DELIVERABLE D.T1.2.4

Territorial needs assessment for VENETO REGION – SISTEMI TERRITORIALI SPA

Version 1.0
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1. Overview of the selected region

Delimitation and basic geographical description of the focused area

Veneto Region is located in North-eastern part of Italy and bordering to other 4 Italian Regions: Friuli Venezia Giulia (to the East), Emilia-Romagna (to the South), Lombardy (to the West) and Trentino-Alto Adige/Südtirol (to the North).

Furthermore, in its northernmost portion, it is bordering with Austria. However, it is to underline how such limited-length (about 25 km) bordering area is placed in a high mountain range with no rail or road connection (i.e. except for hiking or biking trails) linking to the neighbouring Austrian regions (East Tyrol and Carinthia).

Fig. 1 - Veneto region. Source: M. Valli

From the morphological point of view, the region is characterised by a high heterogeneity, which can broadly classified into four main areas: the alpine/pre-alpine context, the hills, the plain and the coastal areas. More in detail, 29% of the surface (the Alpi Carniche, Dolomites and Venetian Prealps) is mountainous. The vast plain reaching unto the Adriatic Sea amounts to the 57% while limited hilly areas (e.g. Monti Berici, Colli Euganei, Colli Asolani and Montello) correspond to the remaining 14%.

With reference to water bodies, important rivers run through the region (Po, Adige, Brenta, Bacchiglione, Livenza, Piave, and Tagliamento), which also includes the eastern portion of the largest lake in Italy (Lake Garda). The Adriatic Sea costal area (corresponding to 200 km of coastline) is characterised by the presence of the Venice Lagoon as well as by 100 km of beaches.

Veneto is Italy's eight region in land area (18,407 km^2) and fifth in population (4,907,529 inhabitants). The corresponding density, about 267 inhabitants/km^2, is remarkably higher than the national average (about 197 inhabitants/km^2).

Furthermore, it is characterised by remarkable economic performances. In fact, in spite of the lower growth of recent years, GDP per capita is almost 10% higher than the EU average; with reference to the overall value (i.e. referring to the whole population), it is ranked in third position at national level.

Its capital city, Venice, apart from being a worldwide known touristic landmark, is one of the 14 metropolitan cities in Italy identified by the national regulation (Law 56 of April 7, 2014) as well as the acts of the autonomous regions.

Veneto Region key data

Capital: Venice

Area: 18,407 km^2

Population:

- ***Total 4,907,529***
- ***Density 267 inh./km^2***

GDP per capita:108.4 [% of EU average]

With reference to administrative subdivisions, Veneto Region (identified by NUTS2 code ITH3) is divided into seven NUTS3 areas: the Metropolitan City of Venice and 6 provinces.

Fig. 2 - Borders, provinces and general framework of Veneto region.

Fig. 3 - NUTS codes according to EUROSTAT

Among these seven NUTS3 areas, the higher values in overall population and related density (see Tab. 1), rather than by the Venice Metropolitan city, are reached by the Province of Padua.

More in general, all the four areas (provinces of Verona, Vicenza, Padova, Treviso and Venice Metropolitan City) corresponding to a broad belt running from east to west, located in the plain and in the Alpine foothills, represent the most economically developed and densely populated part of the region. They are all characterised by similar values overall population (between 850.000 and 950.000) and densities remarkably superior to the national average (between 290 and 450 inhabitants/km^2).

Province	NUTS CODE	Abbrev.	Area (km²)	Population	Density (inh./km²)
Belluno	ITH33	BL	3,672	205,781	56
Padova	ITH36	PD	2,144	936,274	437
Rovigo	ITH37	RO	1,819	238,588	131
Treviso	ITH34	TV	2,480	885,972	357
Venice	ITH35	VE	2,473	854,275	345
Verona	ITH31	VR	3,096	921,557	298
Vicenza	ITH32	VI	2,723	865,082	318

Tab. 1 - NUTS3 areas of Veneto region

The southernmost province, Rovigo, though located in the plain is characterised by remarkably lower density (below the national average), also due to the presence of the Po delta, thus leading to an overall population of about 240.000 inhabitants.

However, the lowest density is registered by Belluno (56 inhabitants/km²), which almost entirely occupied by mountain areas. Therefore it is characterised, at the same time, by the largest area and the lowest population.

At lower administrative level, corresponding to NUTS 4, Veneto Region includes 580 municipalities. Looking at the 10 most populated ones (Tab. 2), a relatively balanced situation between major poles can be seen as well.

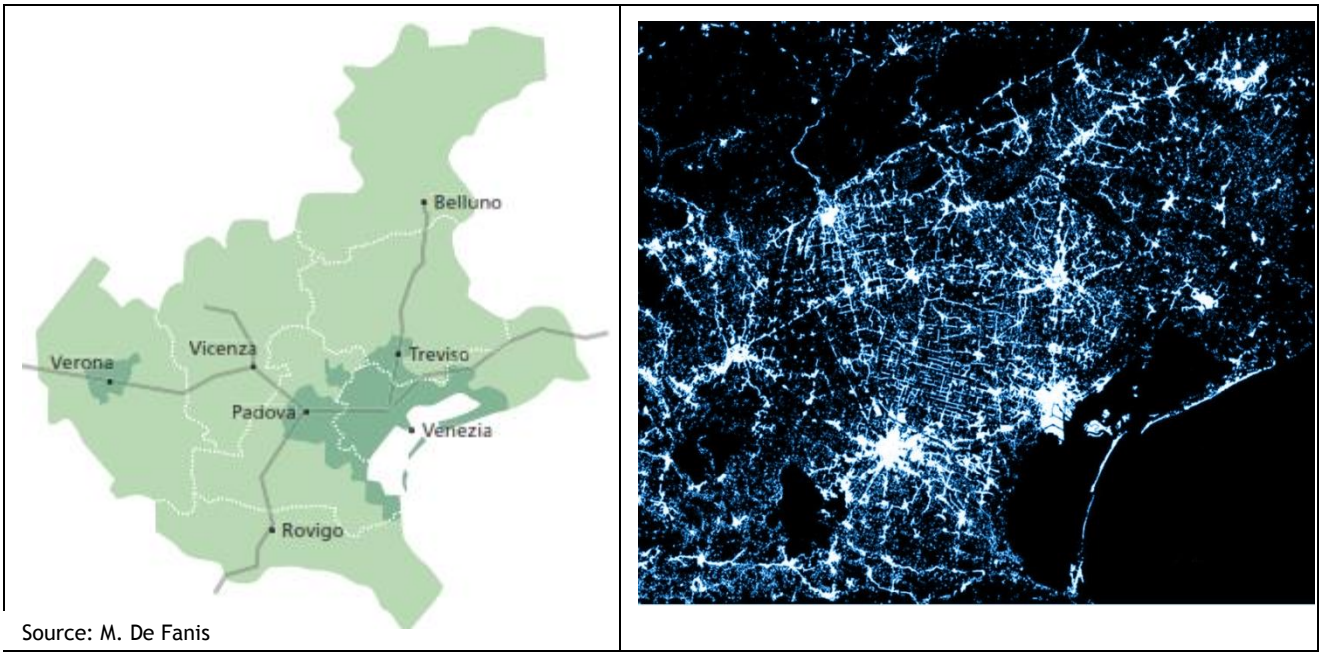
Rank	Municipality	Inhabitants (inh.)	Area (km²)	Density (inh./km²)	Elevation (m amsl)	Province
1	Venice	268,741	412.54	651.4	1	VE
2	Verona	262,403	206.63	1,269.9	59	VR
3	Padua	209,696	92.85	2,258.4	12	PD
4	Vicenza	113,969	80.54	1,415.1	39	VI
5	Treviso	81,665	55.50	1,741.4	15	TV
6	Rovigo	51,378	108.55	473.3	6	RO
7	Chioggia	50,880	185.20	274.7	2	VE
8	Bassano del Grappa	42,237	46.79	902.7	129	VI
9	San Donà di Piave	41,827	78.73	505.2	3	VE
10	Schio	38,779	67.04	578.4	200	VI

Tab. 2 - 10 largest municipalities in Veneto Region

In particular, though Venice presents the higher number of inhabitants (about 268,000), such value is almost reached by Verona while Padua is beyond 200.000 as well. Given also the limited mutual distance, it is to underline the role of poles Vicenza and Treviso, whose dimension is approximately close to 100,000.

In fact, a clearly polycentric structure also associated with urban sprawl can be ascertained with particular reference to the central part of the region that comprises the NUTS3 areas of Padua, Treviso, Venice and, at least partially, Vicenza. Such polycentric system of settlement brings about a complex and widespread system of relationships, especially along the main arterial roads. Hence, the Veneto central area can be regarded as a widespread metropolitan area, characterized by a high degree of continuity, which is not bounded by administrative delimitations.

In this purpose the westernmost province of Verona, represent a more mono-centric context, which is also affected by remarkable interactions with other poles in neighbouring regions (e.g. Brescia to the West and Trento and the Brenner axis direction in general to the North).



Source: M. De Fanis

Fig. 4 – Settlements corresponding to metropolitan areas in Veneto Region

This urban characterisation is clearly interrelated with the socio-economic system and, in particular, to the industrialisation process experienced in the second half of the 20th century. Nowadays, the industrial sector is highly specialised, export-oriented and competitive. It is mainly related to manufacturing and mostly comprised of SMEs, thus once again according to a not centralised character. In particular, the region is endowed with almost 400,000 companies: 13% in industry, 15% in construction and 57.6% in the service sector. Nonetheless, agriculture is still an important sector (corresponding to almost 10% of the national agricultural production) and related companies are characterised by high levels of mechanisation, specialisation and competitiveness.

