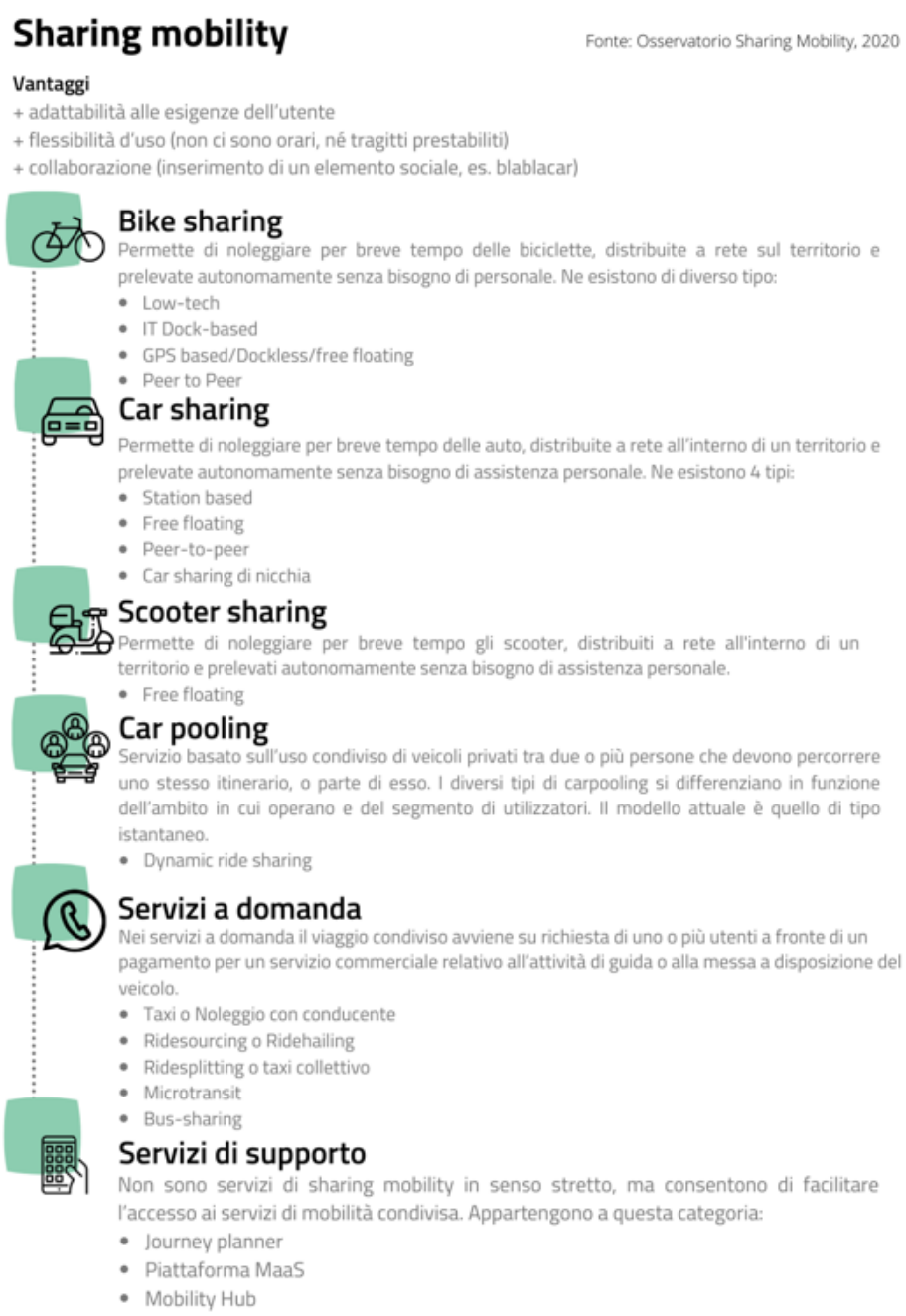
Furthermore, it is to mention that Chioggia and Caorle took the opportunity of SUTRA and MobiTour EU project participation to activates free-floating bike sharing.

