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Tagung der Alpenkonferenz **IX**

Réunion de la Conférence alpine

Sessione della Conferenza delle Alpi

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TRANSPORT

A Rapport de la Présidence du Groupe de travail

B Proposition de décision

Annexes:

- Annexe 1: Report by the « railways corridors » subgroup
- Annexe 2: Report by the « transport costs » subgroup
- Annexe 3: Mandat du Groupe de travail
- Annexe 4: Final document of the European Expert Conference „Environmentally Friendly Travelling in Europe – Challenges and Innovations Facing Environment, Transport and Tourism“

A Rapport

1. Définition du programme de travail

Le mandat actuel du Groupe Transports, qui décline les principaux objectifs du protocole transports, est le 2ème depuis le mandat initial défini par la VIIème Conférence alpine de Merano.

Il résulte des objectifs fixés par les Ministres lors de la VIIIème Conférence alpine de Garmisch-Partenkirchen du 10 novembre 2004 :

- « pour améliorer de façon significative les services ferroviaires contribuant au report modal, rechercher, pour tous les corridors ferroviaires transalpins qui n'en sont pas encore pourvus, des coopérations actives entre gestionnaires des réseaux et opérateurs ferroviaires, et dresser l'état des lieux des services actuels ;

- pour promouvoir une mobilité intra-alpine durable, développer la coopération avec les réseaux de collectivités locales et régionales dans les Alpes, afin de recueillir et de soutenir les actions novatrices en matière de liaisons par transports en commun entre agglomérations alpines, et d'accès aux grands sites touristiques alpins par des modes plus respectueux de l'environnement ;

- approfondir les actions déjà engagées pour renforcer la prise en compte des charges de toute nature dans la tarification des infrastructures et identifier les évolutions souhaitables, afin de contribuer à une politique mieux concertée de tarification routière dans l'arc alpin ;

- présenter une analyse globale des mesures mises en place ou prévues en matière de transports, contribuant a atteindre les objectifs de qualité de l'air dans la zone alpine ;

- poursuivre les travaux sur la connaissance des trafics à travers les Alpes, et veiller à coopérer avec le SOIA pour l'établissement des données d'information et de communication relatives aux transports, notamment dans la définition des indicateurs de qualité environnementale. »

En complément de ce mandat, le 31ème Comité permanent (septembre 2005) a en outre décidé de centrer sur le thème des transports le Rapport sur l'état des Alpes dont la rédaction a été décidée par la dernière Conférence alpine.

Compte-tenu de cette évolution, le Groupe Transports a travaillé activement sur l'essentiel des sujets inscrits à son programme, même s'il n'est pas en mesure d'afficher pour chacun le même degré d'aboutissement. Il a également pris une part active à l'élaboration du Rapport sur l'état des Alpes.

Il s'est réuni 6 fois : le 28 janvier 2005, le 9 septembre 2005, le 24 février 2006, le 24 avril 2006, le 7 juillet 2006 et le 5 octobre 2006.

2. Avancement du travail

2.1. L'amélioration des corridors ferroviaires existants

L'état des lieux des coopérations techniques sur les corridors ferroviaires transalpins, déjà dressé pour la VIIIème conférence alpine, a montré :
- que seuls le corridor du Brenner, le corridor nord-sud par la Suisse, ainsi que le corridor par le Tauern, faisaient l'objet de coopérations étroites entre les gestionnaires des réseaux et les entreprises de transport pour optimiser l'ensemble de l'itinéraire ;
- qu'il était important que les autres corridors bénéficient d'actions similaires.

Sur cette base, et compte-tenu des premiers résultats positifs dégagés sur les corridors précités, le travail du sous-groupe « corridors », piloté par la délégation allemande, a été conduit sur les autres grands corridors transalpins :

- Corridor Semmering/Wechsel : axe Brno-Udine
- Corridor du Tauern : axe München-Salzburg-Ljubljana
- Corridor du Mont Cenis : axe Lyon-Torino
- Corridor Trieste/Koper : axe Venise-Trieste-Koper-Postojina-Ljubljana
- Corridor Pyhrn/Schoberpass : axe Budejovice-Maribor
- Corridor du Danube : axe Passau-München-Bratislava-Budapest

Chacun des corridors a été attentivement analysé : le rapport détaillé du sous-groupe qui présente pour la première fois un état complet des corridors ferroviaires transalpins est annexé au présent rapport (annexe 1). Des mesures d'amélioration de la qualité de service, de

nature et d'intensité très différentes d'un corridor à l'autre, ont été recensées : projets de coopération en cours ou envisagés, mise en oeuvre du système ERTMS… Les actions encore débutantes au moment de la Conférence de Garmisch, comme par exemple le développement du service expérimental d'autoroute ferroviaire entre Lyon et Turin, ont été prises en compte.

Le Groupe a veillé à assurer l'articulation avec les travaux menés dans le cadre du groupe de Zurich (coopération entre les ministres des transports de l'arc alpin), concernant l'exploitation des résultats de l'enquête CAFT 2004 caractérisant les grands itinéraires économiques transalpins. Par ailleurs, en liaison avec la révision du Livre blanc récemment adoptée par la Commission européenne, le rapport du sous-groupe réaffirme la nécessité de promouvoir les alternatives ferroviaires et de combiner les différents modes afin d'en optimiser les potentiels spécifiques.

La présidence du Groupe « Transports » a tenu à associer expressément les ministères des transports à ce travail.

Le sous-groupe conclut de ces travaux que, parmi les grands corridors étudiés, les parties identifient surtout 2 d'entre eux comme prioritaires (corridors du Mont-Cenis et Trieste-Koper), avec des actions concrètes déjà engagées par les Etats, les gestionnaires et les opérateurs.

En outre, la promotion de ces actions fait intervenir une grande complexité d'acteurs, et a un lien très étroit avec les politiques d'investissement de chaque pays. Le sous-groupe propose, sur la base du travail accompli, de présenter à la prochaine Conférence alpine un bilan actualisé des mesures conduites sur les corridors ferroviaires prioritaires.

2.2. Les coûts et la tarification des transports dans les Alpes

Le sous-groupe « coûts », animé par la délégation italienne, a poursuivi son travail en estimant et comparant les externalités et les coûts supportés sur 3 corridors routiers transalpins importants : Brenner, Saint Gothard, Fréjus.

Le document de travail, dans son état actuel (annexe 2), est une contribution appréciable qui a permis de contribuer directement à la rédaction du chapitre C1 du Rapport sur l'état des Alpes, consacré aux effets économiques des transports dans les Alpes.

A l'avenir, le sous-groupe pourrait, sur la base de ses propres travaux :

- achever son travail par la prise en compte des coûts internes et externes
- transmettre pour information son rapport définitif aux Etats et à la commission européenne,
- poursuivre ses travaux sur la structure des coûts des transports dans les Alpes
- dans ce cadre, examiner comment la directive « Eurovignette » se met en œuvre dans l'espace alpin, sur des corridors précis (définition du périmètre de montagne, réflexion sur les financement croisés, notion de corridors,…)

2.3. La qualité de l'air

La présidence du Groupe a établi un questionnaire pour recenser auprès de chaque délégation:

- les objectifs qualitatifs et quantitatifs de qualité de l'air, en matière de transports, dans la zone alpine
- les principales mesures de protection de la qualité de l'air prévues ou mises en place dans le domaine des transports,
- les dispositifs d'observations et les indicateurs de l'efficacité de ces mesures,
- les plans de mesure à long terme visant à améliorer la qualité de l'air,
- les résultats constatés ou attendus.

D'une façon générale, les délégations ont toutes rencontré 3 difficultés :

- les compétences en matière de mesures de la qualité de l'air sont éclatées,
- il n'existe pas d'objectif spécifique national de qualité de l'air pour la zone alpine,
- il n'existe pas non plus d'objectif spécifique par secteur, notamment pour les transports (la part de pollution spécifiquement causée par les transports est même très difficilement identifiable).

Toutefois, les valeurs limites des polluants ont pu être précisément identifiées, en référence aux recommandations des organisations internationales spécialisées (OMS, CEE/ONU). De même, les principales mesures de protection de la qualité de l'air prévues ou mises en place dans le domaine des transports ont pu être mises en évidence : elles touchent les dispositifs techniques (moteur, échappement), la composition des carburants, les mesures de circulation (vitesse maximale autorisée), la tarification (soutien au transfert modal)… Des réseaux d'observations et de mesures sont aussi en place, de façon inégale, dans chacun des pays. Dans l'ensemble, de premiers résultats positifs sont déjà constatés (diminution des émis-

sions de SO2, CO, Pb), mais des actions restent nécessaires sur certaines catégories de polluants (NO2, poussières, particules fines, métaux lourds…).

La prochaine réunion du Groupe de travail inscrira ce thème à son ordre du jour, et le traitera en présence d'experts, afin de définir une organisation du travail et un calendrier précis sur la qualité de l'air, dans sa composante transports uniquement. Les pistes suivantes pourront être suivies :

- recenser les différentes campagnes de mesures ou études existantes, spécialement menées le long des axes transalpins
- évaluer l'impact des différentes politiques ou mesures de gestion/régulation mises en œuvre sur les axes de trafic transalpins et mettre en évidence d'éventuelles bonnes pratiques.

Le Groupe de travail attire l'attention du Comité permanent sur le besoin de travailler également sur la qualité de l'air dans ses autres composantes (autres que transports).

2.4. L'amélioration de l'accès durable aux sites touristiques et des liaisons intra-alpines

Sur ce sujet, le Groupe n'a pas atteint les objectifs fixés: il y a d'abord eu un long cheminement pour trouver les thèmes concrets à creuser, puis les approches possibles, et la présidence française du Groupe « Transports » n'a pas pu disposer du temps nécessaire pour conduire efficacement le travail à engager.

Toutefois, la présidence a réuni une première fois les experts mandatés par chacune des délégations le 30 mai 2005, et constaté que, sur ces sujets, les compétences étaient décentralisées et extrêmement éclatées. Sur la base des bonnes pratiques existantes et des actions conduites par les réseaux de coopérations (projets INTERREG, programmes de coopération transfrontalière), le Groupe a établi un questionnaire destiné à caractériser :

- les liaisons par transports en commun entre agglomérations alpines : autorités compétentes (moyens, actions), services alternatifs à la voiture particulière (horaires, coûts, information du public, trafics), infrastructures de contournement ou de fluidification, politique de localisation et d'insertion environnementale des parkings de regroupement,…
- l'accès aux sites touristiques alpins, ainsi que les déplacements internes aux stations touristiques : actions novatrices et expérimentation en cours ou en projet (cadre, opérateurs impliqués, résultats, perspectives), études disponibles,…

Ce questionnaire s'est avéré à l'usage trop compliqué et difficilement gérable par les délégations, il n'a pas abouti.

Parallèlement, la présidence française a activement participé à la Conférence sur la mobilité durable organisée à Vienne les 30/31 janvier 2006 par la Présidence autrichienne. Les discussions dans le cadre de cette Conférence, et en particulier les recommandations adoptées fournissent des indications concrètes pour engager un travail sur le sujet, en complément d'autres sources de données ou d'informations:

- les travaux commencés directement par le Secrétariat permanent (analyse des horaires des transports publics intra-alpins),
- les éléments rassemblés pour le Rapport sur l'état des Alpes (trafics voyageurs, liaisons existantes entre agglomérations dans l'espace alpin),
- les conclusions des séminaires SWOM italiens et des programmes INTERREG (notamment Interreg III B Espace alpin).