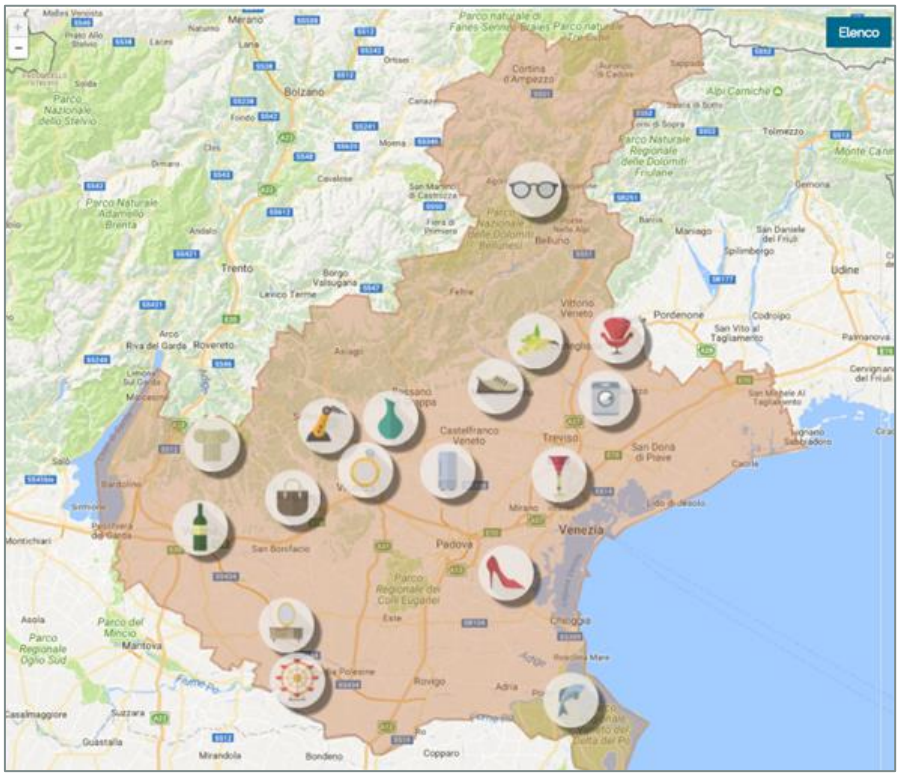


Fig. 5 - Localization of the main industrial districts. Source: ***www.venetoclusters.it***

This productive system is characterised by the presence of "industrial districts", geographical areas where activities related to a specific sector are particularly concentrated. The 17 districts awarded at regional level are represented in the Fig. 5.

Due to its richness in cultural and natural landmarks Veneto has a well-consolidated tradition in providing a valuable and varied touristic offer, which allows tackling with constantly changing demand and user needs. In fact, with reference to cultural tourism, along with by flagship city Venice, many other historic centres, walled cities and Venetian villas in the mainland are complementing such extraordinary heritage. Nonetheless, in terms of visitors overall number, a high share is represented by the beach tourism in the shores of the Adriatic Sea as well as of the Garda Lake. Moreover, the natural environment of the mountains is also providing a well-consolidated and appreciated sector, which finds in the city of Cortina its most notorious example.

This rich and multifaceted heritage is also testified by the presence of five UNESCO sites in the region:

1. Venice and its Lagoon;
2. the Botanical Garden of Padua;
3. Vicenza and the Palladian Villas;
4. City of Verona;
5. The Dolomites.

Fig. 6 - UNESCO sites in Veneto

Along with traditional tourism, Veneto is also increasingly providing more specialised options such as opportunities to practice sports (e.g. golf, horse riding, bike trips), wellness facilities and spa, renowned oenological and gastronomic products, conference tourism, religious holidays, fishing holidays. Hence, in spite of being a heavily industrialised region, tourism is one of its main economic resources. In fact, one-fifth of Italy's foreign tourism is headed towards Veneto, which is the first region in Italy in terms of tourist presence, attracting over 60 million visitors every year.

With regards to the cross-border dimension, the absence of borders in condition to enable direct mutual accessibility (i.e. apart from the aforementioned limited mountainous area in the north-eastern corners) hampers the possibility of establishing significant flows based on daily commuters. Nonetheless, the presence of touristic flows (including also those from Veneto to foreign destinations) as well as consolidated economic relationships play a relevant role. Among other things, the attention paid to such relevant relationships is testified by the participation of Veneto Region to the EGCT "Euregio Senza Confini r.l." together with Friuli Venezia Giulia and Carinthia region. In fact, the EGCT is actively tackling, by means of a dedicated Working Group mobility issues and, in particular, cross-border transport services.

Furthermore, with reference to a wider geographical perspective, it is providing a bridge between the macro-regions in which its members are involved: EUSAIR, EUSALP and EUSDR. In the framework of the Alpine Convention it is currently (2017-2018) chairing two transnational Working Groups, including the one addressing "Sustainable Tourism".

In fact, Veneto connectivity towards foreign countries such as Austria and Slovenia and, further on towards Germany and Croatia is based on the transit opportunity provided by the two neighbouring region that are also tackled by CONNECT2CE project: Friuli Venezia Giulia and Trentino Alto Adige/Südtirol.

In particular, with reference to Friuli-Venezia Giulia, it can be ascertained a clear synergy with the pilot initiatives that are being developed for addressing the accessibility towards Austria and Slovenia:

- Pilot Action 1 ("*Experimental extension of the MICOTRA train to Trieste*");
- Pilot Action 6 ("*Cross-border integrated ticket ITA-SI*").

In this purpose the connection between two remarkable destinations, such as Venice and Vienna, provides a particularly relevant and interesting example.

In fact, the Mi.Co.Tra. service has been originally established between Villach (Austria) to Udine (Italy) as to cope with the gap originated when (in 2009) the long distance cross-border service (Venice-Vienna) operated in by Trenitalia on the Italian side was cancelled (only the night trains were kept).

With regards to long distance services, the Austrian operator (OBB) have replaced the trains cancelled in 2009 with bus services and, more recently, also with the 2 RailJet trains (per direction) operating in daytime.

Considering a longer-term strategic dimension, it is recall the European level and, in particular, the perspectives associated to the Trans-European Transport Network (TEN-T) development.

In this purpose, it is to recall the fact that the region is crossed by the following 3 TEN-T Core Network Corridors (out of a total of 9):

1. Baltic Adriatic,
2. Mediterranean,
3. Scandinavian-Mediterranean.

Furthermore, within the regional territory relevant intersections between those main axes, headed on both North-South and East-West directions, are located. In this purpose it is also to underline the

acknowledgement as core nodes of both Padua and Verona rail-road terminal along with Venice, which is endowed with both the maritime port and the airport (Fig. 1).

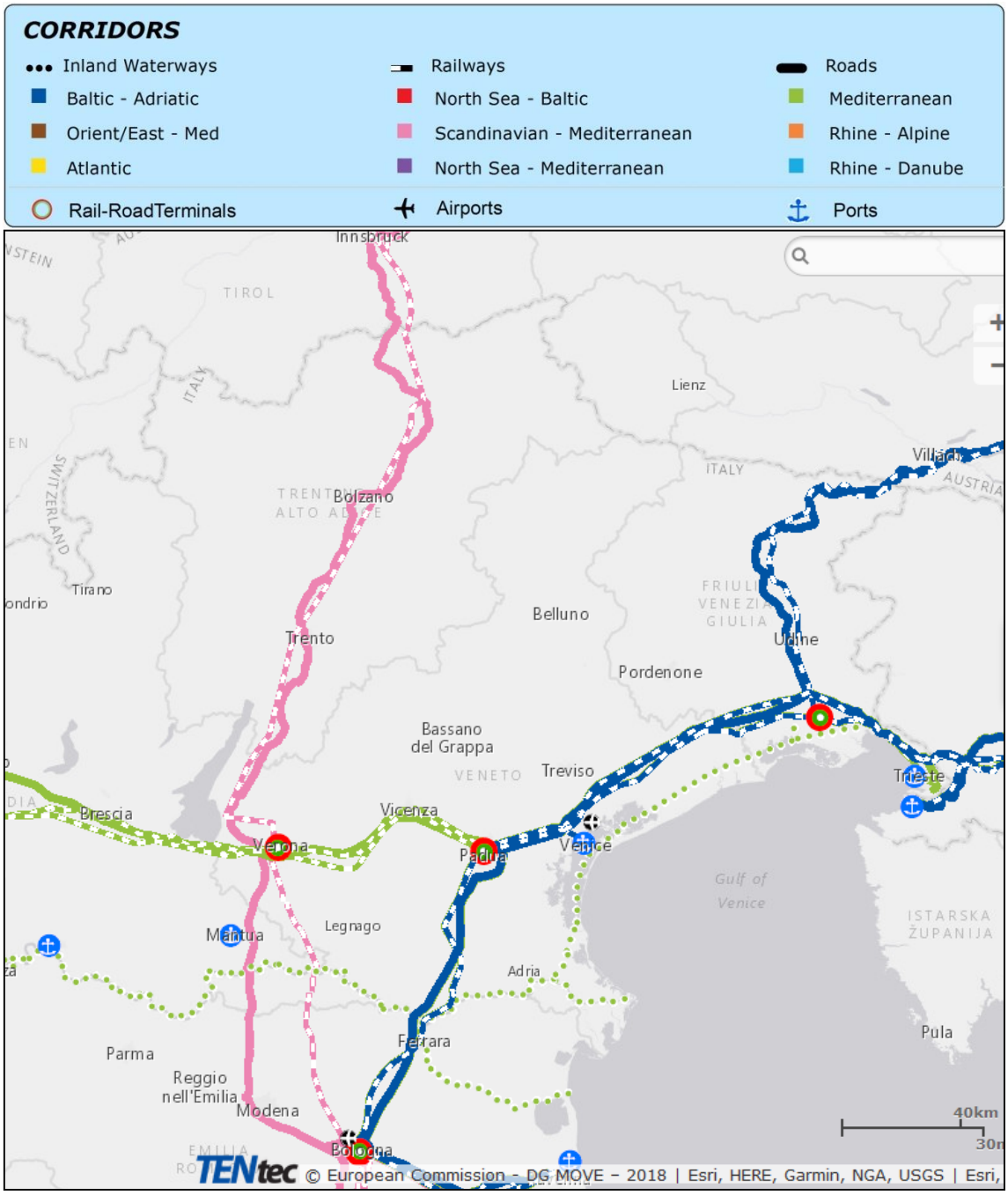


Fig. 7 - TEN-T Corridors crossing Veneto Region. Source: DG-MOVE

In this purpose, it is worth-mentioning the probable leveraging effect that will be determined by the accomplishment of the base tunnels that are currently being realised along the Austrian portion of the Baltic Adriatic corridor. In fact, the accomplishment of both Koralm (expected by 2022) and Semmering (expected by 2024) will allow a one-and-a-half hour reduction of the overall travel time experienced in the Venice-Vienna link.

Consequently, the mutual accessibility will be significantly improved as well as the attractiveness of the train connection. In fact, it eventually allows making it competitive with respect to the air transport for certain transport demand segments (esp. tourists).

With reference to the western side of the region, represented by the area centred in Verona, the cross-border perspective is mainly related to the Brenner axis (i.e. through Trentino Alto Adige/Südtirol). Still in this case, it is to emphasise the relevant touristic component also related to the Garda Lake beach tourism, which presents a high shares of German and Austrian visitors. In this purpose it is to mention the ongoing realisation of the Brenner Base Tunnel, whose accomplishment (and consequent improvements in connectivity) is expected by 2026.

In perspective, Alto Adige/Südtirol is in condition to play a relevant role also for the cross-border connectivity of the province of Belluno. In fact, the improvement of its accessibility in northern direction is deemed a priority by the regional administration. In this purpose, it is to mention the recent agreement between Veneto region and Alto Adige/Südtirol for the realisation of new rail linking Cadore with Val Pusteria. It is to recall that such connection is also being addressed by the development of a long distance cycle-touristic itinerary linking Munich and Venice. In this context, wider cross-border connectivity can also be achieved through intermodal solutions profiting from the well-developed regional transport service in Alto Adige/Südtirol linking to the neighbouring Austrian Regions, even outside of the main transnational corridors (e.g. East Tyrol).