Municipality	Stations	Bicycles
Venezia - Mestre	18	Circa 70
Jesolo	19	120
San Donà di Piave	5	40
Marcon	2	12
Portogruaro	2	16
Chioggia	-	-
Caorle	-	-
Spinea	-	-
Cavallino Treporti	2	Non working

Main bike sharing stations in MCVE

Car sharing is available in Venezia (Mestre) since 2018 through Toyota with the **Yukõ One** service (15 sites) and **YukõWay** as free floating service. In total 50 cars are available, allowing Venice to be ranked behind Cagliari, Palermo e Torino.

Among the others, also special **Demand driven services** have to be mentioned with particular reference to social and scholastic services: the first ones in relation to mobility of old and reduced mobility people, and the second ones in relation to students' mobility.



Overview of sharing mobility approaches

5 Identification of future challenges in the area

The picture defined in the previous paragraphs is describing the overall situation of mobility within the area of the MCVE which can be highlighted according to the following SWOT:

Strengths	Weaknesses
Within MCVE slow mobility (cycle/walk) has a strategic role. High number of initiatives activating services supporting cyclists (racks and charging stations for eBikes…).	Systematic mobility mainly represented by individual mobility (53%).
Public transport services count on 20% of the total mobility and represents a very wide and capillary in both urban and non-urban areas contexts.	Strong potential criticalities derived from the different kind of traffic flows of both passengers and freight coming from port/airport and public transport.
Rail services are very much used for systematic mobility.	Mestre rail node residual capacity quite limited.
Strong request of non-systematic mobility because of international hubs and touristic presence.	Still some peripheral areas of the MCVE have still limited access to the main transport networks.
Good accessibility of urban areas through the road network of different level.	Road network has still some limits in terms of capacity and dimensional characteristic also in relation to the areas within the urban nodes where it affects the development of soft mobility as well as public transport.
Hubs for intermodal services (train/bus station) equipped with parking supporting the modal shift from individual mobility to public transport.	Unchanged level of transport services in the last 5 years not answering to the demand of mobility.
Wide available network of cycleways.	Parking areas in historical centres are reducing their attractivity as well as their practicability.
Bike&Car sharing services available in the territory.	Existing cycleways needs to be enhanced in terms of security and some missing links of the network have to be completed.
Decreasing number deaths and injured people because of car accidents.	Limited availability of filling stations for alternative fuels (e.g. electric and methane).
A wide maintenance plan is foreseen for upgrading main road links in the area.	
Overall general improvement of air quality.	

OPPORTUNITIES	THREATS
High potentials for public transport enhancing mobility to/from Venice in connection to the other main urban areas. High potentials for the increase of the usage of sharing mobility. ICT as a great driver for increasing public transport attractivity and related intermodal solutions, with particular reference to both main kind of users: citizens and tourists. Venice as the crossroad of two important TEN-T Corridors and three strategic national cycleways as further potential to be exploited also in terms of new investments in new infrastructures and services. High attention of local administration to sustainability in general will allow to further invest in new initiatives.	Still some uncertainty in the realization of some strategic infrastructures that could be crucial for unlocking further enhancing local mobility and transport. e-Commerce strong development could hamper traffic flows because of the increase of freight flows. Ongoing urban transformation with new urban areas would be more complicated to manage because of too differentiated situations. Urban sprawl represents a strong limit to the development of local public transport services.

6 Definition of priorities in each involved area

Among the priorities of the area, the MCVE is mainly focusing on following macro objectives that could be highlighted as particularly relevant:

A. effectiveness and efficiency of mobility services
B. sustainability themes such as energy and environment
C. safety and security performances of services and infrastructures
D. socio-economic sustainability of infrastructures and services to be developed

All of them have to be pursued and guided through specific strategies which are mainly declined as follow:

