SCAN MED CORRIDOR

ALPINE REGION

A new
transport route
for Europe

MÜNCHEN

INNSBRUCK

BOZEN/BOLZANO

TRENTO

VERONA

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All concepts marked with * are explained in the glossary.

PREFACE

Alexander Dobrindt, Federal Minister of Transport and Digital Infrastructure, Germany

The mobility of people and goods is the foundation of growth and prosperity. Only by means of a modern and efficient infrastructure can Europe grow together to the benefit of its citizens and its economy. The railway plays an important part in this, due to its particular systemic strength in long-distance transport. Expanding rail infrastructure is a precondition for this.

Germany reached an important milestone in the implementation of the Scan-Med Corridor by completing the high speed route between Berlin and Erfurt, as well as between Nürnberg and München. In 2017, the new route Nürnberg-Erfurt is planned to enter into service, which means that a further section will operate with the highest technical standards. From 2014 onwards, Germany has been investing heavily in transport infrastructure. Therefore we will achieve a timely implementation of further important new routes and route expansion on the German section of this corridor, whereby the new Alpine crossing, in form of the Brenner Base Tunnel, will be its central element.

Jörg Leichtfried, Federal Minister for Transport, Innovation and Technology, Austria

The Scan-Med Corridor is one of the most important European transport axes. Roughly 110 km of the route is located in Austria where it crosses the Alps, which makes it a key section of the entire transport link. This major European transport link is a powerful economic driver, but heavy-freight traffic produces noise and air pollution, which is a burden for the local population and environment. The Brenner Base Tunnel, with its northern and southern access routes, will make an essential contribution towards solving this problem.

The Brenner Base Tunnel is an exemplary European project. Austria and Italy are implementing this project cooperatively and the EU supports this project substantially. This means that rail transport can fully develop its advantages in the context of Europe's freight and passenger transport, in accordance with European goals for transport and climate protection. This means that environment and population are protected from the negative effects of transport, whereas the high performance of the transport system is secured at the same time.

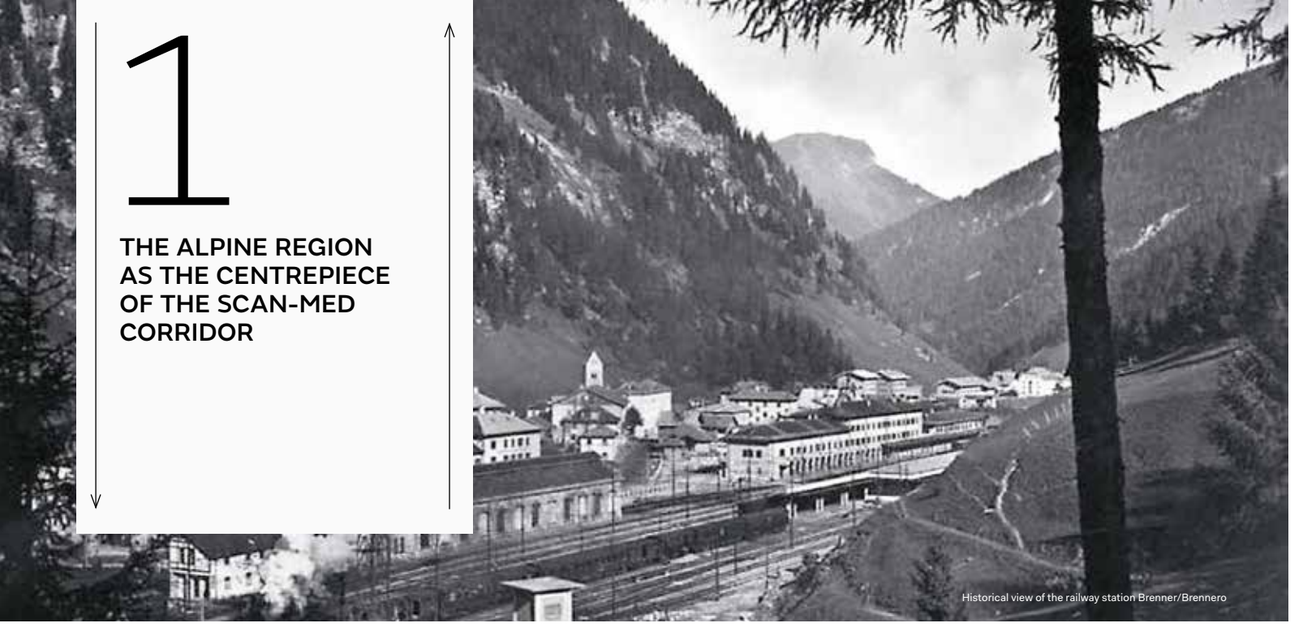
Graziano Delrio, Minister of Infrastructure and Transport, Italy

In a world that is becoming more and more globalized, growth depends on the capacity to offer suitable infrastructure connections and logistics solutions between different states. The Scan-Med Corridor is an important transport axis for the European economy and for the connection of its population. The measures undertaken on the transalpine section help overcome one of the most serious bottlenecks on the Scan-Med Corridor.

The Brenner Base Tunnel, with its northern and southern access routes, will considerably increase the competitiveness of the railway. This is the foundation for a decisive traffic shift from the road to the railway. The following publication offers information to the public and supports public participation; last but not least this document effectively enhances the construction itself and its surroundings.

1

THE ALPINE REGION AS THE CENTREPIECE OF THE SCAN-MED CORRIDOR



Historical view of the railway station Brenner/Brennero

Brenner railway near St. Jodok am Brenner

The railway station Franzensfeste/Fortezza in roughly 1900

THE BRENNER PASS: A HISTORICAL ALPINE CROSSING

As the early as the Bronze Age the pass was used by the Illyrians and later by the Romans to cross the main chain of the Alps. The Via Raetia was constructed in 200 A.D. It passed through present day Augsburg, over the Seefeld Saddle, through Innsbruck and over the Brenner Pass towards the cities Bozen/Bolzano, Trento and Verona. The Brenner Pass was considered to be so important because it was safe throughout winter and could therefore be used all year round.

In medieval times the Brenner Pass was part of the important long-distance trade route called the Via Imperii that stretched from Szczecin to Roma. At that time the Brenner Pass was already the busiest Alpine crossing. In the mid-16th century a mail delivery route was established and in 1777 the Brenner Pass was made a fully-passable road by the Empress Maria Theresa.

In 1867 the Brenner Railway was established between Innsbruck and Bozen/Bolzano, the first rail route to cross the main chain of the Alps. A few years earlier the routes Kufstein-Innsbruck, Bozen/Bolzano-Trento and Trento-Verona were also put into operation.

At that time the Brenner Railway had a much higher performance compared to road transport. Transport volumes greatly increased and maximum capacity was soon reached on the route. Plans to increase capacity of the Brenner Railway were drafted in the 1930s and 1950s, but no significant investments were made to upgrade the route.

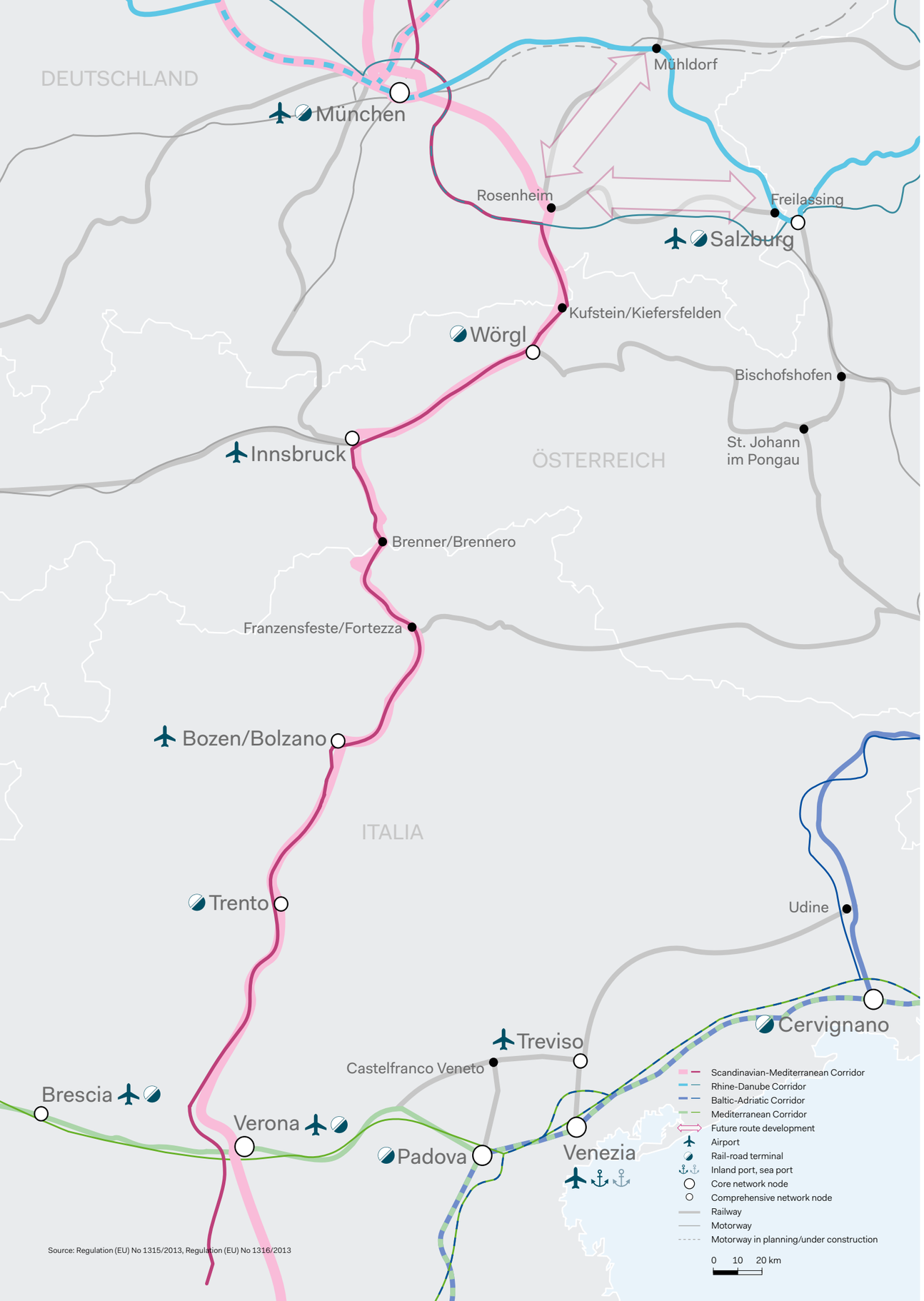
In 1974 the last section of the Brenner Motorway, the first mountainous motorway, was completed. This resulted in a massive shift of traffic to the road, which was not seen as problematic at the time. Investments in road infrastructure rather than in rail infrastructure dominated transport policy during the 1970s.

During the 1980s requests to further develop rail infrastructure grew louder and louder. By signing the Declaration of Udine in 1989, the transport ministers of Germany, Austria and Italy acknowledged the feasibility study for the Brenner Base Tunnel (BBT) and committed to further cooperation. The marked-out route from Innsbruck to Franzensfeste/Fortezza was declared the basis for all future infrastructure considerations. A further feasibility study was conducted for the northern and southern access routes in 1993, which still has high relevance today.

With the Memorandum of Montreux* in 1994 a step by step expansion of the Munich-Verona axis was agreed upon and integrated into the respective national transport policies. It was also decided that capacity bottlenecks need to be removed. The European Council at Essen in 1994 endorsed the Memorandum of Montreux*.

The Brenner Eisenbahngesellschaft (Brenner Railway Company) was established in 1995, in order to implement the first phase of construction on the northern access route of the BBT between Kundl and Baumkirchen. In 2012 the route was put into operation on scheduled services.

In 1999 the transport ministers of Austria and Italy founded the Brenner Base Tunnel EEIG (European economic interest grouping) as the project company responsible for planning and constructing the BBT. The company prepared all the site-relevant project fundamentals to start constructing the BBT. In 2004 the successor company Galleria di Base del Brennero – Brenner Basistunnel BBT SE* was founded.



Source: Regulation (EU) No 1315/2013, Regulation (EU) No 1316/2013

THE ROUTE OF THE SCAN-MED CORRIDOR THROUGH THE ALPS

In the Alpine region, the Scan-Med Corridor runs through southern Germany, western Austria and northern Italy. The transalpine section is limited by the metropolitan areas and transport hubs München and Verona. The majority of the around 450 km road and rail routes, which run in parallel, pass through an Alpine environment, mostly along the course of the Inn, the Wipp, the Eisack and the Etsch valleys.

With an elevation of 1 378 metres above sea level the Brenner Pass is the highest point on the Scan-Med Corridor.

Due to the particular topography of the Alps, road and rail follow a similar route on the transalpine section of the Scan-Med Corridor. Apart from Munich Airport, one of the main airports in the EU[1], there are further airports in Innsbruck, Bozen/Bolzano and Verona, as part of the transalpine section of the Corridor. As it is not located by the sea and has no navigable inland waterways, there is no shipping activity on this section of the Scan-Med Corridor.

Germany

In Germany the Scan-Med Corridor passes through München and the area of Rosenheim towards the border in Kiefersfelden. München is the most important transport hub on this part of the corridor; it includes rail, road and air traffic. Seven supraregional rail routes and motorways connect München with the rest of Germany and its neighbouring states. The connections towards Stuttgart, Salzburg and Linz over Mühldorf, as well as to the Czech Republic via Regensburg, are part of the Rhine-Danube Corridor within the TEN-T* core network. The route München-Mühldorf-Freilassing, including the Tüßling-Burghausen branch line, will be converted to a double track and electrified by the DB Netz AG (in course of the project “Ausbaustrecke 38”). The Rosenheim area is an important regional hub, where the Inn Valley motorway junction is located supraregional and regional rail routes connect. It is currently under discussion if the northern access route of the Brenner Base Tunnel should also run through Mühldorf and not only through München. This freight route could pass through Wasserburg or through Freilassing on the upgraded line München-Mühldorf-Salzburg, which would establish a connection with the Eastern Corridor[2].

Multiple existing or projected elements of rail and road networks in the München area are part of the Scan-Med Corridor. The DUSS[3]-Terminal München-Riem is a multimodal* freight hub which processes traffic between northern and southern Europe. The DUSS-terminal has the second highest rail freight traffic volume on the Scan-Med Corridor, only the terminals in Hamburg process more goods[4]. The road transport network includes the A8 between München and Rosenheim and the A93 between Rosenheim and the border in Kiefersfelden[5]. The rail transport network includes the routes München-Rosenheim and Rosenheim to the border. A number of rail infrastructure projects are planned on this part of the Scan-Med Corridor.

[1] Regulation (EU) No 1315/2013: Article 41, 3
[2] The Eastern Corridor is an important rail route for German freight transport that connects the northern German sea ports with the southeastern German rail network via Leipzig, Hof and Regensburg.
[3] The Deutsche Umschlaggesellschaft Schiene-Straße mbH is Germany largest inland operator for multimodal* road-rail terminals.
[4] European Commission (2014): page 236
[5] The current draft of the Federal Transport Infrastructure Plan 2030 proposes a six-lane extension of the A8 between the München South junction and the Inn Valley junction near Rosenheim (Bundesministerium für Verkehr und digitale Infrastruktur 2016: page 86).

Austria

In Austria the transalpine section of the Scan-Med Corridor stretches from the German border at Kufstein, through the Wörgl area to the Innsbruck area and towards the Italian border at the Brenner Pass. Innbruck is an important rail and road hub within the Austrian transport network and also has an airport. There is a road-rail terminal in Wörgl.

The Scan-Med Corridor includes the A12 between the border at Kufstein and Innsbruck, and the A13 between Innsbruck and the Brenner border crossing. It also includes the rail network between the border at Kufstein and Innsbruck and the section from Innsbruck to the Brenner border crossing. A 40 km long section in the lower Inn Valley with the bypass tunnel in Innsbruck was already extended to four tracks. Further track upgrades and expansions – the Austrian section of the Brenner Base Tunnel in particular – are also part of the Scan-Med Corridor.

Italy

In Italy the transalpine section of the Scan-Med Corridor stretches from the Austrian border at the Brenner, to Bozen/Bolzano and to Trento and Verona. In this part of the section Verona is the most important rail, road and air hub. There is another airport in Bozen/Bolzano, for which the government of the Autonomous Province of Bozen-Südtirol recently approved a strategic development and business plan[6] in November 2015 . Four supraregional road and rail routes run through Verona into the rest of Italy and towards neighbouring states. The connections to France via Milano and to Slovenia via Venezia, are part of the Mediterranean Corridor of the TEN-T* core network. The Quadrante Europa southwest of Verona close to the airport has the third highest freight traffic volume on the Scan-Med Corridor, after the rail-road terminals in Hamburg and München[8].

