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***TOWARDS A MODAL SHIFT OF
TRANSALPINE FREIGHT TRANSIT***

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We thank heartedly all the contributors.

1. MANDATE GIVEN BY THE ALPINE CONFERENCE

For a common position on a modal shift of Alpine freight transit

On 4 April 2019, in Innsbruck, the Alpine Conference entrusted the Transport Working Group (WG Transport) with four tasks. The first was “working on a modal shift of Alpine freight transit”. In its recitals, the proposal read as follows:

“Based on previous work by the Alpine Convention and other organisations, including studies on the internalisation of real costs and on innovative logistics solutions, draft a position paper to be considered at the XVIth Alpine Conference, on the modal shift of Alpine freight transit by 2050 (Transport Protocol Art. 10¹ & 14², Climate Target Tr1³).”

WG Transport was invited to work in cooperation with:

- The *ad hoc* working group in charge of the preparation of the 8th Report on the State of the Alps (RSA 8) on the theme of air quality;
- The EUSALP Action Group 4 (AG 4 Mobility);
- If appropriate, the Zurich Process.

Activities of the Transport WG



At the Alpine conference held at Innsbruck on 4 April 2019 at the end of the Austrian term of the presidency of the Alpine Convention, the Transport WG published three reports, of which *Innovation in rail freight, an important contribution to more competitiveness of rail transport*. This report emphasized measures involving administrative processes (anti-dumping and excessive driving times in the road transport sector); finance (public subsidies for combined transport); societal aspects (acceptability of rail traffic; driving and traffic supervision automation); and technical solutions (rolling stock fitted with digital equipment; extending train length to 1,500 meters; reducing noise level at its source; wagon coupling systems), all in order to enhance a modal shift.

¹ Art. 10 deals with rail and river-sea transport. It aims in particular at shifting long-distance freight transport onto rail.

² Art. 14 deals with real costs. It wishes to introduce charging systems that would apply the ‘polluter-pays’ principle.

³ Meeting in Innsbruck on 4 April 2019, the Alpine Conference adopted the *Climate-neutral and Climate-resilient Alps 2050 Declaration of Innsbruck*. This Declaration adopted the *Alpine Climate Target System 2050*, which sets as one of its targets (T_Tr1) a “Modal shift of Alpine freight transit” and reads as follows: “Alpine freight transit transport (> 300 km) is shifted to rail, going beyond European modal shift objectives, supported by the ambitious implementation of innovative logistics solutions.”

In 2016, the Transport WG had already published a synthesis document entitled *Analysis of innovative logistics solutions such as rolling highways or solutions for other sustainable modes of long-distance Alpine crossing transport*.



Source: Analysis of innovative logistics solutions such as rolling highways or solutions for other sustainable modes of long-distance Alpine crossing transport, WG Transport, 25 July 2016

2. ACTIONS BY PARTNER INSTITUTIONS

Freedom of movement & environmental protection in the European Union

For two centuries now, Europe has shaped itself on the principle of the lifting of trade barriers. The free movement of goods, persons and ideas is one of the European Union's founding principles. The free movement of goods is guaranteed under Articles 26 and 28 to 37 of the Treaty on the Functioning of the European Union (FEU treaty).

Derogations to this principle may be introduced for imperative and justified reasons and applying a balanced approach. Public order and the safeguarding of public health may justify such derogations, applying equally to local and foreign players.

National and local authorities retain the right to allocate their transport infrastructure to given categories of traffic, or even restrict its use. In line with this logic, Low Emission Zones (LEZ) were developed in France under the Framework Act on Mobility Modes.

Environmental protection was introduced into Community legislation at a later stage. In the case of freight transport, Directive 1999/62/EC of the European Parliament and of the Council of 17 June 1999 on the charging of heavy goods vehicles for the use of certain infrastructures, also referred to as the Eurovignette Directive, was a keystone document. It is in the process of being revised. The directive currently allows levying external costs charges from heavy goods vehicles for the traffic-based cost of air and noise pollution. These additional charges are calculated on the basis of the assessment of negative impacts on the immediate surroundings and the environment. However, the maximal leviable amount of external cost charges remains small, i.e. a few cents per vehicle*km⁴, which is rather lower than the estimated amount from the external negative impacts of transport (c€ 4.2/t*km for EU-28⁵). In this regard, it would therefore be important that a new revised Eurovignette directive offered more flexibility to EU member states for levying external cost charges in order to be able to internalise external costs from road freight transport more adequately.

Since the 1990s, the European Union has also been enforcing increasingly stricter pollution control standards on road vehicles. European emission standards have produced seven successive editions, starting with the Euro 0 standard in 1994, up to the Euro 6 standard, applicable to all heavy goods vehicles entering into operation since 2014, thus tightening the air pollution objectives. The compulsory reduction for diesel vehicles

⁴ Cf *Assessment of external costs induced by noise in mountainous areas*, Xavier Olny, CEREMA for the Alpine Convention, May 2018, cf

www.alpconv.org/fileadmin/user_upload/fotos/Banner/Topics/transport/AlpineConvention_TransportWG_ExternalCostsNoise_112018_web.pdf.

⁵ Source: European Commission reports.

is by a factor of 6 for NO_x (from 500 down to 80) and a factor of 30 for fine particles (from 140 down to 4.5). Vehicles running on petrol are subject to similar restrictions⁶.

The European Union Strategy for the Alpine Region (EUSALP)



EUSALP, funded by the European Union, encompasses an area wider than just the Alpine range.

Having taken over the 2020 presidency term, France developed a programme⁷ along seven axes. The third axis, '*developing sustainable mobility and transport solutions*', plans to "promote alternative logistics solutions encouraging a modal shift of freight transit to rail, taking full advantage of development of river and maritime logistics, wishing to promote measures for harmonisation, support and incentives with regard to combined transport".

Its group on '*inter-modality and interoperability in passenger and freight transport*' also called Action Group 4 (AG 4⁸) is working towards the following objectives:

- To promote inter-modality and interoperability in passenger and freight transport, in particular by removing infrastructure bottlenecks, by bridging missing links, by coordinating public transport planning and timetables, by modernizing infrastructure and enhancing cooperation;
- To support a modal shift from road to rail;
- To develop cooperation and greater integration between the existing bodies and structures in the field of transport.

AG4 published an internal intermediate report entitled *Activity of extension of Toll+ approach* (29 January 2017). It also published a study entitled *Overview of existing pricing*

⁶ Cf article on *European Emission Standards*. https://en.wikipedia.org/wiki/European_emission_standards.

⁷ *Programme of the 2020 French Presidency of EUSALP*, 4 February 2020, <https://www.alpine-region.eu/publications/french-presidency-work-programme>.

⁸ Cf Situational analysis of action groups activities (*État des lieux des activités des groupes d'action*), European Union Strategy for the Alpine Region, October 2019.

*components that influence the competitiveness between road and rail freight transport*⁹ (November 2018). It called for a harmonisation of pricing policies in the whole of the Alpine Region in order to prevent windfall effects from boosting road transit.

Furthermore, the group is working on public acceptance for modal shift projects and, on that issue, published a map of the conflict zones.

As for it, in its work on strategic cross-sectoral policy on a low-carbon alpine area, EUSALP AG 9 "Energy" has launched an initiative on territorial and multiple uses of (clean) hydrogen.

Interreg Alpine Space



The Interreg Alpine Space programme, funded by the European Union, encompasses more than just the Alpine range.

Its AlpInnoCT project aims at establishing state-of-the-art information on combined transport in Europe, formulating recommendations for its development and illustrating it by providing a number of case studies. It has flagged up a number of areas offering 'potential for optimization'.

Its conclusions were submitted on 19 November 2019 during a meeting in Brussels, held in the offices of the Representation of the Free State of Bavaria to the European Union.

Regulation measures taken by States and Regions

Except for Switzerland which is a special case, European Union Member States and their Regions have taken regulatory measures, in compliance with Community regulations, to manage negative effects induced by heavy goods vehicle traffic. There are three sorts of measures, depending of environmental goals (restrictive vs incentive ones) or dedicated to road safety improvement. Thus:

⁹ Cf www.alpine-region.eu/node/470, <http://alpine-region.eu/results/overview-existing-pricing-components-influence-competitiveness-between-road-and-rail-freight>.

Restrictive environmental measures:

- The Low Emission Zone concept (LEZ) is developing, i.e., an area where the most polluting vehicles could be subject to heavy constraints in case of a pollution peak. Currently, LEZs are only found in urban surroundings. There are none in the Alpine range;
- Austria: the transport of certain mass goods, which are very suitable for rail transport is prohibited on the Brenner axis in Tyrol¹⁰;
- France: starting in 2020, traffic ban in both Alpine tunnels of Euro 4 HGVs, in compliance with the rule stating that a Euro class is banned once it represents only 2 % of the customer base; HGV traffic banned on Sundays and bank holidays, as well as on Saturdays during winter peak season (in Chambéry); the new Framework Act on Mobility Modes designed a low emission zone (*zone à faible émission - ZFE*) modelled on LEZs; it requests every city with a Plan for air protection to explore the possibility of a ZFE; this would apply to the Arve Valley between Geneva and Chamonix-Mont-Blanc; polluting vehicle traffic could be forbidden there in case of high air pollution level;
- Italy: gradual traffic ban of Euro 3 and Euro 4 HGVs in Piedmont, Lombardy and Veneto districts; HGV traffic ban on Sunday.

Incentive environmental measures:

- Austria: 50 % toll discount for zero-emission HGVs; levying a mark-up¹¹ of additional 25 % on road toll charges on the Brenner corridor and levying external cost charges on all other motorways and expressways;
- Germany: subsidies to private railway junctions; tax cuts for environmentally friendly HGVs, tax (*Kfz-Steuer*) exemption for combined transport last mile HGVs; subsidies granted to HGVs converted to liquefied natural gas (LNG) or to bio-LNG; HGVs driving combined transport last mile allowed to 44 t and to drive on Sunday;
- Italy: exclusion of LNG and alternative fuels driven lorries from paying taxes and tolls on five motorways;
- Switzerland: toll bonus to Euro 6 HGVs.

¹⁰ Cf <https://www.tirol.gv.at/en/environment/vehicle-prohibitions-in-accordance-with-the-ig-l/>.

¹¹ The revenues generated by this mark-up are invested in the Brenner Base Tunnel.

Research & Innovation

There are lots of R&D programs run at European or national initiative. Let's present below some of the most relevant of them.

Clusters 2.0¹²



Clusters 2.0 is a research and development programme and forms part of the Horizon 2020 Programme launched and supported by the European Commission's DG Research. It aims at developing an integrated European approach to supply chains designed as a 'Physical Internet'. Intermodality governs its positions. Clusters 2.0 brings together 29 partners from 9 EU Member States and Switzerland¹³. It is based on an annual call for proposals. Launched in 2017, it allocates an average of € 2 M per year in subsidies.

Shift2Rail



Shift2Rail is a rail industry initiative, an R&I programme launched in 2009 with the support of the European Commission. Its objective is modernising rail technology to make it more competitive. It is based on annual calls for proposals.

One of its objectives is to develop technologies for more sustainable and attractive rail freight. The initiative involves 5 priorities: fleet digitalisation and automation; digital transport management; smart wagons; new concepts for propulsion; and strategies for commercial roll-out. Research is focused notably on digital features monitoring the state of tracks; wagons and their connection with the locomotive; noise induced by braking; and lengthening trains from 750 meters to 1,500 meters.

¹² Cf <https://ec.europa.eu/inea/en/horizon-2020/projects/H2020-Transport/Logistics/CLUSTERS-2.0>.

¹³ Including: PTV, FHG and Duisport in Germany; Armines, Euralogistic and UIC in France; IBI, Bluegreen, FIT and TPA in Italy; and InnovaTrain AG in Switzerland.

Railenium



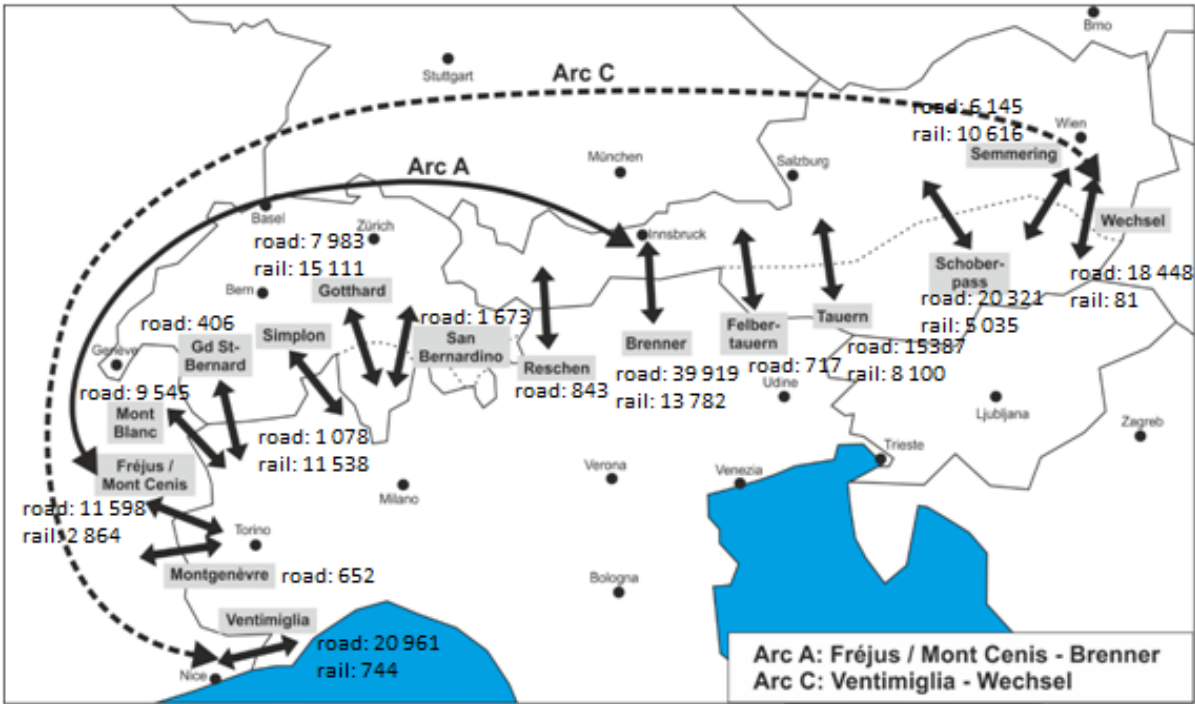
Railenium was founded by French rail academics and professionals as an Institute for testing and research (IRT). It has targeted three research areas: autonomous trains; rail modelling and forecasting; and a testing platform. In this context, Railenium has been working on noise produced by trains and devices on-board (brake blocks...) or ground-based (low noise barriers close to the track) in order to limit the impact.

3. RAIL TRAFFIC OCCUPIES A SIGNIFICANT, YET MINORITY SHARE OF THE TRANSALPINE FREIGHT FLOW

Transalpine freight traffic growth is sustained in Austria, flat in France and in Switzerland

Statistics on transalpine freight traffic are collected by the Alpine Traffic Observatory (ATO) set up jointly by the European Commission and the Swiss Confederation. These statistics are streamlined following a general survey called the CAFT survey (Cross Alpine Freight Transport), carried out by the infrastructure managers, of freight hauliers at border crossings, as per a methodology set down in Community Regulation 70/2012. They are compiled by the Swiss Federal Office of Transport (BAV / OFT / UFT). Each year, an intermediate estimate is done. The latest CAFT survey was published on 7 December 2015. The next survey's analysis will run from 2019 (France) to 2021.

ATO identified 15 Alpine crossings. Its 2018 report¹⁴ gave an estimate of road and rail traffic carried via these crossings.