A l'issue de ces échanges, 3 thèmes de travail sont apparus plus pragmatiques :

- le recueil et la diffusion des bonnes pratiques déjà constatées dans les pays alpins en matière de mobilité durable, à la fois pour la vie quotidienne (desserte des agglomérations ou des espaces ruraux, liaisons entre territoires) et pour l'accès aux sites touristiques ;
- l'étude de l'offre de service en transports collectifs longue distance permettant l'accès aux sites touristiques alpins ainsi qu'aux agglomérations, et l'analyse des éventuels points faibles de l'infrastructure (lignes transfrontalières, raccordement aux réseaux régionaux,…)
- aider des porteurs de projets à développer des actions concrètes, notamment dans le cadre de la préparation des futurs programmes de coopération européens substitués à INTERREG (définir des thèmes pouvant servir de support concret aux offres de projets, par exemple sur les centrales de mobilité, l'organisation des correspondances entre les lignes existantes, les modes alternatifs d'accès aux sites touristiques, les services transfrontaliers…).

Sur ces bases, les experts désignés par les délégations et les associations intéressées se réuniront le 30 octobre 2006 à Paris, pour préciser le programme de travail esquissé.

3. Contribution au Rapport sur l'état des Alpes

Le Groupe a dû réorienter son travail à partir de fin 2005 pour participer activement à l'élaboration du Rapport :

- définition des indicateurs de qualité environnementale retenus pour illustrer le rapport, en coopération avec le Groupe SOIA ;
- rédaction de la partie D concernant les politiques publiques en matière de transports dans les Alpes ; cette partie synthétise, tout en l'actualisant, le document sur l'état de mise en œuvre du protocole transport dans les pays alpins régulièrement élaboré par le Groupe de travail Transports pour chaque Conférence alpine;
- conjointement avec le Secrétariat permanent, rédaction de la partie consacrée aux proposition de travail et support d'une déclaration politique;
- relecture et contribution à l'harmonisation de l'ensemble du rapport, notamment lors des réunions conjointes des groupes Transports et Intégration (24 avril, 18 septembre et 17 octobre 2006).

4. Préparation de la conférence d'Alpbach

Le Groupe remet pour la Conférence :
- un rapport d'activité, fondé sur les contributions des sous-groupes (tarification, corridors ferroviaires) et les éléments rassemblés par la présidence (concernant la qualité de l'air, la mobilité intra-alpine), auquel sont annexés : le rapport définitif sur les corridors ferroviaires, le document de travail provisoire sur les coûts.
- et un projet de mandat pour les 2 années à venir.

Ces 2 documents ont été examinés et approuvés par le Groupe « Transports » le 5 octobre 2006.

B Proposition de décision

La Conférence alpine

1. prend acte du rapport d'activité du Groupe de travail « Transports » et remercie la présidente et le Groupe de travail pour le travail accompli,
2. charge le Comité permanent et le Groupe de travail « Transports » de poursuivre leur travail en appliquant le mandat défini à l'annexe 3 et d'en informer la X^{ème} Conférence alpine et
3. prend connaissance du rapport sur la Conférence Européenne « Voyager de façon écocompatible en Europe. Défis et innovations pour l'environnement, le transport et le tourisme » et demande de prendre en considération les contenus et recommandations de mesures adoptées dans le document final (annexe 4) dans le cadre des Groupes de travail de la Conférence alpine.

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IX

TOP / POJ / ODG / TDR

13

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OL: EN

ANLAGE/ANNEXE/ALLEGATO/PRILOGA

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Cooperation on **A**lpine **R**ailway **C**orridors

Report by the Transport Working Group

October 2006

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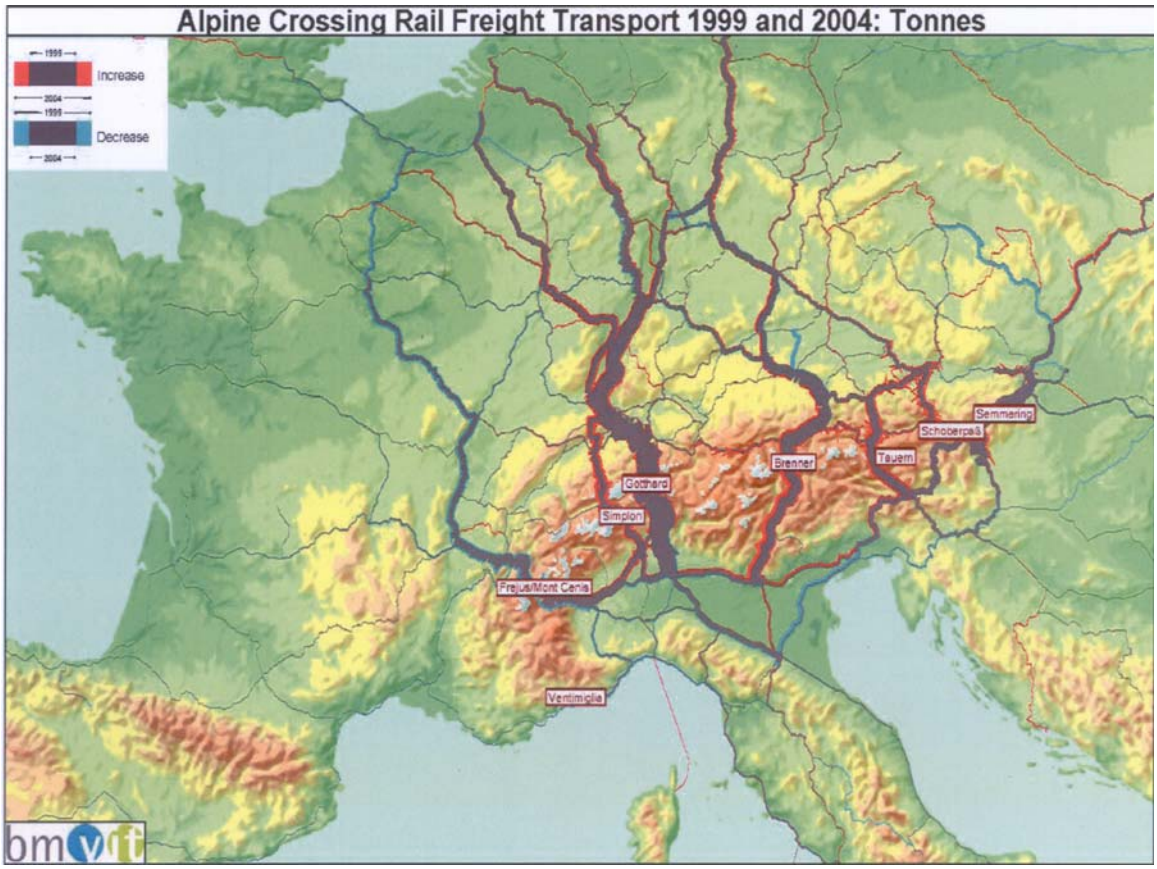
Contents Page

1. **Mandate**

A fundamental objective of the Transport Protocol of the Alpine Convention is the modal shift of freight from road to rail. How reasonable this objective is was also shown very clearly by the 2004 CAFT survey. There is a dynamic growth (3,7 % p.a.) on trans alpine transport demand, even if growth has slowed down in the last 5 years (5,4 % p.a. between 1994 and 1999). Since 1994 freight traffic across the Alpes (rail and road) increased from 132,4 million tonnes to 190,2 million tonnes in 2004 (+ 44 %). Total road transport share increased from 62 % to 67 %. More than 30 million tonnes (one fourth) of road freight passes Brenner and Gotthard is the most important crossing concerning rail transport (15,6 million tonnes).



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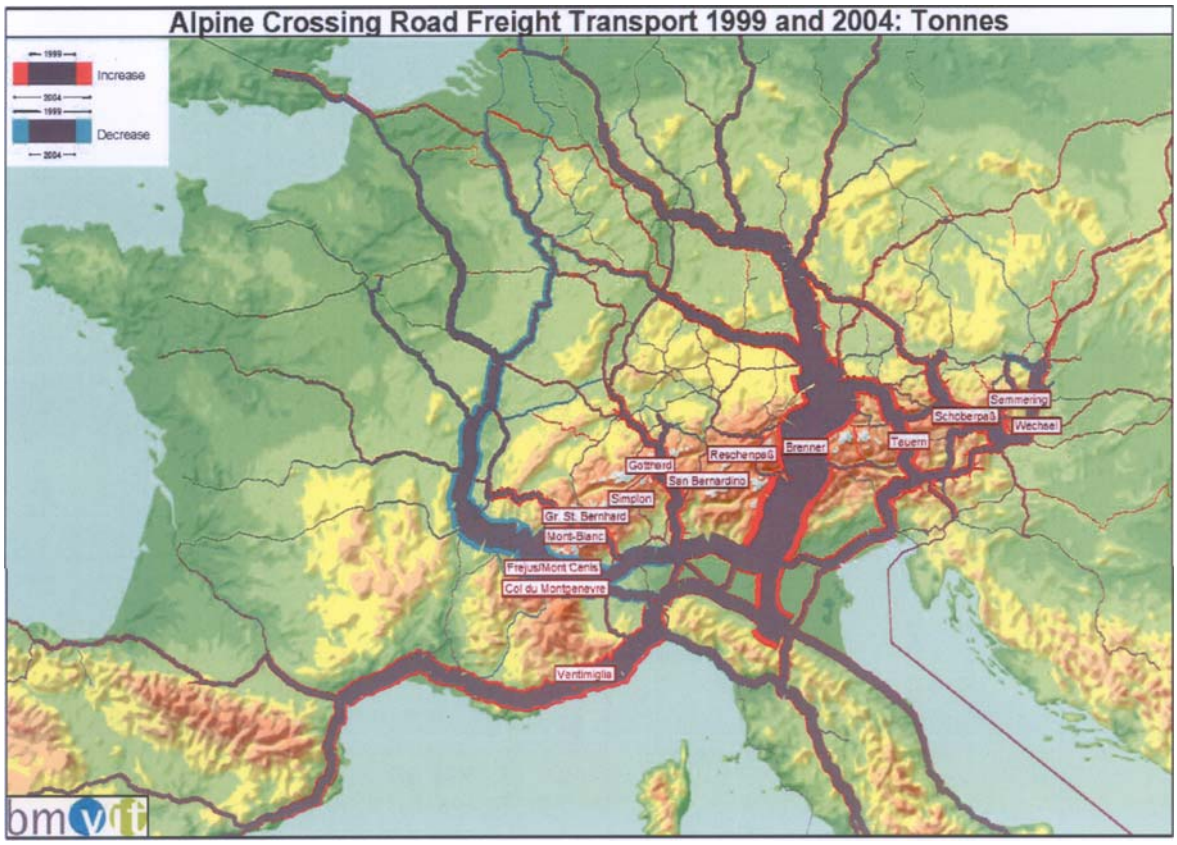

In the mid term review of the European Commission concerning the White Paper on Transport the modal shift to environmentally friendly transport modes and the combination of transport modes ("co-modality") also remain a priority objective of EU transport policy in any case on long distances and sensible areas like the Alpes. On the other side, by placing emphasis at the same time on "the optimization of the specific potentials of the individual transport modes" the aim of the white book 2001 "rebalancing transport models" is diminished.

The 8th Conference of Alpine Regions asked the Transport Working Party in Garmisch-Partenkirchen on 16 November 2004 to give special consideration to the enhancement of the rail transport offers on the trans-Alpine rail corridors. In this context, the existing agreements concerning the Brenner corridor and the north-south corridor through Switzerland may provide guidance. This topic is referred to as follows in the ministerial statement on transport adopted in Garmisch: "Not all existing large corridors have yet been covered by programmes that are similar to those implemented in the framework of the Brenner 2005 Action Plan and the north-south corridor. The Conference of Alpine Regions urgently requests governments and railway operators to extend such measures to

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the other trans-Alpine corridors before the 9th Conference of Alpine Regions is held. A statement on the situation is to be made at the 9th Conference of Alpine Regions 2006."

