6 - LOCAL APPROACH

6.1 - Local perceptions of Corridor V

The nature of the decision-making process connected with the execution proposal of Corridor V, with regards to how it has developed throughout the years in different places and times and with multiple motivations, now makes it possible to examine some "regional" situations with greater attention in order to understand how the Corridor subject, approved by the European Parliament with decision 884/2004, is perceived locally. In the field of its own space limits, the AlpenCorS project is in charge of stimulating the production or the collection of these experiences to position them within the more general multi-disciplinary approach that characterises the project itself.

The subjects treated are mainly concentrated on alpine areas and around them, where the corridor is not necessarily a local requirement, but the result of much more extensive geographic-economic visions, which consider the alpine areas as they are part of a much broader European space which works towards strengthening relationships between the large production plains of the continent and the large metropolitan areas upon which they gravitate.

The role of the debate on a local scale tends to reveal unresolved problems related to communication or development with local communities: they only emerge during the detailed development process and the end up by compensating aspects that have been neglected or underestimated that may effect the launching methods of the final project; at the same time the comparisons based on local subjects tend to exclude the importance of extra-local reasons that inspire the corridor.

Along the logical thread marked by these assumptions, the experience matured and analysed in AlpenCorS highlights that:

- The corridor project, in its various parts, appears more like a process moving towards a more general idea that is specified in space and that communicates with the subject of infrastructures by combining objectives of economy;
- A transport and infrastructural approach that becomes the most important aspect of development, leaves the remaining general motivations unexplored;
- It is important to pay more attention to the subject of environmental impact in the light of general benefits and the methods with which they effect the local communities;
- Benefits are positioned according to the economic activities that locally appear capable of using the very best access created by the presence of the corridor; this is a very modern procedure that is mainly placed at the top of the list of the local communities in question, through cooperation and coordination with their representative organisations, possibly supported by the additional instruments to which they are dedicated;
- For local distribution of the benefits it is important to identify "complementary works" dedicated to carrying out this function and to socialise their effects: this leads to the more general subject of economic-territorial integration of all of the large infrastructures;
- Local alternative of guidelines must always be taken into consideration as possible sources of improvement of the relationship between infrastructures and territory, especially where the most environmental restrictions appear;
- The alpine territories, which feel the effect of the greater impact of infrastructures, must therefore be sustained by compensation measures aimed at improving their participation in general advantages.

6.2 - The ways of the transalpine link Lyon-Turin

The "Transalpine link", the project of a new railway between Lyon and Turin, is one of the main projects of infrastructure along the "Corridor V".

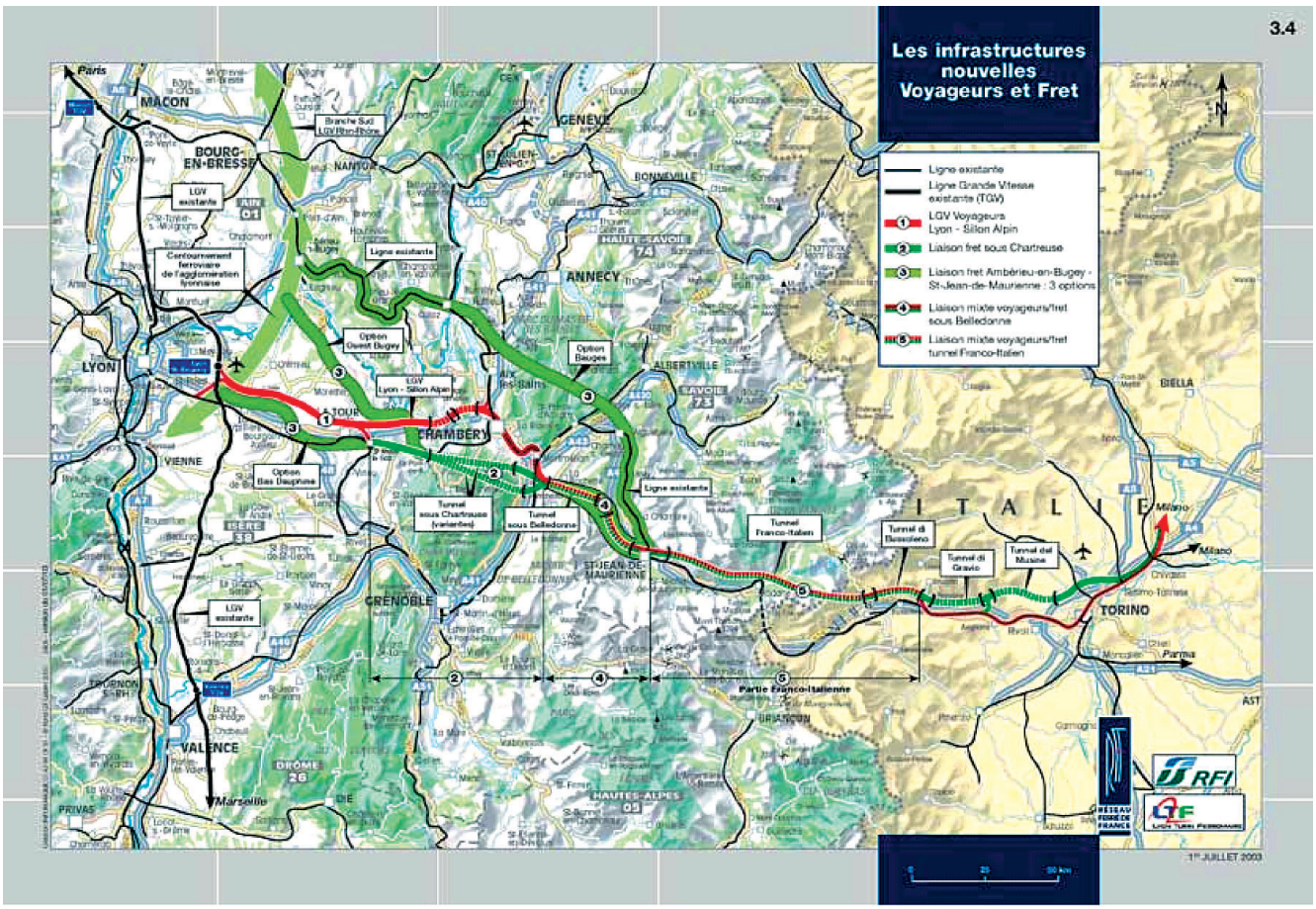
The corridor V, from Budapest to Barcelona, is not an addition of new railway lines or highways. Such a big projects represent some possible objectives for the Corridor V. Therefore, two issues get importance: deciding which infrastructure and how getting to them.

Major infrastructure projects also take place through decades and many changes can occur. In addition to that, transport infrastructures involve lots of various aspects and actors. All geographical and administrative scales are concerned. Technologies, laws, residents, macro-economic evolution are dimensions to be taken into account as well. Finally, many past examples have shown that organisational and political matters do count as much as technical ones. Indeed, designing a big project and managing it is not that easy.

How is then possible to plan adequately a Corridor? As a part of the AlpenCorS Project, "the Ways of the Transalpine Link" analyses these issues on the Lyon–Turin railway project

The starting point is that the Lyon–Turin and Corridor V aren't a mere transport issue. They are multidimensional projects and programs. We had then to adopt a comprehensive approach which takes account for all the various aspects of the project: technical, economic, legal,

Figure 179. The project of the transalpine rail link Lyon-Turin



Source: ENTPE-LET's elaborations

environmental, geo-strategic, cultural and so on.

6.2.1 An historical approach to the project

The Lyon-Turin project is a long-term one. It has started in 1987, eighteen years ago. It is hardly understandable the present day status of the project without knowing its long history. Three kinds of issues are particularly relevant:

- Explaining the actual configuration of the project through the review of the history of its design and management, in order to retrace who and what acted - and is acting nowadays - on it;
- Tracking the evolutions of projects justifications. Here is an history of the different arguments either supporting or opposing its realisation;
- Analysing the involvement of the different actors in the project, looking at the efforts they put on it in comparisons to their own general interests.

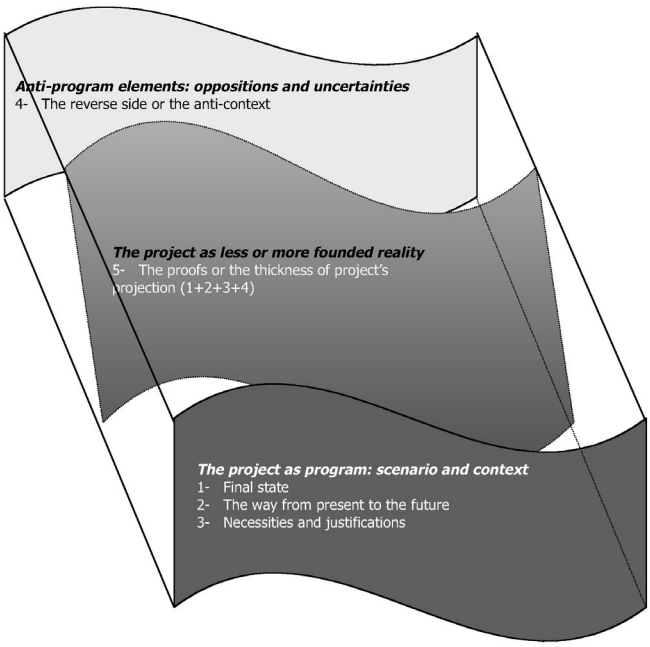
6.2.2 A sociological definition of the project

Historical data were organised in five analytical dimensions:

- In each moment the *final status of the project* is the starting point for the next period;
- The *transition from present to future* is, at each moment, the foreseen action-plan to reach the final status of the project;
- Final status and actions to reach it correspond to a set of *necessities and justifications* that support the project, that is: a project is a justified future final status (including the way to get to it);
- These three dimensions make up a scenario coherent with an appropriate context. All elements, that are incoherent with this context (oppositions, uncertainties) form a "set of *anti-program of the project";*
- The fifth dimension deals with the *degrees of existence of the project.* It results from various tests (study reports, political acts, etc.) related to different kinds of justifications.