Fig. 8 – Focus of the Sistemi Territoriali analysis (red arrow) linking to metropolitan areas (dark green) and cross-border directions (orange)

Within this general framework, the analysis that will be specifically developed by Sistemi Territoriali is particularly focusing on improvements in the regional context with particular reference to the direction through Verona, Rovigo and Chioggia (Fig. 8).

This connection correspond to an arch linking peripheral areas in the southern part of Veneto region with two main core metropolitan areas (the widespread a polycentric area around Venice and the smaller

mono-centric one around Verona). In particular, it will allow focusing on a secondary line (and related potential intermodal connections) whose improvements are lagging with respect to recent advancements registered in the core areas of the regional context. Furthermore, such connection enables linking to the cross-border connectivity characterising the main regional nodes (as described above).

Recent population and demographic trends

According to the most recent data available, Veneto Region in late 2016 had a population of 4,907,529 inhabitants. Despite growing trend registered from 2000 to 2010-2014 (Fig. 9), a general decrease of the number of inhabitants has to be registered in the more recent years.

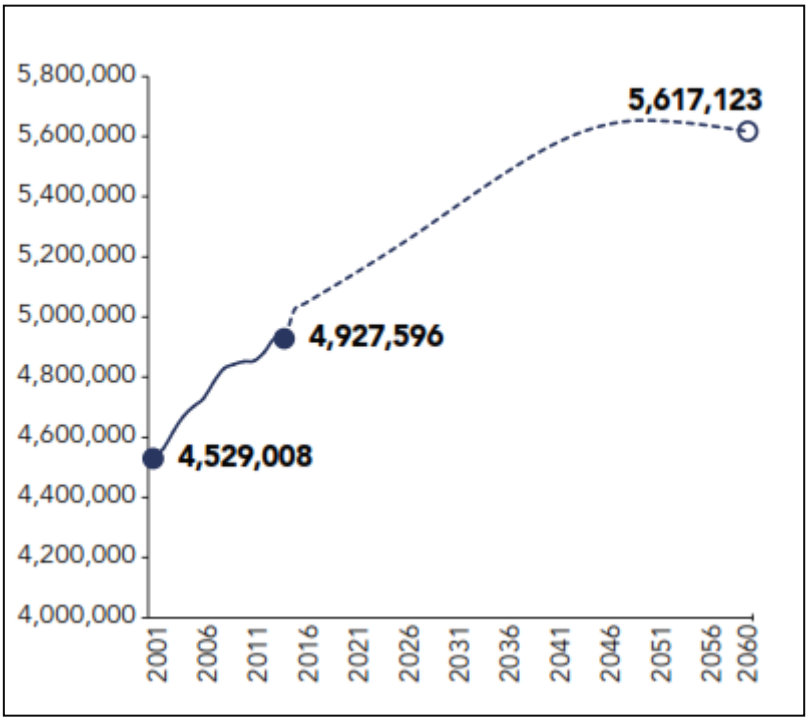


Fig. 9 - Resident population. Veneto - Years 2001:2014 and forecasts 2015:2060. Source: Veneto Region - Regional Statistical System

This pattern is also testified by the demographic balance and population percentage shown in Fig. 10.

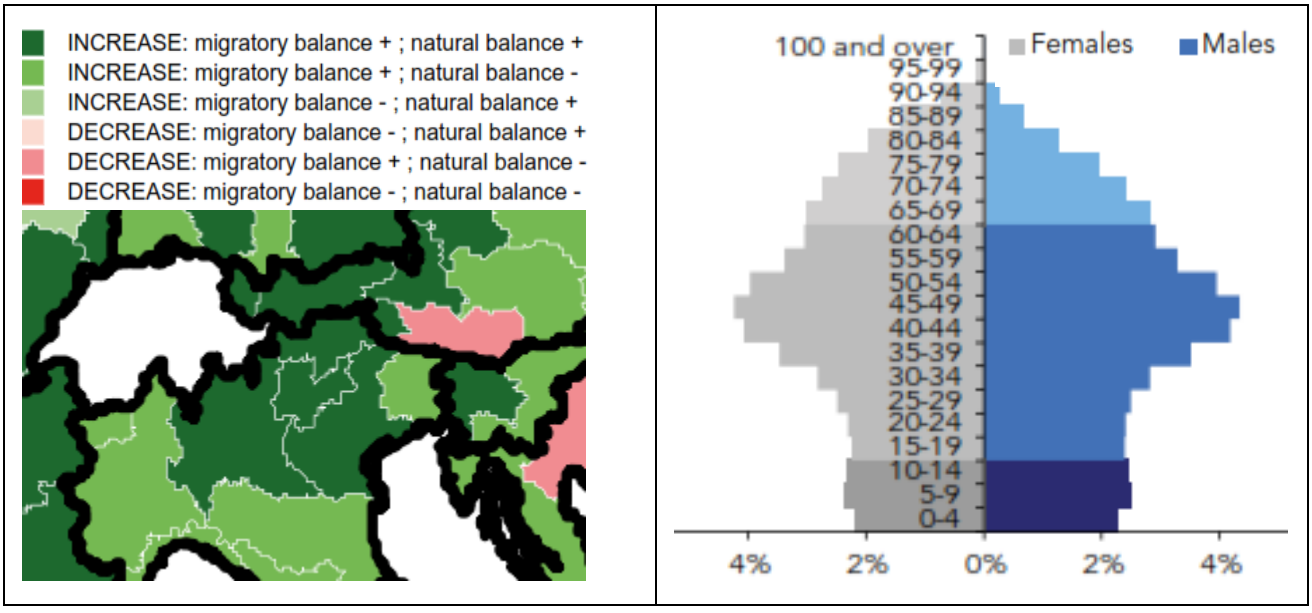


Fig. 10 - demographic balance from 2000 to 2011 and population percentage by sex and age (2014). Source: Veneto Region - Regional Statistical System

In fact, the limited positive natural balance of the last period 200-2011 resulted in a growing pattern trough the additional contribution resulting from the migratory balance. In the meanwhile age pyramid is showing a string tendency towards an ageing population.

With reference to gender balance, in 2016 the percentage of male and female population were almost equal and, respectively, equal to about 49% and 51%.

Province	Births	Deaths	Natural balance	Migratory balance	Overall balance
Belluno	6,8‰ (1.403)	12,7‰ (2.626)	-5,9‰ (-1.223)	0,9‰ (185)	-5,0‰ (-1.038)
Padua	7,9‰ (7.445)	9,6‰ (9.043)	-1,7‰ (-1.598)	0,2‰ (189)	-1,5‰ (-1.409)
Rovigo	6,6‰ (1.585)	12,9‰ (3.117)	-6,3‰ (-1.532)	-1,9‰ (-461)	-8,2‰ (-1.993)
Treviso	8,2‰ (7.266)	9,3‰ (8.279)	-1,1‰ (-1013)	-0,9‰ (-833)	-2,0‰ (-1.846)
Venice	7,2‰ (6.166)	10,7‰ (9.148)	-3,5‰ (-2.982)	0,6‰ (480)	-2,9‰ (-2.502)
Verona	8,7‰ (7.984)	9,9‰ (9.117)	-1,2‰ (-1133)	-0,2‰ (-148)	-1,3‰ (-1.281)
Vicenza	8,2‰ (7.112)	9,5‰ (8.231)	-1,3‰ (-1.119)	-1,5‰ (-1.285)	-2,8‰ (-2.404)
VENETO	7,9‰ (38.961)	10,1‰ (49.561)	-2,2‰ (-10.600)	-0,4‰ (-1.873)	-2,5‰ (-12.473)

Tab. 3 - Demographic balance with reference to the Veneto region NUTS3 regions

More in detail, Tab. 3 is reporting the demographic balance of the various NUTS3 are of Veneto region. In general, they are all characterised by an overall negative balance. However, the provinces of Belluno and Rovigo showed a particularly relevant decrease (respectively, -5.0% and -8.2%). Such decreasing pattern is always associated with a negative natural balance. The migratory balance, differently from what registered in previous years is also mostly characterised by slightly negative values. In this purpose the exception provided by Belluno, Padua and Venice are registering limited increase that are not in condition to counterbalance the decrease in the natural balance.

Transport network and accessibility conditions

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 Veneto Region, given their considerable complexity and relevance with regards 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.

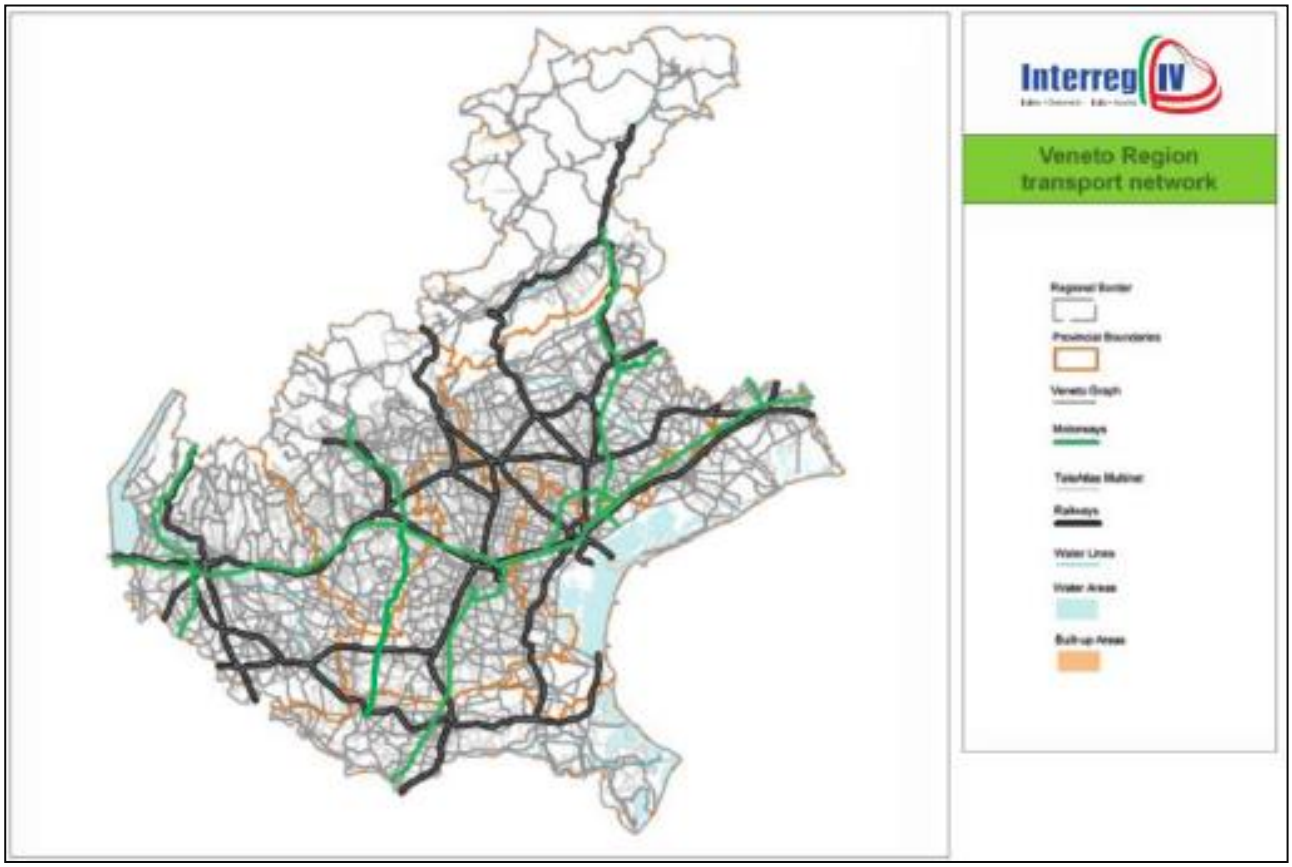


Fig. 11 – Overview of Veneto Region road and rail networks. Source: updated elaborations based on TrIM project (Italy-Austria 2007-2018 Programme)

With reference to the road network, Veneto is endowed with about:

- 9.000 km of regional and provincial roads, managed by local administrative bodies or the regional company Veneto Strade S.p.a.;
- 730 km of other roads of national interest mainly managed by national road company (ANAS S.p.A.)
- 590 km of motorway, mainly managed by concessioners.