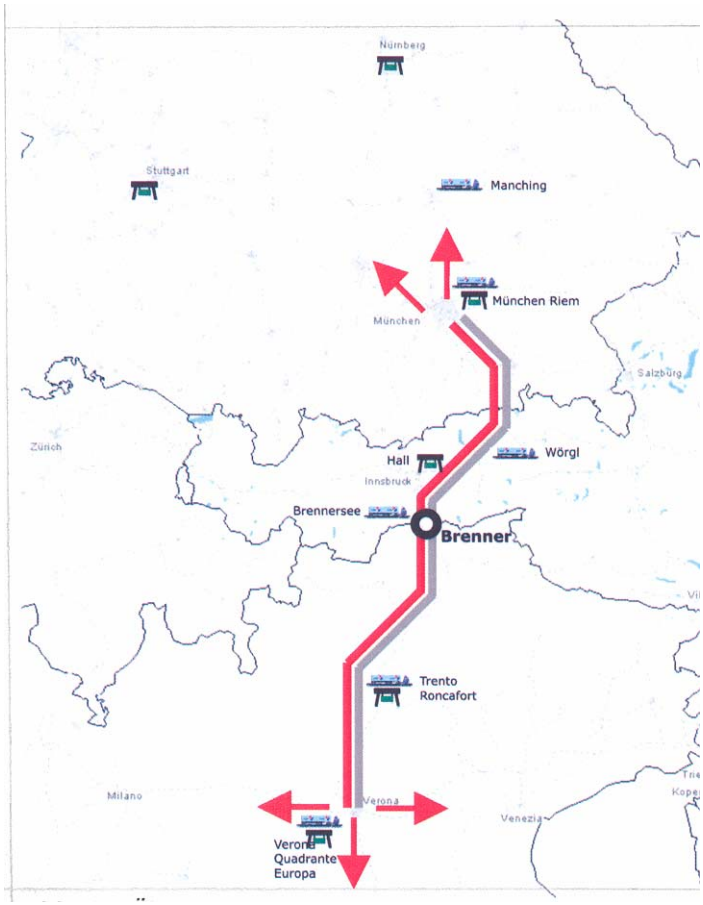
The Transport Working Party cannot directly arrange agreements (such as those mentioned above) between governments, railway companies and other parties involved. However, it can intensify and reiterate the appeal made by the ministers.

This was done by way of discussions within the Transport Working Party of the Conference of Alpine Regions, in which all ministries are represented, and, more specifically, by means of letters of the French chairmanship of the Transport Working Party that were sent to the competent ministries of the countries "with rail corridors" in 2005.

The focus is placed on the following corridors:
Brno – Udine (Semmering)
Munich – Salzburg – Ljubljana (Tauern)
Budejovice – Maribor (Pyhrn/Schoberpass)
Lyon – Turin (Mont Cenis)
Marseille – Genoa (Ventimille) and
Venice – Trieste/Koper – Postojina – Ljubljana
Passau/München – Bratislava/Budapest (Danube axis)

What are the contents of the Brenner 2005 Action Plan, which provides guidance, and what does the north-south axis involve?

2. **The Brenner 2005 Action Plan**



Via the Brenner Pass, which is the Alpine crossing with the highest traffic volume, approx. 42,7 million tonnes of goods were transported in 2004, accounting for a modal split with a road transport share of more than 70%. (CAFT 2004) The Austrian master traffic plan forecasted at that time an increase to 52 million tonnes by 2015 (with the modal split remaining broadly unchanged). In 2002, these figures prompted the ministries of transport of Austria, Italy, Greece and Germany to establish working groups and charge them with the development of measures aimed at increasing the volume of combined transport on this axis by 50% by 2005 in comparison with 2001.

After a detailed problem analysis had been carried out, three packages of measures with a total of 35 measures were integrated into the Brenner 2005 Action Plan taking account of the time required for their implementation (the planned Brenner base tunnel is not taken into account).

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Package of measures I (start of implementation: immediately)

- improvement and intensification of the initial cooperation between the rail transport companies (including the rail network operators)
- improvement of communication and data exchange in order to optimize the interfaces between those involved and to optimize resource management and customer information
- introduction of an integrated quality management system
- removal of operational bottlenecks (rail, terminal)

Package of measures II (short-term implementation)

- development and implementation of a seamless, axis-related traction concept (interoperability)
- enhancement of the service offer in unaccompanied combined transport and further adaptation of quality characteristics to market requirements
- joint assessment of the accompanied combined transport offer (rolling road) and coordination of short and medium-term increases of the offer

Package of measures III (medium-term implementation)

- coordination and assessment of the actual path availability in all network sectors and junctions concerned in order to further increase the transport volume
- upgrading and modernisation of rail infrastructure (lines, junctions)
- improvement of rail links and increase of the transhipment capacities of combined transport terminals in Italy and Germany

If considered individually, all these measures are rather unspectacular; what is interesting, however, is how their implementation is organized; this can be described in three steps:

Comprehensive participation

The action plan was **jointly** developed and adopted by all parties involved in Brenner transport matters, i.e. the representatives of the relevant ministries of transport, rail transport companies, rail network companies, combined transport operators and terminal operators.

Specification of responsibilities

Clear responsibilities were specified for the individual measures. In the package of measures I, for example, “Brenner Rail Cargo Allianz” is responsible for the assessment and prioritisation of the existing deficiencies in communication and data exchange. The development of a computerized system for communication with combined transport customers is the responsibility of “Rail Cargo Austria” etc..

Monitoring

On the basis of regular reports, the ministers of transport of the three countries accompany and support the implementation process in their respective area of responsibility and make appeals to the competent national partners. Among the parties involved, penalties were agreed e.g. for the non-availability of locomotives and train drivers. The agreed “contractual penalties” are paid into a fund and used for improvements in the framework of the Action Plan.

First successful measures

At the beginning of 2005, the first successful measures were reported:

- Thanks to the removal of operational bottlenecks (e.g. allocation of slots for transport and shunting services, improved availability of locomotives and train drivers) it was possible to increase punctuality from an average 40% at the beginning of 2002 to 80% in 2003; since then the percentage has stabilized at this level.
- The terminals Munich-Riem and Verona-Quadrante were equipped with overhead electrification extending as far as possible into the terminals.

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- In the combined transport terminal in Verona, a further transhipment module was installed increasing the capacity from 250,000 to 330,000 loading units.
- At the Brenner Pass, a separate office was established which is responsible for managing data exchange, customer information services and GPS-based train monitoring on a 24-hour basis in cooperation with the Verona operational control centre. Through the use of mobile phones for maintaining permanent contact with all train drivers, it is possible to identify irregularities at an early stage and take remedial action. For example, it is also possible to inform combined transport customers in good time of changed dates for the provision of loading units at the terminal of arrival (estimated time of availability).
- Development of an IT component by means of which the quality of the transport process can be visualized on the basis of clearly defined key performance indicators. The relevant basic data are provided by the infrastructure operators concerned.
- Improved formation of block trains through the upgrading of the Verona terminal to a gateway to the Italian network including a shuttle train service between Verona and Bologna.
- Finally, considerable improvements were made with regard to traction: approval of the pusher locomotive, which is required for the north side of the Brenner Pass, so that it can be radio-controlled by the train driver of the first locomotive of double-headed trains (so-called radio control pushing engine). The first multi-system locomotives have also been made available. The question of reciprocal approval has been resolved and only business aspects determine the use of such locomotives. Work is underway to bring forward the international use of train drivers (linguistic barrier).

Despite all this, the objective of increasing the combined transport volume by 50% by 2005 has not yet been achieved. In this context, however, it must be taken into consideration that important framework conditions have changed. For example, the abolition of the ecopoints system on 1 January 2004 has led to a drastic decrease in rolling road transport on the Brenner route whereas unaccompanied combined transport has increased significantly. In 2003, for example, 4.47 million tonnes of goods were transported in unaccompanied combined transport via the Brenner route, 5.09 million tonnes in 2004 (+ 13.5%) and 5.92 million tonnes in 2005 (+ 16.2%). By the end of 2006, an increase to 6.86 million tonnes is expected. In comparison with 2003, this would represent an increase of more than 50%. This can at least partly be attributed to the Brenner 2005 Action Plan. Without the measures agreed in the Ac-

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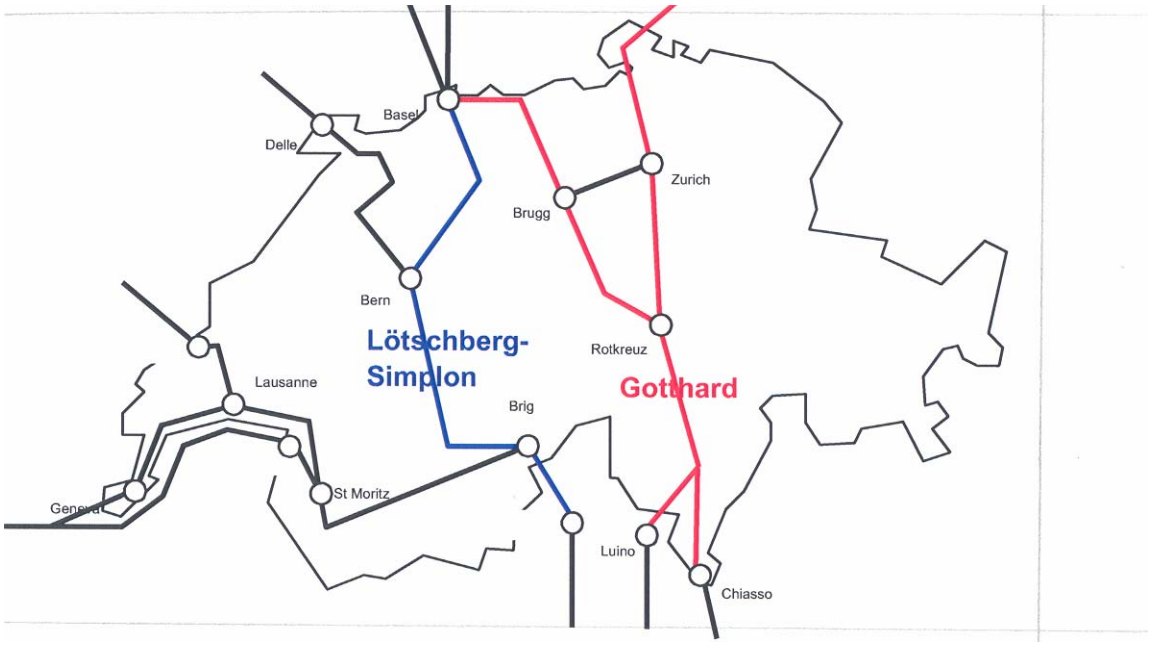
tion Plan it would not have been possible to even maintain the rail transport share. The efforts made to improve the rail transport offer will therefore be seamlessly continued with the BRAVO project in the framework of the 6th EU research programme which involves 15 partners from 6 countries (combined transport companies, railway companies, terminal operators, institutions of higher education and also a Swiss waggon manufacturer).

3. The north-south corridor Rotterdam-Genoa, IQ-C project (Swiss section)



Although the modal split on the Swiss north-south axis accounts for a rail freight share of approximately two thirds and thus more than the inverse ratio of the Brenner route and the French corridors, the Memorandum of Understanding which was signed in Lugano by the ministers of transport of Switzerland, the Netherlands, Italy and Germany in 2003 is also primarily aimed at further increasing or stabilizing the rail freight share. The rail freight routes on this axis are to be strengthened in order to keep them competitive with road transport.