The Scan-Med Corridor includes the A22 between the border and Verona and the rail network between Brenner/Brennero-Bozen/Bolzano-Trento-Verona. Further track upgrades and expansions – the Italian section of the Brenner Base Tunnel in particular – are also part of the Scan-Med Corridor.

This publication is mainly concerned with the rail system, as the transalpine section of the Scan-Med Corridor requires numerous rail infrastructure upgrades and expansions.

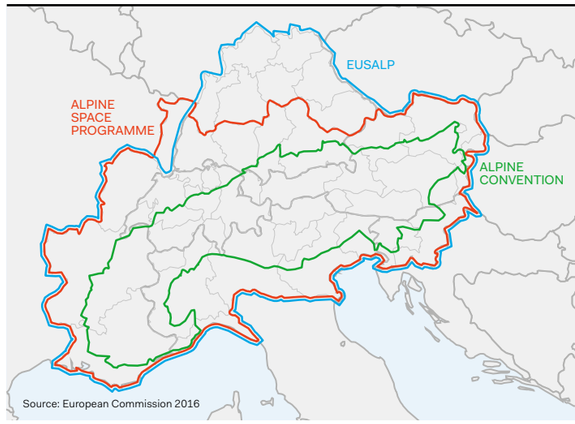
[6] Airport Consulting Vienna GmbH (2015)
[7] On June 12th 2016 a referendum will be held on the Bozen/Bolzano airport extension.
[8] European Commission (2014): page 236

STRATEGIES FOR THE ALPINE REGION

The Alpine Convention

The Alpine Convention is an international treaty established to protect the Alps and to develop them sustainably. In 1991 the Framework Convention was signed by the Ministers of Environment of all the Alpine states and the EU. The Permanent Secretariat of the Alpine Convention is located in Innsbruck. Regular consultations by the parties are called the Alpine Conference. Implementation protocols with different thematic priorities are defined through the Alpine Convention. In 2002 Germany and Austria both ratified the Protocol on the Implementation of the Alpine Convention in the field of Transport (Transport Protocol). Italy and the EU signed the protocol in 2013. Therefore all states are obliged to guarantee more sustainable modes of transport and also to support a modal shift from road to rail. Apart from supporting environmentally friendly modes of transport, the states must abstain from building new transalpine roads.

Area covered by the Alpine Convention, EUSALP and the Alpine Space Programme



EUSALP

To promote economic, social and territorial cohesion, the European Commission supports cooperation between regions through macro-regional strategy[9]. Administrative regions in Europe and in third countries form networks that deal with common issues and challenges based on transnational cooperation. In 2015 the EU founded a macro-regional strategy for the whole Alpine area (EUSALP). In total 48 Alpine regions from five states are involved. The goals for these regions include more sustainability, better transport systems and improved accessibility for all parts of the Alpine area.

The Alpine Space Programme

The Alpine Space Programme is an EU support programme that promotes territorial cohesion and transnational cooperation. Individual projects by stakeholders or platforms are funded based of four priority themes “Innovative Alpine Space”, “Low Carbon Alpine Space”, “Liveable Alpine Space” and “Well-Governed Alpine Space”. All projects must be trans-national; projects concerned with transport and mobility are encouraged to focus on reductions of CO_2 emissions.

[9] A macro region is a region that includes multiple separate, administrative regions, which nonetheless are united by common issues that make coordinated strategic planning necessary. In this sense a macro region is characterized by themes, issues and challenges which go beyond the problem-solving capacity of a single nation state or region, which requires cross-border cooperation.

INTEGRATION INTO THE EUROPEAN TRANSPORT SYSTEM

With a total length of 9 300 km the Scan-Med Corridor is the longest TEN-T* core network corridor. The transalpine section of the Scan-Med Corridor stretches over roughly 450 km.

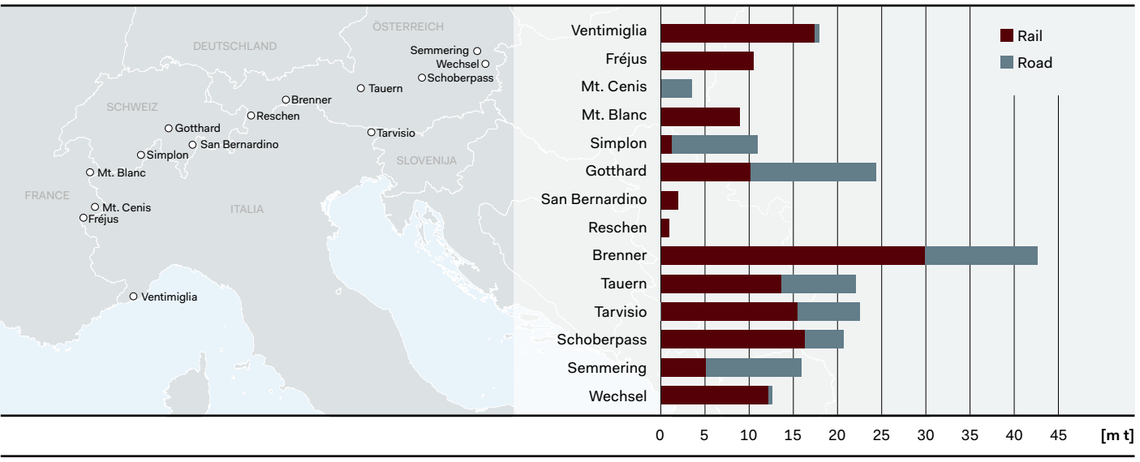
The Scan-Med Corridor plays an important role within the TEN-T* core network. The corridor is vital for the creation of a single European transport area that is efficient and sustainable, that creates advantages for users and supports integrative growth.

Due to its central location within the EU and due to its vast north-south expanse, the corridor has links and overlaps with five of the eight other TEN-T* core network corridors. In course of the transalpine section the Scan-Med Corridor crosses the Rhine-Danube Corridor in the area of München and meets the Mediterranean Corridor in Verona. München and Verona are central nodes both for freight and for passenger transport within the TEN-T* core network; their relevance is also generated through their function as gateways to the Brenner axis.

For transport the Alps represent a natural barrier that can only be overcome through passes or tunnels. Important transport routes between Germany and Italy run through the Gotthard or San Bernardino route in Switzerland, but also through the Brenner Pass and the Tauern Pass in Austria, whereby the Tauern Pass leads on to the border crossing at Tarvisio.

Compared to other Alpine crossings, the Brenner Pass has the highest traffic volumes[10]. In 2013 a total of 27 000 vehicles travelled through the Brenner Pass every day. 10 000 vehicles less a day passed through the second busiest route in 2013, the Gotthard. More goods are transported through the Brenner Pass than through all Swiss Alpine passes combined: 42 % of all freight transported over the five busiest Alpine crossings, can be attributed to the Brenner Pass alone.

Transalpine freight transport in 2012 on all Alpine crossings, transported freight volume

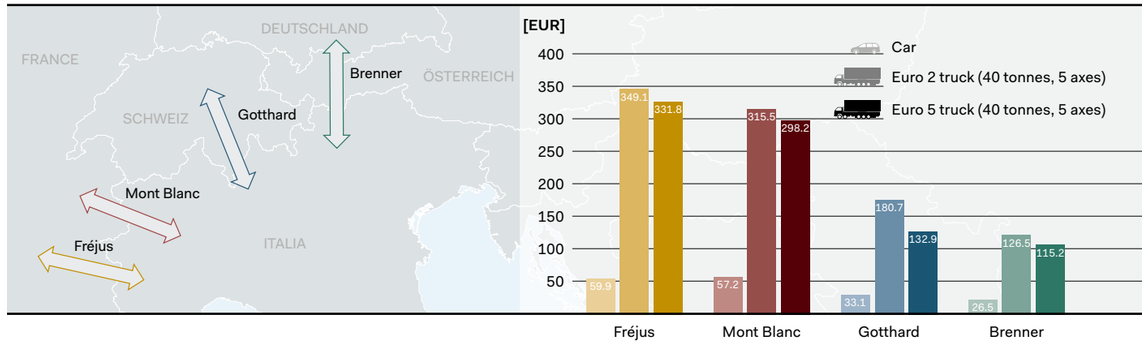


Source: Amt der Tiroler Landesregierung 2014

Both the numbers of heavy duty* transport and of car transport have been rising constantly since 2009 and have always been higher than the amount of traffic on the Gotthard and Tarvisio route. The difference becomes especially apparent if heavy duty*, light duty vehicles and coaches are taken together: Whereas 3 900 such vehicles passed through the Gotthard route, nearly twice as many, roughly 8 800 passed through the Brenner Pass every day in 2013. In 2013 the traffic on the Brenner Pass reached pre-crisis levels. In 2013 a total of 30 million tonnes were transported on the Brenner Pass, significantly more than on the other Alpine crossings.

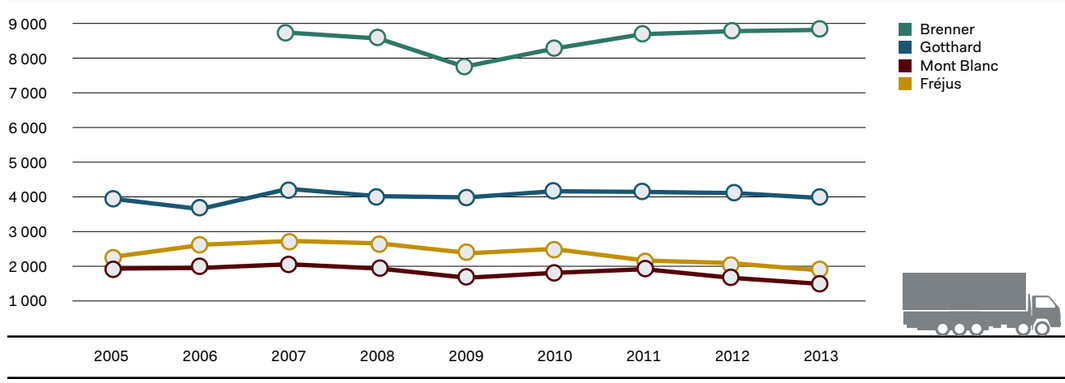
One reason for the high levels of road freight transport on the Brenner, are the comparatively low toll prices: In 2013 the toll for a low-emission truck was 115 Euro and 126 Euro for a high-emission truck, whereas 132 Euro and 180 Euro had to be paid to pass the Gotthard route. Due to the lower cost, de-tours are made and traffic from Germany to Italy is channel-led through the Brenner. Furthermore, the total weight of trucks is limited to 40 tonnes in Switzerland[12], which forces especially heavy trucks to take the Brenner Pass. In 2016 the toll for trucks was lowered by 25 % on the Brenner Pass in order to comply with EU law, again reducing transport costs on the Brenner compared to other Alpine crossings.

Toll prices for selected Alpine crossings 2013



Source: iMonitraf! 2015

Development of average daily traffic, amount of heavy-duty vehicles (2005-2013)



Source: iMonitraf! 2015

[10] The source of information referred to in this chapter, if not stated otherwise, is iMonitraf! (2015): page 17f.

[11] The classification system of low and high emissions is based on European emission standards* (see Council Directive 88/77/EEC and Regulation (EU) No 582/2011).

[12] Bundesamt für Verkehr Schweiz (2016)

2

ECONOMIC GEOGRAPHY AND TRANSPORT INFRASTRUCTURE


München


Inn Valley


Innsbruck


Bozen/Bolzano


Rosengartengruppe in South Tyrol


Verona

PHYSICAL AND HUMAN GEOGRAPHY OF THE ALPINE REGION

The Scan-Med Corridor passes through an area of diverse nature and culture. Due to the mountainous terrain, there are very few areas of permanent settlement* on the route itself.

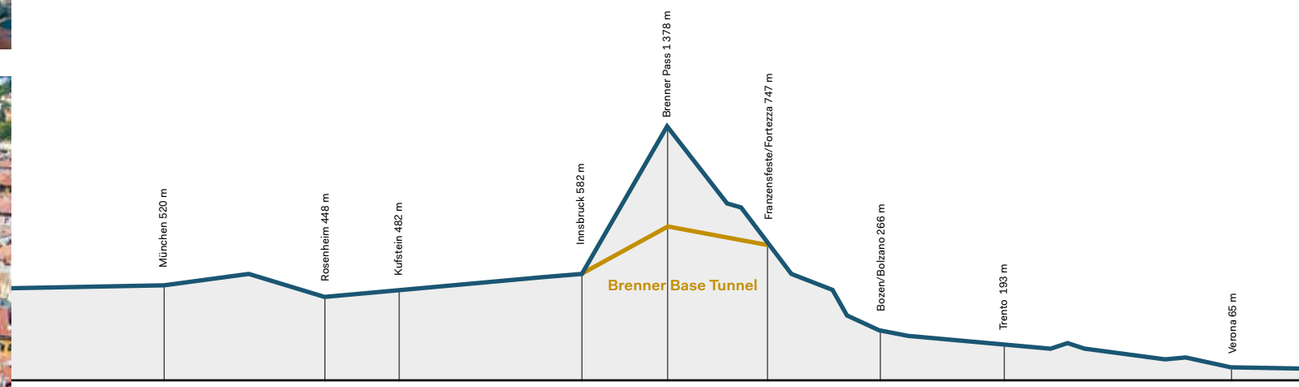
The three nearly equal sized cities Innsbruck, Bozen/Bolzano and Trento are the administrative and economic centres of this European region and are the key points of reference for their surrounding area. The two end points of the transalpine section of the Scan-Med Corridor, München and Verona, are located in two of the most economically successful regions of Europe: southern Germany and the Po Valley in northern Italy. München and Verona are situated in larger regions with favourable climatic conditions and are part of close-knit city networks.

Between München and Rosenheim the Scan-Med corridor partly runs through Alpine foothills. This part of the route is characterized by a high population density in the area of München, which blends into rural areas and a unique lake district. From Rosenheim onwards, already within sight of the Alps, the route of the Scan-Med Corridor is characterized by this vast mountain range.

Within the inner Alpine valleys, the route of the Scan-Med Corridor is determined by the geomorphology of the mountains. Infrastructures are channelled in valleys, where the settlements and economic activity are located.

North of the Brenner Pass, the inner Alpine section of the Scan-Med Corridor passes through the densely populated Lower Inn Valley and the regional capital Innsbruck. South of the Brenner, the inner Alpine section of the Scan-Med Corridor follows the river Eisack, which joins the Etsch in Bozen/Bolzano. The Eisack and Etsch valleys are the main settlement areas of the Autonomous Province of Bozen-Südtirol, with its capital Bozen/Bolzano and the Autonomous Province of Trento, with its capital Trento. The river Etsch flows through the city Verona and through its province with the same name.

The Brenner Pass, with an elevation of 1 378 metres above sea level is the highest point of the transalpine section of the Scan-Med Corridor. The vertex of the Brenner Base Tunnel will be located at 794 metres above sea level. From München to Innsbruck the elevation of the Scan-Med Corridor increases moderately from 520 metres above sea level to 582 metres. Franzenfeste/Fortezza is located at 747 metres above sea level, from where the elevation of the Scan-Med Corridor drops to 266 metres in Bolzano/Bozen and then to 65 metres in Verona.



Elevation profile of the Scan-Med Corridors's transalpine section

ECONOMIC GEOGRAPHY: STRUCTURES AND DYNAMICS IN THE ALPINE REGION

The transalpine section of the Scan-Med Corridor passes through highly productive economic regions, partly, with rapidly growing populations – for instance, the population of München should increase by 23 % from 2013-2030[13]. In the Alpine areas, there is a high degree of manufacturing, research, specialized services, agriculture and tourism, both summer and winter. Trade between Germany, Austria and Italy plays an essential role in the economy of the Alpine region. The economies of South Germany and of North Italy are heavily export-oriented and are deeply entwined with global economic activity. Many important universities and research centres are located in the region.