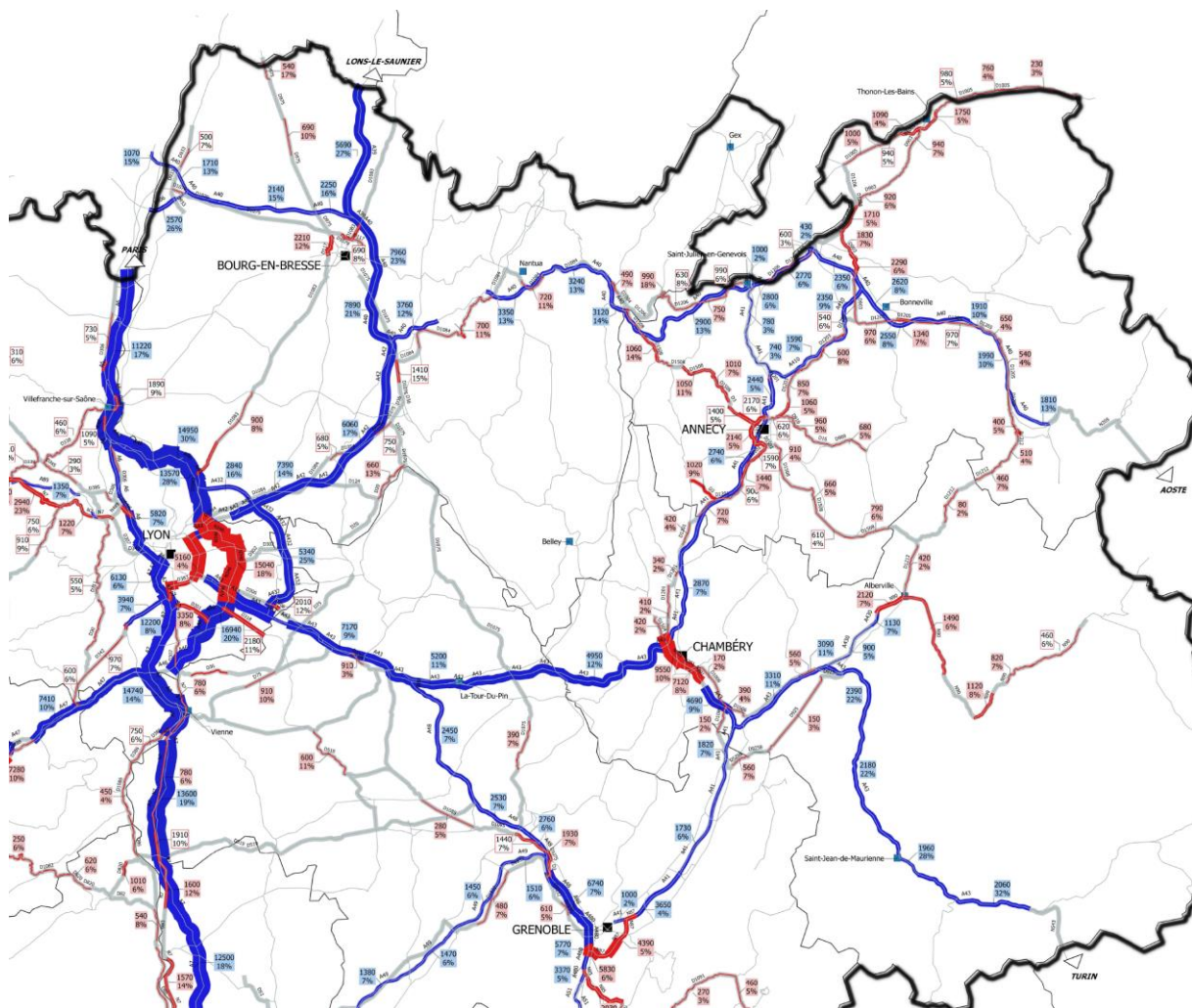


Source: Observation and analysis of transalpine freight traffic flow, Annual report 2019, Alpine Traffic Observatory, May 2020 (values in 1 000 t/Y)

A total of 224 million tonnes (Mt) of freight are carried across the Alps each year: 156 Mt (70 %) by road (11.5 million HGVs, hauling an average load of 13.5 t of goods) and 68 Mt (30 %) by rail. By way of comparison, 16,085 Mt per annum of goods are carried over land

¹⁴ Observation and analysis of transalpine freight flows, Key figures 2018, Annual Report 2018, Sigmaplan for the European Commission and the Swiss Federal Office of Transport, November 2019.

within the European Union¹⁵. Therefore just over 1 % of EC freight, but 5 % of freight moving beyond 150 km, is carried across the Alps. Bearing in mind that there are 14 million inhabitants in the Alpine area, representing 3 % of the Union’s population spread across a relatively sparsely-populated zone, one could deduct, although there are no accurate statistics available, that at least 3 % of freight traffic would take place in this territory. At the scale of the Alpine range, this 1 % of transalpine traffic would weigh significantly, if not crucially, in the intra-Alpine traffic balance. The ensuing modal shift would therefore contribute to the protection of the local environment. In that respect, the example of the northern French Alps points to the fact that transalpine traffic weighs very little when compared with local traffic.

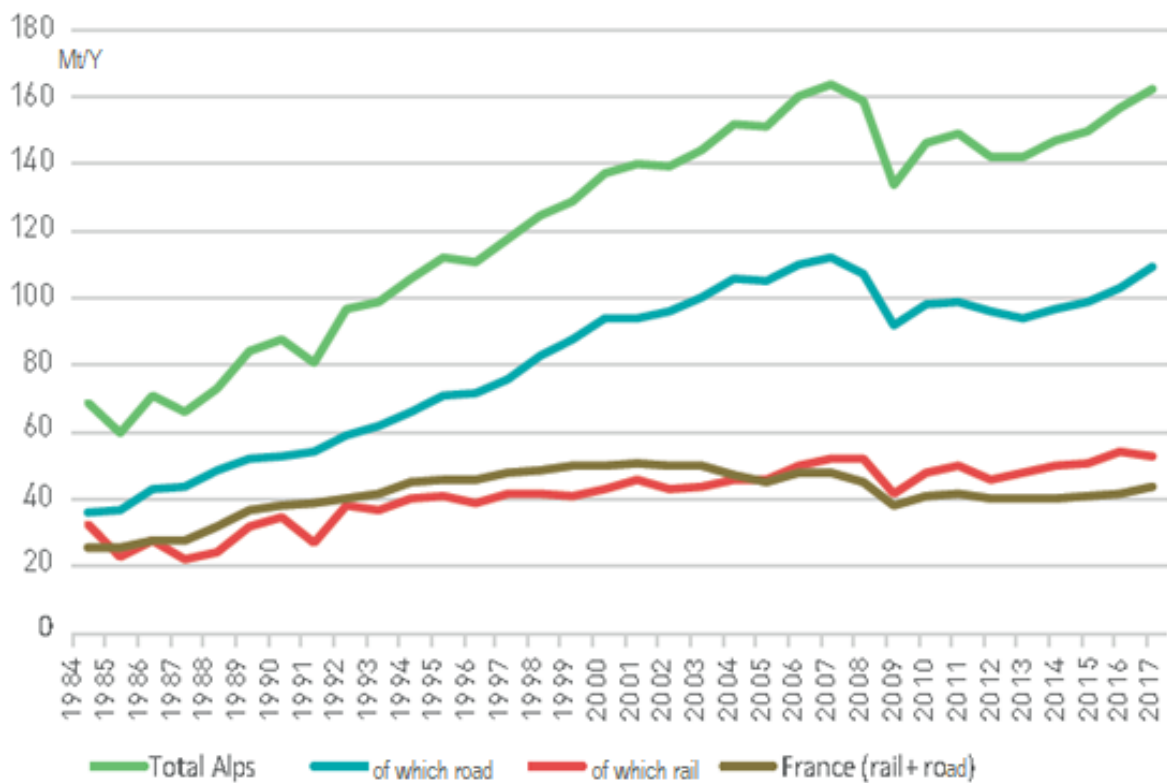


HGV traffic in the northern French Alps in 2015 (total traffic veh/day / % HGV, highways in blue, other roads in red), source: DREAL Auvergne Rhône Alpes

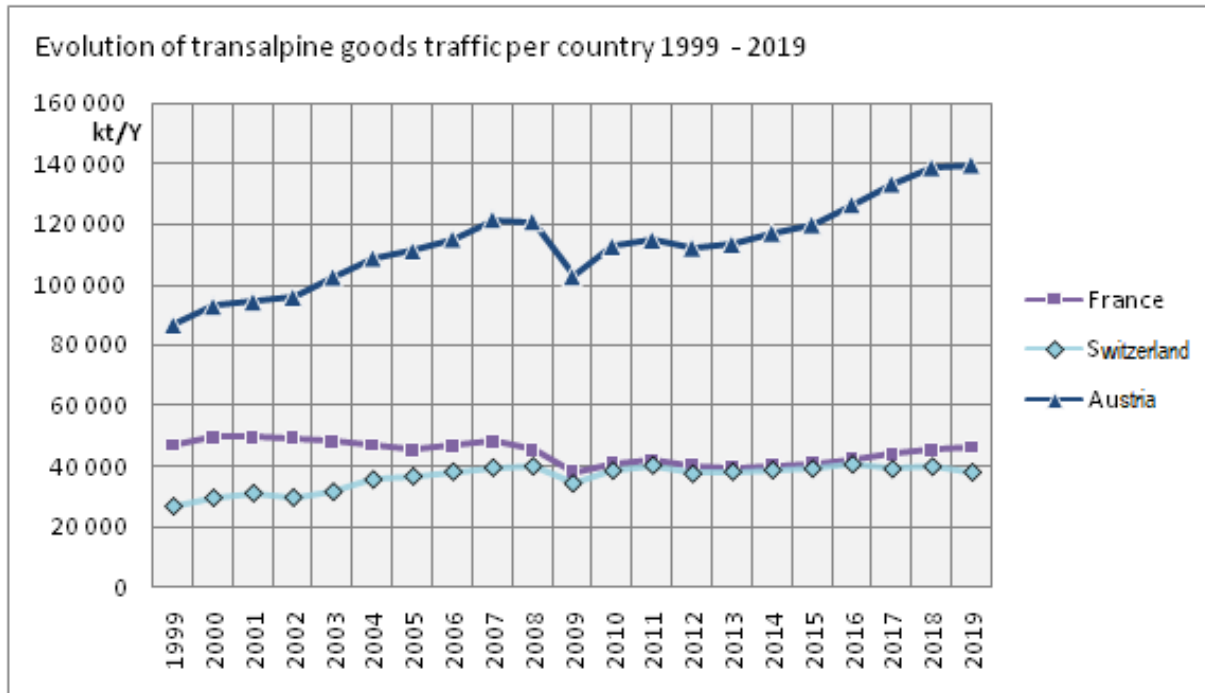
¹⁵ Source: Eurostat, data reported in *Le transport de marchandises*, Michel Savy, Presses polytechniques et universitaires romandes, 2017. Alpifret also reported Eurostat figures but they were slightly different: 16,300 Mt per annum carried by road + rail, including 14,700 Mt per annum by road, i.e. 89 %, and 1,800 Mt per annum by rail.

This traffic flow is globally experiencing a sustained growth, as shown in the graphs below. A temporary decline was nevertheless observed after the 2007 crisis, but in 2018 and 2019, pre-crisis levels were reached once again. In view of this, it appears that over the past 20 years, traffic growth has been of 1.7 % per annum.

Traffic flows have developed in contrasted ways: sustained flows between Austria and its neighbours to the South, flat flows however in France and in Switzerland. The two Franco-Italian Alpine crossings of Mont-Blanc / Monte Bianco and Fréjus / Fregiusio are even experiencing a downward-leaning trend in their flows.



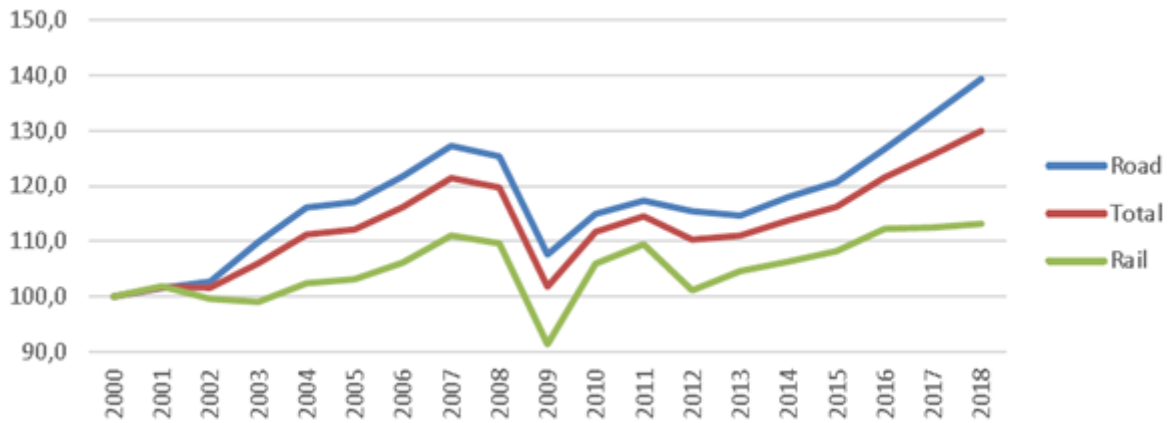
Overall goods traffic flows from Vintimiglia to Tarvisio, source: Carriage of goods through the Alps, AGATE / Département de la Savoie, October 2018, from AlpInfo / BAV – NB: due to lack of traffic data at Tarvisio pass since 2015, updating is impossible



Evolution of transalpine goods traffic from 1999 to 2018, source: Observation & analysis of transalpine goods traffic flows, Annual Report 2019, Alpine Transit Observatory, May 2020

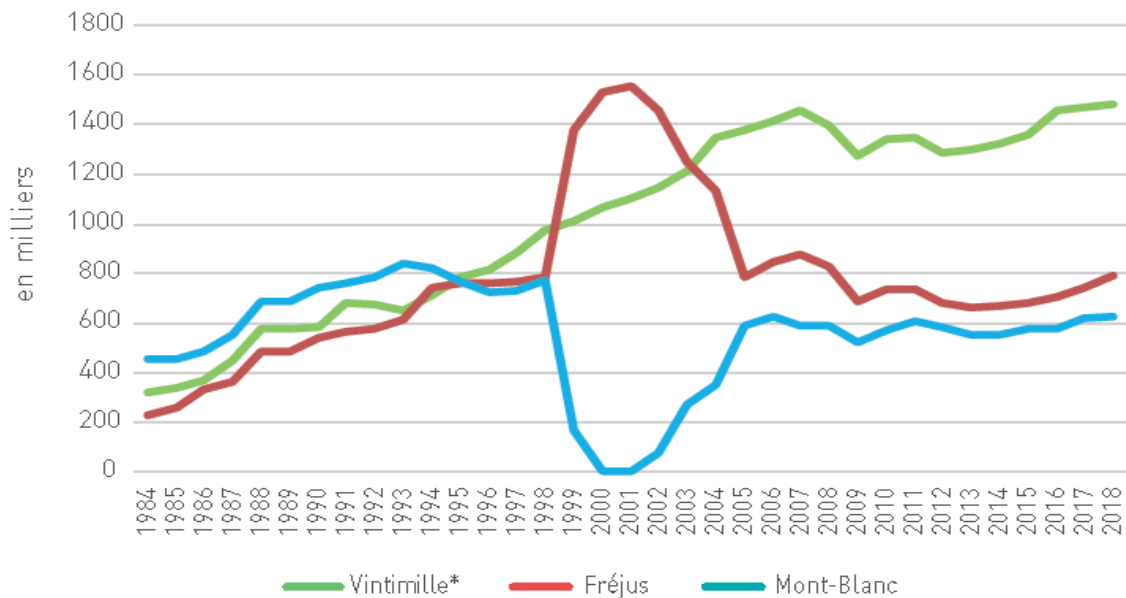
Except in Switzerland, in the Alps as elsewhere in Europe, rail loses ground to road

Furthermore, looking at this growing market, it appears that in spite of a positive nominal growth, the share of rail transport is shrinking versus road transport. Indeed, in 2018, irrespective of transport modes, transalpine traffic growth reached 3.4 %, whereas rail transport growth was only 0.6 %. At the same time, road transport increased by 4.4 %. Following a trend already recognised, the rail modal share had dropped from 32.1 % to 31.2 % in one year. In 2019, rail traffic declined by 2.8 %, whereas road traffic growth slowed down but stayed positive at 1.3 %. Rail share dropped by 30.4 %.