In this case, too, an international working group was established, initially from representatives of the ministries, which, however, was expressly asked to call in representatives of transport companies (i.e. infrastructure and transport operators, in particular) as well as customs authorities, and to work out measures and proposals for improving the quality of the transport offer on this route in coordination with other interested parties (e.g. railway companies, hauliers etc.).

The measures proposed by the working group were essentially placed under the responsibility of the infrastructure operators and ministries which began working on their implementation.

3.1 Infrastructure operators

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The infrastructure managers of the five railway companies involved have intensified their cooperation.
A so-called one-stop shop network for the whole corridor has been in place for some years now. For customers, two computerized systems are available: “Pathfinder” which is for ordering train paths and the European Infrastructure Charging Information System (EICIS) which provides information on infrastructure utilization. Finally, there is a special system for providing train paths to meet short-term needs (System Train Paths).

Furthermore, a corridor manager has been dealing with specific problems concerning the whole corridor since 2005.

Great efforts are also being made with regard to the automated exchange of data between neighbouring infrastructure managers. In addition, the EU funded EUROPTIRAILS project (start: 2006) is to make possible the monitoring of selected trains on the entire corridor.

3.2 Ministries

The ministries are responsible for promoting regulations on the reciprocal approval of locomotives and mutual recognition of train driver qualifications. This must be done within the predefined EU framework and is time-consuming. For example, the first EU Directive for the international admission of train drivers is not expected until 2010. Until then, cooperative solutions must be found between the organizations (enterprises) responsible, and, therefore, a range of bilateral agreements have been concluded, e.g. on the mutual recognition of medical and psychological tests for train drivers. A form of cooperation which is particularly appreciated in the framework of trans-Alpine transport is the official enlargement, by experts from Switzerland and the Netherlands, of the Interoperability Working Group (Germany, Austria, Italy) which already exists for the Brenner axis. The Working Group works on the speeding up of processes and cost-reduction with regard to the reciprocal approval of locomotives and also makes its know-how available to third parties.

Following a Swiss proposal, a tailored and simplified customs procedure for rail freight from the EU will remain in force until the end of 2007. (Goods from the EU account for approx. 90% of rail freight via the north-south corridor.)

Finally, the ministers charged the Working Group in 2004 to examine whether it is possible to equip the corridor with ETCS (European Train Control System).

ECTS would mean continuous traction throughout the entire route with every equipped locomotive and therefore increasing productivity, better quality and easier access for operators (the equipment of locomotives with ETCS is relatively inexpensive).

Results of the study: technically feasible by 2012/2015; economic efficiency, however, depends on a broader use of the system, beyond the route Rotterdam-Genoa, on the remaining network. In order to equip the relevant corridor, subsidies are needed for the infrastructure operators.

The results were put in a wider European context. With the Letter of Intent signed on 3 March 2006, the ministers of transport of the four above-mentioned countries decided in formal agreement with EU TEN coordinator, Mr Karel Finck, to implement ERTMS (ERTMS includes both the above-mentioned ETCS and GSM-R (Global System for Mobile Communications – Railways)) on the corridor Rotterdam-Genoa by 2012/2015 at the lowest possible cost. Through the priority introduction of ERTMS on ten further important freight corridors in Europe the cost-benefit ratio for the introduction of the above-mentioned north-south corridor is improved considerably.

For the purpose of implementation, an executive committee will be established in which the EU Commission and the infrastructure managers will also be represented. A management committee ensures coordination with the other measures taken on the corridor.

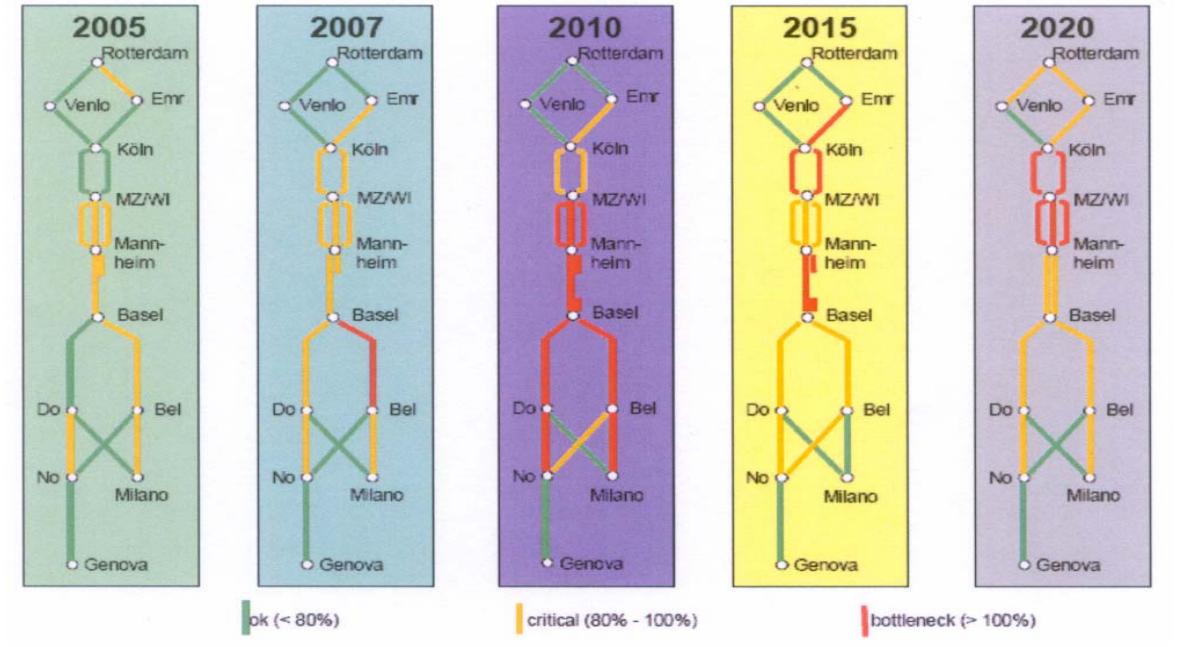
3.3 Results and outlook

As regards the success of the described measures, it should of course be taken into account that due to the traditionally large share of rail freight in Switzerland (2000: 70%) strong increases are simply no longer possible. However, apart from the tax on the use of roads by heavy goods vehicles which boosted combined transport and thus prevented a further decrease of the rail freight share, the current stabilization at 65% can certainly be seen as a success that can be attributed to the described measures.

There is still a need for harmonization, inter alia, with regard to the differences in the implementation of the relevant EU Directives in the Member States and the mutual approval of rolling stock. The situation concerning punctuality and delays of the trains is also still unsatisfactory. This aspect will be one of the key areas of the measures in the years to come.

However, given the existing and new bottlenecks in the corridor caused by the increasing traffic volume, it is above all the ministries that must coordinate their plans for the upgrading of their infrastructures.

Development of bottlenecks on the N-S Corridor 2005-2020



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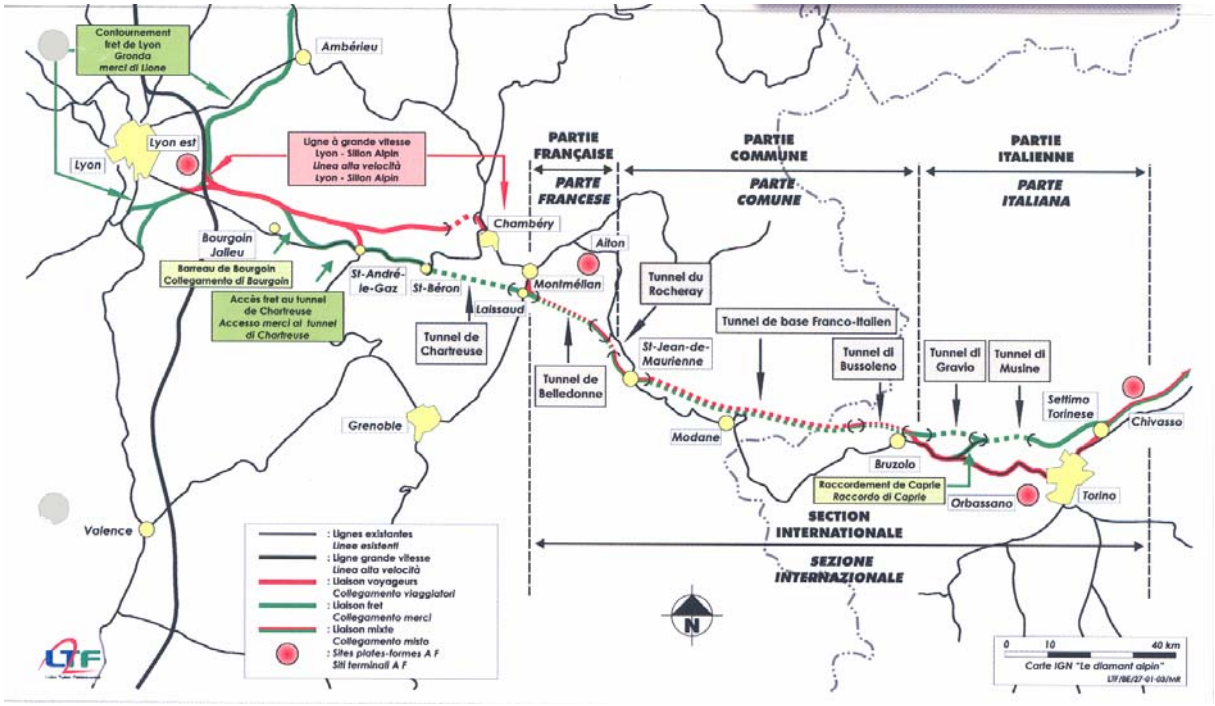
4. The remaining corridors

Of course, improvements of the quality of the offer have been considered for all corridors long before the conclusion of the Alpine Convention and concrete measures have been and are currently being taken. However, they are very different in nature and range from quasi-contractual cooperations, as in the case of the Brenner 2005 Action Plan and the north-south corridor, through the intent to conclude such agreements in the medium term to the conclusion that such measures do not seem to be useful at all. It is obvious in this context that, given the specific infrastructure and operational requirements, specifically adapted solutions must be found.

4.1 Lyon-Turin (Mont-Cenis) and Marseille-Genua (Ventimille)



The Lyon-Turin route is a section of the TEN corridor D Valencia – Ljubljana and the most important rail link between France and Italy (transport volume in 2004: 6.9 million tonnes).

Similarly to the Brenner corridor, there are plans to significantly improve the quality of the rail transport offer in the short and medium term without waiting for the completion of the tunnel between Saint-Jean de Marienne and Orbassano (52 km, completion planned for 2020).

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The objective is to achieve at least the transport volume of 1999 (10 million tonnes).

According to the CAFT survey 2004, the French rail transport share via the Alps amounted to a total of 6.8 million tonnes with a modal split share of 14% which has decreased considerably in comparison with 1994 (19%).

The governments of both countries decided to optimize the conditions in the existing Mont Cenis Tunnel and to develop a high-quality rail transport service (rail highway).

4.1.1 Upgrading of the tunnel

The 13.7-km long Mont Cenis Tunnel, inaugurated in 1871 is a high altitude tunnel, with winding lines that include very steep gradients, which can greatly limit train loads and seriously penalises rail transport costs. For example, the incline either verges up or exceeds 30 ‰ and bends are often below 400 m of the curvature radius, on both sides. A systems of two successive banking engines is required for heavy trains between Saint-Jean-de-Maurienne and Modane, on the one hand, and beyond Modane on the other.
Finally, the reduced gauge of these structures, designed for trains of that era, are now found to be unsuitable.

Under these conditions, the political decision was for heavy works aiming to upgrade the Mont Cenis Tunnel gauge to the European B1 gauge, which will be completed at the end of 2008 and then enable technically to transport most of the road traffic that passes in transit along the Mont Blanc / Fréjus corridor route.