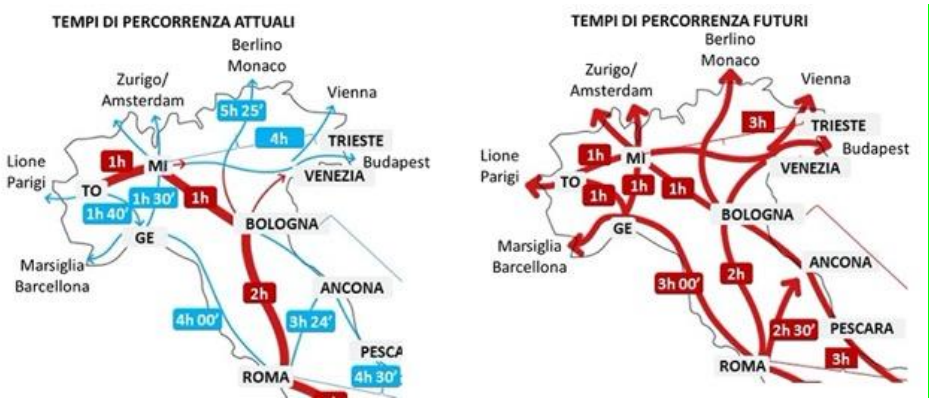
- Integrating the different policy levels dealing with mobility, territorial planning and environment;
- Valorising public spaces for enhancing urban and city accessibility and safety
- Integrating and optimizing the interconnections between long-distance corridors and local networks
- Promoting transport modes with limited environmental and social impacts;
- Promoting the use of technologies and info mobility systems supporting mobility of transport and freight
- Supporting the development of a comprehensive overview on logistics hubs distribution favouring urban logistics
- Encouraging and promoting sustainable and sharing mobility

7 Recommendations

Beside the outlined priorities, it is furthermore to take into account the possibility to take advantage from a couple of “exogenous” factors that should support and contribute in guiding the future development of transport and mobility issues within the area of the MCVE.

A)

The future development of the high-speed train services passing through Venice hub will allow to further develop the connection of the urban area to the wider network of the so-called “Metropolitana d’Italia”, thus representing an extremely interesting opportunity in terms of attractivity of the whole territory of MCVE.



Travel time: actual (left) versus expected (right) once the rail network will be fully deployed

B)

Further synergies need to be researched in order to fully exploit the opportunities coming from the attractivity of Eurovelo cycleways passing through the territories of the MCVE, thus allowing the declination of alternative touristic services than the more classical ones.

Furthermore, also on the basis of the outcomes of the consultation carried out, it is to recall the following set of main recommendations that could “complete” the framework in which the future initiative should be maintained:

- Fight weak accessibility of some marginal areas through more capillary and frequent transport services;
- Increase attractiveness of public transport by further investing in efficient interconnections hubs (train/bus);

- Rise competitiveness of public transport by further investing in more effective info-mobility systems and ticketing options also by further promoting ICT solutions and services.

Therefore, the following main measures should consider the need to answer to the following provisions with particular reference to the MCVE attractiveness:

- widely consider merging the needs of completely different user's needs represented by citizens (i.e. commuters) and occasional users (i.e. tourists)
- make public transport attractive by using direct (i.e. incentives…) as well indirect (i.e. investing in ICT/innovation…) ways to promote its utilization;
- adequately inform and publicize about the social/economic/environmental benefits related to public transport

8 Conclusions

The metropolitan city of Venice, similarly to different areas of Veneto Region, is affected by a highly urbanised context, with particular reference to the area of Venice-Mestre where two TEN-T Core Network Corridors (out of 3 in whole Veneto Region) are passing by.

Such situation is allowing a strong potential synergy between the long-distance connectivity and the urban area represented by Venice surroundings, where the development of the wide set of local mobility opportunities have a central role in promoting such synergy.

Indeed, despite its limited extension, the strategic and central role of MCVE is underlined by the presence of a wide set of transport service operators that are ruled at different level, thus calling for a more coordinated vision to promote integration-related aspects. Such situation is then paired with the presence of relevant infrastructures and hubs, encompassing the whole set of transport modes, which are composing the accessibility network of the area.

This is in particular true when considering the attractiveness of the area in terms of touristic presences that each year are visiting Venice and its surroundings thanks to its airport, port and main train stations.

So said, the future improvements in terms of mobility and transport services will inevitably require to smartly merge the needs expressed by the local mobility of citizens and commuters and the one of occasional users such as tourists.

This would be achieved also by pushing on a further integration of the different policy levels dealing with mobility, territorial planning and environment, with the main aim of finding a coordinated vision of the future of transport and mobility for such peculiar territory.

In this purpose, expected improvements on ICT, info-mobility systems and integrated ticketing are representing one of the most probable way to enhance the attractivity of public transport with the main aim of reducing impacts (social and environmental) of individual mobility and further promoting sustainable and sharing mobility.