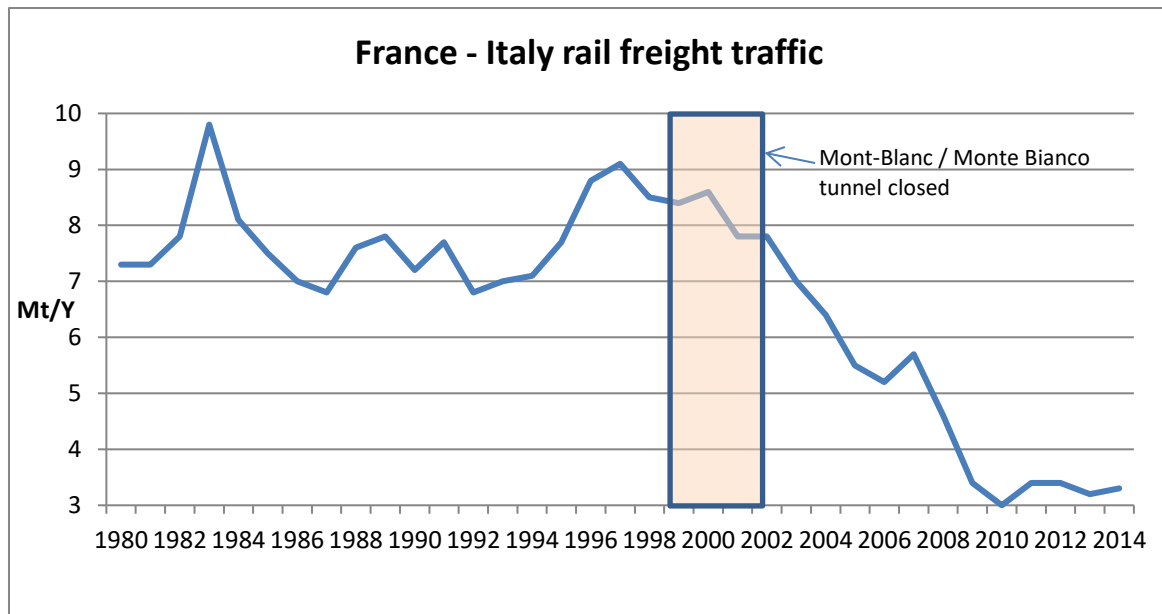


Evolution of transalpine transport (total and by mode) 2000 – 2018 (on the basis of transport volumes; 2000 = index 100), source: *Observation and analysis of transalpine freight traffic flows, Key figures 2018*, Alpine Traffic Observatory

This appears to be a structural phenomenon, fairly free from any competition issues between road and rail. By way of illustration, one notes that during the 3 years the Mont-Blanc / Monte Bianco Tunnel was closed following the March 24, 1999 disaster, nearly all of the road traffic naturally shifted from the Mont-Blanc / Monte Bianco Tunnel to the Fréjus / Fregiusio Tunnel, and during the same period, rail traffic levels kept dropping (cf both graphs below).



HGV traffic (*1 000 HGV/Y) at the 3 Franco-Italian border crossings, source: *Carriage of goods through the Alps (Transport de marchandises à travers les Alpes)*, Agate, July 2019



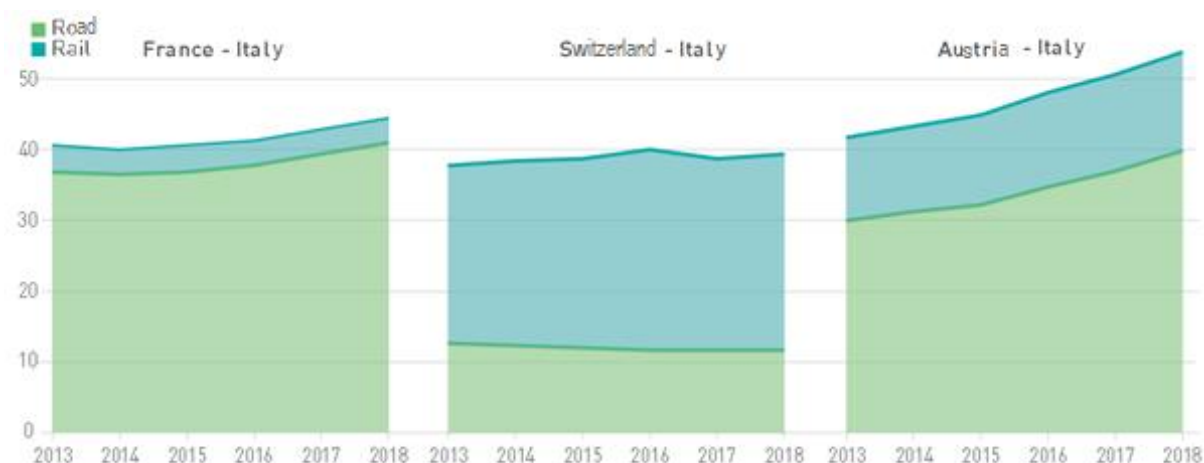
Rail freight traffic France-Italy, source: CGDD, October 2017, according to the Swiss Federal Office of Transport

According to ATO, in 2019 the share of rail transport was:

- 7.8 % of all exchanges between France and Italy (7.4 in 2018),
- 70.4 % (against 70.5 in 2018 and 69.9 in 2017) of all exchanges between Switzerland and Italy, whereas only 941,000 HGV/Y cross that border,
- 27.8 % (like in 2018) of all exchanges inside Austria and between Austria and its neighbours to the south (Slovenia and Italy).

Switzerland is the only country where rail is consistently capturing market shares of the transalpine traffic¹⁶, although the overall traffic growth is definitely less buoyant than in Austria. This could point to a greater interest on the part of hauliers for door-to-door HGV hauled traffic. The risk would be that hauliers would circumvent Switzerland to avoid a double road/rail transshipment. The map below of freight flow crossing the Austrian-Italian border at the Brennerpass seems indeed to show clearly that a big part of it should logically drive through Switzerland.

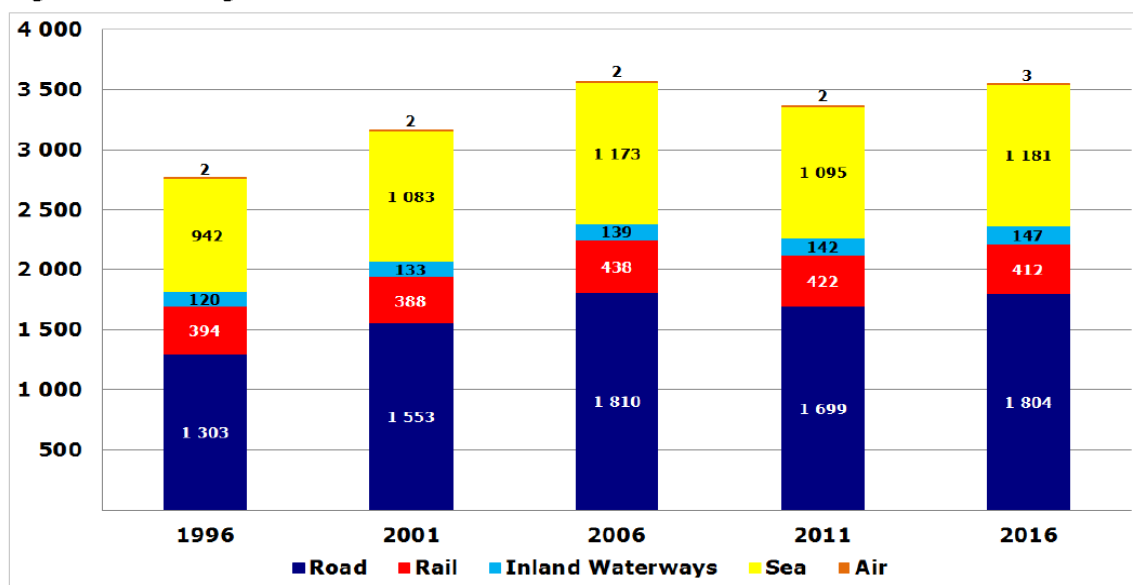
¹⁶ Cf Report on traffic transfers (*Bericht über die Verkehrsverlagerung*), Swiss Confederation, Federal Office of Transport, November 2019.



Total freight volumes crossing the Alps, from Vintimiglia to the Brenner pass, source: Carriage of goods through the Alps (*Transport de marchandises à travers les Alpes*), Agate – Département de la Savoie, July 2019, from AlpInfo / BAV

In comparison, the total tonnage transported by rail in the European Union remains stable and its modal share tends to erode. It dropped from 14.3 % in 1995 to 11.6 % in 2016, as shown in the histogram below.

Figure 1: Freight moved in the EU between 1996 and 2016 (billion t-km)



Source: Authors' own elaboration based on Eurostat (2018)

Source: Research for TRAN Committee -- Modal shift in European transport: a way forward, European Parliament, 29 November 2018

Over the past 20 years and at the scale of the European Union, irrespective of transport modes, inland freight traffic has been growing at an average of 1.3 % per annum, its rail share growing at a more modest rate, i.e. at 0.2 % per annum. Within the European Union, highly contrasting developments have been identified depending on the countries. For example, between 2000 and 2016, rail freight traffic in France lost 41 % of its volume,

which grew by 22 % in Germany, by 36 % in Austria and by 48 % in Switzerland¹⁷. The most recent trend however is definitely sluggish including in Germany.

According to the International Union of Railways (UIC), the modal share of freight traffic in Europe is stable at 17 to 18 % of all carried tonnes per km. The gap between these figures and those of the European Parliament (11.6 %, cf *supra*), is probably due to a different definition applied to Europe, i.e. wider for the UIC as it encompasses Eastern Europe and Russia, where the rail share is traditionally larger.

Teachings drawn from these figures are extremely helpful. They are however to be treated with caution because of the vulnerability of the statistical system on which they are based. It would seem important nevertheless to maintain that system.

RECOMMENDATION (1):

Maintain the statistical system monitoring transalpine freight flows by adapting it to the needs of strategic management.

Transalpine traffic remains limited to local rail services between France and Italy, but longer haul inside the blue Banana

The question arises whether freight traffic flows crossing the Alps are short hauls or long hauls. The comparative advantage of rail over road is indeed clearer for long hauls. The answer varies depending on whether Austrian or Swiss sources were examined, or French ones.

The latest CAFT survey shows that flows through Switzerland are to a large extent, long hauls. Indeed, out of the 38.72 Mt in or out of Italy that crossed Swiss territory in 2014, 35.2 % were bound for or from Germany, 30.8 % for or from Benelux and 4.7 % for and from other northern countries (Great-Britain and Scandinavia). Such figures point to the existence of powerful flows within the 'Blue Banana', i.e. within the European Megalopolis (cf *infra*).

The drawings below show flows through Gotthard and Brenner in 2014, i.e. before the Gotthard base tunnel was opened; they demonstrate the relative importance of long-haul flows, above all through Tirol and at the Brenner.

¹⁷ Source: Quality of service offered by the infrastructure manager to rail freight operators (*Qualité de service offerte par le gestionnaire d'infrastructures aux opérateurs de fret ferroviaire*), Christian Assailly et al., CGEDD, October 2018.

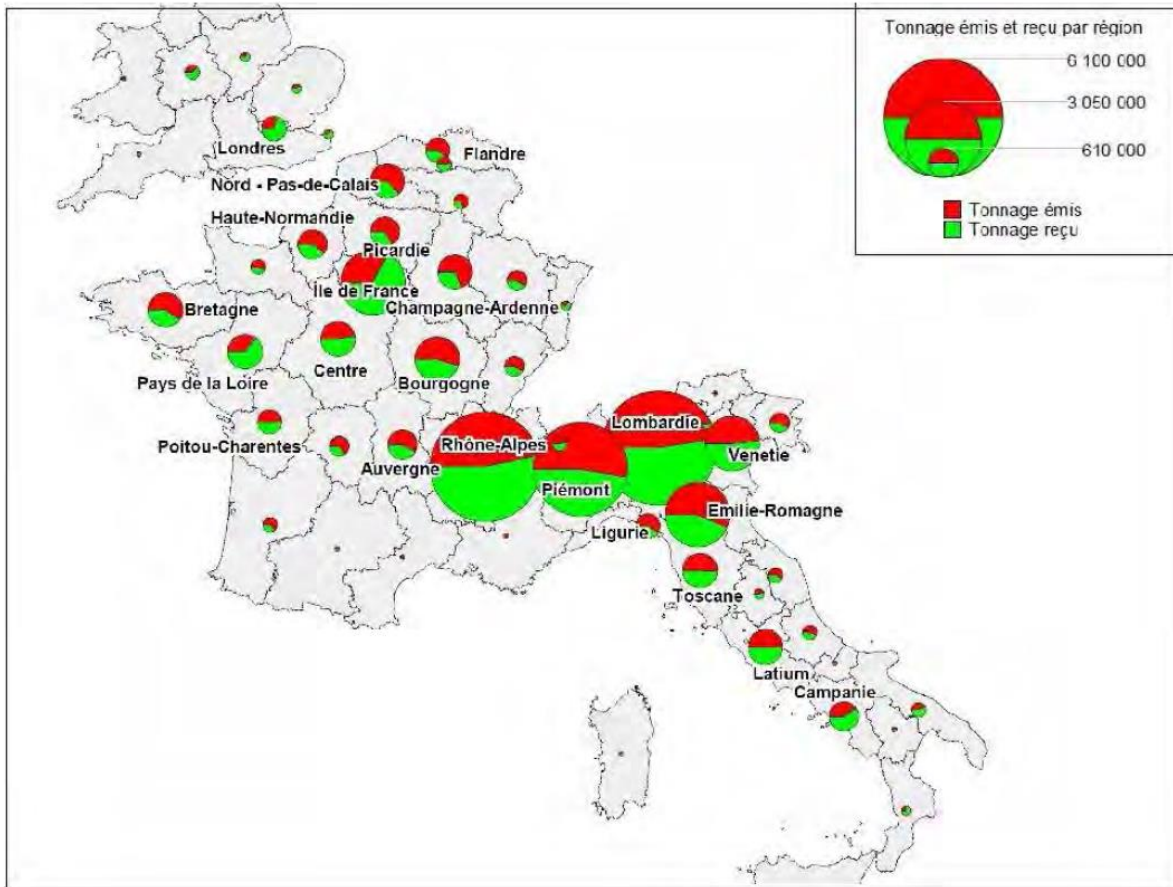


On the left: Freight flows through the Gotthard, source: (CAFT 2014); on the right Freight flows through the Brenner (source: Austrian ministry for Climate and Mobility, data 2014)

Conversely, a 2013 French study¹⁸ highlighted the obvious prevalence of local rail services within transalpine traffic flows. The bulk of the traffic running through the Mont-Blanc / Monte Bianco and Fréjus / Fregiusio tunnels involved the Auvergne-Rhône-Alpes Region in France, Piedmont and Lombardy in Italy and quite a significant share to and from Ile-de-France through the Mont-Blanc / Monte Bianco tunnel. As for crossing via Ventimiglia, the Provence Alpes Côte d'Azur region of France (Southern France) has replaced the Auvergne Rhône Alpes Region; the Catalunya Region has replaced Ile-de-France for the trading of large quantities of fruits and vegetables, and industrial articles with northern Italy. Both maps below are drawn from this study.