Of course these decision in fact led to reduced tonnage transported on the historical line. The works period does not ease operations and, in 2005, a derailed train at the entrance of the tunnel damaged the track even more. Thea im is to at least enjoy the same traffic level as in 1999 (10 MT).

4.1.2 The experimental rail highway

A second political decision was to put into service a 175-km long experimental rail highway in Autumn 2003 between Aiton (France) and Orbassano (Italy), in order to test road sector acceptance, the accessible market, carriages, locomotives, terminals, timetables, regularity, handling of lorry drivers.

This service uses the MODALOHR system and low-loader wagons (20 cm from the rail), equipped with standard-sized wheels, because of the present, very restrictive gauge of the Mont Cenis tunnel, thus receiving up to 4-m high and 2.60-m wide lorries (about 6 % of all HGVs using the Fréjus and Mont Blanc road tunnels, which are mostly tankers). The terminals (at Aiton and Orbassano) are user-friendly and enable simultaneous loading / - unloading of lorries (in less than 40 minutes). The tractor must be uncoupled and can board another MODALOHR carriage. The driver moves to a reception carriage at the front of the train, where meals, films and magazines are available.

Since June 2004, semi-trailers can also travel on their own (unaccompanied transport), as the operator performs loading / unloading via a tractor (service jockey).

The rail highway uses the existing railway line where both passenger and freight trains co-habit.

The service includes four rotations a day (5 days a week). Each can load a maximum of 15 to 16 trailers because of the percentage of accompanied trailers (see infra).

After nearly three years of experience, the experimental rail highway has been found to be technically successful, as the MODALOHR system is reliable and efficient. Nevertheless, service regularity is still deplorable. Thus, in 2005, 65 % of trains in the Italy-France direction arrived at Aiton at least 30 minutes late. There are multiple causes for these delays; notably incidents on engines, works in the Mont Cenis Tunnel, priority given to passenger trains, etc….

There is an average 65 % shuttle occupation rate for all traffic (4 daily return journeys), but the saturation point is reached in afternoon and evening shuttles. Indeed, these times are the most sought after by hauliers, as they enable to load at the plant in the morning or during the day.

Traffic was very slow to pick up at the end of 2003 and in 2004. However, since the start of 2005, traffic numbers reached about 250 lorries a week, which was the result of long and profound commercial canvassing work with hauliers.

Also, most unaccompanied trailer transport grew rapidly (from 40 % in 2004 to 60 % in 2006), thus improving rail highway productivity (+25 %) increasing the load/tare ratio and number of trailers per train. At the same time, haulier logistics around both terminals were reorganised, with agreements being signed between French and Italian partners.
Transport of hazardous substances increased continuously and now exceeds 40 %, after the exceptional peak due to the tunnel closure.

However, the Alpine rail highway's economic and financial results are not very satisfactory, as direct revenue is well below charges. Note that the price of a rail highway crossing is lower than the cost of the equivalent road crossing (by about 20 %), in order to make up for the poor service quality (numerous delays) and longer journey (due to loading / unloading time). During the whole test period, France and Italy equally share the rail highway's operating loss, with aid approved by the European Commission.

4.1.3 Future steps towards a concerted France – Italy action plan for the rail corridor

During the Franco-Italian Summit of 4 October 2005, ministers decided to start thinking about operating a further service, at the end of construction work. This mission must notably consider increasing frequencies, improving timetable distribution, lengthening shuttles and possibly proposing regulatory restraints for directly-competing road crossings (prohibiting some types of goods or time intervals, etc…).

Also, in the medium-term, ministers decided to set up a concerted action plan for optimising rail service on the existing line, in order to stop the drop in the rail freight market share and establish the credibility of the longer termin Lyon-Turin project (see ministers' letter of 4 October 2005). For this, RFF, RFI, SNCF and Trenitalia, under the auspices of both ministries, will set up a concrete action plan (monitoring each traffic, work site hazards and delays, setting up a monthly co-ordination committee, improving operational communication between infrastrukcture managers, connection between the Aiton platform and railway network, etc…). France and Italy could then sign a Memorandum of Understanding, similarly to the approach instituted on the Brenner by Germany, Austria and Italy).

4.1.4 Deploying the ERTMS along corridor D

Similarly to the Swiss section of the IQ-C project, the Lyon-Turin route will also benefit from the intention of the EU Commission to equip the entire corridor D with ERTMS.

In compliance with the Memorandum of Understanding, signed on 17 March 2005 by the European Commission and railway companies, the strategy for deploying the ERTMS on the Valencia (Spain) – Marseille (France) – Lyon (France) – Turin (Italy) – Ljubljana (Slovenia) (= corridor D) standard line is currently being finalised. It will enable to greatly improve service interoperability and quality on this international freight corridor. They planned to deploy the ETCS-level 1 control system.

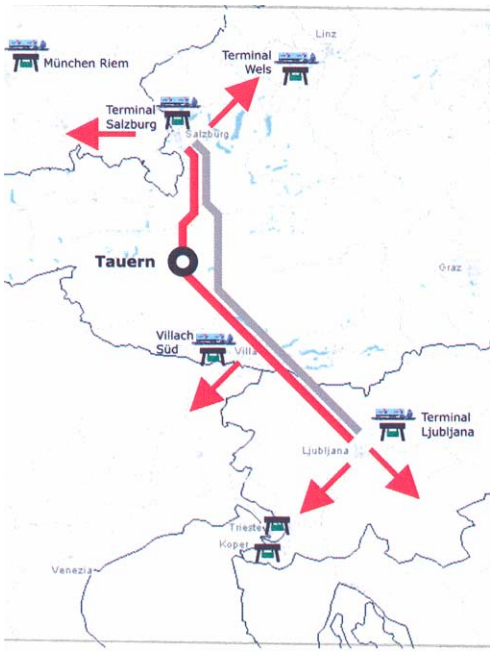
The involved countries' ministers of transport shall soon sign a letter of intent and set up financing required for deploying the ERTMS on the corridor sections in their respective countries. Also, the European Council is preparing financial regulations specifying co-financing application rules fort he 2007-2013 period.

The section Lyon-Turin is planned to be equipped in the period from 2010-2014.

4.1.5 Ventimille

Because of the law traffic passing through (0,5 Mio t in 2004), which has been more or less stable for several years), and of the impossibility of modernising this coastal rail route with very restrictive geographical features, Ventimille doesn't offer real optimisation opportunities at all.

4.2 Salzburg- Ljubljana (Tauern)



After the Brenner route, the Tauern axis is the route with the second largest freight traffic volume of trans-Alpine traffic via Austria.

The principal function of the Tauern corridor today is to link the ports of Koper and Trieste to Southern Germany and the central region of Upper Austria. Since the volume of traffic on these routes exhibits a rising trend, rail freight via the Tauern corridor still has great potential.

In 2004, approximately 4% of the total freight on the Tauern axis was transported using unaccompanied combined transport services and approx. 5% using rolling road services. Between Salzburg and Trieste, rolling road services are operated with 21 trains per week running in each direction.

For this axis, a so-called “Tauern action plan” has been developed. This is a national research project that was carried out in 2003 and aimed at examining deficiencies of this corridor and possible improvement measures. Therefore, it is comparable with the first stage of the Brenner Action Plan, i.e. the first analysis of the situation.

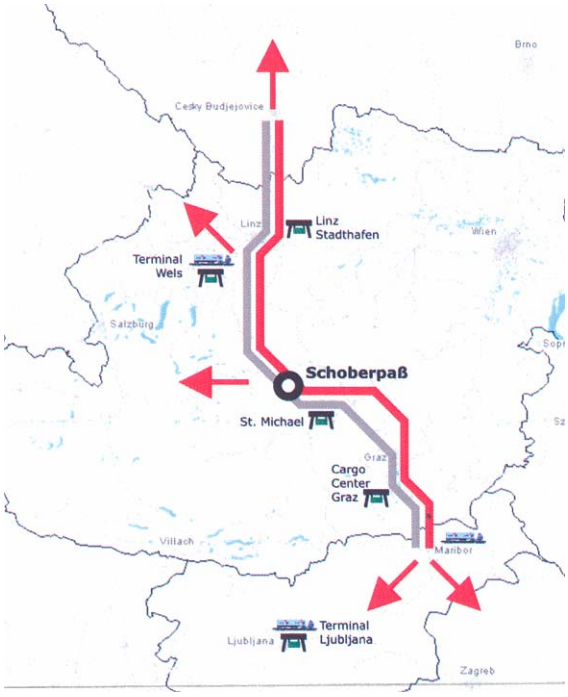
Possible additional measures according to the “Action plan Tauern-Track” which could complete the already planned step by step progressive double tracking of the remaining single track sections, would be

- establishment of an information and quality management system
- removal of operational bottlenecks
- enhancement of the service offer, especially in unaccompanied combined transport, by means of trainload services to Trieste and Koper
- development of a seamless, axis-related traction concept to accelerate the trainload services that are to be introduced

These measures are therefore similar to those set out in the Brenner Action Plan.

The unaccompanied combined transport links from Nuremberg to Trieste ("Trailertrain") and from Munich to Trieste and Koper (“Adria train”) have meanwhile been established in the framework of the INTERREG III B project AlpFRail. On the Salzburg-Villach route, capacity was created for an additional nine trains a day in each direction.

4.3 The Budweis-Maribor corridor (Phyrn-Schober axis)



Since a large part of transport operations on the Phyrn-Schober axis are currently intra-Austrian or bilateral transport operations between Austria and Germany, the same approach as in the Brenner 2005 Action Plan would be less rich in meaning because the interface problems are not the most important aspect in this context.

Although the railway line between Linz and Selzthal is currently for the most part only a single-track line, it can be used for normal combined transport operations without any restrictions. In 2004, 3% of the total freight on the Phyrn-Schober axis was carried using unaccompanied combined transport services and approx. 2.5% using rolling road services. Currently, two rolling road services are operated from Wels to Maribor and from the Cargo Center Graz to Regensburg (42 trains in each direction in total per week). In unaccompanied combined transport, a block train runs between Graz und Duisburg.

In 2005, the Phyrn-Schober axis was analysed with regard to deficiencies and possible improvement measures.

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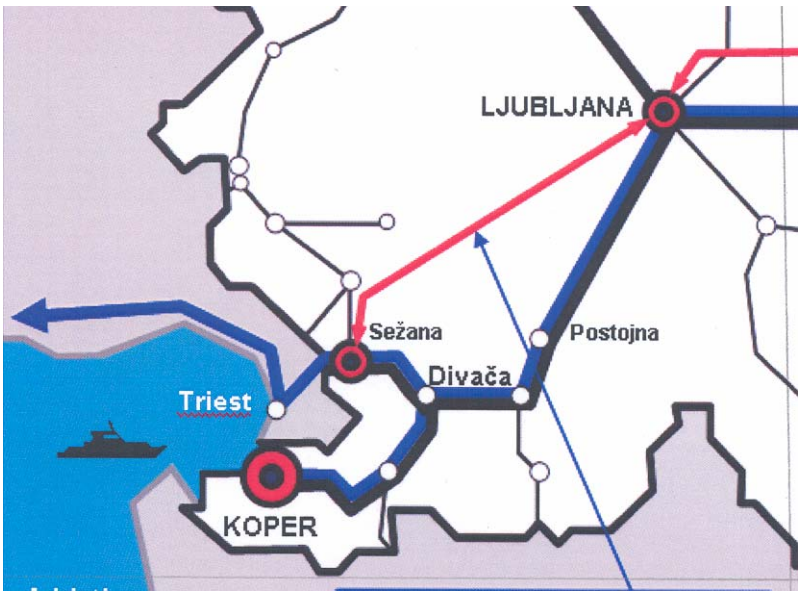
It is planned to double track some single-track sections on the Phyrn-Schober axis. Efforts are being made to bring forward these measures as well as specific capacity increases, for example, through the extension of tracks in crossing stations or measures to enhance signalling technology.