These different dimensions allow assessing the consistency of the project, defined as the kevel of non-contradiction among its different dimensions.
Learning process in the project is one of the marks of this non-contradiction scale. In this study, learning means integration into the project's definition of anti-program elements: oppositions or uncertainties concerning the scenario of the project. It corresponds to a common "safety rule" for minimising the oppositions and the uncertainties concerning the project. Indeed, this process is challenging the irreversibility of the project definition as it incorporates modifications that improve it.
Another aspect involving the non-contradiction notion concerns the coherence between proofs (the different kinds of tests of the project) and justifications.
Applying these analysis criteria to the case of the Lyon-Turin allows to highlight the following considerations.
Firstly, the project has known several route modifications in France and Italy. These changes aimed to stabilise the project and to adapt it to various territorial requirements or constraints that came out mainly from political games and public consultation processes.
Secondly, a very large evolution in the nature of the project has to be pointed. The starting idea was a base tunnel for conventional rail freight transport. Almost immediately, for financial reasons it became a freight/passenger project, with a main place for a TGV link. During the 90's, freight priority was gradually reinforced and nowadays the opportunity of developing a rolling highway scheme is still under discussion.
There are two ways of reading these changes in the content of the Lyon-Turin project: on one optimistic hand, they reveal a capacity of adaptation to local, national and European claims; on an other pessimistic hand, they result from the difficulty to make the project affordable.
Since the beginning main opposition to the project has been referring to its cost. However, no modifications of the content of the project appeared to make it cheaper but rather they generated extra-costs. The inability to make the project cheaper and more profitable is a failed learning, dangerous for the project. The opportunity of the Lyon-Turin project is now challenged through alternative solutions, which appear cheaper (renewal of existing lines) or more efficient (Swiss tunnels).
The question of railways operators' efficiency is an other obstacle to the project. Concerning this point, the effort to involve in the project private operators has not successes up to now. That can be considered as another failed learning. Moreover, current evolutions of the European transport operators tend to favour traffic flows to/from Germany and Switzerland than those through France.

Figure 180. A sociological approach to the analysis of the evolution of infrastructure project



Source: Solange Martin, 2003, p. 222

6.2.3 Project's management issues

The management of the project is a second topic about the history of the Lyon-Turin project. From this point of view, the **increased number and type of actors involved** in the project's exploration is the main learning to highlight. On one hand, this enlargement consists in a strong participation of local authorities in Franco-Italian management of the project. As outcome of this evolution, since 2001 representatives of regions and territories concerned have been part of the project's Inter Governmental Commission created in 1995. On the other hand, the local ecologists are now officially part of the design of the project. RFF, the French railway infrastructures operator, asks local associations of environmental protection for some information on local environmental sensibilities.
However, progress remains to be done on several aspects. The first one is a lack of public debate on project's general goals and opportunities. The French official process of public debate appeared few years after the project was launched and for a long time opening a discussion on these issues was considered as moving back. The situation is changing now and someone speaks about a public debate being undertaken in 2007.
The low ability to go back on past choices could appear as a second failed learning of the project's management. Indeed, project's modifications resulted more from addition of new elements than from questioning past choices.

A third failed learning, in France, deals with the difficulty to involve a strong political willing, not only at regional or European level, but also at the national one. That challenges the different justifications of the project.

6.2.4 Three fields of justifications

Transportation is a first topic of justification of the project. However it is generating more controversies than certainties. Train traffic is very low across the Franco-Italian border and the freight traffic (including road haulage) has been stable for 10 years. In addition, Swiss tunnels may flow out existing traffics.
Even if it is small, the passenger traffic is profitable for the project. Nevertheless, some discussions arise regarding the possibility that passenger traffic can limit somehow freight traffic development. Reliability of traffic forecasts is another point of discussion, with a lot of suspicions of overestimation.
Safety constraints are an important point, especially for tunnels. Railways seem more secure than road, but safety implies very important extra-costs (building of two tubes) that make even more costly a project already expensive per se.
Beside these contestations, others, more general, concern the ability of the actual railways system to satisfy transportation needs. This issue refers mainly to organisational matters and competition development, but also to the future capabilities of railways technology.
Summarising, transportation justifications appear not sufficient for supporting by themself such a major infrastructure project.
Concerning environmental justifications, knowledge on the vulnerability of ecological systems in high mountains is progressing. However this vulnerability is also a symbolic one, which is difficult to treat. Road traffic is pointed out as one of the main nuisances generators.
Furthermore, the Lyon-Turin project shows the difficulty to co-ordinate ecological efficiency at local and global level. On the French side, the project foreseen two different accesses (i.e. for freight and passengers trains). From a technical point of view, two lines are more efficient than one and allow a higher railways' attractivity vs road. From a local ecological point of view, one infrastructure – only a scar in the landscape – is always better than two.
On the other hand, the Lyon-Turin project contributes, as a railways project, to improving global environmental conditions by reducing global warming generated by green-gas emissions. However, if greenhouse effect is the main goal, investments should, as a priority, go where there are bigger traffics volumes, that means not in the Alps. The ecological necessity of the Lyon-Turin project is then mainly related to local sphere, justified by the specificity of the alpine environment.
Concluding, while the local and international ecological claims are getting stronger – especially in the Alps – the true question remains whether or not local and global ecological benefits of the project are enough to prove its necessity. The answer is not clear because of the low weight that environmental parameters have in the calculation of the benefits of project (e.g. in cost-benefit analysis).
A third kind of project's justifications concerns geopolitics issue at European, national and regional level. At the European level, both economic competitiveness of EU and necessity for a EU's transport policy are the main arguments mentioned. Those arguments deal with several goals: maintaining low costs of production, achieving economic convergence of different European areas, increasing transport efficiency, meeting constraint and so on.
National positions, in Italy as in France, have difficulties to co-ordinate different regional strategies and claims because of hard public budget constraint; that's a matter of opportunity cost and, therefore, of choosing one infrastructure among several others. The figure below shows that the Lyon-Turin project could represent a half of the total French state's budget for all the foreseen railway projects in France.
A second matter is to avoid social conflict with railways operators in a very sensitive sector. A third point concerns geo-strategic position: the Lyon-Turin project as a means for the implementation of an hypothetical Mediterranean strategy or, more often, for fostering the east-west opening through the Corridor V south of Alps. However if reinforcing south-western Europe and getting over the Alps are important issues in Italy (at least for northern Italy), for France geopolitical goals of Lyon-Turin project are not unanimously shared.
Regions directly concerned with the project (Rhône-Alpes and Piemonte) are its best supporters. Their motivations are to attract huge investment and to enhance economic development. The idea is to build a strategic place in Europe by improving the environmental quality. The field of geopolitical justifications of the Lyon-Turin project highlights a true gap about the distribution of the aims and means: higher is the stated interest for the project, lower is the financial contributing capability.

6.2.5 Coordination and cooperation

Such a large project as the Lyon-Turin finds lots of justifications, but no one appears sufficient to make the project a reality. Managing the project implies to deal with different kind of necessities, interests and positions that either may produce synergies or, sometime, may also enter into conflict. So, managing such a project needs a high capacity of coordinating different interests and decisions. The

lack of such means of coordination has been a real obstacle, as EC recognises through its very recent decision to appoint co-ordinators for such big projects.
However co-ordination is not enough to raise the adequate collective action. Co-operation among, even partially, shared interests is need as well. Co-operation is not only a consequence of common positions and interests among actors, but it is also the result of an appropriate policy and practice: establishing common knowledge and shared evaluation criteria.
As conclusion, it appears that designing and managing projects and corridors involve deep organisational and political issues. But the history of the Lyon-Turin project allows to insist on the necessity for developing democratic tools and process, as a guarantee for democracy of course, but also as a potential guarantee for the actual realisation of projects and corridors.