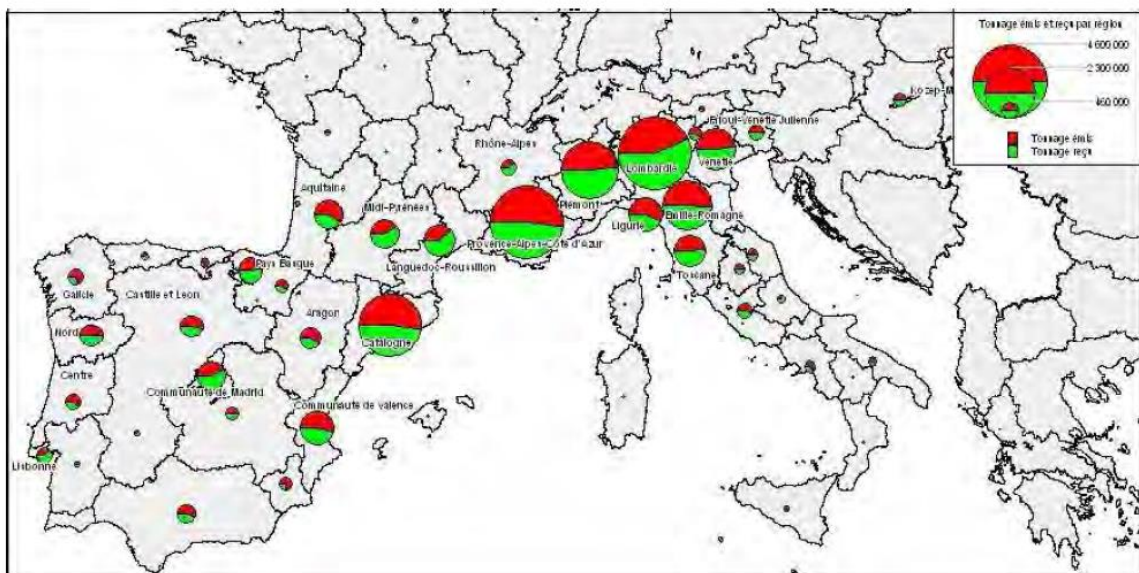
¹⁸ Freight road transport crossing French borders in 2010 (*Le transport routier de marchandises à travers les frontières françaises en 2010*), French Ministry of Ecology – CGDD, France, July 2013.

Carte 3 – Tonnage émis et reçu par pays pour les franchissements des Alpes du Nord



Source : SOeS, enquête Transit 2010

Carte 4 - Tonnage émis et reçu par région pour les franchissements des Alpes du Sud



Source : SOeS, enquête Transit 2010

Freight volumes crossing French-Italian Alps, Source: French Ministry of Ecology – CGDD, July 2013, from a 2010 survey

4. UNACCOMPANIED COMBINED TRANSPORT IS ON THE RISE

Monitoring by the Alpine Traffic Observatory (ATO) has demonstrated that combined transport is gradually superseding traditional convoys (full trains and 'goods traffic'). It now accounts for 53 % of all transalpine tonnage transported by rail. At the scale of the European continent however, it still only accounts for 25 %. In Switzerland, the ratio had already reached 72 % in 2014.

According to the International Union of Railways (UIC), although combined transport in Europe at present only accounts for 25 % of all rail freight, it is the transport mode experiencing the most dynamic growth. It had conquered 32.5 % in t*km from 2005 to 2016¹⁹. According to the International Union for Road-Rail Combined Transport (UIRR)²⁰, UIRR operator members transported 75.78 billion t*km²¹ across Europe in 2018. Compared with road haulage, 1,955.8 billion t*km were hauled over the same period i.e., 26 times more. The average distance travelled by non-road means (rail and waterway) dropped from 871 km in 2017 to 841 km in 2018. This is a sign showing that combined transport is becoming more competitive on increasingly shorter distances.

According to the United Nations economic Commission for Europe (UNECE)²², combined transport is defined as an intermodal transport where the major part of the European journey is by rail, inland waterways or sea, and any initial or final legs carried out by road are as short as possible. There are two types of combined transport:

- accompanied combined transport: transport of a complete road vehicle, accompanied by the driver, using another mode of transport (for example ferry or train);
- unaccompanied combined transport: transport of a road vehicle or an intermodal transport unit (ITU), not accompanied by the driver, using another mode of transport (for example a ferry or a train).

European rolling motorways

There are three types of rolling motorways in Europe: (a) designed to cross an obstacle (mountain range or the Channel); (b) to cross Switzerland; and (c) for long distance journeys (Bettembourg-Perpignan, and the recently opened Calais-Orbassano). Types (a) and (c) rolling motorways have yet to demonstrate their economic viability.

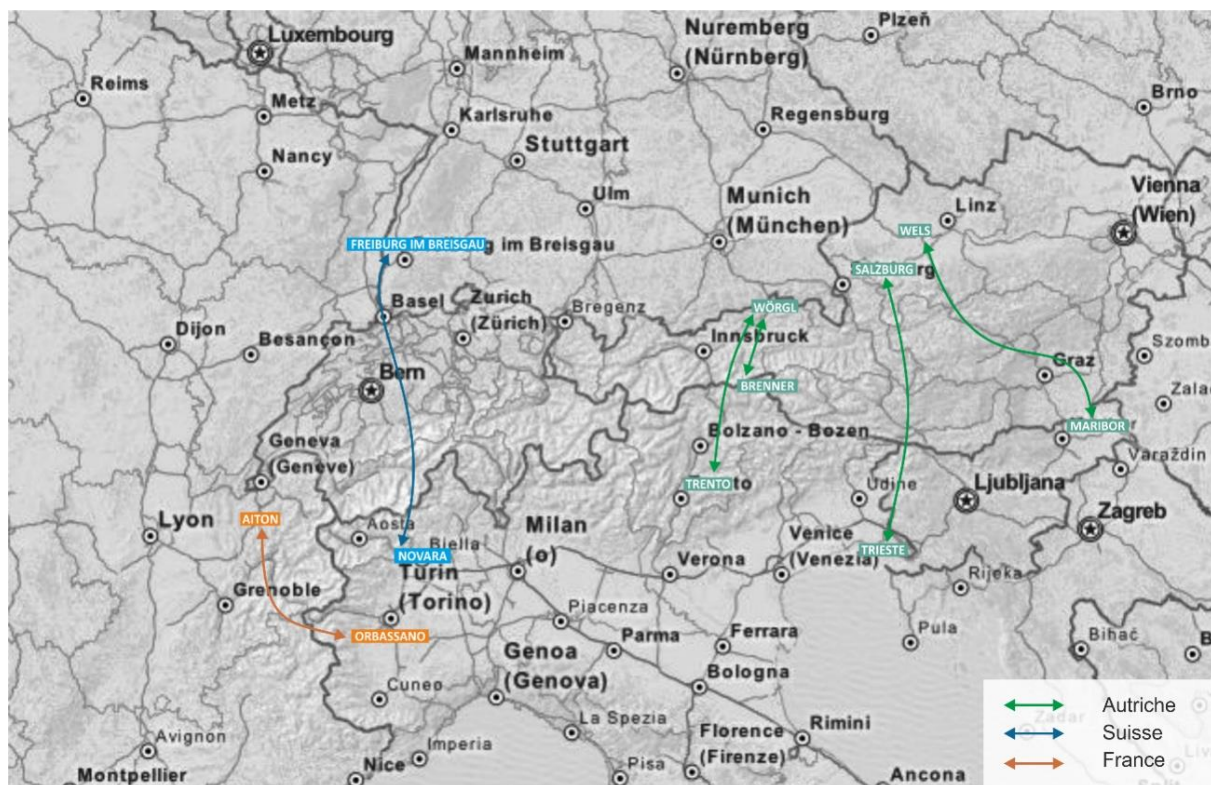
¹⁹ Cf *2018 Report on combined transport in Europe*, BSL for the International Union of Railways, January 2019.

²⁰ *UIRR Report, European road-rail combined transport 2018-19*, International Union for Road-Rail Combined Transport, May 2019.

²¹ Door-to-door and all modes included, it would seem (<http://www.uirr.com/fr/media-centre/annual-reports/annual-reports/mediacentre/1188-uirr-annual-report-2018-19.html> page 33).

²² Cf <http://www.unece.org/index.php?id=26168&L=0>.

The map below shows these services.



Main transalpine rolling motorways, source: *Observation & analysis of transalpine goods traffic flows, 2019 Annual Report*, Alpine Transit Observatory, May 2020 (N.B.: Calais - Orbassano is not included and Salzburg - Trieste has been cancelled since the beginning of 2020)

The Alpine rolling motorway (AFA) France-Italy

The Alpine rolling motorway between Aiton, France and Orbassano, Italy occupies a small niche within the transalpine freight market. Indeed, when in 2019 and irrespective of transport modes, Franco-Italian traffic reached 46.362 Mt, of which 1.992 Mt in combined transport (i.e., 4.3 % of total traffic), the share of vehicles transported by accompanied combined transport (ACT) across the Alps at Mont-Cenis / Monte Cenisio fell back from 0.8 % to 0.4 % of Franco-Italian traffic in the last quarter of 2019²³.

Three types of haulage are particularly interested in AFA: dangerous goods, HGVs requiring GB1 loading gauge, and HGVs with a 44-tonne load.

AFA rolling stock is a Modalohr design enabling the simultaneous loading of complete lorries. Low-floor wagons and small wheels make for an expensive technology in which to invest.

²³ Cf *Observation and Analysis of Transalpine Freight Traffic Flows, Quarterly Report 4-2019*, European Commission / GD Move / Swiss Federal Office of transport, May 2020. The 2019 results are low due both to 2 months without traffic because of track shut down following a mudslide in July, and strikes in France in December.

80 % of the shipments are driverless. The trend is leaning towards unaccompanied shipments.

AFA suffers from a number of drawbacks specific to the line: a 3.6 % ramp before Modane, preventing traction of trains over 1,450 tonnes, i.e., 24 road trailers per shipment; freight and passenger trains crossing ban in the tunnel due to lack of prevention and rescue arrangements underground; power and traction switch in Modane. Indeed, total freight traffic in the Mont-Cenis tunnel, conventional trains included, was divided by almost four over twenty years, down to 2.635 Mt in 2018²⁴. There is no hope of bringing it up to its former level as things stand now, even were it required by the market.



Modalohr wagons on the Alpine rolling motorway, source: Innovation in rail freight transport in France (*L'innovation dans le transport ferroviaire de fret en France*), CGEDD (French General Council for the Environment and Sustainable Development), September 2016

²⁴ As a reminder, in 2012, the public inquiry file for the Lyon-Torino rail link had forecasted a transalpine traffic level of 13 Mt per annum, mostly in conventional trains, for 2020 and before the entering into operation of the new service.



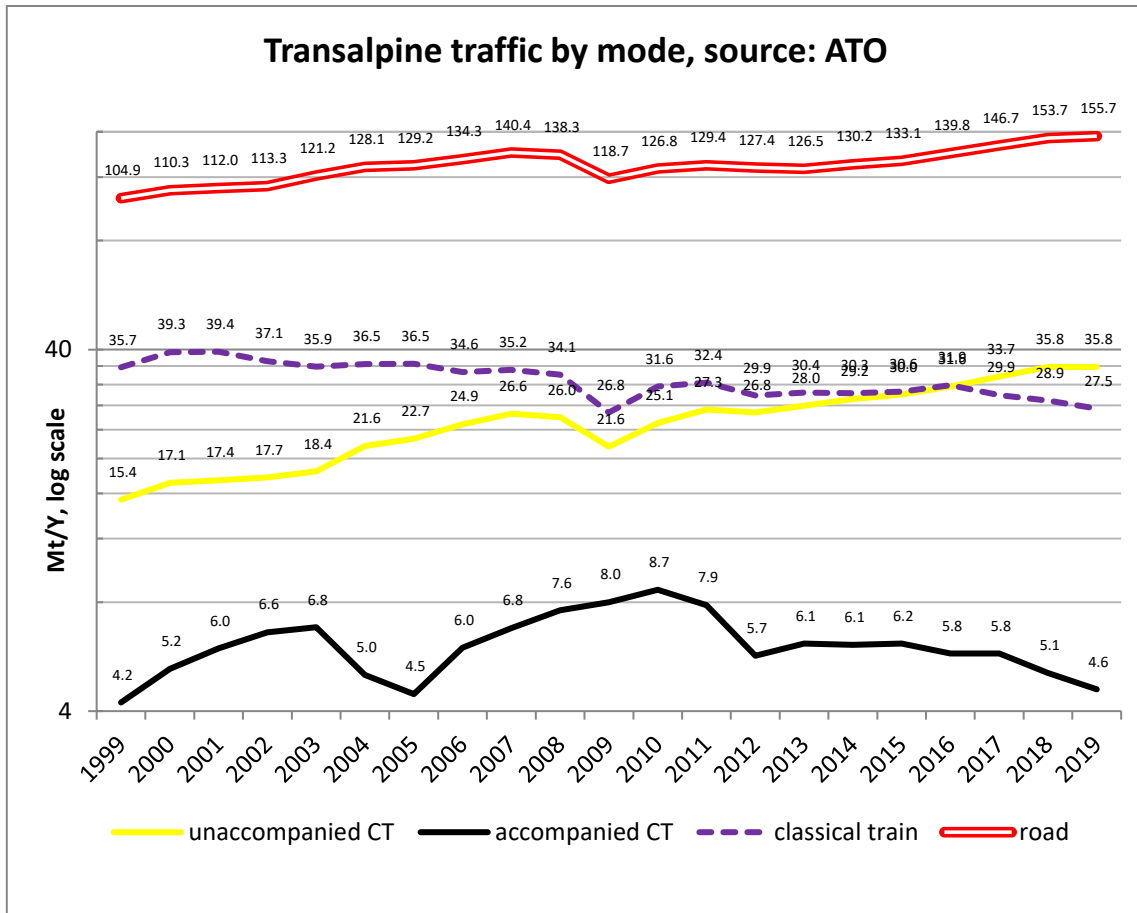
The Aiton - Orbassano Alpine rolling motorway

Most combined transport is now unaccompanied transport

A rapid decrease in the flows of entire lorries carried on rolling motorways has been observed, whilst at the same time, the transport of unaccompanied containers or trailers shows a sustained growth. Between 2017 and 2018, the Franco-Italian AFA witnessed a sudden 33.4 % drop in its traffic flows. Over that same period, their rolling highway peers noted a decline of 11 % in Switzerland and 8 % in Austria.