Therefore, a further improvement of the operating quality can be expected in combined transport. Further specific measures to increase capacity are in preparation. The service offer on the rolling road and in unaccompanied combined transport could be increased, in particular, by operating block train services between the Cargo Center Graz and Germany.

4.4 Venice-Trieste/Koper-Postojina-Ljubljana



The Italian-Slovenian sector as part of the Trans-European Corridor 5 from Barcelona to Ukraine includes the axis Venice-Trieste/Koper-Postojina-Ljubljana. It represents a logistic platform for East-West commercial flows and an important “delivery point”. The existing infrastructural network allows to collect an important traffic quota, including local traffic between Italy and Slovenia, too.

The transport system and logistic network in the Italian-Slovenian borderline is due to develop as part of a larger system integrated with the neighbouring regions.

In 2004, the Italian-Slovenian in/out rail freight flows amount to about 2 million tonnes per year.

Modernisation of the SS devices on Ljubljana-Sezana line was finished in 2004. The project of doubling the Capodistria/Divaca rail connection has been approved. The segment Divaca/Ljubljana is still under planning.

Other short and mid term projects are:

- Ljubljana-Sezane line (5 stations, 13 line sections 2006-2018)
- Diváca-Koper line (4 stations, 5 line sections 2008-2010)
- Reconstruction of existing track of Diváca-Koper line (2007-2010), Upgrading of SS devices on this line (2006-2007), construction of new double track line on the line in phases (2008-2015 and after 2020)

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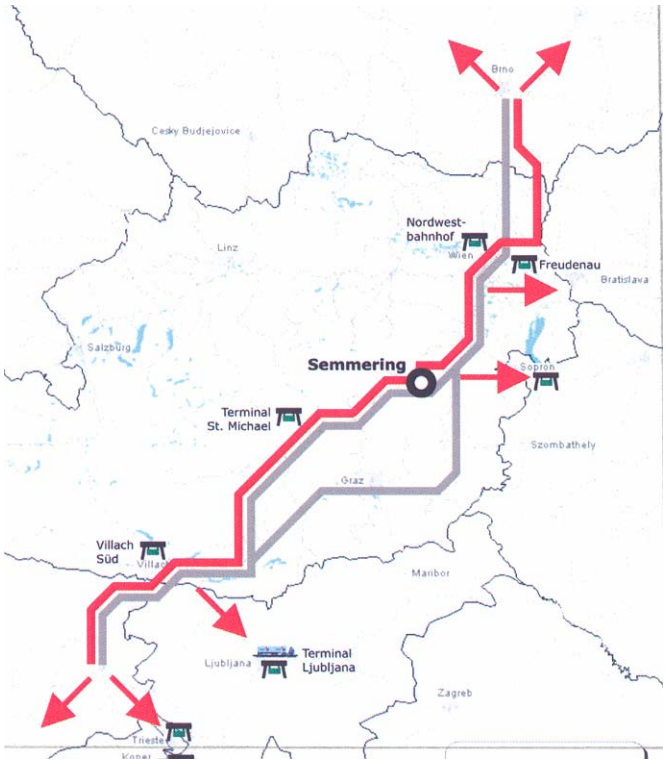
On the Italian side there is no relevant work in progress yet; critical operational conditions persist in the double track line Venice/Monfalcone-Trieste/Villa Opicina/Sezana from the Isontine plane to the Aurisina Fork, because the 12 % slope limits to 1,100 tonnes the maximum weight allowed per train.

4.5 Brno – Udine (Semmering, South corridor)



The South corridor is the main connection between the north Italian industrial area, the ports of Trieste and Koper, the eastern region of Austria and Slovakia, the Czech Republic and Poland. Against the background of these states' accession to the EU, this traffic will gain in importance. (In 2004, approximately 5% of all freight traffic were carried out on this route by unaccompanied transport operations.)

The railway from Brno via Vienna, the Semmering and Villach to Udine has been a continuous double-track line since December 2003 when the new double-track section Tarvisio Boscoverde – Udine was opened to traffic. A total of four tracks are available on a number of sections between Vienna and Wiener Neustadt.

Due to small arc radii and narrow tunnel profiles, certain restrictions apply to the carriage of swap containers and semi-trailers on the section over the Semmering Pass. This means that it is impossible to operate a rolling road. In the long-term, the planned construction of the Semmering Base Tunnel and the Koralm railway could make the axis more attractive for combined transport, too.

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The line is completely electrified; however, between Brno and the Czech/Austrian border, a different distribution system is used (25 kV/50 Hz). Dual system locomotives are needed here for the section Bernhardstal – Breclav, but the ÖBB (Austrian Federal Railways) is able to provide them in sufficient quantities. In Austria alternating current of 15 KV and 16.7 Hz is used. In Italy, the line is electrified with 3 KV direct current.

Train control on the southern section of the line is currently carried out using track circuits. In Italy, an automatic signalling and section block system has not yet been installed along the entire line, which is why the law requires two engine drivers for each locomotive.
On the Semmering Pass, the line has gradients of up to 26 ‰. Due to small arc radii pusher operations are impossible, for which reason a large number of freight trains have to be split.

It is precisely because of the international importance of this rail link and the above-mentioned “border-related” problems to apply element packages of the Brenner Action possibly could make sense to this route.

The following approaches from the Brenner Action Plan possibly could be applied to this route:

- Quality management and removal of bottlenecks in operations, especially on the Villach – Tarvisio – Udine – Trieste section

- Expansion of the range of services offered in unaccompanied combined transport, especially trainload services from Trieste container port to Vienna, Slovakia and the Czech Republic

- Development of a seamless axis-related traction concept to accelerate the trainload services that are to be introduced

- Coordination and assessment of the actual availability of paths on the South corridor

- Improving the provision of rail links from the South corridor towards Verona and Milan and enhancing the transhipment capacities in Northern Italy and Slovakia, the Czech Republic and Poland.

4.6 Danube axis

Although the Danube axis is not a trans-Alpine traffic route in the proper sense, it partly runs along the area of the Alpine Convention and is contained in Appendix 1 of the Transit Protocol to the EU Accession Treaty of Austria. Therefore, it has been included for the sake of completeness, especially since it could provide an important alternative to the Tauern axis, in particular, where the volume of South East European traffic is expected to increase as a result of the accession of the new EU Member States Hungary and Slovakia and later on of Romania and Bulgaria.

The Danube axis runs from Passau and Munich in the west to Bratislava and Budapest in the east. The sections from Passau and Munich to Wels are double-track lines; from Wels to Linz there is, in addition to the double-track western line, a third track via Traun. The line between Linz and Vienna is currently being widened to four tracks, and some important four-track sections of the line are already in operation. The eastern line from Vienna to Budapest is a double-track line from which a single-track line branches off to Bratislava-Petrzalka via Kittsee.
Apart from that, there is a further single-track line between Vienna and Bratislava-Central Station north of the Danube, as well as a single-track line to Budapest via Sopron. In 2004, the Danube axis, compared to the other Austrian rolling road axes, had the largest rolling road transport volume.
Where appropriate, measures or elements from the Brenner Action Plan or the North-South corridor (Switzerland) would be welcome and should be taken into consideration.

5. Conclusion

The examples of the “Brenner Action Plan” and the “IQ-C North-South corridor” have shown that it is possible, on the basis of relevant agreements concluded between all parties involved in freight transport concerning operational, technical and organizational measures and their implementation in ambitious but realistic steps, to achieve significant improvements of the service offer on the trans-Alpine rail corridors without having to wait for major tunnel solutions.

Of course, the challenges are corridor-specific so that a simple transfer of measures is not always possible.

For the corridor Lyon-Turin similar forms of cooperation are conceivable.

For other routes, the transfer of individual elements or element packages seems to be useful (for example on corridor Pontebbana (south corridor) and on Danube axis).

Finally, there are routes (e.g. the Phyrn-Schober axis and the Arlberg axis) with no interface problems since domestic traffic predominates on such routes.

The appeal made by the ministers at the Conference of Alpine Regions in Garmisch-Partenkirchen in 2004 did not lead to any new activity in this field, but comforted government’s decisions already implemented, such as on the corridor Lyon-Turin.

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Tagung der Alpenkonferenz
Réunion de la Conférence alpine
Sessione della Conferenza delle Alpi
Zasedanje Alpske konference

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The Alpine Convention
TRANSPORT Workgroup
Costs Subgroup

External Cost Assessment In Transalpine Corridors

DRAFT REPORT

ITALIAN SUB-GROUP PRESIDENCY - OCTOBER 2006

FOCAL POINT – dr. Paolo Angelini

TECHNICAL CONSULTANTS

Dr. Massimo Santori

Dr. Roberto Maia

1. INTRODUCTION

This document is a work progress conducted by the Sub-group "Costs" of Alpine Convention WGT Transport during the year 2006 [7] to verify the impact of the different costs on Alpine transport. The document takes into account the technical elaborations coordinated by the Italian Chairmanship, with contributions of French, Swiss, Austrian, German and Slovenian delegations and the outputs of the last WGT Transport meeting in Paris, October 5, 2006.

The document mainly concerns an estimation of external costs deriving from heavy traffic on roads in comparison with the costs that have been incurred into by users through the payment of tolls along the three main transalpine corridors:

- Lyon-Turin, through the Fréjus Pass,
- Basle-Milan, through the St. Gotthard Pass,
- Munich-Verona, through the Brenner Pass.

The task carried out so far has provided interesting information.

However, to meet the requirements of the mandate of Garmisch and to complete the cost analysis in transalpine heavy goods transport in general further work needs to be done. It will include the following steps:

1. rough estimations of the approximate infrastructure costs, including costs for maintenance and operation, of the three corridors;
2. estimations of the difference between the total amount of costs (external and direct costs) caused by heavy duty vehicles on the three corridors and the tolls paid according to their performance on these corridors;
3. estimation of the approximate share of tax payments (fuel tax, vehicle tax) of the haulage industry that can be contributed to the three corridors;
4. drafting proposals for a possible future tarification.

2. EXECUTIVE SUMMARY

The data illustrated in this report provide a rough evaluation of the Alpine the carriage of goods by road system and the coverage of external costs by traffic tarification.

Regardless of the numerical values that have emerged, this survey should be intended as an attempt to develop a rough examination method, which starting from the already available data taken from technical literature without any expensive and sophisticated analysis, has allowed the Costs Subgroup and the WGT Transport to carry out a few quantitative evaluations.

The progress of this report, in comparison with the text delivered in February 2006, does not allow to consider it the final one: a few data are still missing in this report to consider it final.

Specifically with special reference to the following items:

- the traffic data used have been updated considering the CAFT 2004 matrix;
- the tolls have been calculated according to the current tariffs (2006);
- the EURO classification is not updated in relation to the tariffs introduced in the various routes under question; the division of the used vehicles in emission categories from EURO 0 to EURO III has been effectuated considering the vehicle's age expressed in he CAFT matrix for the France-related traffic; more updated data would allow a more accurate evaluation, over all the considered corridors;
- for the evaluation of the external costs the INFRAS method - that provides higher values if compared with other methods - has been used: at this respect, it is also possible to consider a study made by the French Ministry of Transports [5] from which lower external costs are reported, that vary according to the traffic type and to the crossed areas in their Country.