6.3 - Proposal for the organisation of a monitoring system for Corridor V at regional scale

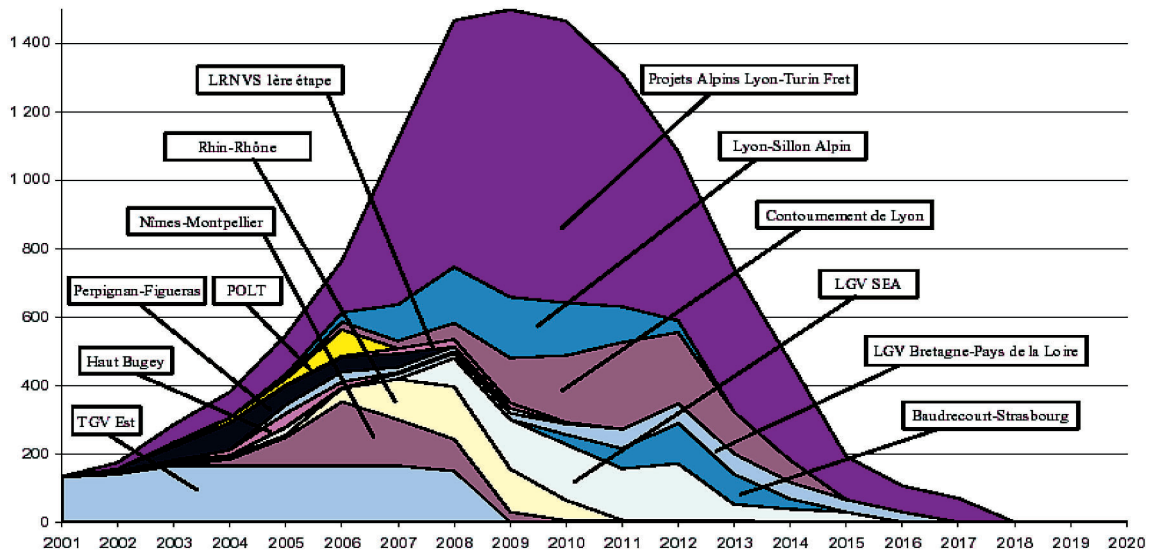
The theme of this action concerns a proposal for the organisation of a monitoring system for Corridor V as a pilot study for the ongoing SEA of a regional transport plan. Although the attention has been primarily focused on monitoring the ongoing SEA of Corridor V, the monitoring process linked to the EIA procedure has not been neglected. In fact, the environmental monitoring of a multimodal infrastructure corridor forms an integral part of the environmental assessment procedures for large infrastructure systems of this kind, namely: the Environmental Impact Assessment (EIA) procedure used for individual projects, and the Strategic Environmental Assessment (SEA) procedure that focuses on plans and programmes for a whole series of such works. Monitoring activities are therefore carried out on two levels:

- The EIA level for individual infrastructures;
- The SEA level for transport plans concerning multimodal infrastructural systems.

The section is divided into three parts:

- The first part analyses the methodological information and guidelines drawn up by the European Union for SEA of plans for transport networks and corridors, paying special attention to ongoing SEA and their relative monitoring procedures. The Italian context is examined to check how SEA would fit into the transport planning system in this country. Lastly, a proposal is tabled for the general organisation of the monitoring system of transport infrastructures at national and regional level which is consistent with European guidelines on SEA and the structure of the transport planning process in Italy;
- The second part outlines the approach used in an environmental monitoring project, based on SEA procedures and referred to the construction (and subsequent operation) of two types of linear infrastructures, rail and motorway. The environmental monitoring activities identified are analysed at the following stages: ante operam, namely before the construction sites are started; during construction, from the moment work starts to the dismantling and reinstatement of construction sites; post oper-

Figure 181. Planned investments in the French railways network with financial state support (Mio Euro at costant price 2001)



Source: ENTPE-LET's elaborations

am, which includes the pre-operating (where specified) and operating phases;
- The third part presents an application of monitoring guidelines linked to the ongoing SEA of Corridor V in the context of the regional transport plan. The results presented refer to an application carried out in a critical area of Corridor V, namely the intersection of the multimodal infrastructure system with the node located inside the metropolitan area of Turin.

The contents of each of the three sections are briefly summarised below.

6.3.1 Results of the study

From an analysis of the methodological information and guidelines drawn up by the European Union for SEA of plans for transport networks and corridors (paying special attention to ongoing SEA and the relative monitoring procedures), it is clear that an essential condition for carrying out ongoing SEA is to have an adequate system of indicators.

It is therefore useful to orient the research towards developing a system of indicators that can be easily monitored and used to assess cumulative local environmental impact, namely which combine the transport infrastructures of the multimodal corridor with the complex of other changes to land use.

When identifying the areas of local impact and the relative indicators, reference was made to the guidelines given by the *Manual on Strategic Environmental Assessment of Transport Infrastructure Plans,* in order to contribute to the operative development of guidelines at a European level.

The following areas of local impact are given in the European manual:
- Atmospheric pollution;
- Noise;
- Urban expansion;
- Water resources;
- Biodiversity;
- Landscape;

The method that has been developed states that, before the indicators are used, the land affected by a transport corridor is divided according to the landscape units so that the value of the indicators can be referred to each. The indicators described below were then constructed and processed so that each indicator refers to a unit of landscape.

6.3.2 Application of indicators to the intersection of Corridor V with Turin metropolitan area[26]

For the reasons stated earlier, it was deemed interesting to examine, as a case study, the intersection of Corridor V in the node of Turin (in the northern sector of the metropolitan area, from the intersection for the Milan branch to that of the Val di Susa branch), applying the system of indicators described above, which should facilitate the process of monitoring the main types of environmental impact.

For ease of description, the northern part of the periurban ring has been divided into two sectors:
- The north-east sector, from the Po to La Mandria park;
- The north-west sector, from La Mandria park to the Dora Riparia.

As was pointed out earlier, the agro-natural area of the metropolitan ring has been divided into landscape units defined as insularised blocks of green spaces in the infrastructure and built-up grid. The indicators were calculated with reference to each of these units.

6.3.2.1 Comments on the results of the assessment

It is clear from this study that the series of new infrastructure projects for the area in question will produce a scenario of marked changes in the periurban landscape of the metropolitan area. This result is very different compared to the scenario that only considers Corridor V, as the only project in the study area.

The application produces important results because it shows that, when evaluated as a whole in terms of the cumulative impacts that they produce, all the projects for the works examined raise clear issues of environmental sustainability, even though they all passed the respective national or regional EIA procedures.

At the end of this evaluation, one question arises spontaneously: how can the environmental impact of this scenario be made more sustainable, in relation to the effects that are now clearly taking shape with reference to periurban landscape of Turin's metropolitan area and which is strongly influenced by the multimodal system of Corridor V?

The answer is relatively simple at least in theory: it is important to realise that the infrastructure projects are not just infrastructure projects; this is because they implicitly involve major changes to the landscape and to the environment, resulting in an environmental balance that is clearly in the red. Where it can be shown that all the proposed infrastructures are necessary, we have to find a way of constructing them so that the environmental impact is at least nil, if not actually positive. This can only be achieved by adopting an appropriate system of compensatory measurements, which above all serve to gauge the renaturalisation of the landscape, planned using ecological and land management criteria.