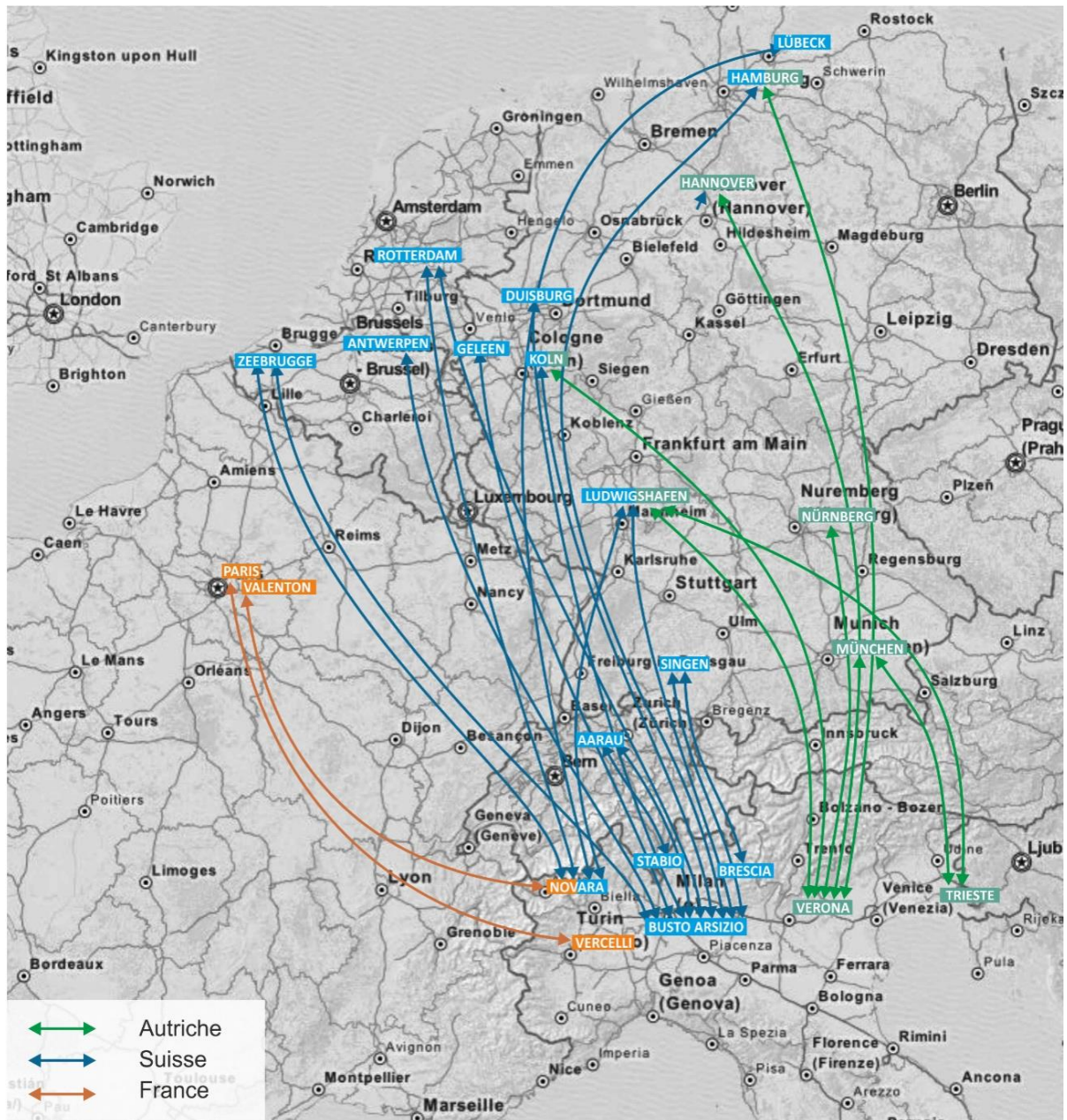
This comes as a confirmation of what ATO has observed over the past 20 years, namely a downward trend of accompanied combined transport, now carrying just 2 % of all Alpine freight, whereas unaccompanied combined transport has exceeded conventional freight transport in volume, as shown in the graph below.

Nevertheless, rolling roads stay an important tool to shift freight from road to rail without need for excessive infrastructure investment. Furthermore, rolling roads are easily accessible for small carriers and can be used without change of logistic processes.



Modal share of transalpine freight traffic, source: *Observation & analysis of transalpine goods traffic flows, 2019 Annual Report*, Alpine Transit Observatory, May 2020

The map below oshows the main rail freight corridors accessible to unaccompanied freight transport.



Main transalpine unaccompanied rolling motorway corridors, source: *Observation & analysis of transalpine goods traffic flows, 2019 Annual Report*, Alpine Transit Observatory, May 2020

5. OUTSTANDING ISSUES

Do major maritime ports generate transalpine traffic?

Typically, major maritime ports are interested in combined transport. Noteworthy is the fact that the tonnages they process every year (634 Mt for Rotterdam and Antwerp ports combined²⁵) as well as the number of containers (23.5 million for those ports combined), are quite similar to the flows transiting through the Alps (respectively 224 Mt and 11.5 million HGVs). The issue is therefore to determine whether the Alps form part of the *hinterland* of major maritime ports, i.e., whether freight unloaded in a northern European port can then be forwarded south of the Alps and, vice-versa, from an Italian or Slovenian port to north of the Alps.



Koper port (Slovenia)

²⁵Source: Eurostat, quoted by Alpifret, 2017 figures. 433 from Rotterdam and 201 from Antwerp.

Expressed in millions of TEUs²⁶ per annum, container traffic figures in 2017 the major European ports were as follows²⁷:

- Rotterdam: 13.7,
- Antwerp: 10.0, of which 60 % was forwarded by HGV, 35 % by river and 5 % by train,
- Italian ports: 10.6, of which 67 % was unloaded for an inland-bound destination,
- Hamburg: 8.8, of which 42 % was loaded onto trains (European record), and the remainder left the port mostly on lorries,
- Piraeus: 4.9 (5.5 in 2019),
- Barcelona: 3.0,
- Le Havre: 2.9,
- Zeebrugge: 1.5,
- Marseille: 1.4,
- Koper: 1.0.

Overall, this business segment is experiencing sustained growth. By comparison, Shanghai, n° 1 port in the world, processes 40.2 million TEUs per annum.

Through the arrival of private investors, globalisation of exchanges is reflected as a major shift in the business model of major maritime ports. For instance, since COSCO has been involved in the management of the Port of Piraeus, the latter has become n°1 port in the Mediterranean. COSCO has also purchased Zeebrugge. In Trieste, MSC acquired a terminal in 2015, which stimulated the port's activities.

It would appear that the 2015 CAFT survey (cf *supra*) had identified major transit flows between the North Sea ports and northern Italy. Conversely, of all freight unloaded in Genoa, it would seem only 4 % made its way north through the Alps.

Nevertheless, it appears that the *hinterland* of major maritime ports is *de facto* constrained. The North Sea to northern Italy connection crosses through a number of hot spots such as the Rhine Gorge under the Lorelei rock (noise), the Baden plain along the Rhine river and down to Basel (a constrained railway node awaiting the construction of the *Herzstück*, a planned underground rail tunnel). The vulnerability of this axis was demonstrated when the train track was shut down for several months at Rastatt following a collapse on 12 August 2017.

It would thus seem that the Port of Antwerp *hinterland* ends with the Alps.

²⁶The 20-foot equivalent unit (TEU) is the standard unit for an intermodal container. 1 TEU ≈ 20 tonnes maximum.

²⁷ Sources: Shifts in business model of major maritime ports (*La transformation du modèle économique des grands ports maritimes*), IGF & CGEDD, France, November 2018; and UIC, January 2019.



Port of Antwerp Hinterland, source: Port of Antwerp, CGEDD, 11 February 2016

This general statement that maritime freight seldom cross the Alps had been already done in 2014²⁸.

The 2019 Alpine Transit Observatory report indicated an offer of 46 unaccompanied freight trains per weekday through the Alps²⁹. 17 of these trains originated directly from maritime ports on the Channel and the North Sea. It would appear that transalpine combined transport involved mostly inland connections, with no maritime leg. Noteworthy however, was the fact that some of the 29 other trains could also dispatch freight traffic from ports (such as trains leaving from Noisy-le-Sec, Duisburg or Basel)³⁰.

RECOMMENDATION (2):

Gather more information on final destinations of freight unloaded in European maritime ports and on the inland transport modes used for its forwarding.

²⁸ The hinterland of maritime ports (volume 2) : European bibliographic survey (*Hinterland des ports maritimes (tome 2): Etude bibliographique européenne*), Ministère de l'écologie, du développement durable et de l'énergie / CGDD - France, July 2014.

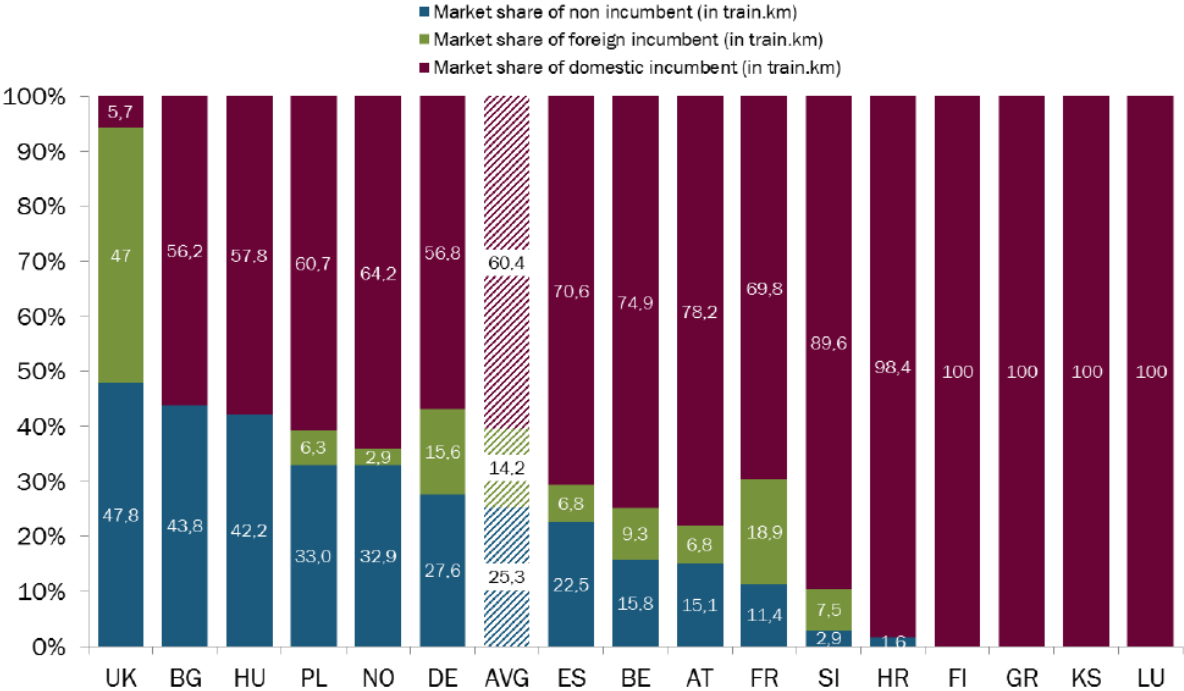
²⁹This statistic only takes into account connections having offered at least 9 services per week in October 2019.

³⁰ About French maritime ports and according to the publication on The hinterland of maritime ports (*Hinterland des ports maritimes, tome 1: Modélisation des trafics des ports français*), by the Commissioner-General for sustainable development (CGDD), July 2014, based on simulations with 2007 traffic data run through the MODEV modelling, only 2 % of all tonnage processed were either outbound to, or inbound from a transalpine country.

Has liberalisation of the rail freight market stimulated rail traffic?

Liberalisation of the rail freight market in Europe has led to the establishment of railway operators in competition with incumbent operators in all major countries. In 2015, the new entrants' share in t*km reached 43 % in Germany, 30 % in France and 22 % in Austria (most new entrants already were incumbent operators in other countries).

Figure 36 – Market shares of domestic incumbent, foreign incumbent and non-incumbent freight railway undertakings (in train kilometres) in 2015



Source: Fifth Annual Market Monitoring Report, IRG-Rail, March 2017

The case of France is indicative of the rail mode loss of attractiveness. Noteworthy is the fact that when the Mont-Blanc / Monte Bianco tunnel closed for 3 years (cf *supra*), road transport did not shift to rail transport. Thankfully however, stabilisation of rail traffic has been noted for some ten years now, although at a very low level. It would seem that the arrival of new rail freight operators could indeed act as a stimulant.

Could pricing be an efficient stimulant?

Of course, the transport price is not the only reason for modal choice in transport, as especially the Swiss example shows. The pricing policy must be combined with sufficient capacities, punctuality and reliability of rail transport. On the other hand, the price as impact on route and modal choice should not be under-estimated, as data to detour road transports to avoid the higher tolls (LSVA) via the Brenner axis in Austria show.

The unaccompanied combined transport seems to show the lowest costs per vehicle*km³¹.

The EUSALP AG 4 report titled *Overview of existing pricing components that influence the competitiveness between road and rail freight transport*, called for a harmonisation of charges for the use of transalpine infrastructures.

Conversely, in the context of drafting the Framework Act on Mobility Modes, CGDD carried out simulations in France using its MODEV model. These seemed to prove that, unless there was an extremely strong pricing signal, modal distribution would not change. If tolls on French Alpine motorways were to triple, which would be far above any price increase authorised under the Eurovignette Directive and obviously unrealistic, it would lead to a 23 % drop in HGV traffic on these road sections and in the Fréjus / Fregiusio and Mont-Blanc / Monte Bianco tunnels. However, the corresponding increase in rail traffic would only be 2.2 %. Traffic would remain significantly road oriented. It would simply detour via different itineraries, particularly through Switzerland³². These simulations tend to considerably tone down any influence that pricing would play.

In Switzerland, the 'performance-related heavy vehicle charge'³³ (*leistungsabhängige Schwerverkehrsabgabe – LSVA / redevance sur le trafic des poids lourds liée aux prestations - TPLP / tassa sul traffico pesante commisurata alle prestazioni - TTPCP*) of CHF 0.0228 per t*km for Euro 6 category HGVs³⁴ which, it should be noted, is quite definitely higher than the Eurovignette price scale and of the order of magnitude of the estimated external negative impacts of road transport (cf *supra*), has certainly contributed to the transfer of transit freight onto rail. Bearing this in mind, it would be important that also EU member states were offered more flexibility for setting road charges by a new revised Eurovignette directive. The revised Eurovignette directive should allow for a more adequate internalisation of external costs and it should provide

³¹ Cf *Observation and analysis of transalpine freight flows, Annual report 2019, First draft*, Alpine traffic observatory, European commission (DG Move), Swiss Confederation (FOT), May 2020.

³² Memorandum by CGDD dated 31 October 2017.

³³ Cf <https://www.ezv.admin.ch/ezv/en/home/information-companies/transport--travel-documents--road-taxes/heavy-vehicle-charges--performance-related-and-lump-sum-.html>.

³⁴ Source: Freight transport (*Le transport de marchandises*), Michel Savy, *op.cit.*

a consistent solution for regions which are subject to high road transport volumes, such as mountainous regions. In these regions, it should be possible for EU member states to add mark-ups on road charges in a way, in which these mark-ups could even more contribute to incentivising a modal shift towards rail transport, similarly as the LSVA does in Switzerland. However, frequency of connections, their range and, of course, their regularity and price, are additional determining factors. We have also noted already that traffic levels remain sluggish in Switzerland whereas they have been growing in Austria. This testifies to the resilience of the road transport mode.

RECOMMENDATION (3):**Assess sensitivity to pricing of transport demand and its modal distribution.**

6. PROSPECTIVE OUTLOOK

According to current trends, rail infrastructure under construction would barely stabilise the rail share of transalpine traffic at 30 %

Extending the trend observed over the past 20 years and taking all transport modes into account, the annual growth of transalpine traffic would be 2 %, thus higher than the growth of freight inland traffic recorded in the European Union (1.3 % per annum), and differentiated (France and Switzerland would be stable and Austria at +3.3 % per annum). Rail mode growth would be reduced to 0.6 %, a value observed lately.

Nuances should be introduced to this forecasted outlook. Indeed:

- In Europe, freight traffic now seems to grow more slowly than the GDP; also, global economic tensions could lead to a drop in the relative weight of long-haul flows;
- Major rail works are underway for easier crossing of the Alps: the Lyon-Torino link; the Ceneri extension of the Gotthard to be inaugurated in September 2020; and the Brenner base tunnel planned for 2028.

We have noted that currently, 68 of the 224 Mt per annum cross the Alps by rail, i.e., 30 %. The issue here is those 154 Mt per annum hauled by road. Those 154 Mt per annum represent ten times the traffic recorded as using the Gotthard base tunnel. This tunnel is currently running at 70 % of its capacity, offering 760 train paths per week for a total capacity of 1,150³⁵. By way of comparison, the Brenner motorway, which has 2 lanes in both directions, currently accommodates 39 Mt per annum, which represent 2.5 times the recorded tonnage transiting under the Gotthard.

Let us take the present assumption of an extension of the current global trends³⁶, then add to that, ambitious assumptions according to which, at some point:

- the Lyon-Torino link would capture 50 % of the current traffic through both Franco-Italian tunnels and 25 % of the current traffic registered in Ventimiglia, totalling a traffic flow of 18 Mt per annum, which is higher than the current traffic flow observed at the Gotthard base tunnel)³⁷;

³⁵Source: *Observation & analysis of transalpine goods traffic flows, 2018 Annual Report*, Alpine Transit Observatory, November 2019.