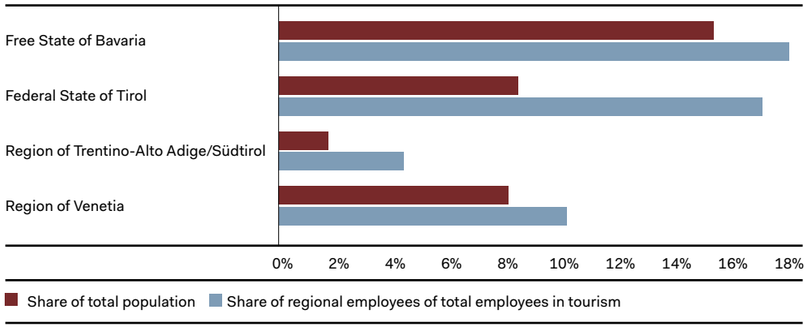
The transalpine section of the Scan-Med Corridor runs through densely populated regions – more than 7 million people live in Upper Bavaria, Tirol, the Autonomous Province of Bozen-Südtirol, the Autonomous Province of Trento and the Province of Verona.

If the populations of Bavaria, the Region of Venetia and the Region of Lombardy are added to the catchment area of the transalpine section of the Scan-Med Corridor, the population would rise to 29 million.

Free State of Bavaria

München is the state capital of the Free State of Bavaria. With 1.7 million inhabitants it is the third largest city of the Federal Republic of Germany. Roughly 5.7 million people live within the larger metropolitan region. München is the largest city on the transalpine section of the Scan-Med Corridor.

Comparison of the share of total population with the share of employees in tourism 2013



Source: Eurostat 2016c/d

[13] Landeshauptstadt München (2015): page 57

München is home to numerous companies in the areas of automotive, mechanical and electrical engineering, biotech and information and communication technologies. München is also an important centre for finance and media. 42 % of all Bavarian jobs are located in the München area and 17.6 % of the entire Bavarian economic output is generated in the capital. With a GDP per capita of 51 000 Euro, München is one of the economically most powerful regions in Germany and also Europe[14].

Important economic clusters are situated within the catchment area of the transalpine section of the Scan-Med Corridor, which rely on very good transport links: One of them is the chemical industry cluster, where more than 260 manufacturing and research companies are located. High-performance companies in the aeronautics and aerospace industry and the automotive cluster are based in the area of München. In the whole of Bavaria, and München in particular, a large amount of world market leaders produce goods and services for which there is global demand: Roughly 90 % of the export value of Bavarian finished products is generated by vehicles, electrical goods or machines[15]. 18 % of German companies in manufacturing are located in Bavaria[16].

Bavaria is an important tourist destination within Germany. Apart from München with its rich cultural life, the lakes and mountains of Upper Bavaria attract many visitors: 15 million people visited the area of München and Upper Bavaria (roughly 36 million overnight stays) in 2015.[17]

Federal State of Tirol

Innsbruck, with more than 130 000 inhabitants, is the third largest city on the transalpine section of the Scan-Med Corridor. In 2014 the Tyrolian GDP per capita was 41 200 Euro and was therefore higher than the Austrian average[18]. Tirol has an unemployment rate of 3 % - one of the lowest in the entire EU. The economy of Tirol is based on manufacturing: Roughly 10 % of all Austrian companies in manufacturing are located in Tirol. In 2012 more than 11 billion Euro worth in goods was exported all over the world, whereby Germany was the most important trading partner. Nearly half of the economic output of Tirol is generated in the Innsbruck area[19].

Due to its location on a historically important major trade route, Innsbruck takes up an important nodal function for transalpine traffic. This is why the transport economy is a significant economic sector in Tirol – roughly 7 % of all companies in Tirol have their commercial focus in transport. These companies generate 6.4 % of the economic output of Tirol.

Tirol is renowned as a tourist destination. A well-developed infrastructure, an intact environment and rich cultural heritage are the foundation of a thriving tourism, both in winter and summer. In 2014, Tirol accommodated more than 10.2 million guests (45.6 million overnight stays), half of which were German. Accommodation generates roughly 13.5 % of the Tyrolean economy, only to be topped by manufacturing with 16.6 %.

[14] The GDP per capita in Germany was roughly 33 800 Euro in 2014. The European average of the EU-28 was roughly 25 900 Euro (see Eurostat 2015).
[15] Wirtschaftsministerium Bayern (2016)
[16] Eurostat (2016d)
[17] Bayerisches Landesamt für Statistik (2015)
[18] The GDP per capita in Austria was roughly 38 500 Euro in 2014 (Source: Statistik Austria 2015).
[19] The source of information referred to in this chapter, if not stated otherwise, is Wirtschaftskammer Tirol/Standortagentur Tirol (2013).

Autonomous Province of Bozen-Südtirol

The Autonomous Province of Bozen-Südtirol is one of the most economically competitive regions in Europe. The economy of the province is based on high-tech manufacturing and research that make up about 20 % of the regional GDP[20]. This includes globally successful companies in the area of sustainable energy production, which are clustered in Bozen/Bolzano[21]. With 6 million guests a year (29 million overnight stays), the province is an important Alpine tourist destination[22]. The economic success of the Autonomous Province of Bozen-Südtirol is based on the performance of many innovative small and medium enterprises – no region in Italy has a higher GDP per capita and a lower unemployment rate[23].

Bozen/Bolzano is the capital of the Autonomous Province of Bozen-Südtirol with more than 100 000 inhabitants. Due to its bi-culturalism the city is an important centre of Italian and German speaking culture. Bozen/Bolzano is the headquarters of numerous large media, services and manufacturing companies, including logistics and metal-working companies which profit from the convenient location.

Autonomous Province of Trento

Trento is a regionally important commercial centre with 117 000 inhabitants and the capital of the Autonomous Province of Trento. Apart from high value-added agriculture, services and tourism, the region is well known as an important manufacturing and logistics centre. Also, there are important metal-working clusters that employ more than 30 000 people[24].

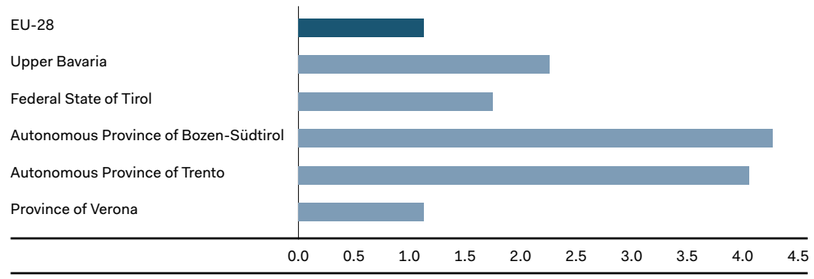
Province of Verona

More than 260 000 people live in Verona, in the northern Po Valley. Verona is the southernmost limit of the transalpine section of the Scan-Med Corridor. As a World Heritage Site, the city has supraregional cultural relevance and is an attractive tourist destination.

The Region of Venetia and the adjacent Region of Lombardy are characterized by their economic potency, compared to other Italian or European regions. The Region of Venetia includes a high proportion of medium-sized, export-oriented companies in manufacturing: 11 % of Italy's companies in manufacturing are located in the region[25].

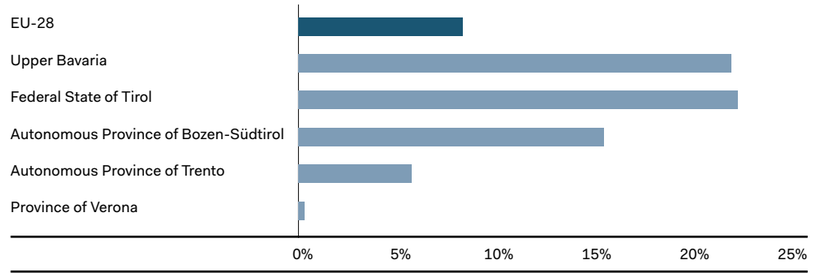
[20] Landesinstitut für Statistik der Autonomen Provinz Bozen-Südtirol (2015)
[21] Germany Trade and Invest (2009): page 13
[22] Landesinstitut für Statistik der Autonomen Provinz Bozen-Südtirol (2015)
[23] The GDP per capita in Italy was roughly 25 400 Euro in 2014 (Source: Eurostat 2015).
[24] Germany Trade and Invest (2009): page 22
[25] Eurostat (2016d)

Tourist arrivals per inhabitant on the level of NUTS 2* in 2014



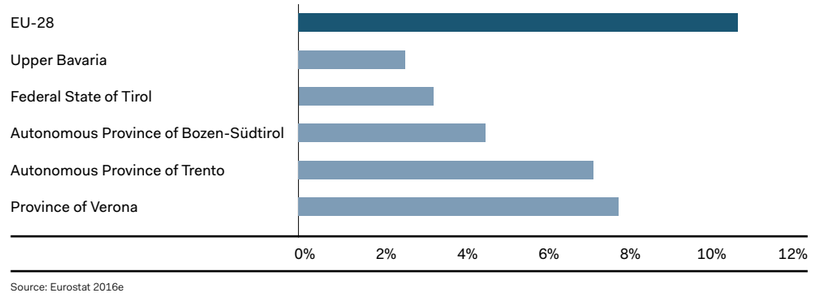
Source: Eurostat 2016a/c

Change of GDP on the level of NUTS 2* 2007-2014



Source: Eurostat 2016b

Unemployment rate in the age category 15-74 on the level of NUTS 2* in 2014



Source: Eurostat 2016e

ENVIRONMENTAL QUALITIES AND CHALLENGES

The Alps are an exceptional and highly sensitive ecosystem, which is considered worthy of protection also because of its natural beauty.

The Alpine region is characterized by varying altitudinal zones with different local climates and various vegetation zones, as well as different settlement forms. On this limited space there are a great number of cultural and natural landscapes that are closely entwined: Alpine valleys including foothills (700 metres to 900 metres above sea level), mountain peaks to the snow line (2 000 metres to 3 100 metres above sea level) and above that a nival level covered by glaciers (4 000 metres above sea level or above). Due to this special topography areas of permanent settlement* are limited to valleys and few favourable slope areas; this often results in high construction densities.

The special climate of the Alpine region

The Alps function as a climatic barrier between the warmer Mediterranean zone and the northern temperate climate zone. Due to differences in terrain the local weather can vary strongly.

Valleys and basins are particularly prone to inversions in winter. In certain weather conditions air layers are separated from each other, which can lead to big differences in temperature and to temperature inversion, where cold air is collected in the valleys, and warm air stays high up. Such temperature inversions can last for many days and significantly reduce the quality of air. This leads to high concentrations of air pollution in urban areas, caused by transport, domestic fuel consumption and industrial production.

Inversionswetterlage im Raum Bozen/Bolzano

Air quality

Exposure to ozone, particulate matter and nitrogen oxides is especially problematic in the Alpine area. Going uphill, motorized transport requires high engine speeds, which results in above average emissions: For instance, an inclination of 5 % produces twice as many nitrogen oxides as a comparable level road section.[26]

To secure good air quality, the EU imposed emission ceilings for certain atmospheric pollutants: For instance, since 2005 daily particulate matter levels are not allowed to exceed 50 µg/m^3 more than 35 times a year. For the protection of public health, hourly nitrogen oxide levels are limited to 200 µg/m3 and cannot be exceeded more than 18 times a year.[27]

In proximity to busy traffic axes these limits are regularly transgressed. In München, in Tirol along the A13 and in the Autonomous Province of Bozen-Südtirol along the A22 exposure to air pollution is especially high[28]. Of all important Alpine crossings, the Brenner Pass exhibits the highest amounts of emissions[29]. If the ceilings for atmospheric pollutants are exceeded continuously, the EU will pursue infringement proceedings against member states.

Noise pollution

Traffic does not only cause air pollution but is also responsible for noise pollution. Currently, the exposure to noise is especially high in the Inn, Wipp, Eisack and Etsch valleys.

Noise is experienced subjectively and therefore differently by individuals: 60 dB(A) road traffic noise is considered a nuisance by 26 % of persons affected, whereas only 15 % consider the same for rail traffic noise[30].

As major transport routes run through the valleys in the inner Alps, constant high levels of noise pollution are a serious issue. Although sound energy normally diminishes rapidly with distance from the source, in mountainous areas sound spreads differently due to the wind and the hilly terrain.

Trentino

[26] ALPNAP (2007)
[27] More information on emission standards and emission ceilings, see Umweltbundesamt Deutschland (2016).
[28] Bayrisches Staatsministerium für Umwelt und Verbraucherschutz (2015), Amt der Tiroler Landesregierung (2015), Autonome Provinz Bozen-Südtirol (2011)
[29] IHK für München und Oberbayern (2015): page 20
[30] Umweltbundesamt Österreich (2004): page 246

Effects for public health and natural environment

High concentrations of atmospheric pollutants and noise have far-reaching consequences in inner Alpine locations: Not only public health is endangered, but also the quality of life of the Alpine population is diminished. Polluted air causes asthma, bronchitis and allergies. Constant exposure to noise causes stress, sleeping disorders and cardiovascular diseases. Exposure to noise at night-time is has particularly adverse effects, as the tolerance to noise is much lower during sleep[31].

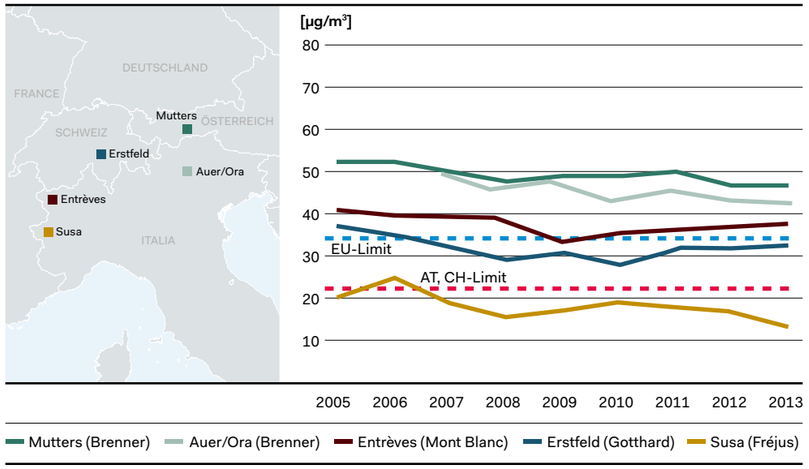
The sensitive Alpine ecosystem also suffers from air pollution. Due to the Alps' particular climate and topography, pollutants are carried high into the atmosphere from where they are widely dispersed. Pollutants are deposited far away from transport routes; this affects water supplies and impairs the vitality and functioning of ecosystems.

Taking care of the Alps as a living space

The special natural and cultural landscape of the Alpine regions has been inhabited by people for thousands of years. This meant developing an understanding of the intricate relationship between human beings and their environment.

Human interventions in the Alpine ecosystem are nothing new, but it is important not to strain the environment of the Alps, so as to destroy its value for animal and plant life; because this would also result in reduced capacity for water retention and natural air renewal, in increased erosion, rock fall and avalanches.

Development of nitrogen oxide levels in the Alpine area 2005-2013



Source: iMonitraf! 2015

[31] Galleria di Base del Brennero - Brenner Basistunnel BBT SE (2007b)

TRAFFIC DEVELOPMENT

Development of freight and passenger transport

The amount of freight and passenger traffic on the Alpine section of the Scan-Med Corridor has increased significantly in course of the last century.

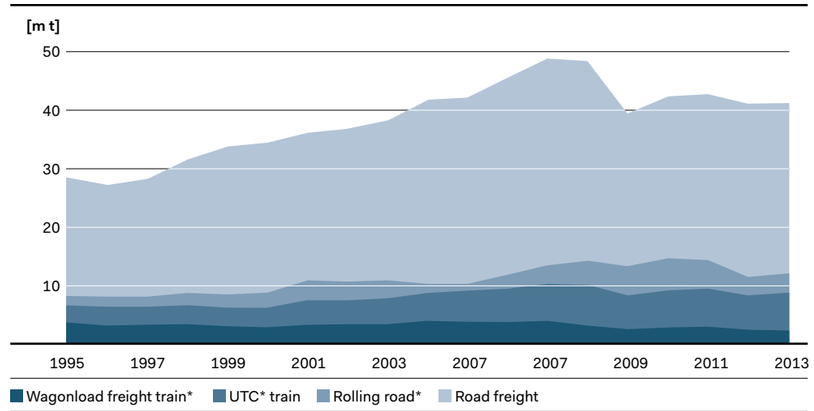
Apart from a general rise in economic activity, the increased economic interconnectedness has led to a surge in freight transport demand. Between 2003 and 2012 the import and export volumes between Germany and Italy increased from 16 million tonnes to 27 million tonnes[32].

Economic growth creates a higher demand for mobility, which has become evident also in passenger transport. According to calculations, more than 26 000 people travelled through the Brenner Pass by road and 3 000 people used train services in the year 2005[33].