6.4 - The Brennero Corridor: infra-structural policies and territorial impacts

6.4.1 General characteristics of traffic of goods along the Brennero axis

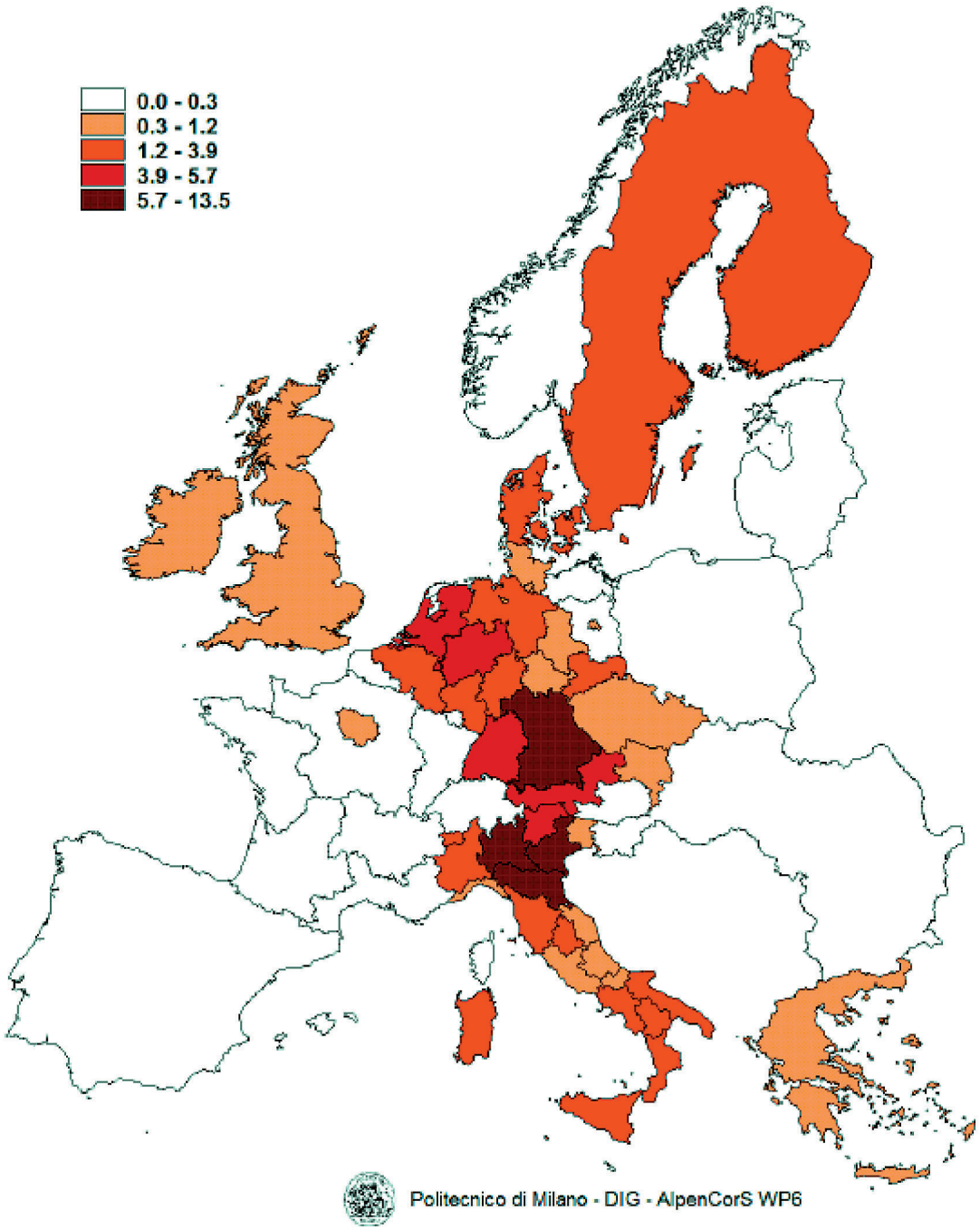
For more than fifty years the Brenner pass has been the alpine passage with the highest flow of goods (more than 35 million tons in 2001/2002), so much so as to become the most frequently used north-south axle for the traffic of goods along the Alpine Arc. Compared with the past, the increase in traffic of goods has accelerated dramatically and double in 10 to 11 years rather than in 15 years.[27]
At the moment, more than one third of alpine traffic covers the Brenner Pass and the annual volume of traffic registers an increase rate of 8%.
In order to investigate the main characteristics of traffic flows in the Brenner corridor, the work team used figures from research carried out by the Austrian Ministry of Transport, Innovation and Technology (BMVIT) with regards to the transport of goods through the Brenner Pass between 1993/94 and 1999/2000.[28]
During this period, the upward trend was confirmed by a 31% increase in the circulation of goods. However, an important aspect that must be highlighted is the amount of traffic for each kind of transport: during the period 1999/2000: 75.4% of goods were transported by road while only 24.6% was transported by railway. From 1993/1994 to 1999/2000, road transport not only represented the main means of transport but also registered a greater increase compared with other means, registering a 45.4% increase against the 3.8% increase of railway transport. Furthermore, during the same period, the Brenner Pass underwent a 43.8% increase in the number of "heavy vehicles" with a 47% increase in the number of goods transported.
The Trento area, therefore, experiments very strong environmental external effects provoked by an increase in the use of the road network (emissions, congestion, accidents etc). During the period 1999/2000 the Brenner Motorway (A22), the main road infrastructure of the Brenner corridor, registered a 5.6% increase in the total number of vehicles (6.6% considering vehicles/km). The increase up to 8.5% of the total number of "heavy vehicles" during the same period was even more alarming (10.3% considering vehicles/km).[29]
Furthermore, passing traffic deserves special attention. By separating the flows of goods according to the transport report, we can see how "transit traffic", with 92.5% of the total number of tons of goods transported, is definitely the most important kind of traffic which certainly creates conditions of minor efficiency in the use of the network by internal traffic, leading to the creation of strong territorial diseconomies. Statistics that describe the number of days of annual congestion speak on their own: between 2 and 3 days congestion per year during 1995/1997 to 62 days in 1999.[30]

6.4.2 Transport of goods on railways

Even though road transport is still the most important means of transport in the Brenner, an important percentage (24.6%) is covered by railway transport, compared with the Italian average.[31]
Maintaining and, possibly, increasing this percentage is strategic for the entire Brenner area, even more so if we consider that the most interesting use of the Brenner railway network refers to inter-modal transport.
Railway transport is well developed within the Brenner corridor with a current trend that illustrates just how traditional railway transport is falling, while new modern methods are emerging and developing: "accompanied" or "rolling motorway" (Ro-La) inter-modal transport and "unaccompanied" (Ro-Ro) inter-modal transport. Between 1994 and 2000 accompanied and unaccompanied transport registered a very important increase of 22.3% and 10.8% respectively.
Thanks to this change these methods of transport have become much more important compared with classical goods-wagons which, during the same period, fell by 23.4%. The Ro-La method in particular has been developed within the Brenner corridor, while its presence is margin in other Alpine corridors. Currently the Ro-La method represents one third of railway traffic of the Brenner. This upward trend, clear in 1999, was confirmed in 2003 with an approximate 8% increase in ITU's (Inter-modal Transport Units) and 13% in tons. If we compare these figures with other Alpine corridors, where traditional railway transport is still very far from undergoing a downward trend, this upward trend is particularly modern.
Therefore the Brenner corridor is expanding its ray of action and in the future it will no longer be a regional Alpine pass but it will become an axle of north-south communication on a European level. In 1999/2000, the majority of traffic of goods was originated or directed at regions of Northern Italy and Southern Germany. The most important Italian regions that generate or attract traffic of goods are Lombardia, Veneto, Emilia-Romagna and Trentino Alto-Adige. The German regions that register the highest percentages are Bayern, Nordrhein-Westfalen and Baden-Wrüttemberg. As proof of the influence of the Brenner in Northern European and Eastern European countries, the percentage of three areas is very important: the Netherlands (4.2% of origins; 2.2% of destinations), Poland (0.9% of origins; 1.1% of destinations) and Sweden (1.5% of origins and

0.9% of destinations). We can see how the main industrial area that generates or attracts flows of goods is still the so-called "Blue Banana", the Central-European backbone.
However, the "Blue Banana" is slightly transferred towards the East, including Scandinavian countries such as Denmark and Sweden. Furthermore, we can state that the "penetration effect" towards new EU members will increase in the future when the integration process is revealed completely. Finally, the Brenner corridor is able to capture a relatively large part of traffic of goods in Southern regions of Italy also (Campania, Lazio and Puglia) and countries from Southern Europe (Greece). This change will, without a doubt, reveal greater diversification and complexity in the traffic of goods along the entire corridor, now capable of attracting important

Figure 182. Flows of traffic of goods crossing the Brenner according to regions of origin (1999/2000; tons; %)



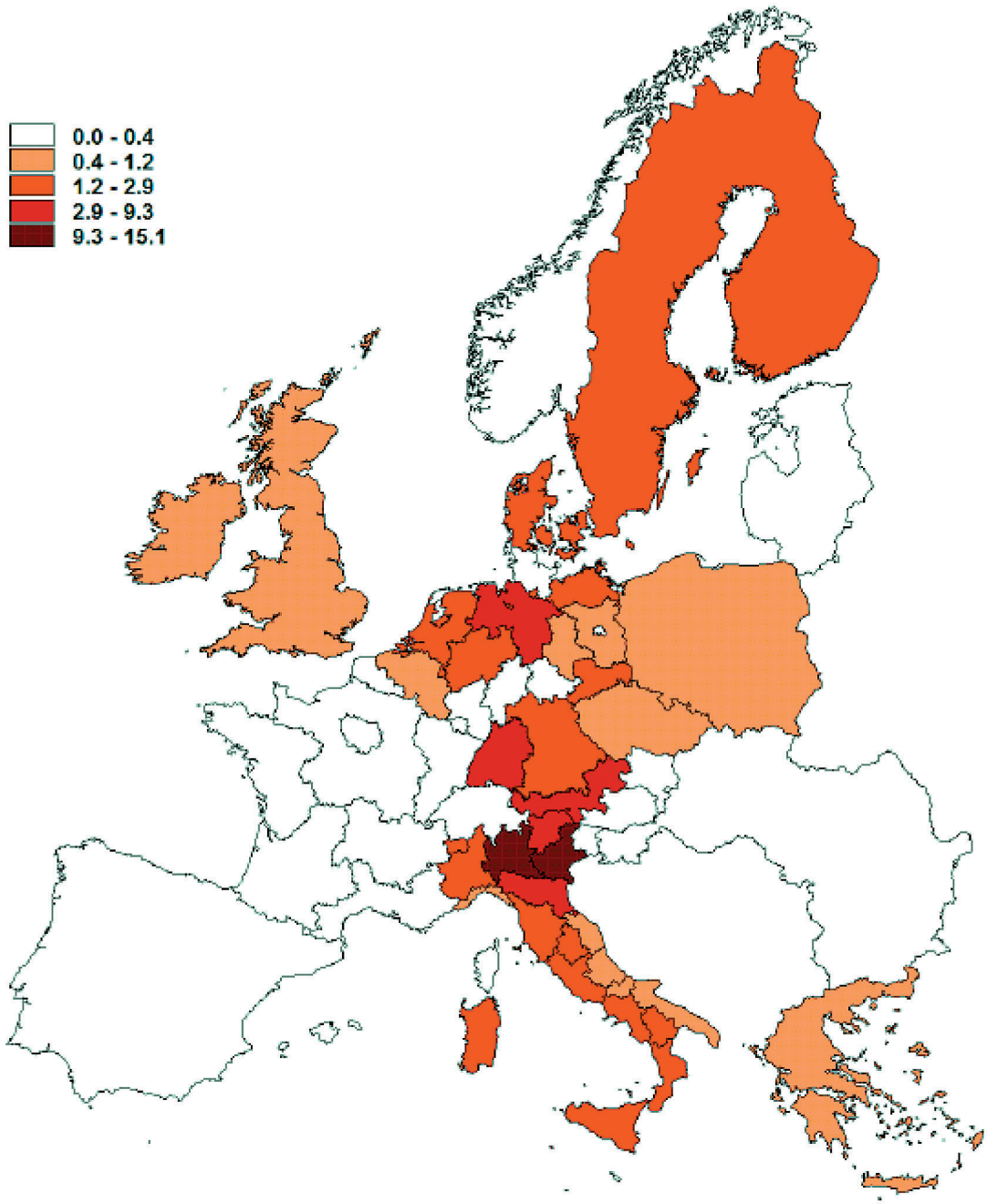
Source: Province of Trento and Milan Polytechnic – DIG's elaborations

shares of traffic of goods across long distances.