³⁶On a prospective outlook for freight traffic in Europe and worldwide, cf *Logistics in France / Situational analysis & avenues for progress (La logistique en France / État des lieux et pistes de progrès)*, Michel Savy, National Conference on Logistics, 2014 ; *ITF Transport Outlook: Scenarios to 2050*, OCDE / International Transport Forum, 2014 ; *Five Scenarios for freight & logistics in 2040 (Cinq scénarios pour le fret et la logistique en 2040)*, Michel Savy et al., Predit, 2011.

³⁷As a reminder, the public interest survey package submitted by Réseau Ferré de France in 2012, *Alpine access Lyon Chambéry Torino / Exhibit G: Tender file and economic and social assessment report* (cf <https://www.sncf-reseau.com/reseau/auvergne-rhone-alpes/projet-ferroviaire-daces-alpin-lyon-chambery-turin>), in its intermediate scenario, forecasted freight rail traffic on the new Lyon-Torino rail link at 41.6 Mt per annum in 2035, against 21.8 Mt per

- the Brenner rail tunnel capacity would equate the current Gotthard capacity, and both would be used at their maximum capacity;
- all other parameters would remain unchanged.

With these assumptions in mind, 20 years from now, transalpine traffic could top 300 Mt per annum, broken down into the quasi-immutable 70/30 split between road and rail modes. This paradox is explained by the relative buoyancy of traffic through Austria, where two-thirds is road traffic.

However, it appears likely that traffic growth will, in future, slow down considerably. This is why one of the main lessons learned from the pandemic that swept across the world in the spring of 2020³⁸, namely that production centres should relocate closer to their markets, should in all logic prompt the economy to move in that direction.

Could we begin to hope that more traffic would use the future tunnels currently at the design stage— one under the Fréjus / Fregiusio on the Franco-Italian border, and the other under the Brenner between Austria and Italy? Or that more traffic would now already transit via the existing Gotthard and Lötschberg tunnels? The answers lie both in infrastructure and relevant operating procedures.

As far as infrastructure is concerned, growth of capacity would call for:

- the doubling up of certain single-track sections: (a) the Lötschberg should nevertheless maintain in 2035 a small single-track section; (b) the Chartreuse planned for a single track only in its “Declaration of Public Usefulness – DUP”),
- investments to be made in Switzerland and its neighbouring countries, to accommodate 750-meter long trains, whereas their length is currently restricted to 430 meters.

Traffic management: rail will only be able to grow its market share at the cost of granting freight traffic clear priority and long slots expressly allocated in the timetable

Having stated that, it would seem that most of the significant progress would come from operating procedures.

In that respect, the entering into operation, on the Gotthard link on 4 September 2020, of the Ceneri tunnel, should boost the timetable, increasing freight trains from 2 to 3 per half hour and per direction, besides 1 passenger train. Under these circumstances, the line’s

annum in freight road traffic. It forecasted as reference traffic levels before the entering into operation of the new link, 13 Mt per annum in 2020, against 2.635 Mt per annum recorded in 2018.

³⁸ By the way, long haul rail freight traffic between China and Europe has grown significantly, but mainly as a substitute to air traffic. One cannot say that rail freight traffic has grown. This statement had been already done during the 2008 financial crisis.

design capacity would jump from 15/70% to $(15/70%)*(3/2)*(750/430)=56$ Mt per annum, and its reasonable capacity to around 40 Mt per annum.

This result remains subject to severe constraints and there is no saying that these will be fully managed in the medium term. Indeed, the challenge is approving a timetable with an average of 1 passenger train running at 200 kph followed by freight trains running at 100 kph every half-hour, in a tube of over 100 kilometres between the north Gotthard tunnel portal and the south Ceneri tunnel portal; or in the medium term, using sidings between the 2 tunnels³⁹.

By giving up full clock-face scheduling and by reserving long train paths for freight traffic in the timetable at off-peak hours, the tunnels' capacities could be increased significantly.

This same logic would apply *mutatis mutandis* to the other base tunnels. In the case of the Lyon-Torino link⁴⁰, the underground portion will be longer than the Gotthard's, which would limit the former's capacity. According to the Public Interest Survey Package of 2012, passenger traffic however would be reduced to 24 trains per day, both directions combined. Conversely, at the Brenner tunnel, the underground section would be slightly shorter, offering a greater advantage. But this will call for in depth capacity studies and market studies. There could be a shift in favour of rail mode, at the cost of differentiated public policies and of major investments in infrastructure, i.e., lengthening trains to 750 meters, retrofitting tunnels with 2 tracks; and major investments in vehicles i.e., fast freight trains. But first and foremost, service timetables must grant priority to freight traffic.

Priority to freight traffic is currently far from a given in any of the Alpine countries. Passenger traffic clock-face scheduling is now the rule on nearly every major route. Freight train movements have become the adjustment variable used by traffic regulators. Freight trains run significantly late everywhere. It seems more and more difficult to set aside the extensive timeslots they require. Furthermore, public loss of interest in plane due to environmental claims or pandemic outcomes could drain more people to train, thus enhancing competition on slots for freight trains.

In this regard, the Swiss case is interesting. Switzerland developed two applications for booking rail capacity. Both have been in use since 2017: the Network Usage Concept (*Netznutzungskonzept - NNK / stratégie d'utilisation du réseau - STUR / programma di utilizzazione della rete - PUR*) and the Network Usage Plan (*Netznutzungspläne - NNP /*

³⁹A marshalling and transshipment facility in Ticino was selected based on the EA 35 report in the National Swiss Investment Programme for rail infrastructure 2026-2035. It would have additional and extended receiving tracks.

⁴⁰ See *EU transport infrastructures: more speed needed in megaproject implementation to deliver network effects on time*, European Court of Auditors, 17 June 2020.

plans d'utilisation du réseau – PLUR / piani di utilizzazione della rete - PUR)⁴¹. The Network Usage Concept is based on expansion steps that form part of the Project to fund and expand Swiss rail infrastructure (FERI) and will guarantee minimum capacities. Expansion Step 2025 is currently operative (STUR 2025). NNPs show an annual progress of the expansion step and are drawn up for each service timetable year, 6 years before that given working timetable year. These binding documents define train path allocation between passenger traffic and freight traffic for a given standard hour and for passenger peak-time traffic hours (between 06 and 09 hours and between 16 and 19 hours). In particular, these NNPs allow setting aside train-paths required by freight train traffic. Concerning transalpine freight traffic, 4 train-paths per hour and per direction are set aside in NNP 2025 for the entire Basel-Saint-Gotthard-Chiasso leg; 2 train-paths per hour and per direction are set aside for the entire Basel-Gotthard-Luino leg; and 3 train-paths per hour and per direction are set aside for the entire Basel-Lötschberg-Domodossola leg.

RECOMMENDATION (4):

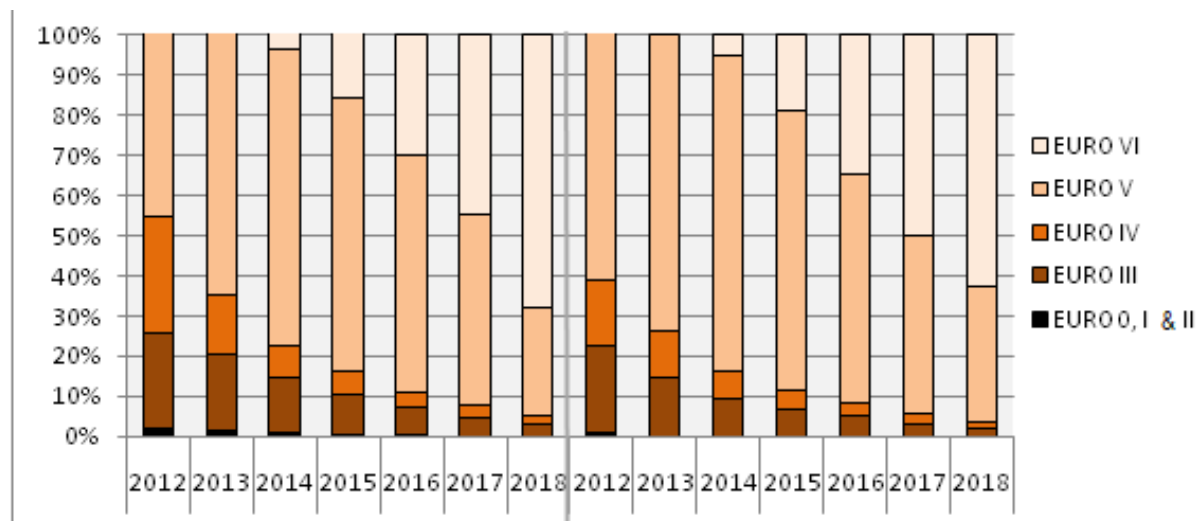
Assess freight transport capacity and the market offered by the new transalpine tunnels (Ceneri, Brenner, Lyon to Torino), factoring in various timetable options allocating different priority levels to freight.

This prospective outlook is still missing a number of details, but clearly advocates for both a wilful policy in favour of a modal shift, and for investigations into supporting measures enhancing clean roads. The following section reflects this concern.

⁴¹ Cf. <https://www.bav.admin.ch/bav/en/home/modes-of-transport/railways/network-usage-concept-and-plans.html>.

Air pollution caused by HGV traffic: to be divided by 4 in the medium term?

In terms of air pollution, European standards have resulted in an undeniable improvement of the situation on and around roads. This is clearly demonstrated by the statistics collected at both Franco-Italian tunnels.



Truck share according Euro classes in the Fréjus / Fregiusio and Mont-Blanc / Monte Bianco tunnels, source: *Observation & analysis of transalpine goods traffic flows*, ATO, November 2019

At the rate at which the HGV fleet replacement is taking place, it is reasonable to expect that within 5 years, all HGVs using transalpine routes will be compliant with European vehicle emission standard Euro 6. They should soon be followed by HGVs used for road-cabotage within the Alpine range.

In this specific case, air pollution due to engines would improve by 25 % (NO_x and PM).

The segment of Euro 6 vehicles is even higher in Switzerland and Austria. Margins for residual improvement are therefore that much smaller.

A prospective outlook on the medium term is obviously less limited. A number of “weak signals” should be traceable:

- Electric heavy goods lorries becoming a reality: according to the very recent analyses carried out by the French Ministry for Ecological and Inclusive Transition⁴², “the cost for a haulier, per tonne-kilometres, of an electric 40-tonne lorry is, as of now, close to the cost of a diesel-powered lorry (whereas the same calculations done in 2017 put the electric lorry at a very definite disadvantage)”. Also: “It seems reasonable to consider the possibility of producing 300 watt-hour per kilogram batteries for the pack by 2025 to 2030 and 400 to 500 watt-hour per

⁴² GHG emissions produced by road haulage reduced through progress in motorisation: is the development of electrically powered HGVs possible? (*La réduction des émissions de GES du transport routier par la motorisation : le développement du poids lourd électrique est-il possible ?*), Memo dated 6 January 2020.

kilogram by 2040.” By that time, a 4-tonne battery pack would offer a semi-trailer energy self-sufficiency over an 800 km range, which would open up the transalpine market. Moreover, electricity being mainly produced from renewable sources in the Alps (100 % from hydropower in Austria), electric lorry would be a clean means of transport (though less energy efficient than train, due to rolling resistance).

- The main local residual pollution produced by HGV traffic would then be from tyre-to-road contact and from braking. In France today, this would represent over 40 % of the particle pollution produced by road traffic⁴³. Even if the entire HGV fleet were electrified, that particular adverse impact would remain. A decline of its impact could however be expected for at least two reasons: (a) the braking system of an electric vehicle is, in part, purely electric and contactless; and (b) the deliveries promised by technological research (e.g., biodegradable tyre surface; particle collecting device fitted next to the brakes, etc.).
- It is a matter of certainty that regulatory constraints regarding air and global pollution will become harsher. Following on from Euro 6, a Euro 7 standard is being drafted for implementation by 2025.



Device by Tallano Technologies to collect particulates produced during braking, cf <https://www.usinenouvelle.com/article/pollution-aux-particules-fines-c-est-le-freinage-qui-pose-probleme-et-une-start-up-parisienne-a-la-solution.N360269>

⁴³ Cf Article from the French daily *Le Monde* at www.lemonde.fr/planete/article/2015/01/19/le-diesel-n-est-pas-seul-responsable-de-la-pollution-automobile_458887_3244.html and https://lexpansion.lexpress.fr/actualite-economique/freins-et-pneus-l-autre-pollution-aux-particules-fines_2037239.html. Cf also Greenhouse gases and air contaminants: assessment of emissions in France from 1990 to 2017 (*Gaz à effet de serre et polluants atmosphériques, Bilan des émissions en France de 1990 à 2017*), CITEPA, July 2019.

One can therefore expect that, in the medium term, with the generalisation of the 'by-then' economically profitable electric traction for HGVs, there will be a two-thirds decline of pollution from particles, compared to the Euro 6 standard, i.e. today's pollution levels will be divided by 4.

7. CHALLENGES TO OVERCOME

Freight shippers' and operators' grievances

These professionals express a number of grievances regarding the rail system, that dampen their interest in this transport mode⁴⁴.

First and foremost, they criticise the service's reliability and regularity:

- Certain intermodal terminals were set up without taking the market into consideration. They therefore process only limited flows and cannot guarantee the frequency that would answer their customers' expectations.
- Delayed arrivals of freight trains could lead to stock shortages, which in turn could stop production. Quality of service indicators in France reveal poor performance: 65 % for SNCF Réseau against market expectations set at a minimum of 90 %. In Switzerland, 30 % of the combined transport trains are subject to a more than 3 hours delay on arrival⁴⁵. Surveys conducted by CGDD in France show the customers' sensitivity to schedule uncertainty.
- Train path allocation by the infrastructure manager never favours freight traffic, and only comparatively low penalties are introduced. Train path allocation ought to be the result of a negotiation between the parties.
- Train path allocation never favours non-incumbent operators.
- Shippers have been deprived from easy network access because of railway undertakings withdrawing from diffuse flows, and infrastructure managers from feeder networks.
-

RECOMMENDATION (5):

Research where to establish combined transport terminals and shuttle services, based on market expectations and targeting clock-faced services.

The professionals' second criticism has to do with the amount of red tape:

- Train path applications must be submitted in April of Year N for Year N+1; this is an unrealistic requirement in view of an increasingly volatile economy. Ironically, quite a number of these booked train paths end up not being used, which penalises the capacity of the busiest routes. Conversely, many train path applications are

⁴⁴On this matter, see more particularly statements by professional organisations (CLECAT, AUTF) and reports by CGEDD of July and December 2018.

⁴⁵ Cf *Bericht über die Verkehrsverlagerung vom November 2019 / Rapport sur le transfert du trafic de novembre 2019*, Schweizerische Eidgenossenschaft / Confédération suisse / Confederazione Svizzera / Confederaziun svizra, p. 26.

last minute requests. In France for instance, one third of all train paths pre-constructed by SNCF Réseau are not requested for use in the end and only 22 % of allocated freight train paths are utilised.

- Some infrastructure managers – SNCF Réseau for instance - require combined transport and rolling motorways to obtain a special transport permit whereas, according to the 4th Railway Package, train movements fall under the responsibility of the railway undertaking.

There are in fact two types of freight transport:

- The conventional train, i.e. a train hauling goods also called a full train, hauling corn, steel, cars, etc. and other materials subject to seasonal variations or erratic speculations for which forecasting one year ahead is very difficult,
- And the modern version of combined transport. Its more regular business activities allow factoring in anticipation.

Conventional trains are the ones for which it is difficult to plan train path needs ahead of time. We have already identified that the tonnage carried by these trains still represents 75 % of all European freight traffic. It is however only 41 % of Alpine traffic, where unaccompanied combined transport has now become the dominant mode, processing 51 % of all rail freight. It is therefore possible to construe that the issue of train path allocation is less acute in the Alps than it is elsewhere.