These values, once divided by the territorial surface, corresponds to values when compared to national averages are higher with reference to motorways; considering (together) the other two cases, instead, the resulting value is lower than the national average.

With regards to the rail network, in Veneto region there are 1,188 km of operative rail lines, 414 km (35%) represented by principal lines and 707 km by complementary lines. The majority of those lines are already electrified (66%) and double track (52%). No lines is provided with the full functional requirements of a High Speed rail (esp. allowing speed >250 km/h).

The national railway companies Rete Ferroviaria Italiana S.p.A. (national railway infrastructure manager) and Trenitalia S.p.A. (company responsible for providing rail service) are managing almost all the regional rail network apart from 57 km belonging to the line Mestre-Adria, which is managed by the regional company Sistemi Territoriali S.p.A.

A main component in transport demand is, obviously, related to (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 survey allowed ascertaining an overall number of 2,603,830, daily trips at regional level, thus marking an increase of about 300,000 units over the previous ten years (i.e. with respect to previous census carried out in 2001). This overall value is made up of 70% of travel for work purposes, while the remaining 30% for study.

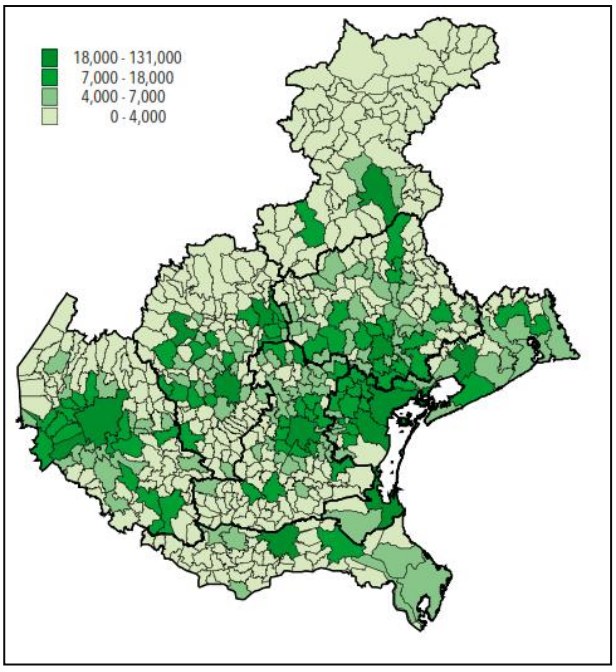


Fig. 12 – Total commuting movements map by municipality (2011).

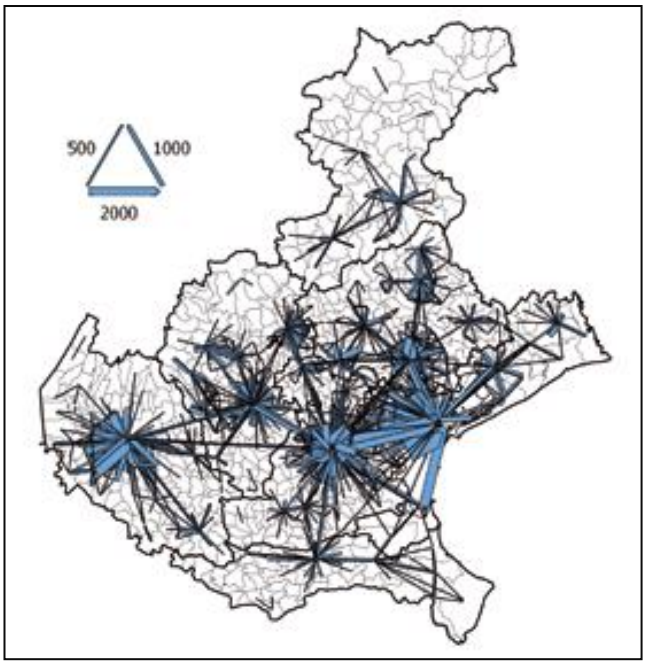


Fig. 13 – Cross-municipal relations with more than 100 commutes per day.

Source: Veneto Region Processing - Regional Statistical System

The following Fig. 14 allows indentifying the top polarities in the regional context, also differentiating between the components related to work and study. In particular, with reference to the prevalent one (work), Veneto municipalities attracting a daily number of movements above 40 thousand are only 5, with the maximum of over 130 thousand daily movements recorded in the municipality of Venice. They are all the capitals of NUTS3 area with the exception of Rovigo and Belluno.

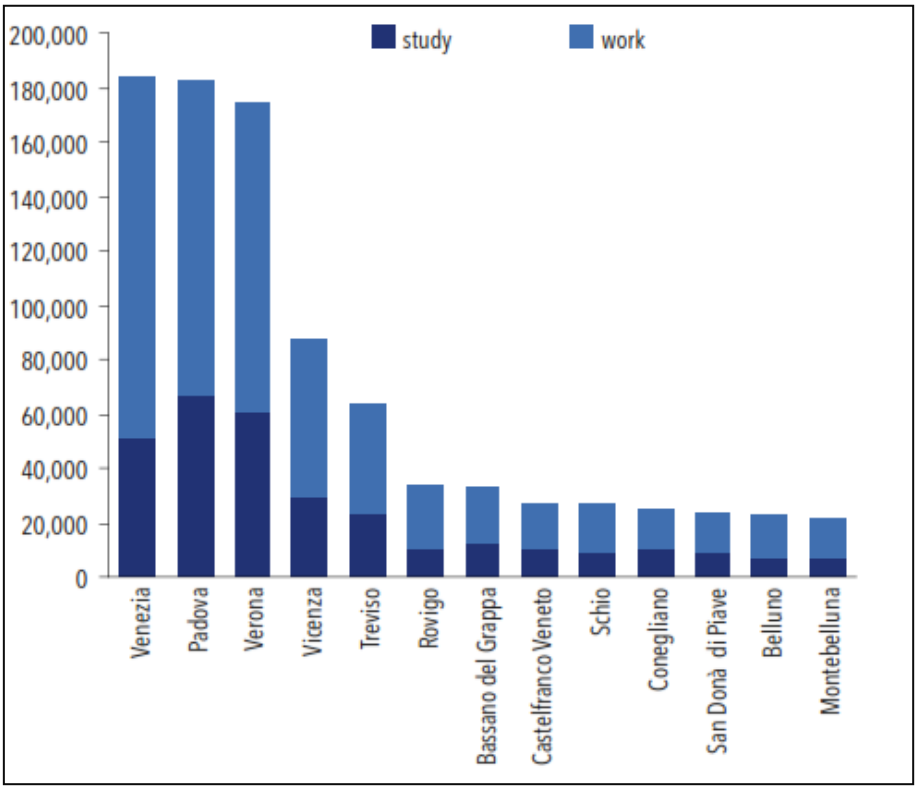
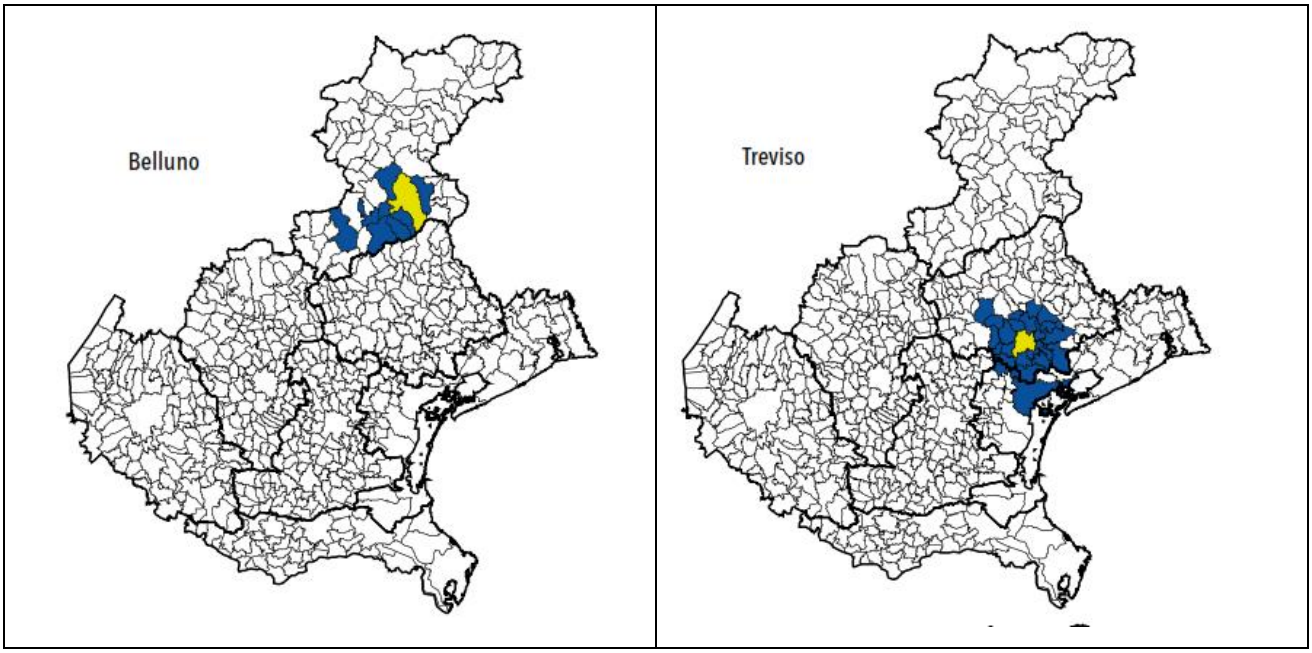
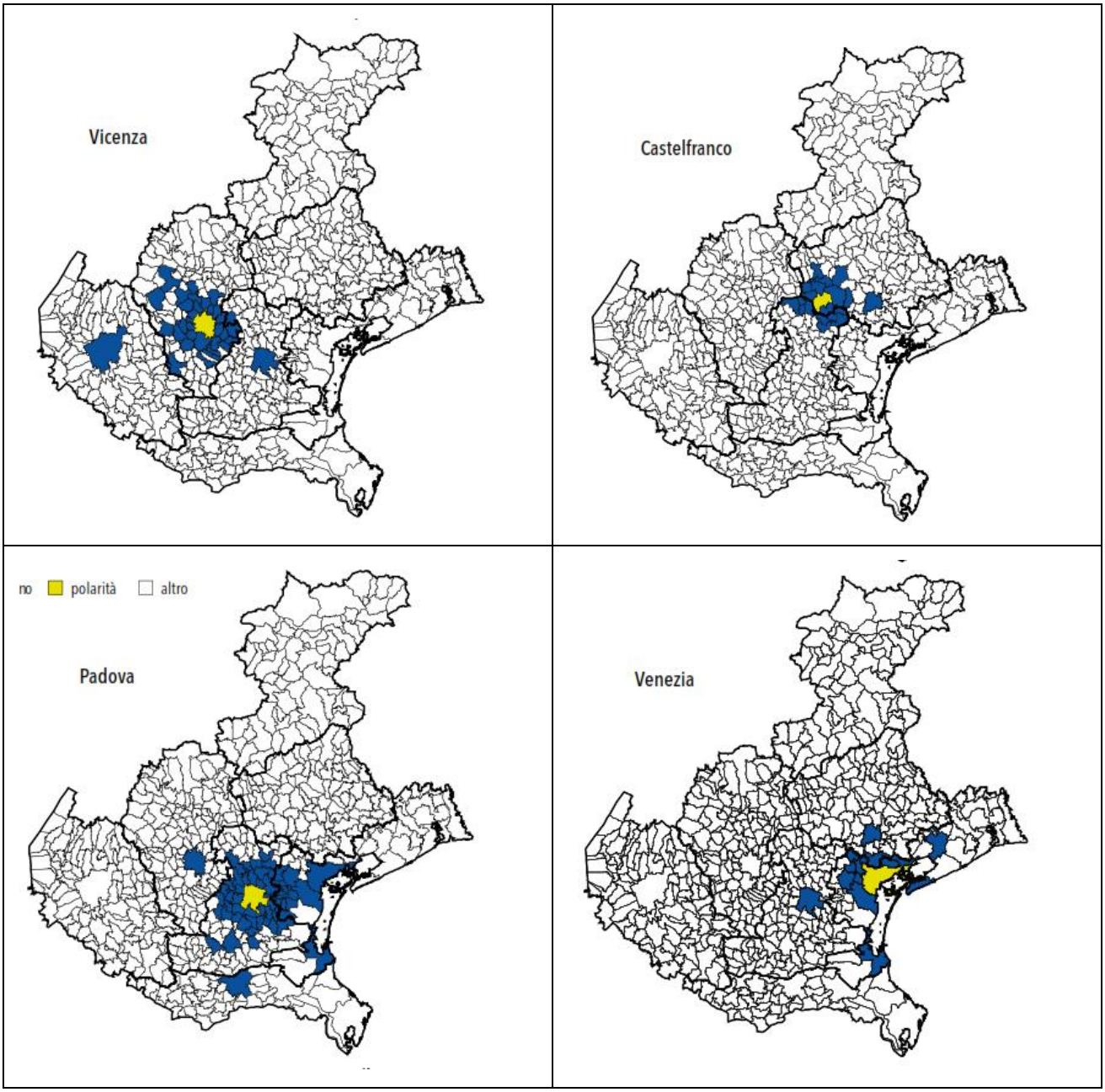