6.4.3 Infrastructures and territorial sustainability

The current condition of infra-structuring of the Trentino area can be summarised by comparing the situation of transport infrastructures in the area with that of the surrounding regions and provinces. The critical point refers to the most adequate reference standards to describe the true requirements of infrastructures of the Trentino territory. As far as the Province of Trento is concerned, any decision related to the plans and objectives to be followed in the future mainly depends on the priority aspects as the results appear to be contrasting and diverse in the case of different references. Considering the capability of producing income (GDP) or the residing population, the indicators of the infra-structural situation indicate that the Province of Trento is characterised by a low infra-structural level. On the contrary, if the territory used is taken as a reference (for residential, pro-

Figure 183. Flows of traffic of goods crossing the Brenner according to regions of destination (1999/2000; tons; %)



Source: Province of Trento and Milan Polytechnic – DIG's elaborations

duction or infra-structural use), the province appears to have a high level of infrastructures compared with other provinces. Therefore, an environmental limit points out how the territory has been deeply marked by the presence of infrastructures, however, the population and economic activities require more infrastructures also due to the fact that the Trentino population goes through seasonal peaks due to the external presences of those who use the area for tourist activities. The objectives and policies depend on the trade-off between these two aspects.

6.4.4 Infrastructural requirements for the Trentino territory

As soon as the effects of integration with the Baltic and Eastern-European area will be completely revealed, the scenario of the Brenner is going to be even more complicated considering that new traffic of goods will transit through the axle due to the development generated by other European multi-modal corridors. Besides the Corridor V that cross the Padana Plains, other traffic routes will be developed: the Adriatic corridor with its Ravenna-Verona diverge and the Tirreno-Brenner (TIBRE) corridor from La Spezia to Verona. For these reasons and so as not to create bottlenecks and situations of congestion, Trentino must improve access with the Padana axle in terms of road as well as railway transport.

6.4.4.1 Basic Brenner tunnel and Southern railway bypasses

The railway axle of the Brenner between Monaco and Verona is the main element of the priority project TEN-T n°1, a multi-modal high speed corridor from Berlin right through to Southern Italy (Palermo), passing through the Alps. The plan includes a railway line with four tracks. including two tracks which already exist and the construction of another two new tracks for high speed transport of goods and passengers. The objective of the project is to deviate part of the increasing road traffic to railways, an important subject for Trentino considering that in 1999/2000 the traffic of heavy vehicles represented between 23 and 25% of the total number of vehicles on the A22 Brenner motorway. The basic tunnel is the central part of the project and it covers 56 km's from Innsbruck to Fortezza and completion is planned for 2015.

6.4.4.2 The A31 Valdastico and “Pedemontana Veneta” Motorway

The objectives of the project include completion of the last section (40km) of the Northern part of the A31 motorway, which will connect Trento directly with Vicenza. Furthermore, the Pedemontana Veneta will be completed connecting Vicenza with Treviso. Both of the projects will create strategic connections between Veneto and Trentino, therefore producing important "network effects".

6.4.4.3 Road (SS47) and the Valsugana railway network

The Valsugana corridor is located to the East of Trento and offers an alternative connection to the Brenner and Valdastico Corridor. Valsugana is characterised by the high level of congestion with a combination of long and short traffic. However, with regards to railway traffic, speed and the frequency of trains will be increased. The main objective is to transfer passenger traffic from the roads to railways through the construction of an urban metropolitan network in order to reduce traffic created by the rush-hour traffic of Trento.

6.4.4.4 The Trento logistic centre

In the Brenner corridor, the policies of transport aimed at boosting intermodal methods made Trento a vital intermodal junction for the future. In 2000 the Trento logistic centre increased intermodal traffic of goods by 325% and, at the moment, as a "rolling motorway" it absorbs more than 50% of the traffic generated by companies localised in the province. In reality, the main activities, besides storage and stocking of goods, concentrate on intermodal transport (Roll-on Roll-off and Ro-La services). The most urgent project for development of the Trento terminal relates to expansion of the existing intermodal area (increasing it from 275 thousand to 1 million square metres) and the construction of the Roncaforte logistic station.

6.4.5 Opportunities for the logistics development of the Trentino area

The trans-European Corridor I will create important opportunities for the logistic heart of Trento: multi-modal reorganisation of existing traffic flows, the redefinition of logistic and transport opportunities through the Brenner axle and possible synergies with traffic flows and logistic activities of Corridor V. Finally, the opportunity to develop new logistic-manufacturing platforms in the local area has not to be overlooked.

The Trento logistic centre may play a strategic role considering its proximity to the "logistic district" of Verona and localisation on the Trentino territory of some international "logistics service providers". The logistic centre may become a leader on a European level in accompanied and unaccompanied railway transport along the Brenner corridor, considering that these services have been already developed in the Brenner area and many private and public companies (Italian and foreign) have requested a

license for the Brenner Pass. Equally important for the logistic centre of Trento is the creation of added value logistic centres ("almost manufacturing") for the local economy and their use as an extended platform centre of logistic services for the production networks of North-Eastern Italy.

- **The agricultural and food industry**: is an export-oriented sector that creates important outward logistic flows, even though it represents more than one third of all Trentino exports. Due to the perishability of products and the need for short distribution times, logistic flows are organised on a "door-to-door" basis through road transport. Furthermore, industrial organisation appears to be fragmented and logistic services are mainly provided by small transport companies. Therefore, combined transport is obstructed by the lack of economies of scale and modern logistic strategies do not find any space due to logistic providers that are too traditional.
- **The wood industry**: it is import-oriented due to the high level of demand in the construction industry, which creates huge inward flows of raw or treated wood from far-away markets (Eastern Europe and Scandinavia). The main difference that emerges from the analysis is the different disposition towards multi-modal transport between operators (sawmills) specialised in the first or second stages of the supply chain. Sawmills that work in the first stage of production prefer the diffusion of inter-modal transport as they have less critical lead times and they prefer the high loading capacity of railway transport.

6.4.6 Application of the SASI model in the case of Trentino

Regional economic development is a function of efficiency of the transport system within the Corridor and of its own connection with the rest of Europe. The "SASI" model is a model that can capture interaction between the development of space and transport infrastructures in order to explain the impacts of the investments made in infrastructures on social-economic development. It belongs to the group of models that use an "approach to access" which is based on the assumptions that the regions with access above the markets also have greater possibility of achieving economic success in terms of production and competitiveness.

Contribution to the AlpenCorS strategy is based on the assessment of potential connected to the intersection between Corridor V and the main north-south transalpine corridor that involves the Italian regions of AlpenCorS: Corridor I, or the Brenner corridor. The recurrent nature of "SASI" on the social-economic development of European regions allows for interaction with:

- The economic and demographic development of the entire European Union in 2001.
- Investments in infrastructures and improvements to the transport system including the trans-European network of transport (TEN-T); the TINA network of Eastern Europe, the multi-modal corridors of Helsinki; additional connections with Eastern Europe and other connections on the NUTS-3 level. For the objectives of the model, the railway axle Lyons-Lubiana (Corridor V) and the railway axle Berlin-Palermo through the Brenner tunnel (Corridor I) are the most important.

The pictures in 2021 created for AlpenCorS are defined starting with reference to all of the most important infrastructures TEN-T and TINA in Europe, excluding the Brenner tunnel. These are used as benchmarks to study the effects of other transport infrastructures that include the intersection of Corridors V and I, with a space focus on the regions located at the entrance and exit of the Brenner tunnel. In reality, the impacts of the Brenner tunnel were initially studied and subsequently, on five different occasions, other local infrastructures were added to the tunnel.

In 2021, the simulation illustrates how the Independent Province of Trento is one of the most productive and wealthy of the Italian AlpenCorS regions. The two independent provinces of Bolzano and Trento have a GDP pro-capita of 125%, much higher compared with the European average. The space distribution of accessibility highlights a fall by the European centre in Northern-Eastern Europe in favour of peripheral regions: Nordic and Baltic countries, Northern England, Scotland, Ireland, the South of France, Spain and Portugal, Southern Italy, Greece and Balkan countries. The highly accessible road and railway corridors between Turin and Venice (towards Corridor V) emerge with regards to passenger accessibility. Accessibility of goods, however, is much more diffused as it is mainly carried out by road and is much more fragmented compared with railway transport. However, a fall in accessibility of goods from countries to the North of the Alps with a large gap between the North and the South is clear.