The professionals' third criticism has to do with the cost of railway services. In France, the National Combined Transport Grouping (*Groupe national du transport combiné*) is calling for lower tolls in spite of the fact that these are already substantially lower than in neighbouring countries. In Germany, there is also a lot of pressure to lower tolls. However, railway services are already heavily subsidised (cf *infra*). But this demand is not widespread. Indeed, although rail transport is not less expensive than road transport, its public profile justifies the interest businesses see in it, shippers as well as hauliers. In point of fact, if this same thought process about motorway tolls were reversed, then the conclusion could be that the railway network usage charge would not be a discriminating factor in any modal choice to be made.

Finally, the tool's technical weaknesses do pose a number of challenges:

- Interoperability is not guaranteed from one country to the next.
- The management of rail nodes plays against freight transit.
- Rolling motorways are sometimes too short for hauliers to free their drivers: this is a relevant issue in the case of the AFA Alpine rolling motorway between Aiton-Orbassano since it is only 172 km long and outperformed by a road motorway.
- Track and tunnel gauges are diverse and penalize bulkier freight trains.



Map of authorised rail gauges, source: Interunit, September 2012 (legend p.m.)

What's more, the European legislation for a long time gave competitive advantage to road hauling. The authorisation granted for road-cabotage inside the European Union borders quickly led to substituting western European HGV drivers with Eastern European ones (from Poland, Romania, the Ukraine, etc.). These drivers could find themselves spending days, and even weeks away home, road-cabotaging at the request of their employer, including on short distance trips. Both employers and their customers benefited indeed from this switch since salaries to eastern European drivers are about 30 % of what western European drivers would receive. Bearing in mind that about 35 %⁴⁶ of the total transport costs in Western Europe are paid out in salaries, this afforded a compelling competitive edge to road over rail. Shippers took full advantage of this, to the detriment of local hauliers and the environment⁴⁷. Professionals are thus arguing in favour of facilitating traffic flows (25.25 m-long trucks; increasing authorised tonnage; etc.) by stating that, in terms of environmental impact, heavy goods vehicles nowadays have little in common with their elders. The European regulation⁴⁸ and the adoption by the European Parliament, on 8 July 2020, of the Mobility package for road transport⁴⁹, should help providing fairer intermodal competition conditions.

⁴⁶ Cf French Conseil national routier (CNR), see Michel Savy.

⁴⁷ Road-cabotage was originally a temporary measure. A foreign haulier was only allowed 3 consecutive journeys inside France. French law makes tax representation in France compulsory for the haulier. Lorry drivers working in France must be paid French rates. This rule is however difficult to monitor and easy to circumvent.

⁴⁸ Directive 2015/413 on cross-border exchange of information on road-safety-related traffic offences, directive 2015/719 on maximum authorized dimensions and weights.

⁴⁹ Regulation relating to access to the profession and to the market, regulation relating to driving times and rest periods and tachographs, directive relating to enforcement and posting drivers in the road transport sector.

Environmental grievances

Just as the rail industry stakeholders hold critical views on the system's weaknesses, the environment also formulates further criticism, expressed through taxpayers and residents:

- Noise: freight train traffic is very loud, particularly because of the traditional braking system involving a cast-iron block against a steel wheel. Areas where conflicts with residents prevail are, notably, near shunting operation facilities, towns and steep-sided valleys like the Rhine Gorge in Rhineland-Palatinate.
- Hazards for residents: though severe accidents aren't a specific problem of rail transport⁵⁰ and are there rather rare, accidents such as the one on March 16, 1992 at the Aix-les-Bains train station in France, are still widely remembered. That latter event happened in the middle of the night and, thankfully, the Rescue and Fire Service managed to get it rapidly under control.

The public authorities' grievances

As stated by the CGEDD in 2015⁵¹, rail service costs are rather high for the taxpayer:

- Toll paid by the railway undertaking to the infrastructure manager for one freight train journey was € 1.70 per train*km in France, € 0.68 to € 2.62 in Switzerland, € 3.39 in Austria, € 4.48 in Germany, € 2.70 as a European average, and € 4.80 in marginal costs. Noteworthy is the fact that this gap is shrinking since Germany as well as Switzerland and all other nations have decided to introduce, or are considering introducing, very pro-active measures to support combined transport. Hence, in Germany, unaccompanied combined transport is subsidized and the cost for a train path has been reduced, particularly for long trains; and an amount of 1,575 M€ subsidy will be given to rail freight in general between 2018 and 2023⁵². In Switzerland, on 13 November 2019, the Federal Council recommended a general drop in train path prices and a special discount for long freight trains. And in Austria, track access charges requested by ÖBB-Infrastruktur AG should drop by € 0.766/train*km or € 0.001586/t*km in 2021⁵³.

⁵⁰ See the fires in the Mont Blanc and in the Tauern road tunnels.

⁵¹ Cf Public support to rail freight transport (*Le soutien public au transport ferroviaire de fret*), CGEDD, June 2015.

⁵² Cf <https://www.bmvi.de/SharedDocs/DE/Artikel/E/masterplan-schienueterverkehr-af-TP.html>.

⁵³ Cf https://infrastruktur.oebb.at/en/partners/rail-network/network-statement/information-track-access-charges-2021/Information_Track_Access_Charge_2021.157240776 or <https://infrastruktur.oebb.at/en/partners/rail-network/network-statement>.

- 'Fret SNCF', a subsidiary of the French incumbent operator, receives € 200 million every year in subsidies. The recent French strikes have undermined the company further.
- In France as elsewhere, 'container lift fork' operations (*coup de pince*) for regular combined transport services are subsidised as well as the maintenance of terminal lines and industrial spurs.
- With the approval of the European Commission, the AFA Alpine rolling motorway between Aiton-Orbassano is receiving a € 5 million a year subsidy, i.e. about € 150 for each heavy goods vehicle transported⁵⁴.

Switzerland has realised that it has not yet reached the high level of modal shift that it has been targeting. To reach it, it is counting on the Ceneri base tunnel entering into operation in 2020 and on capital investments on the Gotthard axis for a 4 m-gauge corridor upgrade. Switzerland feels however, that this will not be enough, highlighting:

- Delays in the completion in Germany, of the access route to the New Alpine Railway Line,
- Gaps in interoperability along the corridor connecting northern and southern Europe: transit of 740-meter long trains is still impossible because German track sections are designed for short trains only,
- Freight trains lack reliability and punctuality.

⁵⁴ Source: French Ministry for Ecological and Inclusive Transition, 10 April 2018.

8. POSSIBLE SOLUTIONS⁵⁵

The shortage of lorry drivers in Europe as an opportunity for the rail transport mode

There is currently a shortage of 500,000 lorry drivers in Europe. The profession is largely dominated by drivers from eastern European countries (Poland, Romania, or even further afield), although even in these countries, hiring is becoming difficult. In fact, lorry drivers are sought out even further east.

The difficulty in hiring and the tarnished image that the profession has among the younger generations, of which driver shortage is a symptom, is making unaccompanied combined rail transport more attractive because drivers are no longer subject to lengthy hauls. Even if transalpine traffic statistics don't show any real advantage of rail over road yet except in Switzerland, this shortage is undeniably an opportunity for the rail transport mode.

Although platooning and other solutions for automation are an actual focus of research⁵⁶, the possibilities for automatic train transport are easier to implement. It seems quite obvious that road HGV trains won't be a reality at middle term.

Quality of rail service, freight granted priority in working timetables, less red tape

One solution to the issue of service regularity would be to organise dedicated rail freight corridors. Relatedly, fair access should be guaranteed to non-incumbent operators.

In a rail world where passenger trains and freight trains are vying for train paths, one solution for conventional freight traffic would be pre-bookings on major train path sections in order to be able to cope with last minute requests. This is already the case in Germany, Austria and Switzerland. Last minute requests are allocated on a 'first come, first served' basis. The Redesign of the International Timetabling Process (TTR)⁵⁷ is a European project providing pre-booking of train paths along specific rail sections, and allocation four months only before paths are used. In France, the 2019 Joint Ministerial Committee for the Sea requested that SNCF Réseau establish national dialogue platforms with shippers, on freight issues. A 'yield management' option could be considered (incremental charges based on demand) to solve the inconsistency of trains paths booked well in advance yet unused, and last-minute bookings.

⁵⁵ On this chapter, cf in particular the four CGEDD reports of March 2014, June 2015, September 2016 and October 2018.

⁵⁶ See *Innovation in rail freight*, Alpine Convention, January 2019.

⁵⁷ Cf <http://rne.eu/sales-timetabling/ttr/>.

The issue for the combined transport industry is that (a) it should benefit from frequent enough advantageous train paths; and (b) its trains should be able to run between passenger train time slots, at the cost of a sufficient commercial pace. This will be particularly crucial on the Lyon-Torino section where freight trains will need to operate sandwiched in with high-speed trains (TGV). A quicker turn-over for the renewal of vehicles dedicated to combined transport seems to be a step in the right direction.

Recommendation (6):

In the spirit of European project 'Redesign of the International Timetabling Process' (TTR), organise a dialogue on train paths between infrastructure managers and their customer railway undertakings, notably for conventional freight, planning for a consistent door-to-door offer with shortened booking times.

Funding

Transformation of practices in the industry can be supported by public funding. There are currently a number of subsidies available:

- a transport subsidy,
- a subsidy for multimodal terminals similar to what is done in Germany⁵⁸; and for rolling motorways,
- a subsidy for the maintenance of terminal lines and industrial spurs: when shippers' private facilities are involved, this subsidy is subject to prior approval by the European Commission,
- backing for forming local railway undertaking⁵⁹,
- in France, energy efficiency certificates for shippers⁶⁰,
- a guarantee fund for the hiring of rolling stock⁶¹.

The network manager can also decide to set freight trains toll charges at a lower level.

In the interest of sound allocation of public funds, rather than supporting the rail transport industry per se by offering toll discounts, it would seem better to support

⁵⁸ Cf Report by European Parliament of November 2018.

⁵⁹ Cf October 2010 Report by French Senate.

⁶⁰ Cf June 2015 Report by CGEDD.

⁶¹ Cf June 2015 Report by CGEDD.

multimodal terminals preferentially once they offer innovative solutions (cf *infra* – reflexions on technologies).

Infrastructure & gauges

Professionals are calling for developments; this could involve studies on railway infrastructure and its potential for accommodating freight trains:

- Raising the authorised tonnage of HGVs running a multimodal service: it remains important however to bear in mind that axle load is a crucial factor in road wear-and-tear and in strain on civil engineering works.
- Authorising longer trains to transit on the TEN-T, i.e. 740 m long, or why not even longer – 1,500 m? Currently, certain Alpine countries (e.g., Germany), do not authorize 740 m long trains.
- Restoring feeder networks and subsidising rail-connected distribution terminals.
- Improving the gauge by lowering the tunnel's rail running surface, at the cost of laying a sub-base layer in crushed stone.
- 3D laser measurement of all obstacle gauges and particularly tunnels, as is done in Switzerland, keeping in mind that UIC gauge standard P400 has not yet been adopted everywhere.
- Extending combined transport sections to improve attractiveness for hauliers: this issue is relevant in the case of the Franco-Italian Alpine Rolling Motorway which is deemed too short at 172 km.
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RECOMMENDATION (7):

Improve interoperability; enable transit of 740 m long trains.

RECOMMENDATION (8):

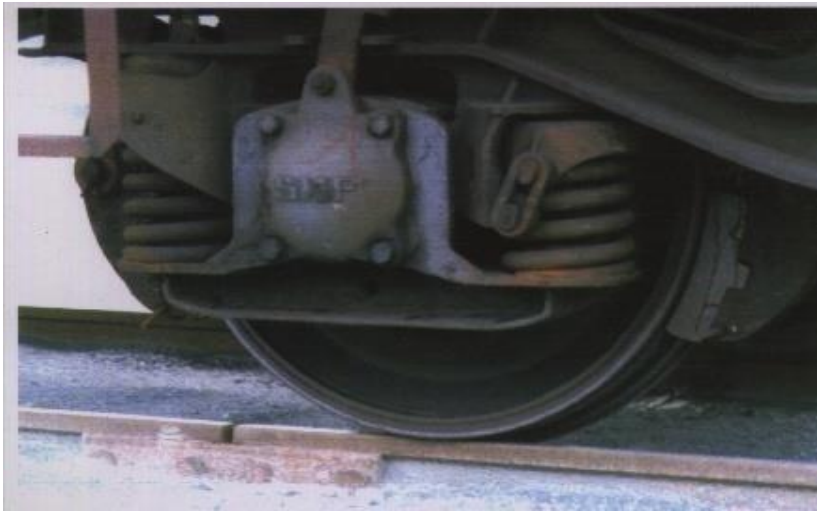
Standardise gauge, targeting UIC Gauge Standard P400.

Logistics

Reducing transalpine traffic also calls for better irrigation via maritime traffic from Alpine riparian countries. The issue is preventing Italy from being serviced by North Sea ports and conversely, that goods landing in Italian or Slovenian ports would cross the Alps to be delivered to Germanic countries.

A balanced development of maritime ports on the North Sea and Mediterranean shores would contribute to a reduction in transalpine traffic. The current growth of Mediterranean ports is conducive to restoring such a balance.

Controlling the impact of rail traffic on the environment, notably of noise



Freight wagon cast-iron brake block, source: Prospective outlook on a policy for noise reduction (Réflexion prospective sur une politique de réduction des nuisances sonores), CGEDD, October 2017

As road freight is becoming less conspicuous, so the matter of noisy rail freight trains is becoming more acute. It is a particularly sensitive issue near shunting operations and rail stations; in steep-sided valleys like the Rhine Gorge in Rhineland-Palatinate where freight transits from North Sea ports; and along slopes (of which there are plenty in the Alps).

A Noise Technical Specification for Interoperability (NOI TSI) was issued by the European Union⁶². Its execution remains optional, however. Practically, this means that the current wagon fleet, that has been in use for 35 years on average⁶³, is most often fitted with cast-iron brake-blocks which are very noisy.

Protective measures against noise can be applied to rail infrastructure (welded long rails; grinding techniques of rail head in order to lower rolling noise of train; noise absorber for rails; concrete sleepers) and to rail surroundings (noise barriers). As for rolling stock, the most accessible solution would be retrofitting wagon brakes with brake blocks made of composite material (K or LL). Quiet braking technologies are indeed the most important measure for reducing noise emissions in rail freight transport: This enables us to combat noise directly at its source. The smoother the wheels and rails, the quieter the rolling noise. Up to now, cast iron brakes have been used in freight transport. However, these have the disadvantage that they roughen the wheels when braking. The newly developed whisper brake with brake pads made of plastic or ceramic does not do this and can thus help to reduce the rolling noise of the wagons by around 7 to 10 dB, which means the

⁶² Commission Regulation (EU) N° 1304/2014 of 26 November 2014 on the technical specification for interoperability relating to the subsystem 'rolling stock-noise'.

⁶³ Source: UIC.

noise is halved for the human ear. The sound advantage anticipated would be completed by the elimination of any fine metal particles (replaced however by composite dust emissions). A retrofitting of the whole French fleet would cost less than erecting noise barriers along the lower Rhône valley⁶⁴. In 2011, retrofitting was estimated at € 4,500 per wagon⁶⁵.

The fight against freight train noise is highly subsidised by public funds, particularly in Germany and in Switzerland:

- In Austria, by the first quarter of 2021, the 7,000 freight wagons in operation in the ÖBB freight subsidiary Rail Cargo Group will be using the brakes quietly. This program has been subsidized up to 3.3 M€ by the Connecting Europe Facility program of the European Commission.⁶⁶
- In Germany, and particularly in the Rhine valley, € 827 million in subsidies were committed between 1999 and 2013, to erect noise barriers. Results were judged unsatisfactory, which led to the 'Silent Rhine Project' in 2008. This meant retrofitting wagons with silent brake blocks; it was a € 140 million budget, 50 % of which was subsidised, and it targeted the 60,000 wagons in use. This second programme produced once again unsatisfactory results. The decision was then taken that, starting in 2020, all traffic of wagons non-compliant with the 'Noise TSI' would be banned.
- In Switzerland, 90 % of the wagons were retrofitted with K composite blocks, payed out of public funds (CHF 500 to 600 million). Noise barriers were erected along rail sections and rail grinding was carried out. A bonus of CHF 0.02 per km was granted to 'Noise TSI-compliant' wagons. Like Germany, all loud wagons will be banned as of 2020.