Fig. 14 – Incoming commuting movements towards the main polarities by reason (2011). Source: Veneto Region Processing - Regional Statistical System on 15th Istat Census data.

The analysis of the main polarities and related basins provide some relevant evidences of the urban context characterisation described in the first chapter. In particular, in the Fig. 15 the 7 capital of the NUTS3 are reported together with a relevant polarity, Castelfranco Veneto, whose basin is peculiarly spreading across two neighbouring provinces.




Vicenza
Castelfranco
no
polarità
altro
Padova
Venezia

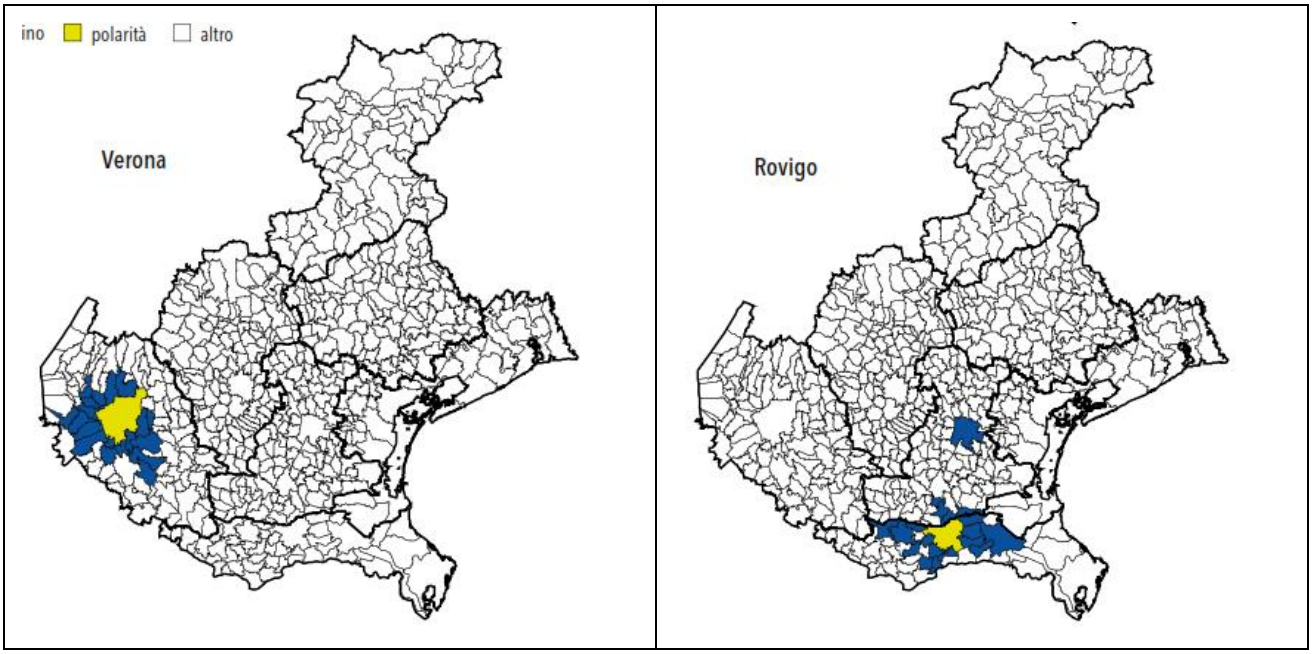


Fig. 15 – Total commuting Polarity municipalities and relative basins (2011). Source: Veneto Region Processing - Regional Statistical System on 15th Istat Census data.

The analysis and comparison of the different polarities and basins [1]allow verifying the overlapping taking place between the Padua, Venice and Treviso NUTS 3 areas as well as the attractiveness of Padua. On the other hand, Belluno and Verona basins are confined within their respective provinces.

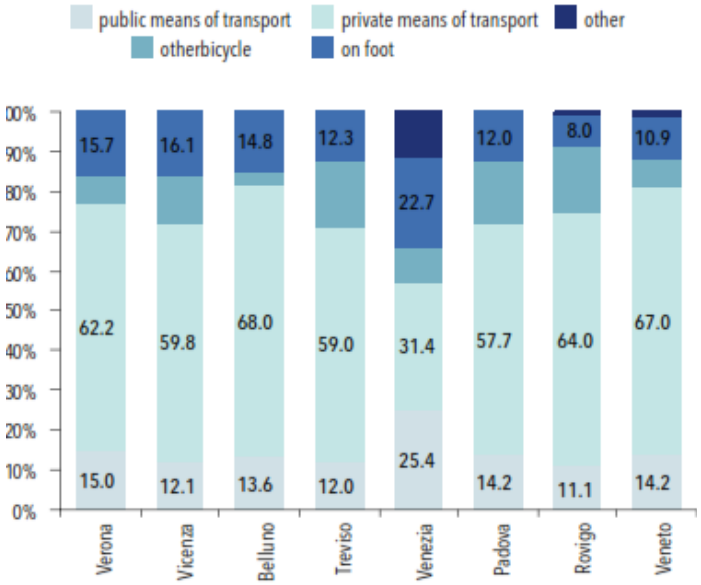


Fig. 16 – Commuters' use of means of transport by capital province municipality. Source: Veneto Region Processing - Regional Statistical System

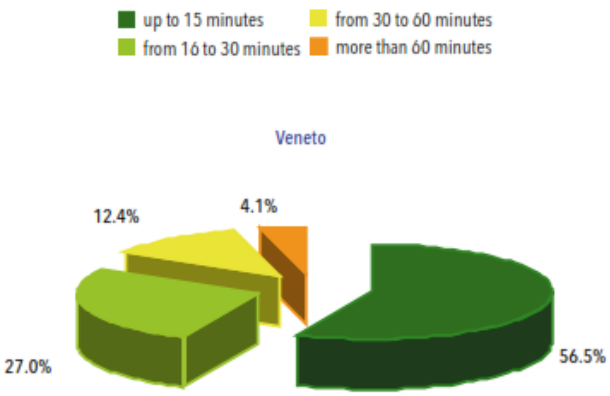


Fig. 17 – Commuting movements' distribution % by duration. Source: Veneto Region Processing - Regional Statistical System.

[1] *Municipalities attracting above 20,000 movements a day are defined "polarities" and the set of municipalities, selected in descending order according to the contribution of mobility, which generates 85% of movements towards the corresponding polarity Is defined"basin". Source: Veneto Region Statistics Unit - Rapporto Statistico 2015*

With regards to modal split (Fig. 16), the prevailing choice is represented by the car, which in total reaches 64% of cases (50% as driver and 14% as passenger). Only 14.2% of movements take place by collective public (or private) means of transport (esp. train or bus), 7% by bicycles and 3% by two-wheeled motor vehicles (such as motorcycles, mopeds and scooters). Obviously, in case of workers the percentage associated to private cars is even bigger, reaching up to 78.3%.