The transalpine section is very important for rail transport on the Scan-Med Corridor: In 2012, roughly 45 % of all cross-border trains on the whole corridor passed through the Brenner Pass – up to 13 000 freight trains annually[34]. The amount of road freight transport is especially high: With 2 million truck journeys annually, the Brenner Pass is the busiest Alpine pass in Austria and the busiest of the entire Alpine area. More than 5 000 trucks use the Brenner Pass daily and 85 % also transit through the 400 km northern and southern access route.[35]

Between 1995 and 2007 the amount of road freight transported on the Brenner Pass increased from 17.6 million tonnes to roughly 35.0 million tonnes a year. In the same period of time, rail freight transport increased by 60 % from 8.3 million tonnes to 13.3 million tonnes. Both slightly decreased due to the economic crisis. The amount of freight transported on the road has been increasing faster than the amount transported by rail: on average by + 2.7 % on the road, whereas rail freight transports increased by + 1.8 % between 1994 and 2013.

Development of transalpine freight transport on the Brenner Pass 1995-2013



Source: Brenner Corridor Platform, Working Group Infrastructure 2016

[32] ETC Transport Consultants GmbH (2014): page 39
[33] Bundesministerium für Verkehr, Innovation und Technologie (2009): chapter 4, page 41; modelled figures
[34] ETC Transport Consultants GmbH (2014): page 87
[35] The source of information referred to in this chapter, if not stated otherwise, is Brenner Corridor Platform, Working Group Infrastructure (2016).

Traffic development forecast

How the freight traffic will develop and how it will be distributed between road and rail transport, depends on transport policy and the development of transport demand. The latter is directly related to the overall development of the economy: Since the economic crisis in 2008 the amount of freight transported on the transalpine section of the Scan-Med Corridor decreased by about 20%[36].

Current traffic integration forecasts assume that the freight transport demand will further increase, and that the economic crisis only delayed this development, without reversing it[37].

All traffic development forecasts proceed on the basis that the infrastructure development goals of the TEN-T* core network will be reached. When looked at more closely the studies only differ in terms of forecast horizon, transport policy implementation and individual infrastructure projects.

The Working Group Infrastructure of the Brenner Corridor Platform created a comparison between various freight traffic forecasts for the Brenner Pass and the transalpine section of the Scan-Med Corridor[38]:

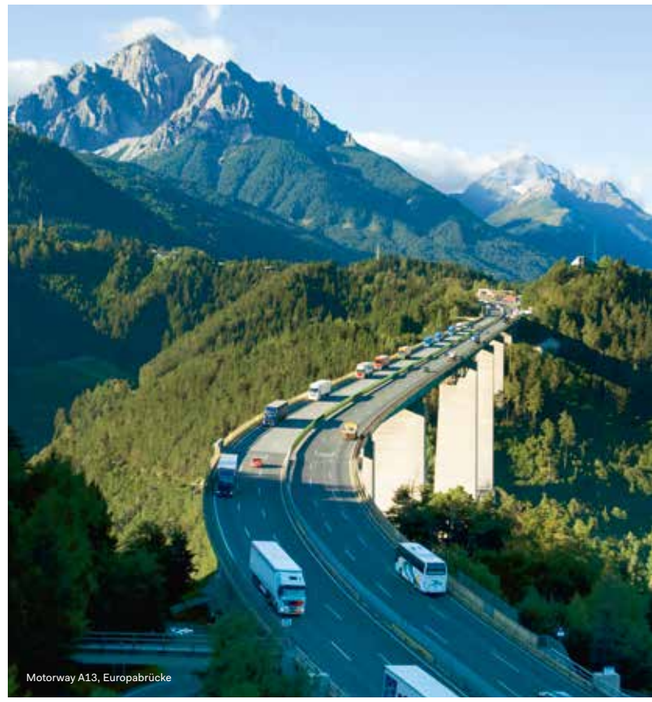
- Pre-crisis forecasts, which do not take account of transport policy or accompanying policy measures or assign only little importance to them[39], assume rail freight traffic to increase annually by between + 2.8 and + 3.2 % and road freight traffic to increase by between + 2.1 % and + 2.6 %.
- The traffic integration forecasts for the Federal Transport Infrastructure Plan[40], which is a post-crisis forecast, takes account of transport policy and accompanying policy measures; it estimates that rail freight traffic between Germany and Italy will increase annually by + 2.6 % and that road freight will increase by + 2.2 %. Although this analysis does not focus on the Brenner Pass directly, it is a good indication of how traffic will develop on this section.

It becomes evident by the comparison of the traffic forecasts that a modal shift from road to rail freight is possible with the appropriate policy measures and also that road freight transport is reaching its maximum capacity.

[36] Brenner Corridor Platform, Working Group Infrastructure (2016)
[37] BVU Beratergruppe Verkehr + Umwelt GmbH et al. (2014): Page 314
[38] Brenner Corridor Platform, Working Group Infrastructure (2016)
[39] Bundesministerium für Verkehr, Innovation und Technologie et al. (2009), Galleria di Base del Brennero - Brenner Basistunnel BBT SE (2007a)
[40] BVU Beratergruppe Verkehr + Umwelt GmbH et al. (2014)

There are numerous forecasts for the development of passenger transport. The Verkehrsprognose Österreich 2025+ (Austrian traffic forecast) estimates that if rail infrastructure is upgraded and extended, daily rail passengers on the Brenner Pass will increase from 3.000 in 2005 to 5 000 in 2025; this is considered a comparatively conservative estimate. The amount of travellers by road will change from 26 000 users a day in 2005, to either 28 000 or 24 500 in the year 2025, depending on the development of automobile transport costs, which stand in direct relation with transport policy.[41]

The volume of passenger and freight traffic currently measured already exceeds the computer-modelled estimates: On average 21 569 cars a day were counted in 2014 on the Brenner Pass[42], which means that 30 000 people passed through the Brenner Pass by road (if 1.4 persons per vehicle are assumed). Rail transport also increased significantly[43], due to new short and long distance services[44]. 5 813 heavy-duty vehicles* on average were counted in 2014[45].



Motorway A13, Europabrücke

[41] Bundesministerium für Verkehr, Innovation und Technologie (2009): chapter 4, page 41; modelled figures
[42] Asfinag Service GmbH (2016)
[43] Tiroler Tageszeitung (2015)
[44] Regional express trains Innsbruck-Bozen/Bolzano-Meran/Merano and EuroCity trains offered by DB, ÖBB und TRENORD
[45] Asfinag Service GmbH (2016)

3

TRANSPORT POLICY AND INFRASTRUCTURE INITIATIVES

INFRASTRUCTURE EXPANSIONS IN CONTEXT OF NATIONAL POLICIES

Federal Republic of Germany

The funding of national transport routes is regulated through the Federal Transport Infrastructure Plan. In the draft of the Federal Transport Infrastructure Plan 2030[46], funding has been agreed for route constructions and expansions on the line München-Rosenheim-Kiefersfelden-border Germany/Austria. Therefore funding priority has been granted for the German transalpine section of the Scan-Med Corridor and projected measures will be implemented until 2030, in line with demand. Included measures are:

- Signal block improvement on the route München/Trudering-Grafing
- Construction of a new twin-track line Grafing-Großkarolinenfeld
- Construction of a new twin-track line Großkarolinenfeld-Brannenburg (Rosenheim bypass)
- Construction of two additional tracks on the route Brannenburg-Kiefersfelden-border Germany/Austria

The route München-Mühldorf-Freilassing, which includes the Tüßling-Burghausen branch line and the Truderinger line, is also considered a priority. It has not yet been decided, if the route Regensburg-Mühldorf-Rosenheim, which is directly linked to the northern access route of the Brenner Base Tunnel, albeit without being part of the Scan-Med Corridor itself, will be considered as an infrastructure expansion priority project. Currently this project will be realised only in case of changed demand.

Republic of Austria

The Federal Ministry for Transport, Innovation and Technology is responsible for planning and funding transport infrastructure in Austria. This includes the construction of the Brenner Base Tunnel and the expansion of the Lower Inn Valley route. Austria will fund 50 % of the Brenner Base Tunnel, which is already included in the ÖBB framework plan 2016-2021[47]. For the construction of the Brenner Base Tunnel it will be necessary to:

- continue surveying in depth and construction works that were started in 2011
- construct the main building lots
- finish the construction until 2025 and take up service in 2026

For the projected four-track expansion of the Lower Inn Valley railway, part of the northern access route of the Brenner Base Tunnel, following projects must be completed:

- Selecting route layout and establishing building lots, basic authorization and strategic asset management on the section between the border at Kufstein and Schaftenau
- Establishing building lots, basic authorization and strategic asset management on the section between Schaftenau and the Radfeld junction

The expansion of the Wörgl terminal and further maintenance measures on railway stations, are also part of implementing Scan-Med Corridor in Austria, which are already included in the ÖBB framework plan 2016-2021.

[46] Bundesministerium für Verkehr und digitale Infrastruktur (2016); all information used here was extracted from the March 2016 draft.
[47] Bundesministerium für Verkehr, Innovation und Technologie (2015)

The Italian Republic

Co-Financing the Brenner Base Tunnel and the four-track expansion of the southern access route Franzenfeste/Fortezza-Verona are considered as priorities of Italian transport policy.

The current strategic infrastructure programme[48] determines the Brenner Base Tunnel as one of 25 priority projects (in Appendix No 3). The Brenner project is included in three European and Italian strategic plans and programmes: the Connecting Europe Facility*, the European Fund for Strategic Investments (EFSI)[49] and the Programme Contract 2012-2016 between the Ministry for Infrastructure and Transport and the Rete Ferroviaria Italiana S.p.A.

The Programme Contract 2012-2016 between the Ministry for Infrastructure and Transport and the Rete Ferroviaria Italiana S.p.A. includes the following projects concerning the southern access route of the Brenner Base Tunnel:

- definitive project and first implementation phases of the four-track expansion of the route Franzensfeste/Fortezza-Waidbruck/Ponte Gardena, the Bozen/Bolzano bypass and the entry to the Verona junction
- preliminary project and preparation of the Trento and Rovereto bypass
- preliminary project for the four-track expansion of the route Bozen/Bolzano-Trento

The four-track expansion of the routes Waidbruck/Ponte Gardena-Bozen/Bolzano and Rovereto/Marco-Borghetto-Pescantina are currently not included in the Programme Contract 2012-2016. But they are considered as future expansion projects by the Rete Ferroviaria Italiana S.p.A.

New route constructions and expansions are substantiated by national strategy documents

[48] Ministero dell'Economia e delle Finanze (2015)
[49] Regulation (EU) 2015/1017

INFRASTRUCTURE COMPANIES AND COLLABORATIVE DEVELOPMENT OF INFRASTRUCTURE

It is the responsibility of infrastructure companies to operate and construct new railway infrastructure on the transalpine section of the Scan-Med Corridor. Cooperation agreements were established between Germany and Austria for cross border line expansions and a construction company was created by Italy and Austria.

The DB Netz AG plans, constructs and operates the German railway infrastructure. The company is a 100 % subsidiary of the Deutsche Bahn AG, which is owned by the Federal Republic of Germany. The DB Netz AG is responsible for all planning and construction of infrastructure expansions on the transalpine section of the Scan-Med Corridor in Germany.

The Austrian railway infrastructure is planned, constructed and operated by the ÖBB-Infrastruktur AG, a 100 % subsidiary of the ÖBB-Holding AG, which is owned by the Republic of Austria. All infrastructure projects on the transalpine section of the Scan-Med Corridor in Austria are managed by the ÖBB-Infrastruktur AG, with the exception of the Brenner Base Tunnel, which is constructed by an infrastructure company founded especially for this project. In order to prepare the northern access route of the Brenner Base Tunnel, the Brenner Railway Company was founded by the Republic of Austria in 1995, which was merged into the ÖBB-Infrastruktur AG in 2009.

German and Austrian Ministries of Transport reached an agreement in 2012 to cooperate on the development of cross border infrastructure expansions. Based on this agreement the DB Netz AG and the ÖBB-Infrastruktur AG are jointly planning the northern access route of the Brenner Base Tunnel. The main goal is to ensure the route has the capacity required by the time the Brenner Base Tunnel takes up operation.

The Rete Ferroviaria Italiana S.p.A. is a 100 % subsidiary of the Ferrovie dello Stato Italiane S.p.A. and is therefore owned by the Italian Republic. The company operates, plans and constructs the Italian railway infrastructure, with exception of the most important train stations, which are managed by Grandi Stazioni S.p.A. The Rete Ferroviaria Italiana S.p.A. is responsible for all Italian railway infrastructure of the transalpine section of the Scan-Med corridor, apart from the Brenner Base Tunnel.

In 2004 the Galleria di Base del Brennero - Brenner Basistunnel BBT SE* was founded for the construction of the Brenner Base Tunnel. The company is publicly owned by Austria and Italy: 50 % of the company is held by ÖBB-Infrastruktur AG and another 50 % by the Tunnel Ferroviario del Brennero Holding S.p.A., a consortium of the Rete Ferroviaria Italiana S.p.A. (roughly 86 %), the Autonomous Province of Bozen-Südtirol, the Autonomous Province of Trento (both roughly 6 %) and the Province of Verona (roughly 2 %).

COLLABORATIVE DEVELOPMENT OF THE BRENNER AXIS

Brenner Corridor Platform

The Brenner Corridor Platform (BCP) was created in May 2007 based on the initiative of former EU Commissioner Prof Karel Van Miert, who was also the coordinator of a previous European initiative PP1 Railway axis Berlin-Verona/Milano-Bologna-Napoli-Messina-Palermo. This trans-national working group includes the Italian, German and Austrian Ministries of Transport, the relevant infrastructure companies as well as the provinces and regions adjacent to the transalpine section of the Scan-Med Corridor[50].

The BCP is chaired by the EU Commission. After two years of preparation the BCP developed the Brenner Action Plan. This plan and a Memorandum of Understanding were signed in Rome on May 18th 2009. It includes 80 concrete measures to improve transport management on the Brenner axis. The plan is currently under revision. The updated version will be signed during the TEN-T-Days* in June 2016 in Rotterdam. This initiative serves as a best practice example of the EU Commission for cooperation on a TEN-T* core network corridor.

Aktionsgemeinschaft Brennerbahn

The Aktionsgemeinschaft Brennerbahn (Brenner railway action group) includes representatives of the Autonomous Province of Bozen-Südtirol, the Autonomous Province of Trento, the Province of Verona, of the Free State of Bavaria, and of the Austrian Federal State of Tirol, as well as chambers of commerce of these provinces and federal states. The Aktionsgemeinschaft Brennerbahn promotes infrastructure improvements, the upgrading of existing railway between München-Verona and the construction of the Brenner Base Tunnel.

Presidents conference of the Aktionsgemeinschaft Brennerbahn 2015

[50] The European Investment Bank EIB was included in the Working Group Cross-Financing but is not full member of the BCP. The Brenner Eisenbahngesellschaft BEG, which is as a member, was incorporated into the ÖBB-Infrastruktur AG in 2009

GOALS AND INITIATIVES ON THE REGIONAL LEVEL

Free State of Bavaria

The Free State of Bavaria supports a modal shift from road freight to rail freight and to inland shipping. Bavarian transport policy focuses on infrastructure improvement, especially on upgrading railway infrastructure, loading terminals and by creating incentives, rather than using disincentives and prohibitions.[51]

Automatic traffic management systems were installed on the A8 between München and Rosenheim and on the A93 in order to optimize the flow of traffic on main road networks on the transalpine section of the Scan-Med Corridor. In case of high volumes of traffic, trucks are not allowed to overtake.

The overall transport plan for Bavaria[52] is currently being revised. This plan determines the development of mobility for the years to come. The Bavarian transport policy will be in accordance with the Federal Transport Infrastructure Plan 2030[53], which has projected 30 rail infrastructure projects for the whole of Bavaria, apart from other projects.

Federal State of Tirol

The Federal Government of Tirol aspires to increase the proportion of rail freight from 30 % to 35 % and to reduce the amount of road freight accordingly; also to introduce further 100 km/h speed limits on motorways and to expand sectoral driving bans for trucks. With the support of an Alpine crossing exchange*, truck transit journeys should be reduced to under 1 million per year.[54]

The regional development plan ZukunftsRaum Tirol determines a further modal shift of freight transport from road to rail, as well as measures to optimize transport routes. Certain incentives should assist implementation of these policy goals, for instance, the promotion of the “rolling road”* or the expansion of railway infrastructures, but also measures such as restrictions for high-emission vehicles or sectoral traffic bans. Implementation of an Alpine crossing exchange* is currently being considered.[55]

From 2007-2011 the Federal State of Tirol issued a sectoral traffic ban in order to shift the transport of certain durable commodities from road to rail. But the EU declared that this measure inhibited free trade and lifted the traffic ban, which will be revised and reinstated by 2016.