An analysis of the various strategies of infrastructural development on the Brenner-Corridor V intersection has produced the following results:

- The Brenner tunnel is a key factor to connect Northern Europe with Southern Europe. The effect on passenger accessibility extends throughout the entire continent, to all of Italy towards the North-East to Monaco, Vienna and beyond, but also along Corridor V. The regions to the South of the tunnel, Bolzano and Trento, achieve the greatest advantages in terms of accessibility. The effects on accessibility of goods are even greater, with strong

impacts to the North of the Alps, in Germany, the Czech Republic and Poland, but also to Baltic and Nordic countries. The regions closest to the tunnel exits, Bolzano and Innsbruck, are less affected due to the organisational methods of the trailer load onto trains. The tunnel is only interesting in the case of long distance journeys (eg.: Monaco-Verona). The regions further to the East or to the West of the tunnel are not affected as they use other Alpine passages. If, however, we also consider the railway Trento and Bolzano are the ones that still achieve the greatest benefits in terms of accessibility with other regions located at the exit of the tunnel;

- In similar terms to accessibility, the effects of the Brenner tunnel on regional economic development extend throughout Europe: along the Italian peninsula, to the North-East up to Southern Sweden and Norway, to the West along Corridor V. The regions to the South of the tunnel, Bolzano and Trento, benefit the most from the construction of the tunnel, followed by Innsbruck and other Tyrol regions as well as Southern Bavaria and around Verona (Vicenza, Brescia and Mantova). If we compare accessibility, not all of the economic effects of the tunnel can be perceived. The impacts on the economic development of Bolzano and Trento are very important and tangible and they will be created across a long period of time after the tunnel has been opened. If the Brenner tunnel is also connected by a whole range of complementary elements, such as the railway bypass between Trento and Verona, completion of the Valdastico and Pedemontana motorway or improvement of Valsugana will lead to increasing effects;
- The impacts on accessibility of goods and passengers are stronger and stronger compared with those of the Brenner tunnel alone: the most important impacts are caused by the railway bypass between Trento and Verona, up to a quarter of the initial effect. The effects of Valdastico and Valsugana are much lower and refer to the nearby provinces of Padova and Vicenza and also Belluno and Treviso. Interventions in Valsugana are much lower than in Valdastico and Pedemontana Veneta. The economic effects are minimum but widespread;
- Improvements to the networks to the South of Brenner create effects to adjacent provinces, in particular to Vicenza, Padova, Belluno, Treviso and Venezia. Valdastico and Pedemontana Veneta appear to be much more efficient, however Valsugana is less efficient. Obviously the combination between all kinds of intervention provides huge support to all of the Italian regions in the Adriatic Corridor. As far as Trento and Bolzano are concerned, the combination of the tunnel with other infrastructures only results in discreet extra benefits (never above 1% of their GDP), excluding the case in which the three projects are combined together.

The analysis of synergies among the various projects on a local scale highlights how the effects of their combined implementation may be lower, identical or higher than the total amount of their individual effects. As far as Trentino is concerned, there are only negative synergies that indicate how the three infra-structural projects are at least partially redundant as they allow for the same benefits of accessibility and economic performance to be achieved in different ways. An extension to Valdastico and to Pedemontana Veneto together with an improvement to the Valsugana mainly achieve the same results. However, a railway improvement to Valsugana may result in substantial environmental improvements due to a reduction in road traffic.

If, however, we consider the Brenner situation with the European transport infrastructures related to the TEN-T and TINA programmes, outside of the AlpenCorS area, the effects on accessibility and on regional economic development are much more powerful. Even if the focus of TEN-T and TINA programmes aims at improving the transport system of new member states, the more extensive impacts are located in Southern and in Eastern Europe. Considering the GDP pro-capita which is standardised on a European average, parts of Switzerland, Germany, France and North-Western Italy are "loosing" in economic terms (the differences are negative) as new member states are achieving a greater advantage in terms of accessibility.

However, due to the effect of the Brenner tunnel and the relative projects based on local transport, the provinces of Bolzano and Trento and surrounding regions are still "winners". On the one hand the objective of this scenario is to demonstrate how, on a long term, the improvement of European infrastructures can be more important than improvement based on local infrastructures. On the other hand, local infrastructures allow for the provinces interested to benefit from the positive effects produced by infra-structural projects on a European level.

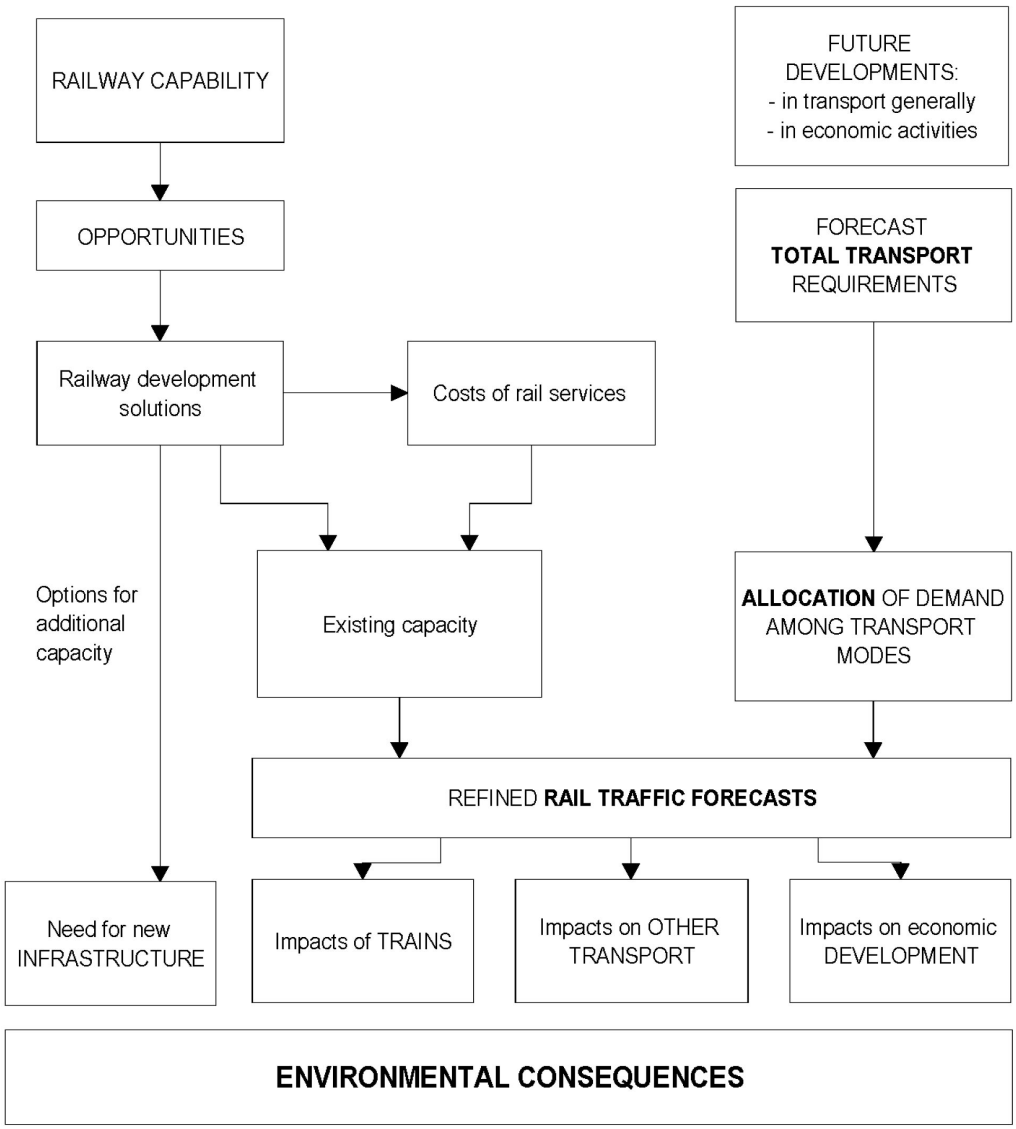
6.5 - Corridor V in Slovenia

The approach to strategic evaluation of HSR[32] is depicted in the following picture. It shows that economic and transport needs associated with HSR has to be clarified first (i.e. before any environmental impacts are evaluated). The analyses in the SEA therefore covered the following main areas:

- Needs for railway transport in the country (existing, future; what generates these needs, what is inevitable for Slovenian development? The answers have been extracted from Slovenian strategic documents like National Development Programme 2002-2006, Strategy of Economic Development of Slovenia, National programme of the modernisation of the railway infrastructure, Spatial Development Strategy of Slovenia etc.);
- Needs for new infrstructure (is it possible to meet the needs with existing infrstructure provided its modernisation or is it necessary to build new infrastructure?);
- Changes and effects in the environment/space (what is the difference between modernisation of existing infrastructure and building new one, what are indirect impacts due to expected economic development in either case?).

The study did not provide definite answers to all these questions; there are uncertainties associated with a number of issues at this planning stage of the HSR, which could not be removed/reduced in the study itself. However, the conclusion in the context of the terms of reference for the study is: a new HSR infrastructure

Figure 184. Schematic presentation of the approach to SEA for HSR Trieste-Ljubljana



Source: MoE e Jozef Stefan Institute's elaborations

between Trieste and Ljubljana, which will enable speed of 250 km/h for combined freight transport and at least 300 km/h for passenger transport, is problematic from environmental point of view. Not any of the alternative routes A, I, M is assessed as suitable. Therefore, it is recommended to the planners (at the MoE, Ministry of Transportation, Agency for railway transport etc.) to check other possibilities for routing HSR in the fifth trans-European corridor through Slovenia.