With reference to the travel duration (Fig. 17), the majority (58%) are carried out within 15 minutes. In this purpose, it is to report a lower duration for students, with 63.2% of them falling within this interval (53.6 % for workers). Correspondingly the percentage of workers spending up to 30 minutes rises to 30.6%.

In addition to commuting mobility, it must be underlined the relevance of peaks of seasonal traffic mainly associated to tourism (especially in summertime), which is also related to cross-border and long-distance connectivity (described in the following). These phenomena are obviously affecting the routes heading towards the main touristic destinations within the region (esp. seaside and mountainous area). Nonetheless, they are also related to transiting traffic from/to external destinations affecting the motorways (esp. A4).

In order to assess the effect of such mobility system predominantly based on the car usage, it is important to assess the condition of the vehicle fleet in the regional context. The National register of Vehicles (ACI) registered in 2015 about than 3.940.000 vehicles in Veneto region, with cars amounting to more than 3 millions. It corresponds to an average of indicatively 613 cars/1.000 inhabitants. Considering the overall consistency of vehicles, (though decreasing in shares) the majority of them is still represented by petrol engines. Furthermore, the majority (about 57%) of cars belongs to the EURO 4 (or higher) standard.

In order to draw a general (though, obviously, simplified) conclusions, a general accessibility index can be used. For instance, such index can be based on the accessibility towards the inter-urban and logistic nodes. In particular, it is based on the travel times in minutes, from the core centre of every municipality to the three nearest infrastructures, for each of the four considered categories (ports, airports, railway stations, toll booths). It must be noted that the obtained value for Veneto is remarkably inferior to the national average.

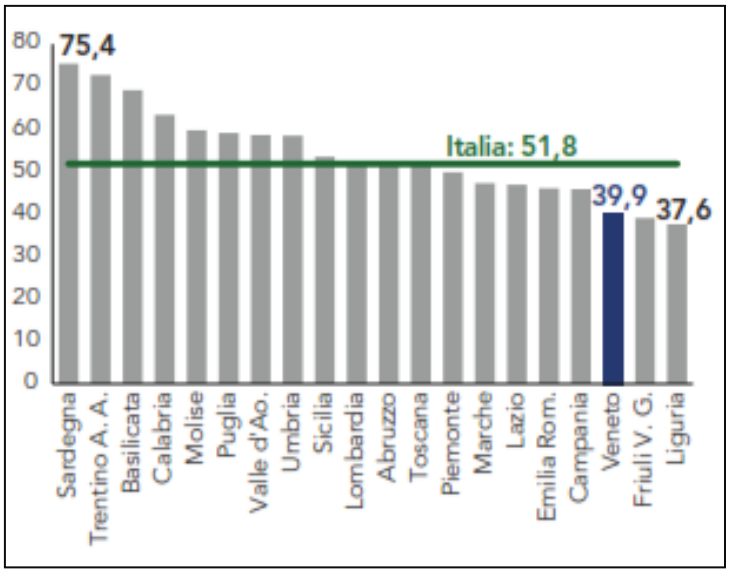


Fig. 18 – Index of accessibility towards the inter-urban and logistics nodes per region – Year 2013. Source: Veneto Region Processing - Regional Statistical System

As for cross-border connectivity is concerned the absence of direct connections with foreign countries (described in the first chapter) implies that its accomplishment is related to the overall connectivity ensured through neighbouring regions (and, in particular, the two analysed within CONNECT2CE: Friuli Venezia Giulia and Trentino Alto Adige/ Südtirol).

Furthermore, in this purpose it is to recall the role of Veneto as crossroad of various transnational corridors (whose relevance is recognise at European level) as well as the presence of nodes playing the role of key gateway to the external.

Concerning air transport, the regional system is based on the intercontinental-level airport of Venice and also includes other two airfields, whose relevance is awarded at National level. Consequently, the regional system is ranked in third position at National level. This facilities and relate remarkable flows provide relevant gateways to touristic flows and are served by specifically dedicated bus services.

In terms of accessibility, another key entry point role is played by the ports, in particular with regards to touristic flows related to ferry and cruise services. In this purpose it is to mention the relevant as cruise port of Venice. On the other hand, it must be recalled the relevance of Venice as commercial port, certainly an important stopover within the Adriatic basin, acting as a European gateway for commercial flows from and to Asia. Recently, following the new national regulation the Port of Venice and the second port in the regional context (Chioggia) have united under the newly established 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).

From the logistics point of view, are also worth mentioning the intermodal logistic nodes (interporti) located in Padua and Verona, which are characterise by infrastructures and functional performances of strategic relevance recognised at European level.

Organisation of transport sector and key stakeholders

As seen in the previous chapter, the regional transport sector is based on a multimodal network that includes road, rail and maritime transport services. All these different modes of transport are interested by public transport service whose coordination is ultimately in charge of the region.

The current framework is the result of a complex and still ongoing reform process that in Italy the Public Transport sector has been affected by a complex and still, which started in 1997 with the National Acts (law 59/1997 and Legislative Decree 422/1997), implementing the EU Directive 1831/1991. At regional level the key milestone is provided by the Regional Decree 25/1998.

One of the key goals of the reform was the shift from a concession-based system to a competitive tendering system, to be managed by Regions and the Local Administrations. Through the years such reform process has been accompanied by various national and regional provisions implementing the subsequent EU regulations (e.g. EU Reg. 1370/2007 and EU directive 2012/34).

Such a deep transformation led to a long lasting evolutionary process, encompassing various intermediate steps, which is still facing some transitory phases. This process has been marked by the challenging efforts related to setting-up a tendering process related to such a complex system.

In the meanwhile, relevant decrease in the financing (e.g. in the national funding) has further pushed forward the need for an increase efficiency and proper allocation of resources. This need has led to the development of a joint methodology for assessing standard cost agreed at national level and which is gradually coming into force. Such approach has been ratified by a unanimous agreement reached in February 2018 within multilevel governance permanent platform involving the Italian National administration together with the regional ones ("Conferenza Stato Regioni"). Veneto Region has actively participated to the debate concerning the correct methodology for determining the proper value of the amount to be paid to the bus operators. This process has been carried out both with elaborating on the service data (e.g. multivariate statistical analysis) and to the discussion on criteria to be applied. Such thorough evaluation will allow overcoming the limits of the currently used approach, which is strongly based on consolidated values without a complete insight. This insight is needed in order to properly understand the effect of specific operational conditions (which can impact heavily on the real cost of a specific service). In practice this will mean shifting from the usage of average values to the usage of mathematical function taking into account (as inputs) all the main factors that contribute to determine the actual cost of a transport service.

As a general overview, on yearly basis the supply of public transport (reference year=2015) at regional level can be summarised as follows:

- About 16 millions of train/km;
- 86 millions of km of extra-urban bus services;
- 40 millions of km of urban bus services;
- More than 500.000 service hours for waterborne transport services.

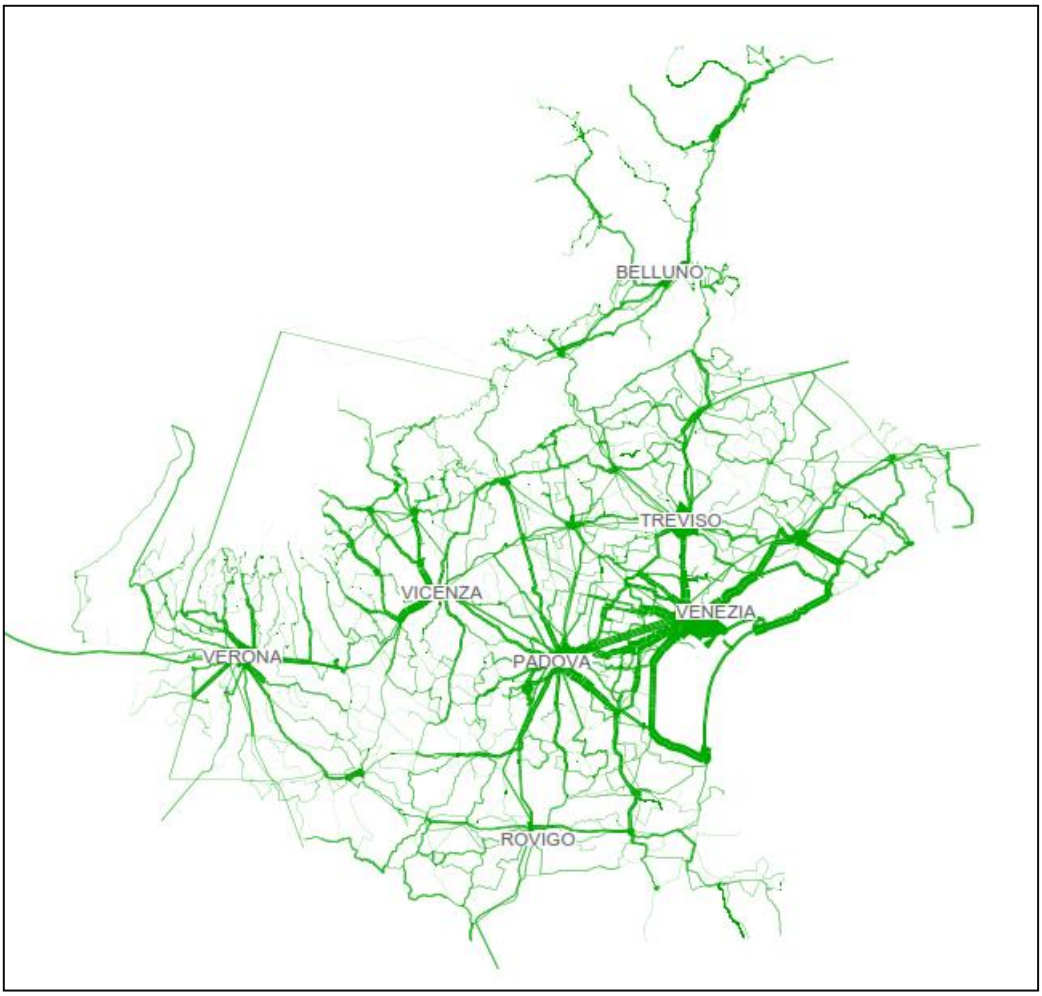


Fig. 19 – Overview of daily bus services. Source Regional Transport Plan

Summarising the governance of PT in Veneto, the Region is entitled to manage and coordinate those services in order to optimize, verify and monitor multimodal transport services.

More in detail, rail transport service is tendered by the region and only two operators are currently implementing the service:

- the national railway company Trenitalia S.p.A. which covers the majority of the regional lines and services;
- the regional company Sistemi Territoriali S.p.A. whose services are concentrated on the lines Adria-Mestre, Verona-Rovigo and Rovigo-Chioggia.

With reference to road and waterborne transport services, it has to be mentioned how these ones are tendered by the provinces and the metropolitan city of Venice as well as, to a limited extent, by some municipalities. Therefore the resulting complex picture is represented in the following figure.