  This study also highlights the fact that in the French highway corridors all external costs are fully paid by the tolls: it is therefore compulsory to evaluate if these considerations can be extended to the Italian, Swiss, Austrian and German ones;
- due to the lack of data, neither the infrastructure costs, including maintenance and operation costs, nor the taxes (fuel tax, vehicle tax),have been estimated yet; parametric data concerning Italian costs have been provided, but accurate information about the other Countries are still missing.

Nevertheless, the method that has been defined and illustrated in this report may serve as a useful starting point to carry out more accurate, thorough and meaningful evaluations. Hence, the contribution provided by the delegations taking part in the Costs Subgroup is useful to further improve this method and to use more updated traffic data.

3. METHODOLOGY

3.1. Approach

For the purposes of the above-mentioned evaluation, we have deemed it necessary to make a comparison of overall data related to heavy goods vehicles, which actually cover a certain transalpine route during a certain period of time (a calendar year), in order to take into account the whole variety of vehicles under question (type of vehicle, axle configuration, European emission category) and loads.

Once the reference route was identified, an evaluation and a comparison of the heavy goods vehicles transit external and transport charges were carried out in each individual Country concerned.

Before comparing external costs and charges, infrastructure costs have to be deducted from the charges, taking into account the charge policies implemented in each individual Country.

As a result, a comparison is made between the overall external costs generated by the heavy goods vehicles that cover a certain distance on a yearly basis and the amount of money paid, which is available to internalise external costs in each individual Country concerned by their transit.

3.1.1. Traffic flow evaluation

The following steps are the quantitative evaluation of annual traffic flows along the routes under question and the identification of vehicle classes according to their polluting emissions, which is necessary to estimate external costs.

In order to evaluate traffic flows, the O/D CAFT (Cross Alpine Freight Transport) matrix has been used, which is characterized by the following features:

- reference period: 2004,
- subject: the carriage of goods by road through the Alpine Arc,
- zoning of origins and destinations according to NUTS (*Nomenclature of Statistical Territorial Units*) classification for European States and to ISO Alpha 2 for non-European States,
- transport modes under question: rail and road,
- classification of vehicles according to the weight of vehicles, loads and axle configuration.

The tables used for the evaluation were complete enough to allow the classification of vehicles according to the charges implemented in the Countries under question. For every transit the following elements are known:

- Country in which the vehicle is registered,
- origin,
- destination,
- which pass is crossed,
- which transport mode is adopted,
- traffic report: import, export, internal traffic, transit,
- type of vehicle: truck, trailer truck, articulated truck, motor unit without trailer,
- axes configuration,
- vehicle mass,
- load mass,
- expansion factor.

There are 4 parameters for the vehicle mass that are fundamental for the calculations:

- empty truck or motor unit mass,
- empty trailer mass,
- overall maximum permissible truck or motor unit mass,
- overall maximum permissible trailer mass.

The freight mass is to be considered as the net mass of produces transported, including the packaging.

The O/D matrix has allowed to define loads on each individual Pass; the overall result is 9,987,421 vehicles/year.

Table 1 reports the number of road vehicles that have crossed each Alpine Pass in 2004. Hence, the international Passes with the highest traffic rate are: Brenner and Shoberpass in Austria, Fréjus and Ventimille in France and St. Gotthard in Switzerland. This analysis specifically refers to Fréjus, Brenner and St. Gotthard Passes.

Data emerging from the CAFT survey are in line with Alpinfo statistical data published by the Swiss Federal Office for Local Development during this same year.

The overall freight value can be estimated on the total annual number of heavy goods vehicles crossing all the Alpine Arc Passes, and on the total freight amount. Taking into account 130,343,715 tonnes transported by 9,987,421 vehicles, the average load will amount to 13.1 tonnes/vehic. This amount is higher than the amounts suggested by Cipra, Infras [1] and "Amici della Terra" [3]. That could depend on the actual presence of heavy road vehicles, that often drive on long international routes.

Generally it has to be remarked that the listed numbers on the transport volume relate to the Alpine passes and not to the whole corridor. Simply because, on the one hand, not all trips identified at the Alpine passes actually lead through the entire corridor (e.g. on the Munich-Verona corridor trips from Italy to Innsbruck), on the other hand, the trips within the corridor, which do not lead over the Alpine passes (e.g. trips from Munich to Innsbruck) are not included in the numbers.

Countries	Pass	Traffic flows [vehicle]	Mass [t]	Average load [t/vehicle]
France/Italy	Ventimille	1,339,960	19,370,992	14.5
France/Italy	Montgenèvre	39,324	430,529	10.9
France/Italy	Fréjus	1,130,963	18,093,272	16.0
France/Italy	Mont Blanc	353,107	5,636,832	16.0
Switzerland/Italy	Gr, St, Bernhard	65,067	610,282	9.4
Switzerland/Italy	Simplon	66,598	670,876	10.1
Switzerland/Italy	Gotthard	969,347	9,884,441	10.2
Switzerland/Italy	San Bernardino	154,352	1,330,670	8.6
Austria/Italy	Reschen	135,143	1,966,093	14.5
Austria/Italy	Brenner	1,995,553	31,138,528	15.6
Austria	Tauern	940,813	12,175,467	12.9
Austria	Schoberpass	1,280,848	14,636,255	11.4
Austria	Semmering	527,934	5,639,756	10.7
Austria	Wechsel (Schäffern)	988,412	8,759,723	8.9
	Total	**9,987,421**	**130,343,715**	**13.1**

Table 1 - Heavy road vehicles crossing the main Alpine Passes in 2004 (source: CAFT data and Alpinfo)

3.1.2. Routes definition

For every Alpine Pass we analysed, possible routes within the Alpine Arc area were detected. The "Alpine Arc areas" are to be considered as the ones located in the geographical limits established by the Alpine Convention, in order to make the final external costs fall on that specific area. Complying with this process the chosen routes are the following:

- Montmelian-Turin within the Lyon-Turin corridor (Fréjus tunnel) between France and Italy;
- Altdorf-Bellinzona within the Basle-Milan corridor (St.Gotthard pass) between Switzerland and Italy;
- Rosenheim-Bolzano within the Munich-Verona corridor (Brenner pass) between Germany, Austria and Italy.

These are the shortest routes, and they only include motorways: they represent the routes that a truck driver would most likely prefer while driving through the areas taken into account. For this reason, urban areas were not considered (and they would anyway be external to the Alpine Arc area).

3.1.3. Emission evaluation

The CAFT survey does not contain a classification of vehicles according to European emission classes, a parameter that is instead used for levy systems in force in Germany and in Switzerland.

In order to bridge this gap, a rough evaluation has been based on the information found in the CAFT matrix about French Passes, that shows the year of registration of transiting vehicles. Then, using the report, showed in Table 2, it was possible to tag every vehicle with the corresponding emission category by the year of registration.

Year of registration	Emission categories
Before Dec. 31st 1992	Euro 0
After Jan 1st 1993 or Oct 10th 1996 (by kind of gas emitted)	Euro I
After Jan 1st 1997	Euro II
After Oct 10th 2001	Euro III

Table 2 - Classification of emission categories by vehicle registration year.

Table 3 reports the percentage classification of emission categories reflecting the situation of French Alpine Arc passes in 2004, calculated on the basis of data taken from the above-mentioned source, which classifies vehicles according to the fuel they run on and to the EU emission categories they belong to (91/542 Stage I, 91/542 Stage II, 93/59 Euro I, 96/69 Euro II, 98/69 Euro III, 99/96 Euro III).

Emission Category	Number of vehicles	%
non identified	35,689	1.25%
Euro 0	54,586	1.91%
Euro I	95,042	3.32%
Euro II	1,172,115	40.94%
Euro III	1,505,922	52.59%
Total	**2,863,355**	**100.00%**

Table 3 - Classification of heavy road vehicles transiting the French Alpine Arc passes in 2004 by emission category (source: CAFT matrix).

4. RESULTS

4.1. Traffic

4.1.1. Lyon-Turin Corridor

The Montmelian-Turin route has a total length of 172 km, subdivided into 83 km within the French territory, from Montmelian to Modane (A43 motorway) and 76 km in Piedmont, from Bardonecchia to Turin (A32), in addition to a further 13 km long section of the Fréjus Tunnel (T4).

Based on the CAFT data, it can be inferred that 1,130,963 heavy goods vehicles pass through this road in both directions.

Traffic [vehic/year]	Mileage [km]	Total gross laden weight [t]	Average freight [t/vehic]
1,130,963	172	18,093,272	16

Table 4 - Annual Traffic along the Montmelian-Turin route (source: CAFT data).

4.1.2. Basle-Milan Corridor

The Altdorf-Bellinzona route crosses Switzerland for 106 km (A2 motorway) transiting the St. Gotthard Pass.

This corridor can be subdivided into three sections. The two sections Altdorf-Gotthard Tunnel (northern access) and Bellinzona-Gotthard Tunnel (southern access) are typical mountainous road with long bridges and tunnels; the central section is the Gotthard Tunnel. The sections between Bellinzona, Chiasso and Milano have not been taken into account because the traffic flows have a relevant local component; therefore these flows cannot be directly determined through the CAFT matrix.

Based on the CAFT data, 969,347 heavy goods vehicles transit every year along this road in both directions.

Traffic [vehic/year]	Mileage [km]	Total gross laden weight [t]	Maximum permissible gross laden weight [t]	Average permissible gross laden weight [t]	Average gross laden weight [t/vehic]
969,347	106	9,884,441	33,073,273	34.1	10.2

Table 5 - Annual Traffic along the Altdorf-Bellinzona route (source: CAFT data).

Please note that the average gross laden weight value referred to 2004 for the Altdorf-Bellinzona route is about double the amount of 1999, increasing from 6.4 to 10.2 tonnes. This difference is due to the increase in the maximum permissible gross laden weight (28 tonnes in 1999, 34 tonnes in 2004) and to the performance-linked tax allowance on heavy traffic in order to optimise the capacity of articulated lorries travelling through Switzerland.

4.1.3. Munich-Verona corridor

The Rosenheim-Bolzano route stretches throughout Germany, Austria and Italy. Every year 1,995,553 heavy goods vehicles travel along this corridor in both directions, over a total mileage of 222 km: 27 km in Germany, from Rosenheim to Kufstein along the A93 motorway, 110 km along the Austrian A12 and A13 motorway sections from Kufstein to Brenner, and 85 km on the A22 motorway from the Brenner Pass to Bolzano South.

Traffic [vehic/year]	Mileage [km]	Total gross laden weight [t]	Average gross laden weight [t/vehic]
1,995,553	222	31,138,528	15.6

Table 6 - Annual Traffic along the Rosenheim-Bolzano route (source: CAFT data).

4.2. Tolls

4.2.1. Lyon-Turin corridor

Toll payment along the corridor linking France to Italy concerns the following motorway tollgates: Chiguin barrière, and Saint Michel Maurienne barrière along the A43 motorway, Salbertrand tollgate, Avigliana tollgate and Bruere tollgates along the A32motorway. Toll is also due to enter the Tunnel.

Size [N° axles]	Traffic [vehic/year]	Mileage [km]	Unit rate [€/vehic]	Total Costs [€]
2	11,249	83	24.60	276,725
3 or more	1,119,714	83	32.90	36,838,601
			TOTAL	37,115,326

Table 7 - Total annual costs borne by heavy goods vehicles along the Lyon-Turin Corridor, Montmeliane-Modane (A43) section, in France.

Size [No. axles]	Traffic [vehic./year]	Mileage [km]	Unit rate [€/vehic.]	Total Costs [€]
2	11,249	76	10.20	114,739
3	10,413	76	15.50	161,394
4	63,267	76	20.90	1,322,283
5 or more	1,046,035	76	24.20	25,314,038
			TOTAL	26,912,455

Table 8 - Total annual costs borne by heavy goods vehicles in Italy along the Lyon-Turin Corridor, Bardonecchia-Turin section (A32).