[51] Bayerisches Staatsministerium des Innern, für Bau und Verkehr (2014)
[52] Bayerisches Staatsministerium für Wirtschaft, Verkehr und Technologie (2002)
[53] Bundesministerium für Verkehr und digitale Infrastruktur (2016)
[54] Amt der Tiroler Landesregierung (2013)
[55] Amt der Tiroler Landesregierung (2011)

Further policy measures include a 100 km/h speed limit on the A12 and parts of the A13 between Kufstein and the Brenner Pass to improve air quality. On the A12 and A13 it is generally prohibited for trucks over 7.5 tonnes to overtake in order to optimize the flow of traffic; on parts of the A13 it is forbidden for trucks over 7.5 tonnes to drive on the second lane and forbidden for trucks over 3.5 tonnes to use the third lane.

High-emission vehicles are prohibited to drive on the A12 in both directions between Kufstein and Zirl; exceptions to these regulations can be requested. Based on these measures air pollution should be reduced, which also functions as an incentive to modernize trucks. Unfortunately, the level of monitoring required is relatively high.

An additional year-round ban on night-time driving is directed at heavy-duty transport* apart from low-emission vehicles. On weekdays there is a general driving ban for trucks between 22:00 and 05:00; on Sundays and bank holidays from 23:00 and 05:00, these times are extended in winter. This ban is valid on the A12 between Zirl and Langkampfen.

Autonomous Province of Bozen-Südtirol, Autonomous Province of Trento, Province of Verona

To upgrade infrastructure in the transalpine section of the Scan-Med Corridor is a transport policy goal of the Autonomous Province of Bozen-Südtirol, the Autonomous Province of Trento and the Province of Verona. This goal has been formally adopted by the common provincial council of Südtirol, Tirol and Trentino.

Measures to reduce and control the volume of traffic on the A22 and to limit negative effects within the region have already been implemented. For trucks over 7.5 tonnes there is a general speed limit and an overtaking ban – between Klausen/Chiusa and Bozen/Bolzano speed is limited to as low as 60 km/h. These measures reduce the risk of accidents and noise pollution. From the Brenner Pass to Bozen Süd/Bolzano sud, speed for cars is limited to 110 km/h. Pilot projects are currently underway to reduce speed to 100 km/h when the volume of traffic or air pollution is particularly high or if weather conditions are particularly bad.

In Italy road tolls have to be paid for all vehicles, according to travel distance. But between the Brenner Pass and Affi the toll charge per kilometre is higher than for the rest of Italy, as a special charge for mountainous areas is included. In accordance with the new infrastructure cost directive* a “Eurovignette” for cross-border transport is under consideration, that should automatically collect tolls depending on vehicle type and vehicle emission standard.

A new concession for the operation of the A22 has been awarded to the Autostrada del Brennero SpA/Brennerautobahn AG, valid until 2030. This contract included a financial contribution of 1 620 million Euro for the Brenner railway and to support multimodality*, for instance, by adapting their fares policy.

In 2015 the Autonomous Province of Bozen-Südtirol established a working group responsible for drafting accompanying policy measures. Members of this group include representatives of the Autonomous Province of Bozen-Südtirol, the railway companies operating in South Tirol, the Autostrada del Brennero SpA/Brennerautobahn AG and also the observatory for the Brenner Base Tunnel and southern access route. This initiative aims to promote the “rolling road”* and to support regional, national and international organizations with their policy expertise.

Konsortium Beobachtungsstelle Brenner Basistunnel und Südzulauf

The Konsortium Beobachtungsstelle Brenner Basistunnel und Südzulauf (Observatory for the Brenner Base Tunnel and southern access route) opened in early 2007. It aims to support local residents, municipalities, districts and the Autonomous Province of Bozen-Südtirol with questions concerning planning, construction and operation of the Brenner Base Tunnel. The observatory has also been concerned with the southern access route of the Brenner Base Tunnel in the area of the Autonomous Province of Bozen-Südtirol since 2013.

The core task of the observatory is its function as an independent source of information for the local population and to deal with individual complaints relating to construction work. Apart from this, the observatory also monitors the environmental impact of the construction work and also monitors workplace safety and hygiene on behalf of the public. The observatory runs a public information office in Franzenfeste/Fortezza.

Franzensfeste/Fortezza Fortress, office of Konsortium Beobachtungsstelle Brenner Basistunnel und Südzulauf

COMMON POLICY MEASURES: TOWARDS A MODAL SHIFT FROM ROAD TO RAIL

The main goal of an Alpine transport policy is to shift traffic from the road to the railway. Apart from implementing necessary infrastructure projects, regulatory policy measures are required to achieve this goal.

The EU infrastructure costs directive* is an important foundation for European transport policy. This directive regulates the user charges for roads. In sensitive mountainous regions like the Alps, which are affected by large volumes of traffic and constant congestion, additional charges of up to 25 % are possible. In Austria these fees are charged on the A12 and A13. All additional revenue must be invested in the rail infrastructure of these mountainous areas. The directive will be adapted in 2016.

A memorandum of understanding was signed by the Ministers of Transport, the railway companies of Germany, Austrian and Italy, by the Free State of Bavaria, the Austrian Bundesland Tirol, the Autonomous Province of Bozen-Südtirol, the Autonomous Province of Trento and the Province of Verona that has a special focus on the section between München and Verona[56]. In this document all stakeholders agreed to invest the revenue from road tolls in railway infrastructure on the route München-Verona, especially in the Brenner Base Tunnel, as intended in the infrastructure costs directive*.

The implementation of an Alpine crossing exchange* has gained support in the Alpine region, as a policy measure. Based on such a system the number of truck transit journeys through the Alps would be directly regulated politically. But there is also opposition to such a system, for instance, by certain advocacy groups and member states, because such measures could limit the free exchange of goods.

The Zurich Process

The Zurich Process was launched by the German, Italian, French, Swiss and Austrian Ministries of Transport in 2001 with support from the European Commission. The process was initiated after a severe traffic accident in the Gotthard tunnel on the 24th October 2001 and after a succession of further accidents in road tunnels. In 2012 Liechtenstein also became a member.

This cooperation platform consists of the conference of transport ministers, a steering committee and five working groups. The aim is to increase transport security and to encourage a modal shift from road to rail. Existing railway routes should be optimized, additional Alpine crossings created and new funding mechanisms established. Furthermore, the possibility of an Alpine crossing exchange* and other accompanying policy measures, such as traffic management systems, were assessed[57].

Zurich Process
Cooperation of Transport Ministers of Alpine Countries

iMONITRAF!

EUROPAREGION EUREGIO Tirol Südtirol Trentino Tirolo Alto Adige Trentino

[56] Memorandum of understanding on the development of the railway between Berlin and Palermo with special focus on the section München and Verona. Rome 2009.
[57] Emissions trading scheme, modulated toll system TOLL+; see Steering Commitee of the Zurich Process (2016)

iMonitraf!

In course of the project iMonitraf! a coordinated transport strategy for the Alpine area was developed, that includes the Federal State of Tirol, the Autonomous Province of Bozen-Südtirol, the central Swiss Cantons, the Canton Tessin and the regions Rhône-Alpes, Aosta Valley and Piedmont. Regional transport policy and steering measures are developed concertedly based on this project.

The European Region Tirol, Südtirol, Trentino and the common provincial council of Südtirol, Tirol and Trentino

The European Region Tirol, Südtirol, Trentino aims to encourage cross-border cooperation between these provinces and regions. The common provincial council of the Tirol, the Autonomous Province of Bozen-Südtirol and the Autonomous Province of Trento can reach binding agreements for the politics of the region.

Furthermore, the common council supports the idea of an Alpine crossing exchange*, the reduction of diversionary traffic on the Brenner route and the development of a legal framework and of an integrated transport policy on the European, national and regional scale to ensure a modal shift from road freight to rail[58].

The common provincial council of Südtirol, Tirol and Trentino on Octobre 24th 2014 in Schwaz

[58] Beschluss Nr. 16 und 17 des Südtiroler, Tiroler und Trentiner Landtages vom 28. Oktober 2014

4

THE CURRENT STATE OF THE SCAN-MED CORRIDOR AND INFRASTRUCTURE PROJECTS

THE CURRENT STATE OF RAIL INFRASTRUCTURE

The necessity to expand infrastructure on the Scan-Med Corridor is the result of the European TEN-T* core network policy. Especially for rail infrastructure new infrastructure requirements have to be met, which go beyond requirements for the TEN-T* comprehensive network[59]:

All TEN-T core network railway lines will be electrified.
Freight transport routes will be accessible for at least 22.5 tonne axle loads, 100 km/h line speeds and 740 metre trains.
Routes will be fully and continuously equipped with ERTMS*.
New tracks will have a nominal gauge of 1 435 millimetres.

The state of railway infrastructure in the transalpine section of the Scan-Med Corridor does not currently meet all these standards. For different reasons certain sections deviate from the standards required:

The majority of lines on the transalpine section of the Scan-Med Corridor are not yet equipped with ERTMS*. The operation of different train safety systems results in lengthy border stop overs and requires special qualifications for railway train employees.

Furthermore, different power supply systems between Austria and Germany (an alternating current of 15 kV and 16.7 Hz) and Italy (3 kV direct current) are in use, which is problematic for cross-border services, even for multi-system locomotives[60].

Maximum freight train lengths are severely limited on certain sections, for instance the railway station Brenner/Brennero can only process trains up to 600 metres, as this is the maximum track length. Maximum train lengths cannot exceed 540 metres on the northern and southern ramp of the Brenner Pass, depending on the limit load*[61].

Currently the connection to the München-Riem terminal in the direction Innsbruck can be reached only through a detour via the München Ost railway station that also requires a change of direction. At the moment it is necessary to change traction vehicles (electric/diesel) for the direct connection Mühldorf-Rosenheim. This implies great logistical effort and time loss in the processing of rail freight transport.[62]

[59] Regulation (EU) No 1315/2013: Art. 39; additionally the rail network must meet requirements of the EU Commission (Commission Decision of 26 April 2011): New routes within the TEN-T* core network must be able to handle an axle load of 25.0 tonnes, a train length of 750 metres and track speeds of 200 km/h. Expansion projects within the TEN-T* core network require axle loads of 22.5 tonnes, train lengths of 600 metres and track speeds of 160 km/h. Newly constructed routes used exclusively or partly by freight transport, are allowed to have maximum gradients as steep as 12.5 ‰ or in some cases even below this value.

[60] The Brenner Base Tunnel and the new route between Franzensfeste/Fortezza and Verona will be equipped with a 25 kV 50 Hz alternating current. In future the transalpine section of the Scan-Med Corridor will use three different power supply systems.

[61] DB Netz AG (2014): page 1

[62] For passenger services a non-electrified connection between Mühldorf and Rosenheim is in operation. Currently, there is no demand for freight transport on this route; because of the lack of electrification electric freight trains cannot be used continuously.

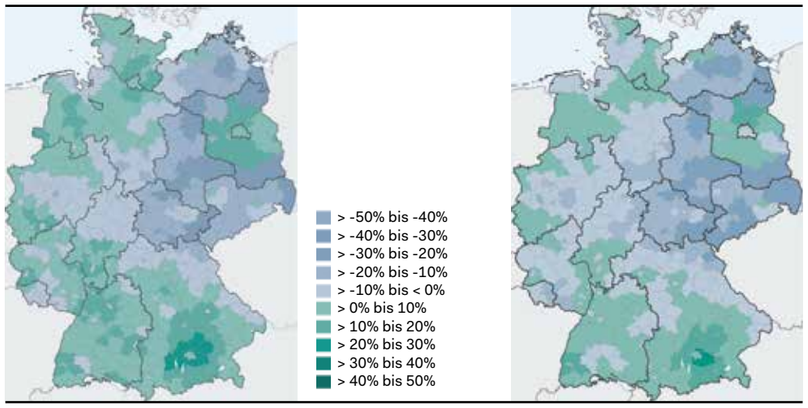
At the moment the existing rail route Innsbruck-Franzensfeste/Fortezza runs through the Brenner Pass. The gradients of the northern and southern access ramp are as steep as 27 ‰ with extremely tight curves. Average speeds are 70-80 km/h on the northern ramp but particular sections demand much lower speeds. Adding a pusher engine* or double heading* is often required to use the ramps. For instance, a 2 060 tonne freight train needs two locomotives and a pusher engine to climb the northern ramp of the Brenner Pass[63].

In addition, capacity bottlenecks are expected on certain sections of the München-Verona line in the medium-term: The draft of the Federal Transport Infrastructure Plan 2030 classifies capacity utilisation in 85 % - 110 % (full capacity) and > 110 % (overload)[64] on the route München-Rosenheim-Kiefersfelden-border Germany/Austria. Based on the traffic forecast 2030 there will be no “overload” on the section Rosenheim-Kiefersfelden. Further infrastructure expansion will be based on future needs.

Also the Austrian study “Zielnetz 2025+“ estimates capacity utilisation of 80 % - 100 % for the line Wörgl-Baumkirchen until 2025[65]. Capacity overloads are also expected for the route Franzensfeste/Fortezza-Verona in the medium-term[66].

This means that for the majority of the transalpine section of the Scan-Med Corridor, capacity bottlenecks are to be expected. If and when these capacity issues occur, depends on the successful implementation of transport policy and steering measures.

Change in the destination and origin of regional traffic in 2030 compared to 2010 in context of overall traffic and population development 2010-2030 in districts and district-free towns



Source: Bundesministerium für Verkehr und digitale Infrastruktur (2016): page 56

[63] Calculations by ÖBB-Infrastruktur AG
[64] Bundesministerium für Verkehr und digitale Infrastruktur (2016): page 19; this forecast takes account of projected route capacity in 2030 without new or expanded routes. If capacity is fully utilised further operation is possible, albeit without meeting the quality management goals of the ÖBB-Infrastruktur AG for the TEN-T* core network.
[65] ÖBB-Infrastruktur AG (2011): page 39; this forecast assumes that in 2025 rail infrastructure will be in the same condition as 2009.
[66] A forecast of capacity bottlenecks for the route Franzensfeste/Fortezza-Verona is currently under way.