Therefore, additional alternative routes should be developed. Modelling results of space suitability analysis for HSR routing showes that a new railway through Vipava and Horjul valley[33], could be a better option. Whether this is feasible needs to be checked/agreed with Italy, since routing through Vipava valley would require certain adaptation of the route in Italy, probably starting from Venice and then near Trieste and further towards Slovenia.

Another relevant issue concerning the routing of Corridor V through Slovenia, coming out from the SEA study, regards the opportunity of making a deviation to Zagreb in order to enhance regional development as a consequence of the improvement of the accessibility of industrial pole located nearby Novo Mesto (i.e. the third for importance in Slovenia).

6.5.1 Economic impact

Summary of topical conclusions are as follows: the White Paper on Transport Policy of the EU by 2010 claims that transport contributes more than 10% to the average GDP in EU and employs more than 10 million people. We were not able to confirm such relations for Slovenia, since the Institute of macroeconomic analysis and development of Slovenia does not perform analysis of this kind. On the other hand, recent results of the analyses in the USA confirm strong association between GDP and transport. However, the strength of this association is difficult to quantify precisely. Macroeconomic analyses are still under development while microeconomic analyses, like CBA, provide answers on the level of an individual enterprise (industrial producer, shipes, logistic company, etc.). In Slovenia such companies are Revoz Novo mesto, Luka Koper, Slovenske _eleznice, Adria Kombi. Conclusion is that new railway infrastructure in Slovenia is not a necessity from economic point of view, and that investments would not be prove reasonable and profitable. This, in turn, suggests that it would be difficult to engage private capital in the project (e.g. through a project financing initiative).

In Slovenia about 1,500 enterprises need/use railway, but only two exceed 1 million tons of annual freight transport (Port of Koper and Revoz Novo mesto – Renault car producer). Others are of lower importance in the context of possible stations/intermodal nodes for HSR. Spatial distribution of the enterprises with the indication of their importance is depicted in figure below. Important points are Koper, Ljubljana in Novo mesto.

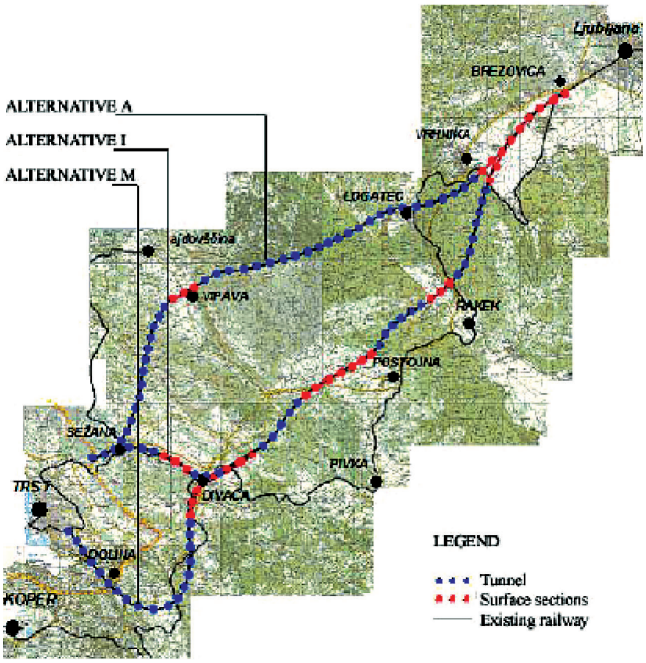
Regarding transport demand, the situation is clearly highlighted considering that total railway freight transport in 2003 reached 17 million tons, while international passenger transport moved 1,656,918 persons. Moreover, the scope of inland passenger transport can be represented by a number of passengers getting on and off the train in Ljubljana. These figures are: 63,000 gets-on per week and 58.000 gets-off per week, all together 121,000 in all directions (_tajerska, Dolenjska, Gorenjska etc.).

Table 41. Main technical data for HSR alternatives Trieste-Ljubljana

Alternatives	A	I	M
Lenght (km)	71	74	82
Tunnel (Nr.)	2	7	5
Tunnel (km)	49	36	49
Excavated material (Mio m^3)	24	22	14
Cost (billion ¤)	1,70	1,37	1,78

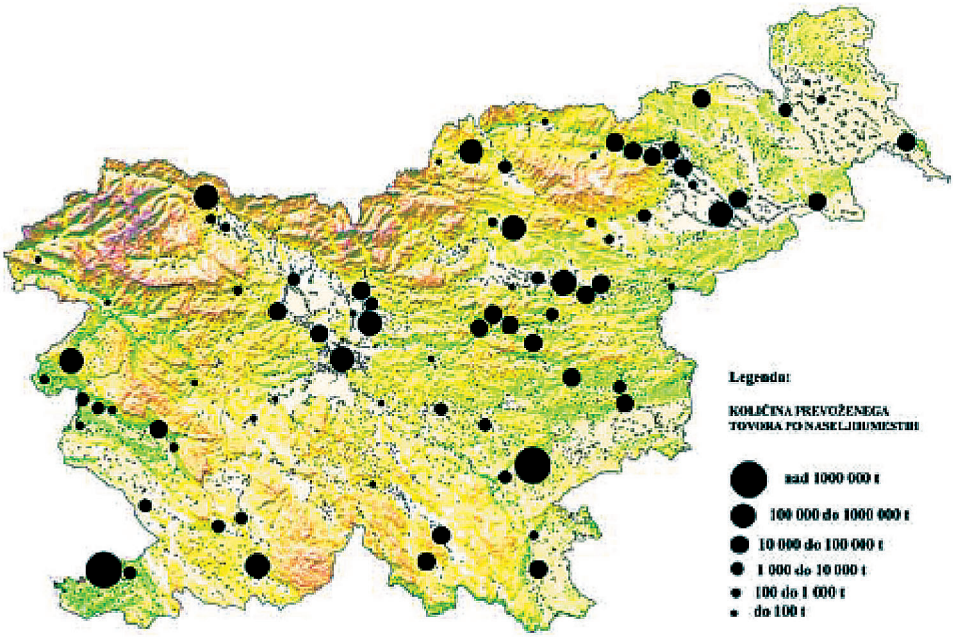
Source: MoE e Jozef Stefan Institute's elaborations

Figure 185. HSR alternatives from Treiste to Ljubljana



Source: MoE e Jozef Stefan Institute's elaborations

Figure 186. Slovenia - spatial distribution of freight rail transport with the quantitative indication of scope/needs of railway



Source: MoE e Jozef Stefan Institute's elaborations

Such a situation and predictions for the next 10-years period do not justify construction of the HSR for Slovenian needs. Therefore, it seems more reasonable to focus on the modernisation of the existing infrastructures instead of building the new one.
Justification, on the other hand, can be reached if the new HSR is evaluated in the EU context i.e. from the point of view of networking urban, logistic, multimodal transport nodes, and transit from west to east. In that perspective Slovenia has political responsibility and obligation to support such networking which makes HSR through Slovenia, especially for passenger transport, a neccessity. Slovenia also has interests at Balkans and far East.

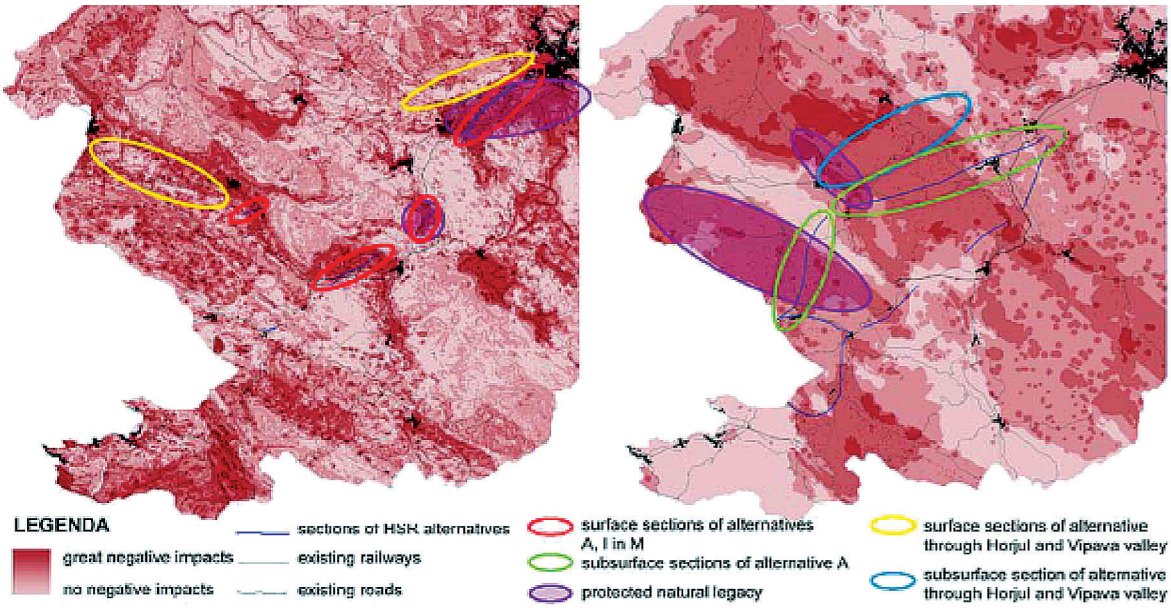
6.5.2 Spatial effects and environmental impacts

Main environmental reasons for such a conclusion are related to tunneling through the Karst (multiple uncertainties are relevant in this respect to environmental predictions is limited, construction costs are uncertain, psychological effects associated with safety of long tunnels is an issue) and conflicts with Natura 2000 and groundwater/drinking water resources protection. A surface rail link through the Karst wold be less risky and, at the same time, it would allow to measure environmental impacts with a reasonable confidence level.
Pollution aspect – CO2 and other emissions – looks less important in comparison to spatial considerations. Changes in air pollution have been evaluated for two alternatives of modal transport changes in passenger transport from Italian border to Budapest via Zagreb and alternativelly via Maribor. Expected annual reduction of CO2 emissions are between 160 and 390 thousands tons, for NOx between 1,790 and 3,290 tons, while for hydrocarbons an increase of emissions is expected of around 45 tons. Such minor changes can be explained with the fact that Slovenian population hardly changes transport habits (comodity of traveling by car) untill major improvement in public transportation is achieved. This means that no significant shift in passenger transport from cars and buses to train is expected, especially for distances less than 300 km.