In addition to motorway charges, the Frejus Tunnel toll is also levied. The information on the year of registration of the vehicles transiting along the pass have been used to classify the heavy goods vehicles passing through the Fréjus Tunnel according to the European emission categories.

The absolute number and the percentage of heavy goods vehicles passing through the Fréjus, divided by emission categories, are reported in Table 9. The result is the amount of tolls reported in Table 11.

Emissions category	NO. vehicles	% vehicles
Euro 0 – Euro I	42,146	3.78%
Euro II	466,104	41.77%
Euro III	607,529	54.45%
Total	1,115,778	100.00%

Table 9 - Heavy goods vehicles passing through the Fréjus Tunnel in 2004 subdivided by emission category (elaboration on CAFT data).

		2-axle Vehicles			Vehicles with 3 or more axles		
		Traffic [vehicle]	**Rate [€/vehic]**	**Total [€]**	**Traffic [vehicle]**	**Rate [€/vehic]**	**Total [€]**
Euro I	3.87%	425	113.60	48,269	42,294	228.30	9,655,810
Euro II	41.77%	4,699	107.10	503,277	467,748	215.30	100,706,163
Euro III	54.45%	6,125	107.10	655,981	609,672	215.30	131,262,347
Total	100%	11,249		**1,207,526**	1,119,714		**241,624,319**

Table 10 - Tolls paid annually by heavy goods vehicles travelling along the Lyon-Turin corridor passing through the Frejus Tunnel.

The total amount paid by the 1,130,963 heavy goods vehicles passing through the Fréjus Tunnel corresponds to 242,831,845 €.

Yet, the result appears to be overestimated due to the possibility to obtain a return ticket rather than a one-way ticket for heavy goods vehicles valid for the next 24 hours of the fifteenth day since the day after the emission. Thanks to this return ticket, a lower rate of 19.40% on average is obtained as against the sum of two one-way tickets. Assuming that all the lorries benefit from this discounted return rate, the total tolls paid amount to 195,722,467 €. Hence, this value will be taken as reference for the following evaluations.

Total costs Paid in France [€]	Total costs paid in Italy [€]	Total costs paid in the Fréjus Tunnel [€]	Total costs paid along the corridor [€]
37,115,326	26,912,455	195,722,467	259,750,248

Table 11 - Total annual costs paid along the Montelian-Turin section.

4.2.2. Basle-Milan corridor

In order to calculate the levy on heavy goods vehicles (LSVA) adopted in Switzerland, the Euro 0 and Euro I vehicle percentage values are grouped together, up to a total of 38.3%.

Lacking any further data related to the specific case, for the classification of lorries in the remaining emission categories, the percentages of traffic within the French Alpine passes are used, supplemented by the results obtained for the Euro 0 category. Please refer to the breakdown reported in the following Table 12.

Emission category	Percentage
Euro 0 - Euro I	4.0%
Euro II	42.0%
Euro III	54.0%

Table 12 - Breakdown according to the European emission categories of heavy goods vehicles that every year travel along the Basle-Milan corridor passing through the St. Gotthard Tunnel (elaboration on CAFT data).

At this point, the LSVA levied on an annual basis for the transit of heavy goods vehicles can be calculated, by dividing the total maximum permissible gross laden weight (33,073,273 tonnes) by the percentages of emission categories, assuming that the weight is proportionally distributed. The overall distance amounts to 106 km.

	%	Maximum permissible gross laden weight [t]	Rate [CentCHF/t×km]	Rate [Cent€/t×km]	Total costs [CHF]	Total costs [€]
Euro 0 - I	4.0	1 322 931	2.88	1.81	4 038 644	2 538 431
Euro II	42.0	13 890 775	2.52	1.58	37 105 038	23 321 834
Euro III	54.0	17 859 568	2.15	1.35	40 701 955	25 582 624
Total	100	33 073 273			81 845 636	51 442 889

Table 13 - Distribution of the maximum permissible gross laden weight among the European emission categories and calculation of the costs incurred into by the heavy goods vehicles, which every year cover the Altdorf-Bellinzona distance (A2) along the Basle-Milan corridor.

The tolls paid by the 969,347 heavy goods vehicles that cover the Altdorf-Bellinzona section passing through the St. Gotthard amount to 51 442 889 €.

4.2.3. Munich-Verona corridor

The vehicles reported in Table 13 are expected to pay the heavy traffic levy along the 27 km long distance within the German territory. The heavy traffic levy amount is reported in Table 14, assuming a distribution proportionate to the percentages of vehicles up to 3 axles and those with 4 axles or more.

Emission category	Percentage	Traffic [vehic/year]
Euro I	4.0%	79,822
Euro II – III	96.0%	1,915,731
Total	100.0%	1,995,553

Table 14 - Breakdown according to the European emission categories of heavy goods vehicles which every year travel along the Rosenheim-Bolzano corridor (elaboration on CAFT data).

		Euro I			Euro II-III		
	Traffic > 12t [vehic/year]	**Traffic [vehic/year]**	**Rate [€/vehic×km]**	**Costs [€]**	**Traffic [vehic/year]**	**Rate [€/vehic×km]**	**Costs [€]**
Up to 3 axles	209,749	8,390	0.13	29,449	201,359	0.11	598,036
4 axles or more	1,785,804	71,432	0.14	270,014	1,714,372	0.12	5,554,565
Total	1,995,553			299,472			6,152,601

Table 15 - Breakdown of vehicles whose weight is > 12 tonnes according to European emission categories and calculation of annual costs incurred into along the Rosenheim-Kufstein section of the Munich-Verona corridor.

The total LKW-Maut amount for the section under question is 6,452,064 €.

In Austria, the (GO-Maut) heavy traffic levy includes two charges for all vehicles with a weight more than 3.5 tonnes: a standard rate and a special additional rate regarding to 35 km section along the Innsbruck-Brenner A13 motorway (Table 16 and Table 17).

Size [N° axles]	Traffic [vehic/year]	Mileage [km]	Standard km Rate [€/vehic×km]	Total Costs [€]
2	153,437	110	0.130	2,194,155
3	56,312	110	0.182	1,127,358
More than 3	1,785,804	110	0.273	53,627,698
TOTAL				56,949,211

Table 16 - Annual costs calculated on the basis of the standard charges applied in Austria for heavy goods vehicles along the Munich-Verona corridor, Kufstein-Brenner (A12-A13) section.

Size [N° axles]	Traffic [vehic/year]	Brenner Supplementary Toll [€/vehic]	Total costs - Brenner [€]
2	153,437	23.50	3,605,779
3	56,312	32.90	1,852,651
More than 3	1,785,804	49.40	88,218,724
Total			93,677,154

Table 17 - Annual costs calculated on the basis of the special charges applied in Austria for heavy goods vehicles from Innsbruck to Brenner (A13).

Costs paid according to the standard rate [€]	Costs including the Brenner supplementary toll [€]	Total Costs paid in Austria [€]
56,949,211	93,677,154	150,626,365

Table 18 - Total annual Austrian charges paid by heavy goods vehicles along the Munich-Verona corridor, Kufstein-Brenner (A12 - A13) section.

On the Italian territory the same 1,995,553 heavy goods vehicles are required to pay the charges (reported in Table 19) between the Brenner tollgate and Bolzano South tollgate on the motorway A22.

Size [N° axles]	Traffic [vehic/year]	Mileage [km]	Unit rate [€/vehic]	Total Costs [€]
2	153,437	85	5.20	797,875
3	56,312	85	6.30	354,763
4	71,014	85	10.10	717,239
5 or more	1,714,790	85	12.20	20,920,443
TOTAL				22,790,319

Table 19 - Total annual costs paid by heavy goods vehicles in Italy along the Munich-Verona corridor, Brenner-Bolzano South (A22) section.

The total costs paid along the whole corridor are reported in Table 20.

Total paid costs in Germany [€]	Total paid costs in Austria [€]	Total paid costs in Italy [€]	Total paid costs along the corridor [€]
6,452,064	150,626,365	22,790,319	179,868,748

Table 20 - Total annual costs paid along the Rosenheim-Bolzano section.

4.3. External costs

To calculate external costs, cost coefficients have been defined according to the 1995 Infras-IWW method [1][7] (updated at year 2000), which takes into account some cost components, such as the average PM_{10} concentration level, the loss of output capacity due to death or disability, the amount of insurance premiums for vehicles, medical expenses, the fleet composition, the frequency and severity of road accidents, the percentage of population exposed to noise, the impact on the natural environment and landscape, land use, urban effects and indirect costs.

The Infras-IWW method suggests differentiated costs for each Country concerned and it highlights all the differences existing at a national level for each impact category. Anyhow, rather than using distinct values for each Country, it has been preferred to use the indicated value of average unit's cost of 7.01 cents €/(ton×km) and to consider a spread between 5.5 and 8.5 cents €/(ton×km) (i.e. ± 22%) to include possible differences between Countries, and cost actualisation.

Table 21 shows the external costs calculated with the INFRAS method subdividing the corridor into two homogeneous sections corresponding to the interested Countries.

Corridor	Mileage [km]	External costs - lower bound [€]	External costs - upper bound [€]
A32 - Torino-Frejus tunnel	76	75,669,067	117,118,365
A43 - Frejus tunnel-Montmelian	83	82,638,587	127,905,583
A2 - Bellinzona-Gotthard tunnel	27	14,686,001	22,730,562
A2 - Gotthard tunnel-Altdorf	57	31,003,780	47,986,742
A22 - Bolzano-Brennero	85	145,648,052	225,429,787
A13 - Brennero-Innsbruck	35	59,972,727	92,824,030
A12 - Innsbruck-Kufstein	75	128,512,987	198,908.636
A93 - Kufstein-Rosenheim	27	46,264,675	71,607,109

Table 21 - Calculation of external based on the Infras methodology along the three corridors taken into account.

4.4. Infrastructure costs

The share of charges paid by heavy goods vehicles to cover infrastructure costs for each transalpine corridor is now calculated in order to estimate the available amount to cover external costs derived from their transit through the Alpine area.

This is a very critical step because the infrastructure costs to be taken into account, shared in depreciation and maintenance costs, can vary a lot among the involved Countries as function of age of the infrastructures, taxation norms and other specific factors.

For this reason, in absence of sufficiently precise indications, the estimate of the infrastructure costs has not been made, limiting this report to the supply of tentative values, valid for the Italian reality, to be compared to those that might be supplied by other Countries:

- construction costs for a section of highway in Alpine area: 28 ÷ 50 Million €/km,
- construction costs for a section of tunnel: 200 ÷ 300 Million €/km,
- maintenance costs for a section of highway in Alpine area: 350,000 ÷ 600,000 €/km.

It should also be borne in mind that the infrastructure costs can be used to cover maintenance costs in order to reduce external costs, with special reference to noise pollution (building noise barriers or noise-absorbing paving), safety (*guardrails,* drainage paving and facilities, fixed and variable road signs), aesthetics (plant arrangement and grass mowing along the sides of the road). Yet, the relationship between maintenance costs and the internalisation of external costs is not an easy one.

4.5. Taxation

To complete this analysis it is also important to take into account the tax paid when buying the fuel, which depend upon the use of the infrastructure by the vehicle, and are therefore proportional to the external costs generated upon the examined corridors.

Also in this case there are harmonisation problems among the various Countries: it is possible for a transport Company to pay the fuel tax in a Country and to use the vehicle in a corridor crossing another Country. In many cases the Country cashing the tax is different from that suffering the damage from the external cost of the transport.

This evaluation would anyway require precise knowledge about fuel taxation in the various Countries. In Italy the fuel tax corresponds to 52% of the price, and includes various local, regional and state duties.

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