München
Rosenheim
DEUTSCHLAND
Kufstein/Kiefersfelden
Wörgl
Innsbruck
ÖSTERREICH
Brenner/Brennero
ITALIA
Franzensfeste/Fortezza
Waidbruck/Ponte Gardena
Bozen/Bolzano
Trento
Castelfranco Veneto
Verona
Padova
Mühldorf
Freilassing
Salzburg
Bischofshof
St. Johann/Pongau
Udine
Cervignano

+ 25 tonnes axle load permitted
+ 160 km/h speed for freight trains permitted
+ 740 meters train length permitted
+ Gradient less than 12.5 ‰
– No equipment with ERTMS*

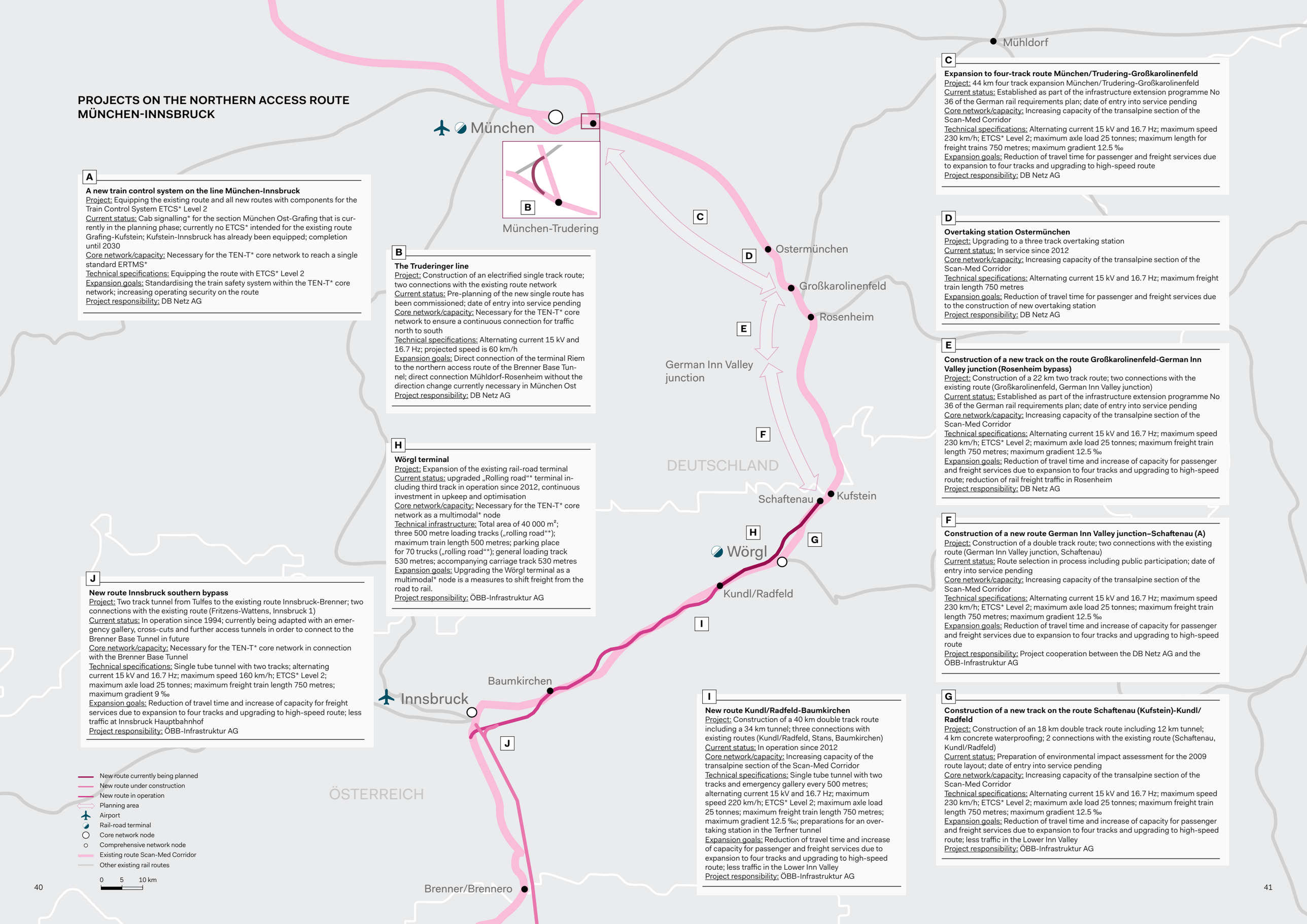
+ 25 tonnes axle load permitted
+ 160 km/h speed for freight trains permitted
+ 740 meters train length permitted
+ Gradient less than 12.5 ‰
+ Equipped with ERTMS*

+ 22.5 tonnes axle load permitted
– 50 km/h speed for freight trains permitted on certain parts of the route
– Partly only 400 meters train length permitted
– Gradients up to 27 ‰
– No equipment with ERTMS*
– Power supply system change on the Brenner Pass from 15 kV 16 2/3 Hz (AT) to 3 kV DC (IT)

+ 22.5 tonnes axle load permitted
+ at least 100 km/h speed for freight trains permitted
+ Gradient less than 12.5 ‰
– Partly only 500 to 600 meters train length permitted
– No equipment with ERTMS*

Airport
Rail-road terminal
Inland port, sea port
Core network node
Comprehensive network node
Gradient
Steep gradient
Existing route Scan-Med Corridor
Other existing rail routes
0 10 20 km

PROJECTS ON THE NORTHERN ACCESS ROUTE MÜNCHEN-INNSBRUCK



A

A new train control system on the line München-Innsbruck
Project: Equipping the existing route and all new routes with components for the Train Control System ETCS* Level 2
Current status: Cab signalling* for the section München Ost-Grafing that is currently in the planning phase; currently no ETCS* intended for the existing route Grafing-Kufstein; Kufstein-Innsbruck has already been equipped; completion until 2030
Core network/capacity: Necessary for the TEN-T* core network to reach a single standard ERTMS*
Technical specifications: Equipping the route with ETCS* Level 2
Expansion goals: Standardising the train safety system within the TEN-T* core network; increasing operating security on the route
Project responsibility: DB Netz AG

B

The Truderinger line
Project: Construction of an electrified single track route; two connections with the existing route network
Current status: Pre-planning of the new single route has been commissioned; date of entry into service pending
Core network/capacity: Necessary for the TEN-T* core network to ensure a continuous connection for traffic north to south
Technical specifications: Alternating current 15 kV and 16.7 Hz; projected speed is 60 km/h
Expansion goals: Direct connection of the terminal Riem to the northern access route of the Brenner Base Tunnel; direct connection Mühldorf-Rosenheim without the direction change currently necessary in München Ost
Project responsibility: DB Netz AG

C

Expansion to four-track route München/Trudering-Großkarolinenfeld
Project: 44 km four track expansion München/Trudering-Großkarolinenfeld
Current status: Established as part of the infrastructure extension programme No 36 of the German rail requirements plan; date of entry into service pending
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical specifications: Alternating current 15 kV and 16.7 Hz; maximum speed 230 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum length for freight trains 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time for passenger and freight services due to expansion to four tracks and upgrading to high-speed route
Project responsibility: DB Netz AG

D

Overtaking station Ostermünchen
Project: Upgrading to a three track overtaking station
Current status: In service since 2012
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical specifications: Alternating current 15 kV and 16.7 Hz; maximum freight train length 750 metres
Expansion goals: Reduction of travel time for passenger and freight services due to the construction of new overtaking station
Project responsibility: DB Netz AG

E

Construction of a new track on the route Großkarolinenfeld-German Inn Valley junction (Rosenheim bypass)
Project: Construction of a 22 km two track route; two connections with the existing route (Großkarolinenfeld, German Inn Valley junction)
Current status: Established as part of the infrastructure extension programme No 36 of the German rail requirements plan; date of entry into service pending
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical specifications: Alternating current 15 kV and 16.7 Hz; maximum speed 230 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services due to expansion to four tracks and upgrading to high-speed route; reduction of rail freight traffic in Rosenheim
Project responsibility: DB Netz AG

F

Construction of a new route German Inn Valley junction–Schaftenau (A)
Project: Construction of a double track route; two connections with the existing route (German Inn Valley junction, Schaftenau)
Current status: Route selection in process including public participation; date of entry into service pending
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical specifications: Alternating current 15 kV and 16.7 Hz; maximum speed 230 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services due to expansion to four tracks and upgrading to high-speed route
Project responsibility: Project cooperation between the DB Netz AG and the ÖBB-Infrastruktur AG

G

Construction of a new track on the route Schaftenau (Kufstein)-Kundl/Radfeld
Project: Construction of an 18 km double track route including 12 km tunnel; 4 km concrete waterproofing; 2 connections with the existing route (Schaftenau, Kundl/Radfeld)
Current status: Preparation of environmental impact assessment for the 2009 route layout; date of entry into service pending
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical specifications: Alternating current 15 kV and 16.7 Hz; maximum speed 230 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services due to expansion to four tracks and upgrading to high-speed route; less traffic in the Lower Inn Valley
Project responsibility: ÖBB-Infrastruktur AG

H

Wörgl terminal
Project: Expansion of the existing rail-road terminal
Current status: upgraded „Rolling road“* terminal including third track in operation since 2012, continuous investment in upkeep and optimisation
Core network/capacity: Necessary for the TEN-T* core network as a multimodal* node
Technical infrastructure: Total area of 40 000 m²; three 500 metre loading tracks („rolling road“*); maximum train length 500 metres; parking place for 70 trucks („rolling road“*); general loading track 530 metres; accompanying carriage track 530 metres
Expansion goals: Upgrading the Wörgl terminal as a multimodal* node is a measures to shift freight from the road to rail.
Project responsibility: ÖBB-Infrastruktur AG

I

New route Kundl/Radfeld-Baumkirchen
Project: Construction of a 40 km double track route including a 34 km tunnel; three connections with existing routes (Kundl/Radfeld, Stans, Baumkirchen)
Current status: In operation since 2012
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical specifications: Single tube tunnel with two tracks and emergency gallery every 500 metres; alternating current 15 kV and 16.7 Hz; maximum speed 220 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰; preparations for an overtaking station in the Terfner tunnel
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services due to expansion to four tracks and upgrading to high-speed route; less traffic in the Lower Inn Valley
Project responsibility: ÖBB-Infrastruktur AG

J

New route Innsbruck southern bypass
Project: Two track tunnel from Tulfes to the existing route Innsbruck-Brenner; two connections with the existing route (Fritzens-Wattens, Innsbruck 1)
Current status: In operation since 1994; currently being adapted with an emergency gallery, cross-cuts and further access tunnels in order to connect to the Brenner Base Tunnel in future
Core network/capacity: Necessary for the TEN-T* core network in connection with the Brenner Base Tunnel
Technical specifications: Single tube tunnel with two tracks; alternating current 15 kV and 16.7 Hz; maximum speed 160 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 9 ‰
Expansion goals: Reduction of travel time and increase of capacity for freight services due to expansion to four tracks and upgrading to high-speed route; less traffic at Innsbruck Hauptbahnhof
Project responsibility: ÖBB-Infrastruktur AG

PROJECTS ON THE ALPINE CROSSING INNSBRUCK-FRANZENSFESTE/FORTEZZA

Brenner Base Tunnel project characteristics

The Brenner Base Tunnel (BBT) is the centrepiece of infrastructure development on the transalpine section of the Scan-Med Corridor. On the Austria side of the tunnel two connections to the tunnel will be constructed: from Innsbruck station and another branch route of the southern Innsbruck bypass (Tulfes Portal). The tunnel stretching from Innsbruck to Franzenfeste/Fortezza will be 55 km long and if the Innsbruck bypass in Tulfes is also added, it will be 64 km long in total. The BBT will be the longest rail tunnel in the world.

The BBT consists of two main tunnel tubes and a continuous exploratory tunnel. The two main tunnel tubes have an inner diameter of 8.1 metres each and will run parallel 70 metres apart. Connections every 333 metres function as escape routes in case of emergency. This corresponds with the highest safety standards for tunnel construction. Emergency stops are installed near Innsbruck, St Jodok and Trens, through which passengers can escape via the four access tunnels (Ampass, Ahrental, Wolf/Steinach, Mauls) in case of emergency.

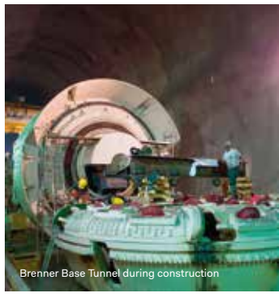
The axis of the exploratory tunnel is located between the two main tunnels, albeit 12 metres lower than the main tunnels. It will have an inner diameter of a least 5 metres. Its function during constructing is to gain insight on the composition of the mountain in order to reduce building costs. Four types of rock are common: phyllite, slate, gneiss and granite. During construction the exploratory tunnel is used for drainage. But once the tunnel is in operation it will be also used for maintenance reasons.

The construction work is divided into eight main building lots, four in Austria and four in Italy. Depending on geological circumstances, rock is blasted or dug with tunnel boring machines. Up to a third of the excavation material is used for the construction.[68]

North of the Brenner Pass the gradient of the BBT will be 6.7 ‰ and 4 ‰ on the south. The vertex of the tunnel is situated at 790 metres above sea level – 588 metres lower than then Brenner Pass, which is situated at 1 378 metres.

The BBT passes through the European Watershed. Numerous highly sensitive water sources are located in the area. Extensive hydrological monitoring will be carried out for this reason, focusing on water volume, temperature and conductivity. A total of 700 sources, 200 channels and 300 groundwater measuring points will be under constant observation.


Brenner Base Tunnel during construction


Brenner Base Tunnel during construction

[67] Galleria di Base del Brennero - Brenner Basistunnel BBT SE (2016)
[68] Galleria di Base del Brennero - Brenner Basistunnel BBT SE (2008): page 55

PROJECTS ON THE SOUTHERN ACCESS ROUTE FRANZENSFESTE/FORTEZZA-VERONA

N

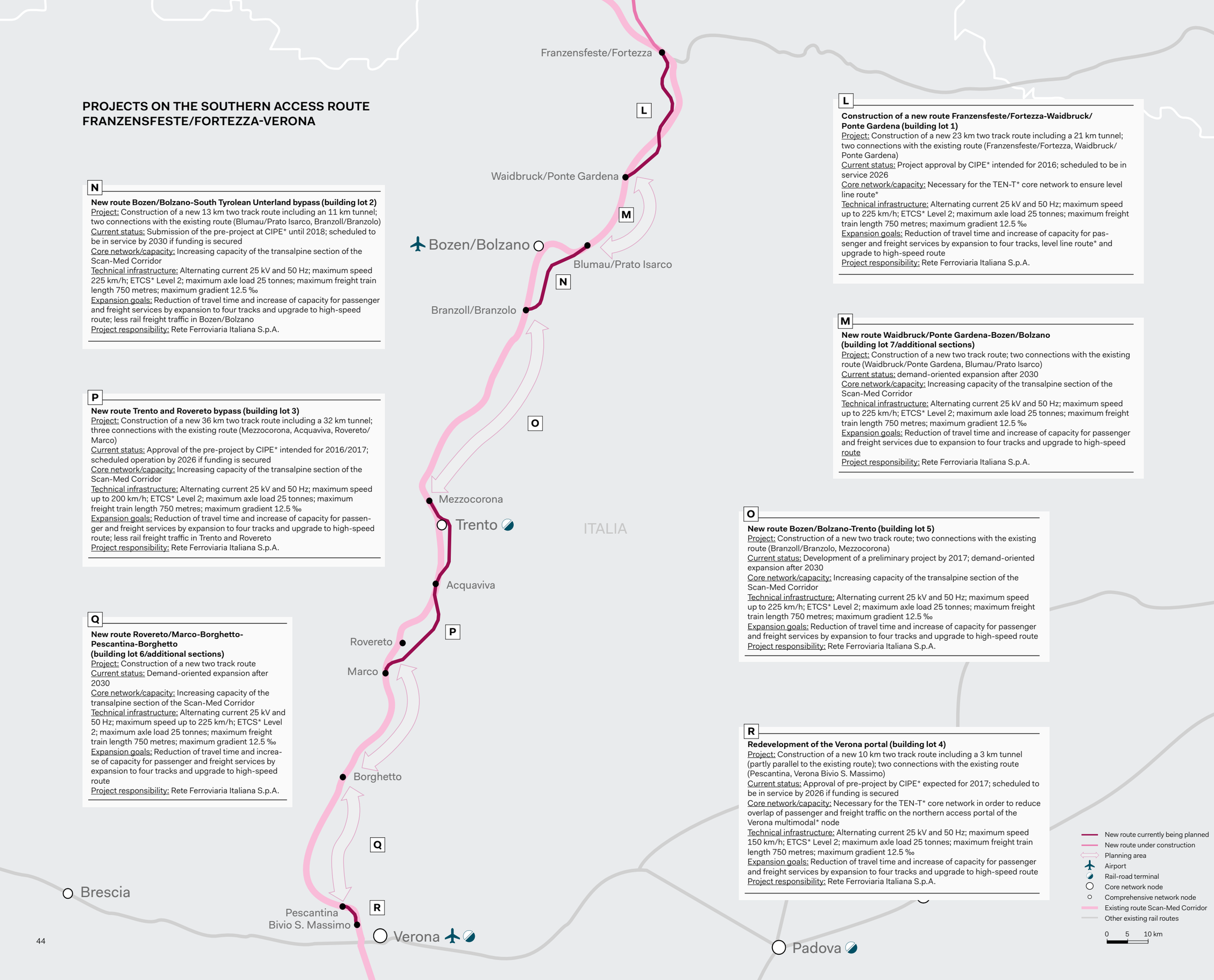
New route Bozen/Bolzano-South Tyrolean Unterland bypass (building lot 2)
Project: Construction of a new 13 km two track route including an 11 km tunnel; two connections with the existing route (Blumau/Prato Isarco, Branzoll/Branzolo)
Current status: Submission of the pre-project at CIPE* until 2018; scheduled to be in service by 2030 if funding is secured
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical infrastructure: Alternating current 25 kV and 50 Hz; maximum speed 225 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services by expansion to four tracks and upgrade to high-speed route; less rail freight traffic in Bozen/Bolzano
Project responsibility: Rete Ferroviaria Italiana S.p.A.

P

New route Trento and Rovereto bypass (building lot 3)
Project: Construction of a new 36 km two track route including a 32 km tunnel; three connections with the existing route (Mezzocorona, Acquaviva, Rovereto/Marco)
Current status: Approval of the pre-project by CIPE* intended for 2016/2017; scheduled operation by 2026 if funding is secured
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical infrastructure: Alternating current 25 kV and 50 Hz; maximum speed up to 200 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services by expansion to four tracks and upgrade to high-speed route; less rail freight traffic in Trento and Rovereto
Project responsibility: Rete Ferroviaria Italiana S.p.A.