6.5.3 Regional development

Regional development as a goal or an initiator for constructing a HSR is justifiable only if a regional center is a station/node. However, geographic circumstances in Slovenia allow two stations at most of the planned HSR, if a speed of 250 km/h or 300 km/h is to be achieved. This means that regional development at the scale of Slovenia is not a factor for HSR.
Moreover, if significant effects in terms of regional development have to be claimed to support HSR, than its route design should include the Zagreb urban node. Indeed, this would allow to access the industrial pole of Novo Mesto, which is one of the most important in Slovenia together with the Port of Koper.

Figure 187. Slovenia - Surface vulnerability map (left) and subsurface vulnerability map (right) with marked sections of HSR alternatives A, I, M and the "neww" alternative through Horjul and Vipava valley



Source: MoE e Jozef Stefan Institute's elaborations

That comes from the application of a two stages evaluation methodology: the first one aims at choosing among different alternative corridors, while the second one is devoted to choose among alternative routes within the best corridor. Results of this methodology for the region of Dolenjska indicate that the best route should be characterised by:

- Partial exploitation of the highway corridor;
- Rail service, both passengers and freight, at a speed up to 160 km/h;
- The construction of an intermediate station, with distribution centre, at Mackovec (to serve the industrial area of Novo Mesto).

Notes:

26 *For more detailed information on this application see the web site* http://www.ocs.polito.it.

27 *Provincial Development Scheme of the Trento Province (2002).*

28 *Other data elaborations, using different data sources (CSST and TPS), provided similar conclusions. For more details see the AlpenCorS web site.*

29 *Data from the Provincial Development Scheme of the Trento Province (2002).*

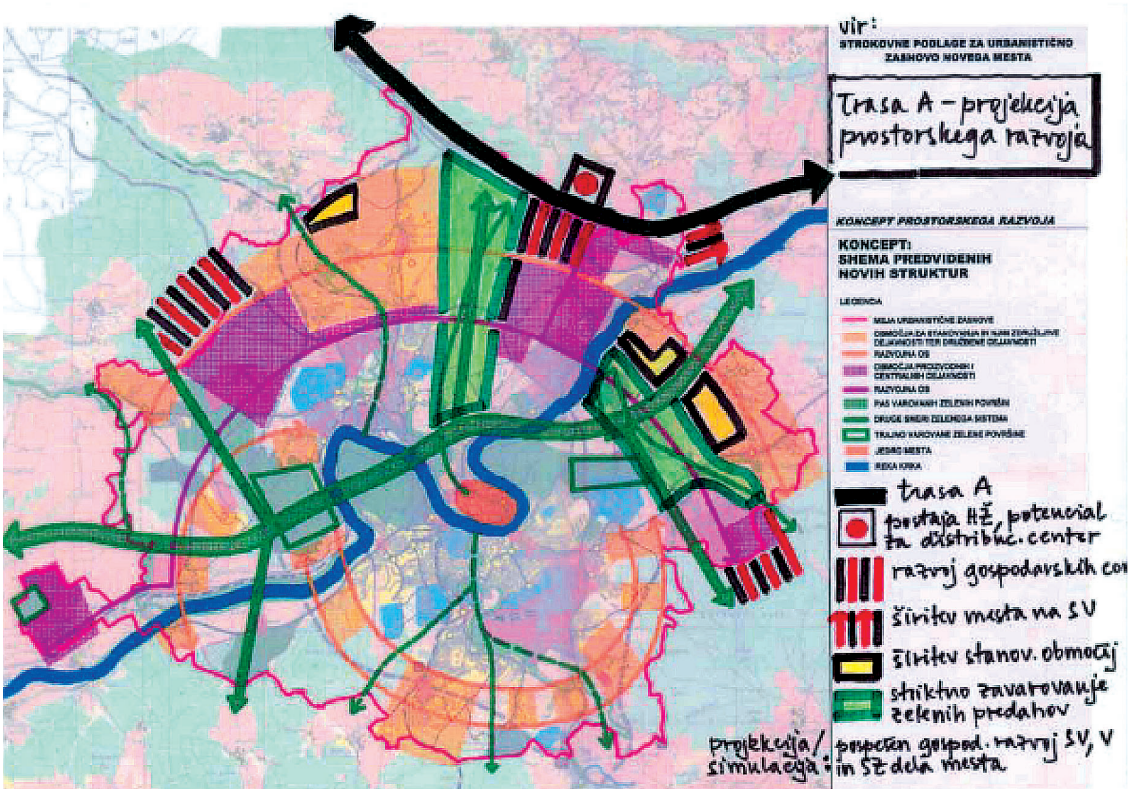
30 *Provincial Development Scheme of the Trento Province (2002).*

31 *28% according to the Provincial Development Scheme of the Trento Province (2002).*

32 *The study was financed by the Slovenian Ministry of Environment, Spatial Planning and Energy and by the Ministry of Education, Science and Sport.*

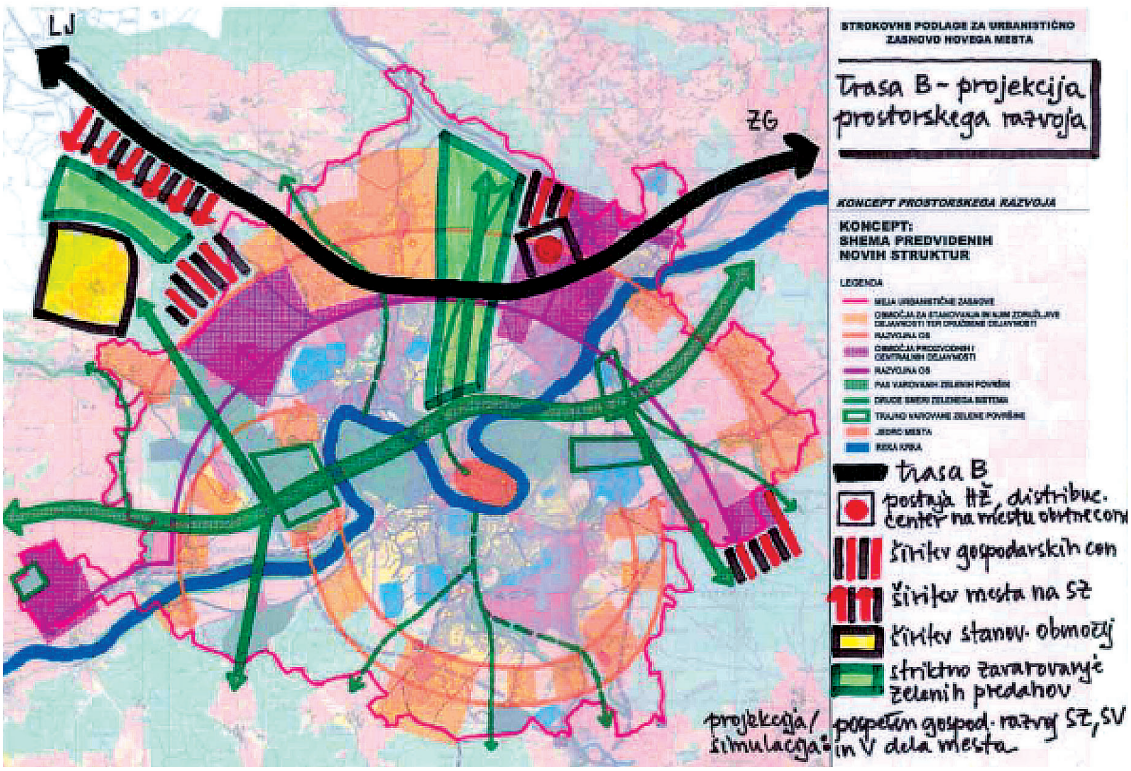
33 *This project alternative, examined in the past (Zarina d.o.o, Nova Gorica, 1999), was excluded by an in depth evaluation by means of no clear justifications.*

Figure 188. Slovenia - Schematic representation of expected changes in Novo Mesto due to the best alternative



Source: MoE e Jozef Stefan Institute's elaborations

Figure 189. Slovenia - schematic representation of expected changes in Novo Mesto due to the worst alternative



Source: MoE e Jozef Stefan Institute's elaborations

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