Given the high number of road transport operators the figure reports only the main one related to each provincial context (and that will be taken into account in the next paragraphs). A complete picture is provide by the annex ALLEGATO A DGR nr. 1004 del 27 giugno 2017.

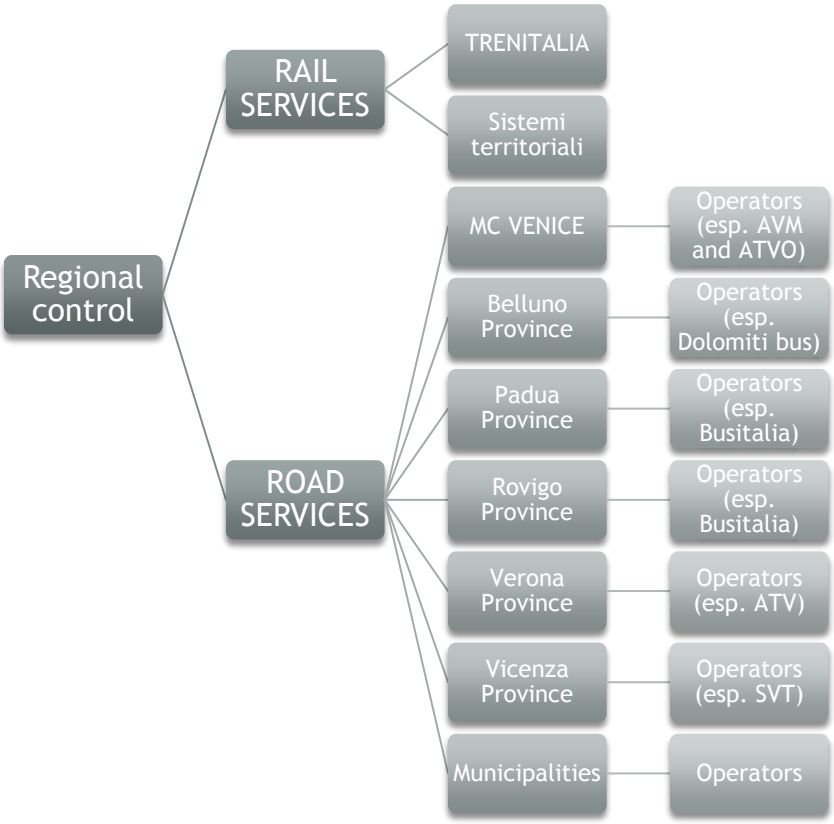


Fig. 20 – Public transport governance in Veneto region.

2. Territorial needs assessment

Connectivity

The need of satisfying transport demand needs in such a complex system, as previously described, calls for an overall vision and planning process. In this purpose, the decision makers need to be supported by thorough technical analysis, encompassing different what-if evaluations and scenarios.

These steps are being developed in the light of the new regional transport plan, which is a key milestone set for the next future.

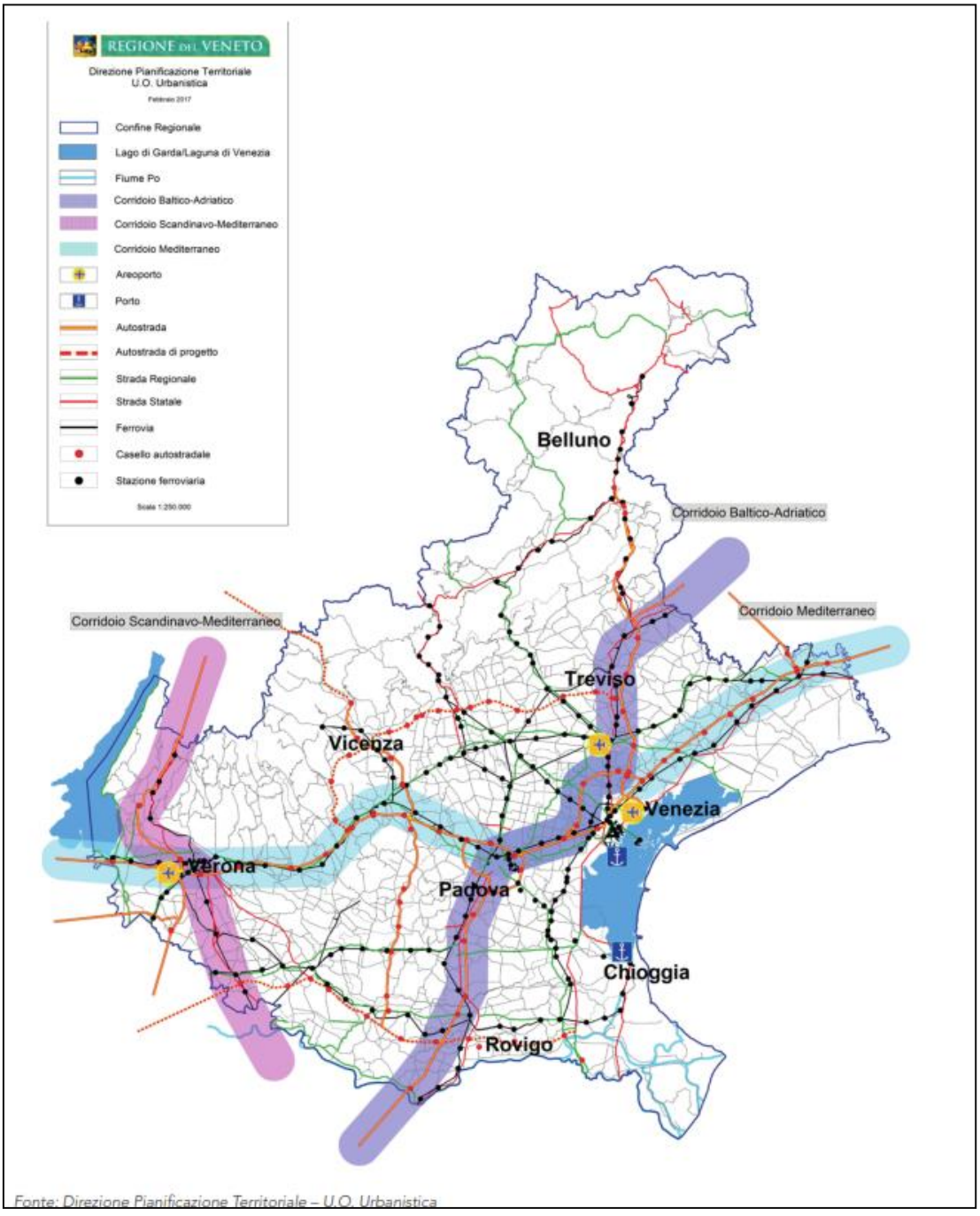


Fig. 21 – Veneto Region transport system, including planned realisations. Source Veneto Region Territorial Planning Unit

Nonetheless, the already set objectives for the short-medium term can be outlined on the basis of what reported in the Regional Economic and Financial Document DEF 2017-2019 (thematic area "Mobility"). In particular, with reference to infrastructure realisations the following ones are presented.

- Starting the realisation process of the "Dolomiti rail", aiming to connect the Province of Belluno with Alto Adige/Südtirol;
- Realisation of the Brescia-Padova rail segment of the Mediterranean Corridor;
- Completion of the Pedemontana Veneta highway.

With regards to public transport, instead, it is to report:

- Promotion of an integrated and multimodal system;
- Retrofitting of fleets;
- Integrated electronic ticketing encompassing both rail and road services (see the following chapters);
- Ensuring adequate standards to rail transport services

In particular, the Brescia-Padua rail corresponds to strategic perspective supported by the TEN-T development strategy along the main axis crossing the region in East-West direction. In this purpose, it is to underline how the urban characteristic of Veneto region settlement is not facilitating the adoption of High Speed solution with subsequent stops at considerable distance given its polycentric nature. Furthermore, given the strict technical requirements associated to high performance railway lines (e.g. minimum radius of curvature), the urban sprawl context implies relevant difficulties, which can lead to difficulties in reaching the needed consensus for accomplishing the realisation process.

This intervention, will allow closing the missing link in the corridor development as to reach Venice (the section Padova-Mestre has been already upgraded in the last decade). On the other hand, the planning of the section from Venice eastwards (towards Trieste) whose design phase is undergoing an update and revision process.

As already clarified, the regional context along with the presence of relevant transnational corridors is affected by a highly urbanised context (especially in its central part). In order to cope with this second aspect an ambitious strategic vision aiming at the development of a Regional Metropolitan system (SFMR, "Sistema Ferroviario Metropolitano Regionale") was developed in the recent past.

The key aspects of the related approach are meant to integrate urban and suburban transport in the vast hinterland through the conversion of the regional rail network into metropolitan service by using the existing rail lines with several infrastructure improvements. In particular, with reference to infrastructural realisation and facilities provision, it addresses: higher safety standards, elimination of level road crossing points, building of new stations, and purchase of new metropolitan trains. In terms of service organisation, it implies the adoption of the clock-face timetable for rail services, an increase in their frequency and the application of train-bus rendez-vous mechanism at stations aiming to promote intermodality.

In December 2013, a relevant step was made since the new clock-face time table started to be operational for the first time with a substantial change of the previous rail transport supply system. In practical terms, it implied the adoption of this paradigm as to improve the regularity and coordination of rail services with reference to the whole regional network (though without reaching the high frequencies foreseen in the initial approach). However, to a certain extent, the structural inelasticity compared to the traditional flexible time table implied some further adjustments in the following period.

In general, the performed interventions let to achieve remarkable improvements, as also testified by general positive outcomes in customer satisfaction surveys (esp. related to increased punctuality).

Nevertheless, given the current limited availability of funds its full realisation of the SFMR in the medium-short term is deemed not feasible (even though the main concepts are essentially still valid).

Other relevant improvements are associated to the modernisation of the rolling stock, also with reference to the next improvements foreseen in the new service contract signed between the Region and Trenitalia in January 2018. Furthermore, with reference to the main centres in the Metropolitan Area, Padua and Venice, it is mention the innovation provided by the new tram system; this experience will be used for developing similar interventions in two other relevant centres: Vicenza and Verona.

Fig. 22 – SFMR planning vision

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Infomobility systems

The presence of a high number of public transport operators in Veneto region has led to development of different ICT solutions that are mainly referred to a specific territorial basins (mainly corresponding to Provinces). This situation could lead to a fragmented overview of travel paths, especially if considering long-distance connections in different urban areas (potentially requiring interchanges to be performed between different operators or mode of transport).

In particular, this fragmented situation is characterising regards to road transport (urban and extra-urban bus services): in general each operator developed its own travel planner making it available on its own website; moreover almost all of them developed or adopted also dedicated apps endowed with user-friendly interfaces. On the other hand, the increasing supply of mobile phone apps, includes also tool providing information related to various operators.

The following tables are providing an overview of the infomobility systems offered by the main road operators in each provincial area as well as the two rail operators (Trenitalia and Sistemi Territoriali). These tables are summarising the information collected through the questionnaire defined among CONNECT2CE partners.