Q

New route Rovereto/Marco-Borghetto-Pescantina-Borghetto (building lot 6/additional sections)
Project: Construction of a new two track route
Current status: Demand-oriented expansion after 2030
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical infrastructure: Alternating current 25 kV and 50 Hz; maximum speed up to 225 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services by expansion to four tracks and upgrade to high-speed route
Project responsibility: Rete Ferroviaria Italiana S.p.A.



L

Construction of a new route Franzensfeste/Fortezza-Waidbruck/Ponte Gardena (building lot 1)
Project: Construction of a new 23 km two track route including a 21 km tunnel; two connections with the existing route (Franzensfeste/Fortezza, Waidbruck/Ponte Gardena)
Current status: Project approval by CIPE* intended for 2016; scheduled to be in service 2026
Core network/capacity: Necessary for the TEN-T* core network to ensure level line route*
Technical infrastructure: Alternating current 25 kV and 50 Hz; maximum speed up to 225 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services by expansion to four tracks, level line route* and upgrade to high-speed route
Project responsibility: Rete Ferroviaria Italiana S.p.A.

M

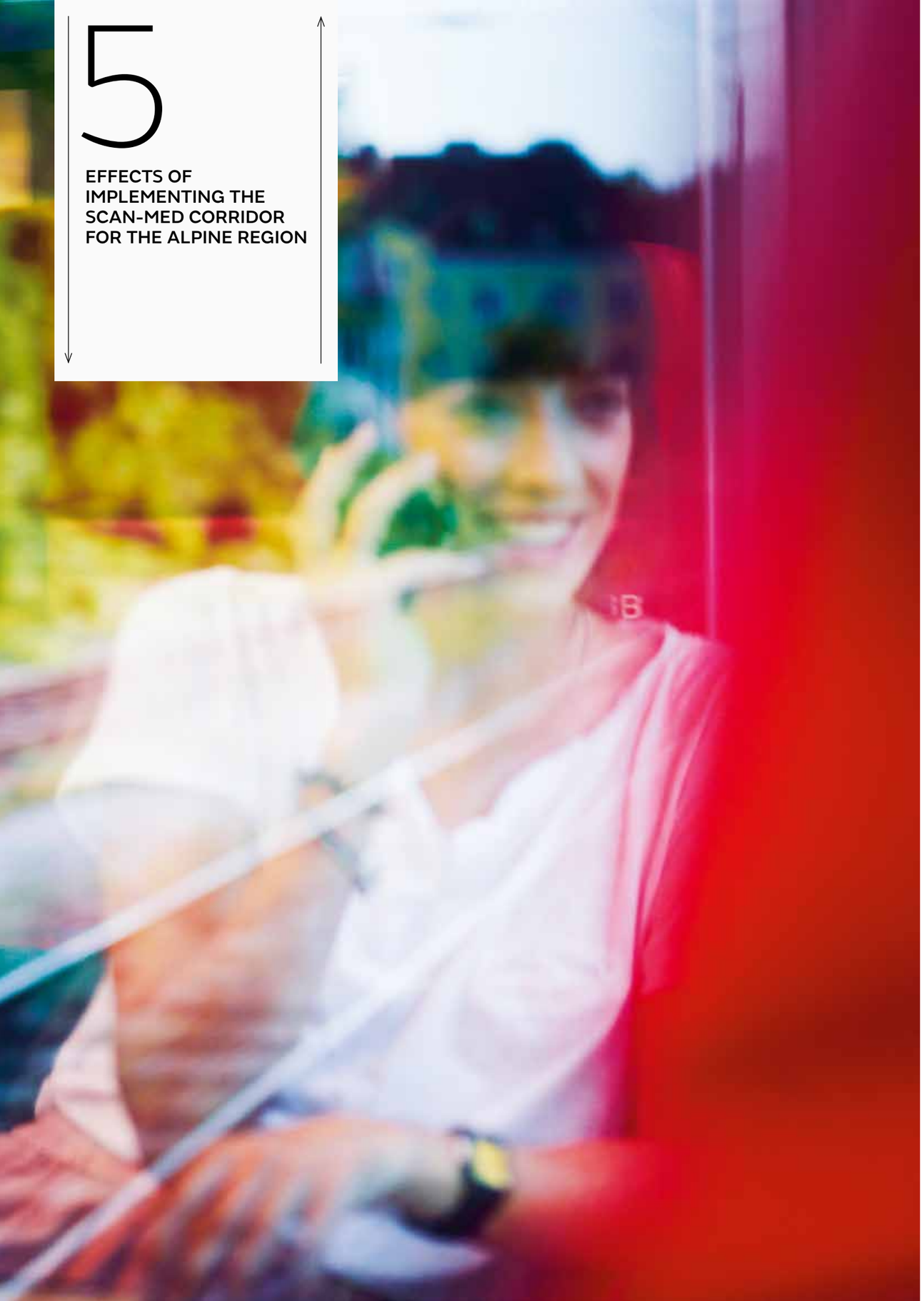
New route Waidbruck/Ponte Gardena-Bozen/Bolzano (building lot 7/additional sections)
Project: Construction of a new two track route; two connections with the existing route (Waidbruck/Ponte Gardena, Blumau/Prato Isarco)
Current status: demand-oriented expansion after 2030
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical infrastructure: Alternating current 25 kV and 50 Hz; maximum speed up to 225 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services due to expansion to four tracks and upgrade to high-speed route
Project responsibility: Rete Ferroviaria Italiana S.p.A.

O

New route Bozen/Bolzano-Trento (building lot 5)
Project: Construction of a new two track route; two connections with the existing route (Branzoll/Branzolo, Mezzocorona)
Current status: Development of a preliminary project by 2017; demand-oriented expansion after 2030
Core network/capacity: Increasing capacity of the transalpine section of the Scan-Med Corridor
Technical infrastructure: Alternating current 25 kV and 50 Hz; maximum speed up to 225 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services by expansion to four tracks and upgrade to high-speed route
Project responsibility: Rete Ferroviaria Italiana S.p.A.

R

Redevelopment of the Verona portal (building lot 4)
Project: Construction of a new 10 km two track route including a 3 km tunnel (partly parallel to the existing route); two connections with the existing route (Pescantina, Verona Bivio S. Massimo)
Current status: Approval of pre-project by CIPE* expected for 2017; scheduled to be in service by 2026 if funding is secured
Core network/capacity: Necessary for the TEN-T* core network in order to reduce overlap of passenger and freight traffic on the northern access portal of the Verona multimodal* node
Technical infrastructure: Alternating current 25 kV and 50 Hz; maximum speed 150 km/h; ETCS* Level 2; maximum axle load 25 tonnes; maximum freight train length 750 metres; maximum gradient 12.5 ‰
Expansion goals: Reduction of travel time and increase of capacity for passenger and freight services by expansion to four tracks and upgrade to high-speed route
Project responsibility: Rete Ferroviaria Italiana S.p.A.



5

EFFECTS OF IMPLEMENTING THE SCAN-MED CORRIDOR FOR THE ALPINE REGION

PERFORMANCE OF FREIGHT AND PASSENGER TRANSPORT

Freight transport

By expanding the railway infrastructure on the transalpine section of the Scan-Med Corridor, technical requirements are established that will support competitive rail freight.

Due to the new level line route*, lengthier and heavier freight trains can be put into service between South Germany and Italy. A centralised operational management and the equipment with ERTMS* make an especially efficient rail operation possible.

These advantages have a positive effect on production costs of railway freight on the entire transalpine section of the Scan-Med Corridor. In future, costs for double heading*, additional train drivers and a pusher engine* can be avoided, as well as shunting at the Brenner railway station. These new competitive transport costs for rail freight will be significantly lower than for road freight.

Improvement of rail freight competitiveness on the transalpine section of the Scan-Med Corridor

	Traction	Maximum train weight	Limiting factor
Existing Brenner Pass route including northern and southern ramp	2 locomotives	1 400 tonnes	Limit load
	2 locomotives + pusher engine	2 060 tonnes	Limit load
Brenner Base Tunnel with new route Franzensfeste/ Fortezza-Waidbruck/ Ponte Gardena	1 locomotive	1 680 tonnes	Mean velocity 70 km/h
	1 locomotive	1 380 tonnes	Mean velocity 100 km/h
	2 locomotives	3 000 tonnes	

Source: Calculation ÖBB-Infrastruktur AG

By constructing the Brenner Base Tunnel, it can be assumed that internal rail freight transport costs[69] will be only half as high as comparable costs for road transport (based on tonne-kilometres*). These advantages of rail transport will be even more pronounced if the development of rail freight is encouraged[70] by appropriate transport and environmental policies.[71]

[69] Internal transport costs are costs that are directly covered by users, in general, costs for infrastructure usage and operation. External costs are those costs that result from noise and air pollution that are covered by the public (see Bundesamt für Statistik Schweiz 2009: page 13).
[70] Bundesamt für Statistik Schweiz (2009): page 23
based on average rail and road usage, with the exchange value 1 Euro = 1.22 CHF:
truck: internal costs (infrastructure and means of transport): 41 cent/kilometre-tonne*, calculated from total costs: 48 cent/kilometre-tonne*, of which external accident and environmental costs: 7 cent/kilometre-tonne*;
rail freight: internal costs (infrastructure and means of transport): 18.6 cent/kilometre-tonne*, calculated from total costs: 20 cent/kilometre-tonne*, of which external accident and environmental costs: 1.4 cent/kilometre-tonne*.
[71] for example toll systems and consumption-related taxes

Improving the competitiveness of rail freight transport will make it possible to shift the increasing amount of freight traffic on the transalpine section of the Scan-Med Corridor to the rail system. This implies a relative increase of the proportion of rail freight transport. Because the existing road freight capacities will be available also in future, freight that cannot be efficiently shipped via rail (for instance fresh produce) can nonetheless resort to the road.

Passenger transport

Expanding rail infrastructure on the transalpine section of the Scan-Med Corridor creates the preconditions required for attractive short and long-distance rail passenger services.

The Brenner Base Tunnel will significantly reduce travel times for long-distance and cross-border regional services. New high speed routes on the northern and southern access routes will cut travel times for passenger services from München to Verona to 4 h. The current travel time is 5 h and 45 minutes.

Increasing the frequency of short distance services in metropolitan areas are the indirect advantages of unbundling freight transport from short and long distance passenger services. For instance, in Tirol the recent development of the suburban rapid transit system in the Lower Inn Valley was only possible because of the transfer of freight and long-distance passenger rail traffic to the new route Kundl/Radfeld-Baumkirchen in 2012: In 2015 roughly 40 000 passengers a day were transported by the suburban rapid transit. This is an increase of 25 % compared to 2012.[72]

Making rail transport more attractive will increase regional and long-distance passenger numbers. Recently established regional and long distance services on the Brenner have proven this. But also road transport will profit from these developments, because if traffic is shifted from the road to rail this will also help reduce road congestion[73].

DB-ÖBB EC München-Verona near St. Jodok am Brenner

[72] Tiroler Tageszeitung (2014); calculations by ÖBB-Infrastruktur AG
[73] Aktionsgemeinschaft Brennerbahn (Hrsg.; o.J.): page 19

ECONOMIC EFFECTS

Making the European economy more competitive

Investments in infrastructure reduce transport costs. Lower transport times, more frequent and more flexible connections and optimizing transport volumes make distributing industrial production easier.

Strong economic regions and also less dynamic regions – often peripheral regions – benefit from a reduction of transport costs: Lower transport costs expand the sales markets of companies in core regions, which have a competitive, export-oriented economy. At the same time, lower transport costs improve competitiveness of regions which are more peripheral by increasing core market accessibility.[74]

Implementing the transalpine section of the Scan-Med Corridor will shorten the rail route Innsbruck-Franzensfeste/Fortezza by 21 km. By increasing line speed for freight trains to roughly 100 km/h and improving operability, travel times for freight transport are cut in half. Converting the transalpine section of the Scan-Med Corridor into a level line route* and increasing maximum train length from currently 400 metres to over 700 metres will significantly raise capacities of individual freight trains[75].

The comparative advantages of the rail system on the transalpine section of the Scan-Med Corridor are especially evident as the quality of supply and service will be greatly improved. The entire European economy will be strengthened by removing the Alps as a barrier to transport and economic activity. This also will increase the market area of European ports – especially of the Italian ports in the Mediterranean – that will be able to offer a more cost-efficient hinterland transport in future.

Strengthening the Alpine economy

The construction of infrastructure projects positively affects gross value added and employment rates of inner Alpine areas. In Italy and Austria the Brenner Base Tunnel generates a gross value added of 15 billion Euros, based on an investment of 10 billion Euros, thereby securing 200 000 jobs in course of its construction. Expanding the route Innsbruck-Waidbruck/Ponte Gardena will result in a regional gross value added of 3.4 billion Euros in Tirol and the Autonomous Province of Bozen-Südtirol. Local gastronomy, retail and services will profit from additional 77 million Euros in revenue.[76]

The Alpine region will benefit from the implementation of the Scan-Med Corridor on a long-term basis. Improved accessibility will equally strengthen industry, manufacturing, transport and tourism.

[74] Polasek, Wolfgang et al. (2009)
[75] Konsortium Beobachtungsstelle (2016)
[76] Aktionsgemeinschaft Brennerbahn (Hrsg.; o.J.). page 3 and page 11

As a result of upgrading infrastructure on the transalpine section of the Scan-Med Corridor, the Alps will no longer be a barrier for transport. Economic links within the inner Alpine area will be strengthened and access to European and global sales markets will be improved, especially through creating a more cost-effective connection to the Mediterranean ports that are becoming more and more important for long-haul transport. The developments in Bavaria aptly illustrate this point[77].

Relatively high costs for constructing the Brenner Base Tunnel and its northern and southern access routes are set off in the long-term against lower infrastructure and maintenance costs compared to the mountain route currently in use. Indirectly this will also reduce maintenance costs for high-level roads by shifting traffic from road to rail.

Quelle: IHK für München und Oberbayern (2015): Seite 17

[77] IHK für München und Oberbayern (2015): page 17

EFFECTS FOR ENVIRONMENT AND PUBLIC HEALTH

Currently public health and the environment are exposed to intense road freight traffic on the transalpine section of the Scan-Med Corridor. The proportion of heavy-duty traffic* is very high compared to rail freight traffic: More than 70 % of the freight that was transferred through the Brenner Pass in 2013 was transported by road[78].

It is expected that by expanding rail infrastructure on the Scan-Med Corridor in the Alpine area, that negative effects of traffic will be reduced.

These adverse effects are currently being assessed by the Working Group Environment of the Brenner Corridor Platform. For this task it analyses data collected by the regions and provinces and current monitoring measures established for construction.

Improving transport safety

Expanding and enhancing rail infrastructure on the transalpine section of the Scan-Med Corridor results in better safety in the entire transport system, because road transport in shifted to the railway. Rail transport is statistically safer than road transport: Risk of dying in a passenger car accident is 63 times higher than dying in a train accident and being injured is 113 times more likely[79].

As upgrading rail infrastructure on the transalpine section of the Scan-Med Corridor incurs implementing modern rail safety standards, it can be expected that travelling by train will become even safer.

Reducing the carbon footprint

Shifting road traffic to rail has a general positive effect on the climate footprint. Based on the European average, CO_2 emissions for road transport (in kilometre-tonnes*) are roughly three times higher than for rail transport[80]. In context of Alpine traffic and with an energy mix that includes a high degree of sustainable sources[81], the CO_2 emission of road transport (in kilometre-tonnes*) can be up to 18 times higher. Similarly, for passenger transport: air transport has 15 times higher CO_2 emissions and car travel 12 times higher CO_2 emissions than a comparable rail journey (in passenger-kilometres*).[82]

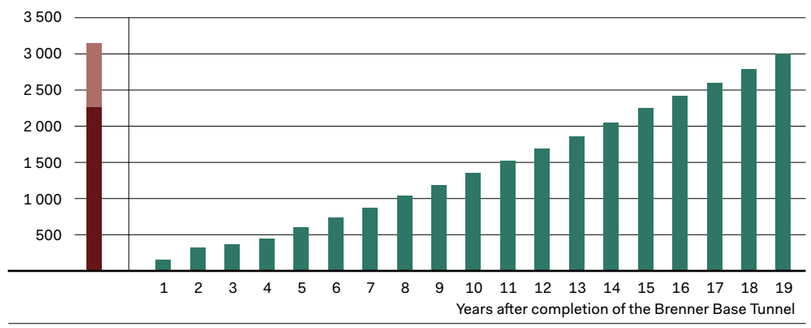
[78] Brenner Corridor Platform, Working Group Infrastructure (2016)
[79] In Europe significantly less people are injured in rail traffic than in road traffic: 0.15 passengers are killed in rail transport (in billion passenger-kilometres*) compared to 3.5 passenger on the road (see Vorndran, Ingeborg 2010: page 1 083).
[80] European Environment Agency (2013)
[81] The energy mix of the ÖBB on which these figures are based, consists of 92 % renewable energy sources (see ÖBB-Infrastruktur AG 2016).
[82] ÖBB-Holding AG (2015)

Each passenger that chooses rail over road transport and each tonne of freight that is transported by train and not by truck can be considered a valuable contribution to climate protection.

The projected reduction of CO_2 emissions for the Wipp Valley from Innsbruck to Franzensfeste/Fortezza due to the Brenner Base Tunnel is estimated at 40 000 tonnes a year[83] - a total of 3 million tonnes of CO_2 until the year 2040[84].

Because of reduced maximum gradients the rail route Innsbruck-Waidbruck/Ponte Gardena can be operated as a level line route*, which needs less energy to cross the transalpine section of the Scan-Med Corridor. This results in a total reduction of primary energy and fossil fuel use for rail transport.

CO_2 emission savings due to operation of Brenner Base Tunnel in relation to emmissions caused by construction



- CO_2 emissions caused by the construction of the Brenner Base Tunnel
- CO_2 emissions caused by the construction of the southern access route Franzensfeste/Fortezza-Waidbruck/Ponte Gardena
- Accumulated CO_2 savings in the first 19 years of operation of the Brenner Base Tunnel

Source: Galleria di Base del Brennero - Brenner Basistunnel BBT SE 2010: page 224

[83] The source of information referred to in this chapter, if not stated otherwise, is Galleria di Base del Brennero - Brenner Basistunnel BBT SE (2007b).
[84] Galleria di Base del Brennero - Brenner Basistunnel BBT SE (2010)

Limiting exposure to immisions

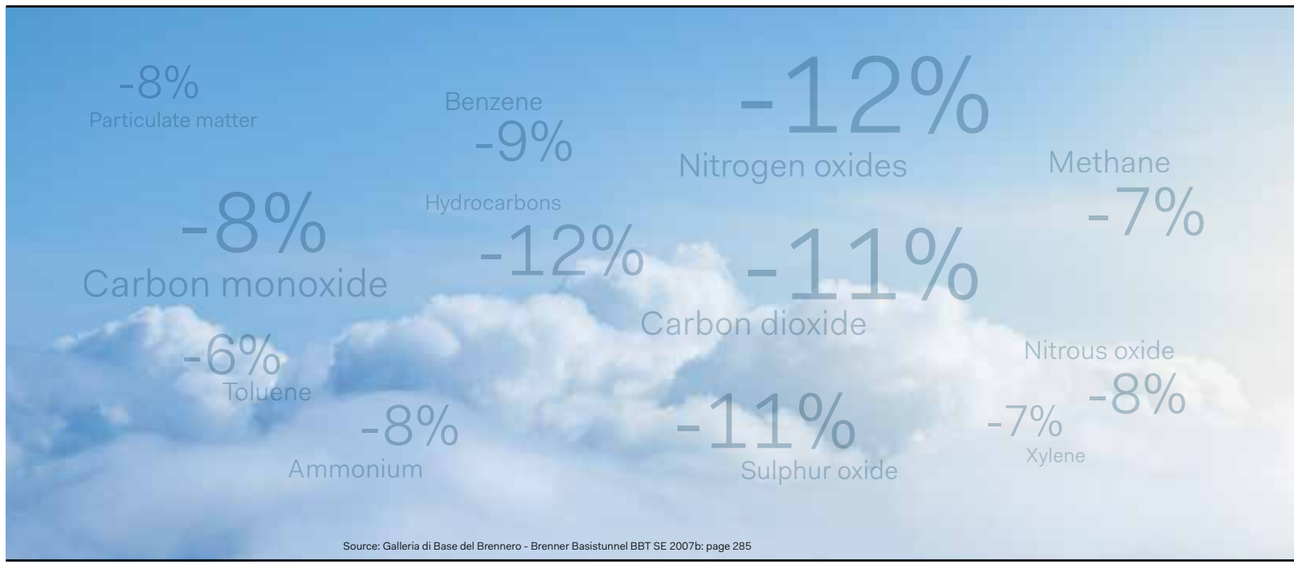
In order to fully implement the Scan-Med Corridor in the Alpine area, construction of new routes in tunnels - outside populated areas - or open air routes in sparsely populated areas, will be necessary. It is expected that the majority of freight traffic will be processed on these new routes. Those towns that are exposed to rail noise pollution, especially at night-time, will benefit from noise reduction due to these developments.

At the moment 9 % of the population of the Wipp Valley suffers from noise exceeding 65 dB(A)[85], especially at night. This value will be reduced to less than 2 % by the Brenner Base Tunnel. Roughly 16 % of the population in this area is exposed to noise louder than 55 dB(A), which will be reduced to less than 10 %. The extent to which areas of permanent settlement* are burdened by excessive road and rail noise will be reduced in future through the Brenner Base Tunnel.

To which degree air pollution will actually be reduced depends on the success in shifting road freight to rail freight transport. Assuming a rail friendly policy will be adopted, the exposure to nitrogen oxides in the Wipp Valley would annually decrease by 150 tonnes; the average annual amount of air pollutants would be cut by between 6 % and 12 %.[86]

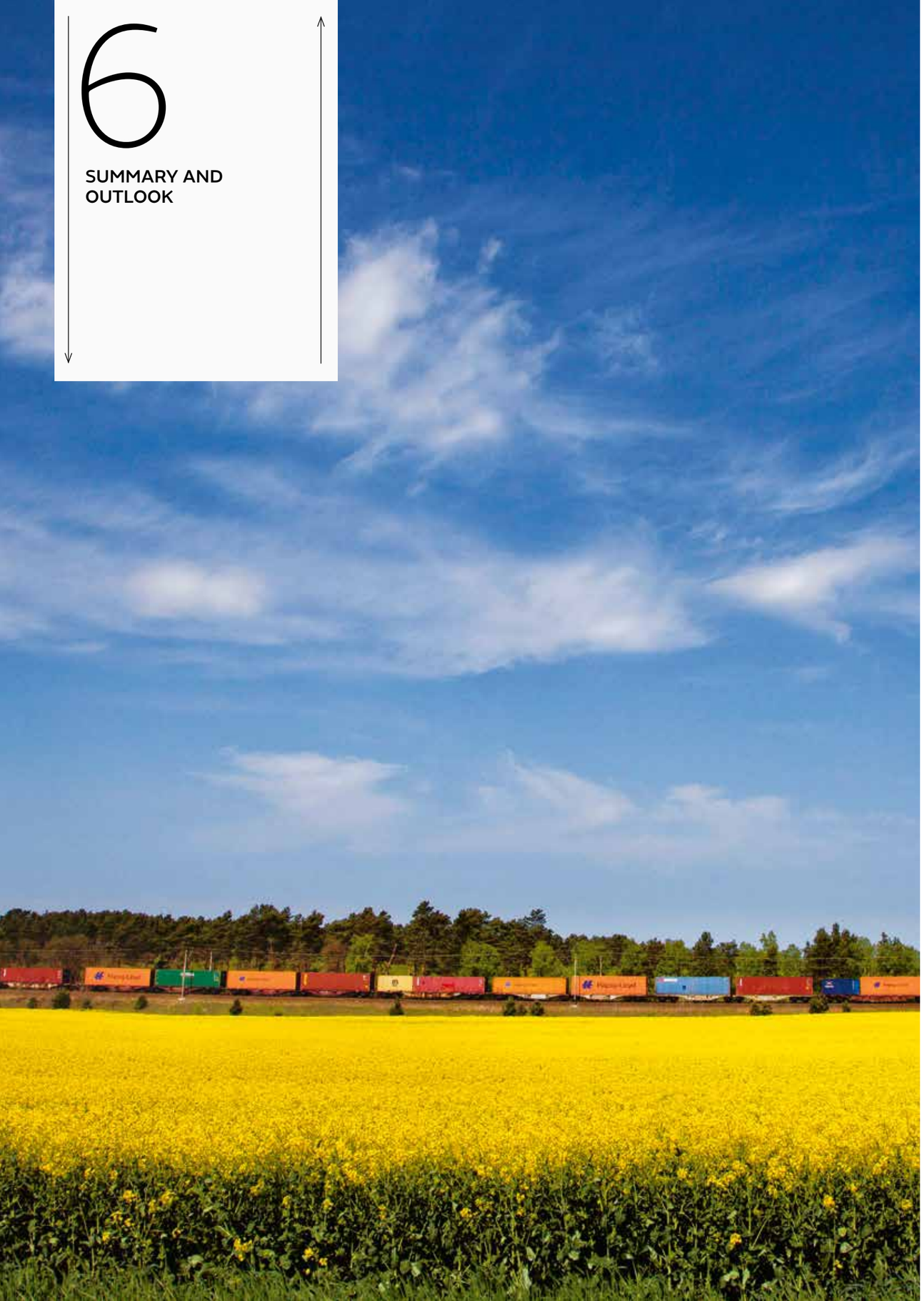
All future infrastructure expansion will be based on state of the art technology and on a single environmental licensing regime. This will ensure that all new infrastructure construction will be highly sensitive to the needs of the local environment.

Reductions of air pollutants based on traffic scenarios



Source: Galleria di Base del Brennero - Brenner Basistunnel BBT SE 2007b: page 285

[85] The EU green paper on transport (see European Commission 1996) considers noise exceeding 75 dB(A) as unacceptable and noise louder than 65 dB(A) requires certain measures in order to be reduced. These decibel values are weighted to take account of the higher sensitivity to noise at night time.
[86] These values and their difference are hypothetical scenarios for 2015.



6

SUMMARY AND OUTLOOK

SUMMARY AND OUTLOOK

The Scan-Med Corridor crosses the Alps between München and Verona, where it overcomes one of the greatest topographical barriers on the entire route. With an elevation of 1.378 metres above sea-level, the Brenner Pass marks the highest point of the corridor. The Brenner Pass has been in continuous use as an Alpine crossing since the Bronze Age. München and Verona are important nodes within the TEN-T* core network, where the Scan-Med Corridor is linked to the Rhine-Danube Corridor and the Mediterranean Corridor.

Due to economic growth and intensifying European integration since the 1950s, the volume of transalpine traffic – especially road traffic - has increased rapidly. Today the Brenner Pass is the busiest Alpine crossing: Roughly 2 million trucks pass through the Brenner annually. This exposure to high volumes of traffic has severe detrimental effects to the environment and population of the Alpine region with its limited area of permanent settlement* and unique climate. Currently, affected regions and provinces are adopting measures to reduce these adverse effects or at least to keep them from further increasing.

Ambitious infrastructure constructions and expansion are currently being planned, in order to complete implementation of the Scan-Med Corridor in the Alpine region. The centrepiece of the route München-Verona is the Brenner Base Tunnel, which will commence scheduled operation in 2026. The newly constructed route Franzensfeste/Fortezza-Waidbruck/Ponte Gardena, will have a maximum gradient of only 12.5 ‰ instead of the current 27 ‰, which will establish a continuous level line* on the entire route.

Additional rail projects on the northern and southern access route of the Brenner Base Tunnel will increase performance and capacity of the rail route. Individual projects, like the bypasses in Rosenheim, Bozen/Bolzano, Trento and Rovereto, will reduce exposure to rail freight traffic in densely populated areas. The aim of these efforts is to meet TEN-T* core network requirements by 2030 and to prevent capacity bottlenecks.

By expanding rail transport infrastructure on the transalpine section of the Scan-Med Corridor, rail freight and rail passenger services will become a more attractive mode of transport. This will lay the foundation for competitive rail freight transport, as costs for additional locomotives, shunting and changes of staff will be removed and overall travel times will be reduced.

To which extent these efforts will actually succeed in increasing transalpine rail freight, depends on the implementation of accompanying policy measures, as well as environmental and transport policy.

Various platforms and initiatives were created in order to implement infrastructure projects and policy measures concertedly. The current success in jointly planning and realising infrastructure must now be followed by jointly developing a common perspective and a common framework for transport and environmental policy. First plans for positive and negative incentive schemes have already been developed by the Alpine states. Therefore, a first decisive step towards an efficient and sustainable European transport system has been made in the Alpine region.

GLOSSARY

Alpine crossing exchange
The main goal of this system is to protect environment, health and passenger safety. Transit rights are auctioned off to freight transport companies or given away for free to companies that use rail transport.
Area of permanent settlement
An area of permanent settlement is an area that is suitable for agriculture, traffic infrastructure or settlements, due to topographical and/or climatic characteristics.
Pusher engine
Additional engines are added to the back of the train in order to operate on routes with high gradients.
Cab signalling
Cab signalling (German: Linienzugbeeinflussung) is a system for transmitting reference signals to the train driver. Cab signalling allows for driving monitoring and breaking manoeuvres if necessary.
CIPE
The Comitato interministeriale per la programmazione economica (CIPE) is a collegial body of the Italian government consisting of ministries that is directly concerned with economic growth; the CIPE grants funding for large infrastructure projects.
Connecting Europe Facility
The Connecting Europe Facility (CEF) is a financial instrument of the EU developed for funding TEN-T transport projects. The word “facility” is used in banking and finance and refers to funding possibilities within a defined limit.
Double heading
Double heading is the practice of adding an additional locomotive on the front of a heavy freight train, to ensure safe passage on tracks with high gradients. Double heading involves two locomotives on the front of the train.
ERTMS, ETCS
The European Rail Traffic Management System (ERTMS) will be used in future for managing and guiding the European rail transport system within the TEN-T core network. The European Train Control System (ETCS) is an important element of the ERTMS (on Level 2) as it will allow constant communication between trains and the Radio Block centre (RBC).
European emission standard
These standards define acceptable limits for exhaust emissions and groups them based on thresholds values: Euro 1 is the category for high-polluting vehicles.
Heavy-duty transport
Heavy-duty transport is transport by vehicles heavier than 3.5 tonnes.
Infrastructure cost directive
This EU directive, see Directive 2006/38/EC, regulates the collection of tolls and charges for roads. In sensitive Mountain areas, like for instance the Alps, where traffic is congested or where the environment is threatened a surcharge of 25 % is permissible.
Level line routes
Newly constructed routes within the TEN-T core network are allowed to have maximum gradients as steep as 12.5 ‰ (according to the Commission Decision of 26 April 2011 Chapter 4.2.4.3.). Routes that meet these criteria are called level line routes. Under special circumstances, for instance, flow resistance in tunnels, lower gradients could be required.
Limit load
A limit load is the permissible towable mass that can be transported by one or multiple traction units, with a certain speed on a certain route.
Memorandum of Montreux
In the Memorandum of Montreux the Ministers of Transport of Germany, Austria and Italy agreed to jointly construct the rail system between München and Verona in 1994.
Multimodality, multimodal
A transport system can be called multimodal, if transport demand is efficiently covered by multiple means of transport or by their combination.
NUTS
The nomenclature des unités territoriales statistiques (NUTS) is a spatial classification of European regions for statistical purposes.
Passenger-kilometre
Passenger-kilometre is a unit of measurement used for calculating the performance of passenger services 1 passenger-kilometre means that 1 person was transported for 1 km.
„Rolling road“
The „rolling road“ or “rolling highway” is a form of combined transport of road trucks by rail. Entire trucks are loaded on the train and transported via railway.
SE
The abbreviation SE stands for Societas Europaea, a European company registered in accordance with European law.
The TEN-T days
This is an annual conference where the development and funding of the TEN-T is discussed (see also TEN-T in this glossary).
TEN-T
The Trans-European Transport Networks is the common transport network for high-level road, rail, air and waterway transport in the EU.
Tonne-kilometre
Tonne-kilometre is a unit of measure used for calculating the performance of freight transport 1 tonne-kilometre means that 1 tonne of goods was transported for 1 km.
UTC train
Unaccompanied combined transport trains (UTC), are a type of train, where only the loading units, for example containers, are transferred between modes of transport.
Wagonload freight
This is a type of rail freight transport, in which freight wagons from various dispatchers and recipients are summed up in a single train.

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The Alps are a highly sensitive living space and the biggest topographical barrier for transport in Central Europe. The Scan-Med Corridor will be expanded and enhanced by modernising rail infrastructure between South Germany and North Italy. The railway enables both environmentally friendly freight transport and shorter travel times for passenger transport.