Such information (Tab. 4) are relate to what is supplied by public transport operators in terms of: information before the trip (e.g. supporting the user when organising the trip), during the trip (including real-time information) as well as synthetic description of the typology of the offered PT service as well as the related geographical coverage.

	ACTV/AVM	ATVO	ATV	BUSITALIA VENETO	Dolomiti Bus	MOM	SVT
Pre-trip travel information system	X	X	X	X	X	X	X
On-trip travel information system	X	X	X	X	X	X	X
Mobile app	X	X	X	X	X	X	X
Local	X	X	X	X	X	X	X
Regional	X	X	X	X	X	X	X
(Trans)National	X	X	X	X		X	X
Geographical coverage (km^2)							X
Bus (urban)	X	X	X	X	X	X	X
Bus (interurban-regional)	X	X	X	X	X	X	X
Tram	X	X	X	X	X	X	X
Train	X	X	X	X	X	X	X
Water	X	X	X			X	X

Tab. 4 – Main features of road Public Transport operators infomobility systems

	ACTV/AVM	ATVO	ATV	BUSITALIA VENETO	Dolomiti Bus	MOM	SVT
Address	X	X	X	X		X	X
Stop	X	X	X	X	X	X	X
Schedule	X	X	X	X	X	X	X
Route	X	X	X	X		X	X
Travel time	X	X	X	X	X	X	X
Changes	X	X	X	X		X	X
Stops	X	X	X	X	X	X	X
Fares	X	X	X	X	X	X	X
POI (Point of Interest)							
Linked static timetables	X	X	X	X	X	X	X
Linked timetables on stop level	X	X	X	X	X	X	X
Online payment option	X	X	X	X	X	X	X
Ticketless system	X	X	X	X	X	X	X

Tab. 5 – Information provided by the road Public Transport operators infomobility systems

With reference to rail services, the National railway company Trenitalia has its own travel planner as well as a mobile app, which is available for acquiring several kind of different information before and during the trip. With regards to Sistemi Territoriali, in addition to the static information on timetables and train services available on its website, is providing a service (PUNTUALTRENO) with real time information on its trains.

	TRENITALIA	SISTEMI TERRITORIALI
Pre-trip travel information system	X	X
On-trip travel information system	X	X
Mobile app	X	X
Local	X	X
Regional	X	X
(Trans)National	X	
Geographical coverage (km^2)	About 18.000	3 lines
Bus (urban)		
Bus (interurban-regional)		
Train	X	X

Tab. 6 – Main features of rail Public Transport operators infomobility systems

	TRENITALIA	SISTEMI TERRITORIALI
Address		
Stop	X	X
Schedule	X	X
Route	X	X
Travel time	X	X
Changes	X	X
Stops	X	X
Fares	X	X
POI (Point of Interest)	X	X
Linked static timetables	X	X
Linked timetables on stop level	X	X
Online payment option	X	
Ticketless system	X	

Tab. 7 – Information provided by the rail Public Transport operators infomobility systems

All the above-mentioned information is provided by each operator either at their own website (reported hereafter) or by means of app (mainly developed by the operator itself):

- Muoversi a Venezia (ACTV/AVM Venezia) - http://muoversi.venezia.it/it
- ATVO Veneto orientale - http://www.atvo.it/it-orari-e-autolinee.html
- ATV Verona - http://www.atv.verona.it/Linee_e_orari_autobus
- BUSITALIA VENETO (PADOVA/ROVIGO) http://www.fsbusitaliaveneto.it/index.php/offerta/orari-inverno-2017-2018 (extraurban service of Padua province only through downloadable .pdf files)
- Dolomiti Bus - http://dolomitibus.it/it/l/orario-dolomiti/index
- MOM - http://www.mobilitadimarca.it/p/linee-e-orari
- SVT - http://www.svt.vi.it/orari-percorsi/ricerca-orari-percorsi
- TRENITALIA - http://www.viaggiatreno.it/viaggiatrenonew/index.jsp
- SISTEMI TERRITORIALI - http://www.sistemiterritorialispa.it/ferroviaria/index.asp

Moreover, some external initiatives/websites (not directly linked to the single operator) are providing optimised routes by connecting timetables and services in order to compose and optimize routes at interregional level (also combining different modes of transport). These are for example:

- http://www.mycicero.it/ (train + bus services)
- https://www.trainline.it (train + bus services)
- https://www.logitravel.it/ (train services)
- https://www.goeuro.it (train + bus services)
- https://www.wanderio.com (train + bus services)

- https://www.busradar.it (bus services)
- https://www.checkmybus.it (bus services)

In particular, the first one (mycicero) represents also the reference mobile app for BUSITALIA and SVT.

Furthermore, as a recent development, it is to mention the DaAaB app (introduced in January 2018). It is managed by a consortium grouping together various operators (ATVO, AVM, ATV, FAP, ALILAGUNA and MOM). Since the tool is based on the Google transit platform, it can profit from the wide availability of information related services in other geographical contexts and with reference to the different means of transport. Nonetheless, the payment option (see the following chapter) is available only with reference to the operator directly involved in the consortium.

Summarising the variety of infomobility solutions allow to integrate the picture (thus explaining the wide coverage of the aspects referred to in the various cells of Tab. 4).

Integrated ticketing and tariff schemes

Veneto Region is actively committed the development of integrated ticketing and tariff at regional level.

In this purpose, 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.

Fig. 23 – VENETO UNICA smartcard

A relevant first step, which is meant to be followed by a further adoption in the whole regional context, has been recently made. In fact, in 2017 this solution has been firstly adopted by allowing users to acquire, within the same card, tickets of both the rail operator Trenitalia and the bus operator Dolomitibus (active in the province of Belluno).

Another interesting example, particularly related to tourism, is represented by the "Venezia Unica City Pass" (contactless card with RFID), which is providing a unique 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/ACTV on top of the experience gained in the past years with the IMOB card.

Fig. 24 – Venezia Unica City Pass

Furthermore, it is recall the usage of apps allowing to acquire and store e-tickets in a smartphone. In this purpose, the infomobility tool DaAaB (described in the previous paragraph) 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 due to the fact that the ticket inspector is in condition to verify its

validity simply through the screen of the user' smartphone (hence with no need of further devices, such as handhelds etc.).

Even though a full integration of tariff scheme is not available at present some relevant progresses and interesting initiatives have been developed. In fact, the aforementioned tools are fostering the development of the whole set of aspect implied by integration (of services, of ticketing of fares). On the other hand, they are also somehow coping with a key need of the user, ensuring a seamless acquisition of the overall ticket for performing a chain of (intermodal) trips, bypassing the need of accomplishing the full integration of all aspects (e.g. including fares).

Furthermore, along with remarkable technological advancements, even progresses in service coordination and related pricing are to be registered (with a growing number of examples).

In this purpose, it is to mention the improved seamless integration of the service from Treviso to Venezia pooled services jointly organised by in cooperation between MOM ("Mobilità di Marca"), operating in the province of Treviso, and AVM, operating in Venice.

Another example is the ACTIVO interoperable system developed in cooperation between MOM and ATVO (public transport company operating in the eastern part of the Venetian area and based in San Donà del Piave). ACTIVO, by means of an electronic card, allows both company to issue each other's ticket and in particular only a single ticket is now needed for the connection Treviso-San Donà.

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

With reference to integration between operators and modes (bus/rail), it is to report 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.

Furthermore, the case of MOM, allow to underline how the process of merging of different operators (as happened also in other areas of the regional context) has led to the integration of their ticketing systems system. In fact MOM was the result of merging (2013) bus services previously performed by 4 different operators (ACTT, La Marca, CTM and AT) with reference to the provincial area. On the basis of an agreement with different municipalities that were entitled to rule related urban services, the Province administration received the needed proxy for setting-up a unique and homogenous fare system.

3. SWOT analysis

Strengths	Weaknesses
• Veneto region is well equipped in terms of infrastructures (road, rail, ports and airports) that can be used for transport services. • Recent, ongoing and planned Infrastructure realisation are improving some existing/potential bottlenecks and criticalities • Existence of ongoing initiatives on integrated ticketing system (also between different modes of transport) that is planned to be further developed and extended.	• High traffic volumes and congestion affecting part of the road network • Limited accessibility, with particular reference to remote areas (esp. in rural and mountainous contexts). • The high number of transport operators and variety of services, with special reference to bus services, can somehow complicate to the adoption and implementation of seamless solutions developed according to a unifying vision;
Opportunities	**Threats**
• The definition of standardise cost to be adopted will allow a more transparent approach striving operators to maximise efficiency. • The new regional transport plan will allow assessing general principles and criteria to re-organize the supply of transport services: this will give the opportunity to optimise the efficiency of the different interventions according a unifying and synergic vision duly taking into account costs and benefit of each alternative solution • Synergies with improvements with achievement carried out by neighbouring regions as well as the planned/ongoing intervention along the TEN-T network corridors are increasing the possibility and appeal of cross-border public transport services (e.g. Venice-Vienna and Venice-Ljubljana)	• renovation fleets and infrastructural improvements (ranging from the big infrastructures to the small interventions such as interchanges/stops etc.) could be limited by the lack of financial resources • The complex decisional process associated to the relevant infrastructural projects could imply difficulties in reaching consensus

4. Overall conclusion

Veneto Region, along with the presence of relevant transnational corridors, is affected by a highly urbanised context (especially in its central part).

Concerning the first aspect, it is to recall the fact that the region is crossed by 3 TEN-T Core Network Corridors (out of a total of 9), whose accomplishment will improve the long distance connectivity with particular reference to the main regional hubs (e.g. Venice).

In order to cope with the second aspect, an ambitious strategic vision aiming at the development of a Regional Metropolitan system (SFMR, "Sistema Ferroviario Metropolitano Regionale") was developed in the past. Even though its full implementation is deemed not feasible in the short-medium (also due to its budgetary implications and the current financial perspectives) some relevant improvements have already been achieved in the recent past.

With reference to the organisation of public transport, it is report an articulated governance mechanism under the coordination of the region. The region is also in charge of tendering rail services; with reference to bus and water service, instead, the tendering is performed by other local administrations (Metropolitan City of Venice, the Provinces and some municipalities).

This overall picture implies a high number of operators and services to be coordinated and, consequently, the need of promoting integration-related aspects. Therefore, Veneto Region is actively committed the development of integrated ticketing and tariff at regional level. With reference to integration aspects even though a full integration of tariff scheme is not available at present relevant progresses and interesting initiatives have been developed. In fact, innovative tools are fostering the development of the whole set of aspect implied by integration (of services, of ticketing of fares). In this purpose, among others, 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.

Other significant improvements are related to the growing availability and coverage of infomobility tools (esp. apps for smartphone) that are also meant to enable the acquisition of tickets.

Furthermore, along with remarkable technological advancements, even progresses in service coordination and related pricing is to be registered with reference to a growing number of examples.