It would be advisable that all wagons circulating in the Alps be fitted with composite brake blocks, progressively and on the medium term⁶⁷.

RECOMMENDATION (9):

Ensure that, progressively, non-noisy wagons and clean lorries – notably alternatively fueled ones - are privileged to circulate in the Alpine range.

⁶⁴ Cf Rail freight noise (*Bruit du fret ferroviaire*), CGEDD, March 2014.

⁶⁵ Cf The Sustainable Logistics Green book (*Grünbuch der nachhaltigen Logistik*), Logistics Federal Association of Austria and Germany, March 2011.

⁶⁶ Cf <https://konzern.oebb.at/de/leise-gleise/massnahmen/laermschutz-fahrzeuge-gv> and <https://blog.railcargo.com/artikel/leiser-güterverkehr.html>.

⁶⁷ The CGEDD report of June 2015 suggested a ban on cast-iron blocks in 2022, and a ban on all wagons fitted with cast-iron blocks in 2025, at least on sections vulnerable to noise. The report ruled out the idea of subsidising brake block retrofitting.

Clean lorries

As stated earlier, it is likely that unless strong measures in slot allocation in favor of rail freight transport, road transport could remain the dominant mode in the short and medium term. It's therefore essential also to work on reducing its environmental impact. Administrative measures, but also very promising technological developments (less polluting engines, intermodal vehicle design, etc.) can help to achieve this. In this respect, a policy strongly favouring a modal shift cannot afford to bypass a policy in support of clean lorries. The latter could take a number of forms: technological, financial and fiscal, regulatory.

Technology has definitely progressed through the demands of society and the constraints of regulations, particularly in the area of air pollution (Euro standards) and noise (better tyres; better surface course and tyre/road contact; aerodynamics; engine noise). On the short term, LNG engines should prove promising. New areas are under study such as trolley trucks currently undergoing testing in California and in the German Land Hessen and that could, on the road, outperform a rolling motorway. To implement such a system on a bigger scale, it would clearly lead to massive investment in infrastructure, while railways already offer the advantage of a full length overhead contact line⁶⁸. On the longer term, electric lorries powered by on-board batteries offer a promising option (cf *supra*). Hydrogen could also prove to be a solution, provided it were produced at a reasonable cost and from green processes.



Source: <https://www.siemens.com/press/en/presspicture/?press=/en/presspicture/2014/infrastructurecities/> according to Innovation in Rail Freight, Ernst Lung, Österreichisches Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, January 2019

⁶⁸ Cf <https://www.autoscout24.at/informieren/news/panorama-test-mit-oberleitungs-lkw-ernuechternd/>

Prospects look *a priori* more limited in financial and fiscal terms. French simulations mentioned earlier seem to point to the fact that taxing lorries would not shift a significant share of the freight traffic towards rail. And for that matter, the Eurovignette Directive in its current form offers no such incentive.

In terms of rules and regulations, local arrangements are already enforced in sensitive geographies, e.g., Alpine valleys (cf *supra*). The Low Emission Zone concept (LEZ, cf *supra*) is developing, i.e., an area where the most polluting vehicles are regulated.

There is also the issue of compliance of HGVs with the regulation on maximum permissible gross laden weight. Indeed, HGVs are the primary factor contributing to the deterioration of infrastructure and civil engineering works through the pressure they exert on pavements. For some 20 years, systems fitted in roads have allowed assessing axel load of HGVs driving past. But sanctioning implies both an improvement of the European directive 2015/413⁶⁹, allowing member states to prosecute foreign lorries, and a subsequent intervention of the police force. Nevertheless, automated check-and-sanction systems should be operational shortly. For a more comprehensive control (gauge, driving time, pollution, etc.) calling at times for a brief immobilisation of the vehicle, Switzerland has set up 2 quick control checkpoints in the north-eastern part of the country and very recently in Ticino.

Recommendation (10):

Assess options for an automated check-and-sanction system of heavy goods vehicle traffic, particularly of HGV loads.

⁶⁹ European directive 2015/413 facilitating cross-border exchange of information on road-safety-related traffic offences.



An automated control system in France by CEREMA, source: <https://www.republicain-lorrain.fr/edition-de-metz-ville/2019/06/20/camions-trop-lourds-le-controle-automatise-teste-sur-l-a4>

Technology and innovation: designing new and ‘outside-the-box’ solutions for intermodal platforms and cargo transport units

In terms of technological innovations, operator expectations target more particularly digitization and alternative fuels. That is in fact the ambition of the Shift2Rail new technologies project (cf *supra*). As for the issue of alternative fuels, we have already noted that these are uncharted territories.

First and foremost is the issue of road-to-rail transfer performance. The performance of the route set for trains loaded with HGVs is commonly the target of interest. Nevertheless, the efficacy of loading and unloading processes, as well as of rail service matter no doubt just as much.

As far as service is concerned, rolling motorways offering insufficient frequency and regularity make for disappointed customers.

As for handling, existing technologies display their limits:

- Direct loading of a tractor and its trailer implies low-floor deck wagons with smaller wheels that wear more quickly, e.g., the Modalohr System,
- Loading only the container with a lift fork implies a procedure on a track free of any catenary, which in turn calls for many complex train coupling/uncoupling operations.

HGVs offer a multitude of potential uses, yet most of them only perform short-haul trips which would most likely never justify rail piggybacking. Including in the Alps, these short

trips tally up most of the mileage as reported above. Exploring HGV design for multimodal transport purposes is only relevant for those running long-haul journeys.

In as much as unaccompanied freight transport seems to offer a growth niche for the transport of freight by rail, the relevant issue is availability, and therefore the design of a customised fleet of road lorry tractors. In terms of environmental impact, a removable container (fitted for maritime or land haulage) placed on a towed platform is obviously preferable to an integrated trailer. But the type of goods and therefore the market segment interested are not the same: a container is best suited for maritime transport and an integrated trailer for inland transport. Noteworthy however, is the fact that there are removable containers well suited to lorry transport, at least for goods that do not call for lengthy handling.

On-going research on the ergonomics of a road vehicle and of the transshipment of its container onto a wagon is on-going at present. The most promising options offer to carry out transshipment under catenaries by sliding rather than lifting the container onto the wagon, which would significantly speed up the process. The Swiss InnovaTrain AG company is offering just that. Its design is probably better suited to light loads such as for couriers or small package freight, but it is definitely worth exploring.



Rail/road transshipment according to InnovaTrain AG, source: www.innovatrain.ch

A key issue is the maximum speed at which freight trains run. Indeed, in long sections without stabling options, like long base tunnels, the difference in speed between passenger trains and freight trains reduces capacity considerably. Would it be possible to envision the concept of a fast/high-speed freight train? This would call for developments in freight train braking systems and dynamic stability. Let us bear in mind that Getlink shuttle trains carry HGVs (tractor with trailer) at 140 kph through the Channel tunnel.

Recommendation (11):

Drive an R&D effort to identify innovative solutions in the areas of rail/road transshipment management; and of the corresponding design for road vehicles and fast freight trains.

Operational governance of the logistic chain at local level

Integrating the rail freight logistic chain will be the cornerstone of its development. That is an operational governance issue.

Implementing strategies presented above will call for a clear spread of responsibilities across all stakeholders involved in the supply chain. The shipper > haulier > service provider of rail intermodality > rail infrastructure manager chain tends indeed to dilute the responsibilities of stakeholders and to reduce their hold on the process. It is however important for hauliers to remain in full control of selecting their transport modes.

The current gap in rail cost and quality of service versus road transport will neither shrink by implementing incremental improvement measures, nor because of a hypothetical “internalisation of external costs” which limitations are visible (cf *supra*). We are called to carry out a rather radical thinking exercise in re-engineering⁷⁰. It calls in particular for a reflexion on how to bring down the cost of terminal operations for pre- and post-road-forwarding and the cost of managing and administrative railway interfaces, where substantial potential for improvement, cost killing and time saving, is to be found. Managing freight gathering in order to allow small clients to do last-minute booking would be a true breakthrough to that effect. Nowadays however, most efforts concentrate on the main rail segment, admittedly the longest, but which is often barely half of the total service cost.

The following two proposals are made with a view to joint governance:

Recommendation (12):

Establish a set of relevant service indicators to monitor service implementation via a dashboard shared with all stakeholders.

Recommendation (13):

Draw up a projection of the freight system in the Alpine range, including expected outputs.

A mean-term scenario would underscore the synergy of all recommendations and the involvement of the various public and private stakeholders. It would help clarify the socio-economic relevance of recommended improvements and investments. It would also supply an order of magnitude of the expected result.

⁷⁰ Similar to the former Recordit programme.

9. CONCLUSIONS AND GUIDANCE

The approach suggested herein intends to make rail mode more attractive for shippers and hauliers. It would seem that options are available, that do not necessarily commit public budgets heavily, or weigh forcefully on the current market forces.

This report submits thirteen recommendations to that effect, listed once again here below:

1. **Maintain the statistical system monitoring transalpine freight flows by adapting it to the needs of strategic management.**
2. **Gather more information on final destination of freight unloaded in European maritime ports and of the inland transport modes used for its forwarding.**
3. **Assess sensitivity to pricing, of transport demand and its modal distribution.**
4. **Assess freight transport capacity and the market offered by the new transalpine tunnels (Ceneri, Brenner, Lyon to Torino), factoring in various timetable options allocating different priority levels to freight.**
5. **Research where to establish combined transport terminals and shuttle services, based on market expectations and targeting clock-faced services.**
6. **In the spirit of European project 'Redesign of the International Timetabling Process' (TTR), organise a dialogue on train paths between infrastructure managers and their customer railway undertakings, notably for conventional freight, planning for a consistent door-to-door offer with shortened booking times.**
7. **Improve interoperability; enable transit of 740 m long trains.**
8. **Standardise gauge, targeting UIC Gauge Standard P400.**
9. **Ensure that, progressively, non-noisy wagons – notably alternatively fueled ones - and clean lorries are privileged to circulate in the Alpine range.**
10. **Assess options for an automated check-and-sanction system of HGC traffic, particularly of HGV loads.**
11. **Drive an R&D effort to identify innovative solutions in the areas of rail/road transshipment management; and of the corresponding design for road vehicles and fast freight trains.**
12. **Establish a set of relevant service indicators, to monitor its implementation via a dashboard shared with all stakeholders.**
13. **Draw up a projection of the freight system in the Alpine range, including expected outputs.**

It's obvious that all of them don't aim at the Alpine Convention itself, but at relevant institutions and bodies, Alpine Convention member States are members of.

10. ANNEX

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WG Transport, Ernst Lung	Innovation in rail freight	Alpine Convention	Jan. 2019
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WG transport, Massimo Santori	Deployment of Alternative Fuels Infrastructure Implementing the EU Directive 2014/94/EU on the Alpine territory	Alpine Convention	Dec. 2018
Beata Tuszyńska	Research for TRAN Committee – Modal shift in European transport: a way forward	European Parliament	29 Nov. 2018
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Geoffroy Caude	La transformation du modèle économique des grands ports maritimes (The transformation of the economic model of major maritime ports)	IGF, CGEDD - France	Nov. 2018
Christian Assailly	Qualité de service offerte par le gestionnaire d'infrastructures aux opérateurs de fret ferroviaire (Quality of service offered by the infrastructure manager to rail freight operators)	CGEDD - France	Oct. 2018
Markus Maibach	Future trends for transalpine transport; Input paper on the role of innovative technologies and digitalization for the iMONITRAF! Strategy	iMONITRAF!	25 Sept. 2018
Cambridge Econometrics	Trucking into a Greener Future: the economic impact of decarbonizing goods vehicles in Europe	European Climate Foundation	5 Sept. 2018
EBERL	Description of the state of the art of the European transport system with a focus on CT	AlpInnoCT	Sept. 2018

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WG Transport, CEREMA	Assessment of external costs induced by noise in mountainous areas	Alpine Convention	May 2018
Matthias Rinderknecht	Desk Research Report for environment-related freight transport issues in the Alpine area	Zurich Process	30 Apr. 2018
Jean-Cyril Spinetta	L'avenir du transport ferroviaire (The future of rail transport)	Premier Ministre - France	15 Feb. 2018
Yves Crozet et al.	L'avenir du transport routier de marchandises (The future of road freight transport)	Economica	2018
Marissa Moultak et al.	Transitioning to zero-emission heavy-duty vehicles	ICCT	26 Sept. 2017
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Michel Savy	Le transport de marchandises / Economie du fret, management, logistique, politique des transports (The transport of freight – freight economy, management, supply chain, transport policy)	Presses polytechniques universitaires romandes	2017
TCI Röhling et al.	Status quo des Güterverkehrssysteme in Deutschland – eine Metastudie unter besonderer Betrachtung der Vernetzung des Verkehrs	Bundesministerium für Verkehr und digitale Infrastruktur - Deutschland	Oct. 2016
Hervé de Tréglodé	L'innovation dans le transport ferroviaire de fret en France - rapport d'étape (Innovation in rail freight transport in France – Interim Report)	CGEDD - France	Sept. 2016
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Author	Title	Editor	Date
	Freight traffic by road and rail through the Swiss Alps 2014	Federal Office of Transport, Switzerland	7 Dec. 2015
Michel Savy	Nouveaux lieux, nouveaux flux, les mobilités de l'avenir (New locations, new flows, mobilities of the future)	Odile Jacob	12 Nov. 2015
Hervé de Tréglodé	Le soutien public au transport ferroviaire de fret (Public support to rail freight transport)	CGEDD - France	June 2015
Michel Savy	La logistique en France (Logistics and supply chain in France)	Conférence nationale sur la logistique (National Conference on Logistics) - France	March 2015
	Regulation (EU) No 1304/2014 on the technical specification for interoperability relating to the subsystem 'rolling stock – noise'	European Commission	26 Nov. 2014
	Hinterland des ports maritimes(2): Etude bibliographique européenne (Maritime Ports Hinterland : European bibliographic survey)	Ministère de l'écologie, du développement durable et de l'énergie/ CGDD - France	Jul. 2014
Bernard Simon	Bruit du fret ferroviaire (Noise made by rail freight)	CGEDD - France	March 2014
Colin Albizzati	Le transport routier de marchandises à travers les frontières françaises en 2010 (The transport of freight by road through the French borders in 2010)	Ministère de l'écologie, du développement durable et de l'énergie / CGDD - France	July 2013

Author	Title	Editor	Date
Pierre Franc	Trafics conteneurisés échappant aux ports français : éléments d'appréciation et zoom sur l'Ile-de-France (Container traffic bypassing French ports: evidence and a focus on the Ile-de-France region)	Revue Transports	Nov. 2012
	Accès alpins Lyon Chambéry Turin / Pièce G: Dossier d'offre de service et d'évaluation économique et sociale / Dossier d'enquête préalable à la déclaration d'utilité publique (Alpine access Lyon Chambéry Torino / Exhibit G: Tender file and economic and social assessment report / Survey package prior to the public interest statement)	Réseau Ferré de France	2012
	Roadmap to a single European Transport Area; Towards a competitive and resource efficient transport system - White paper	European Commission, DG Tran	28 March 2011
Gerald Gregori, Thomas Wimmer	Grünbuch der nachhaltigen Logistik	Bundesvereinigung Logistik Österreich und Deutschland	March 2011
Francis Grignon	Rapport d'information sur l'avenir du fret ferroviaire (Information report on the future of rail freight)	Sénat - France	20 Oct. 2010
Michel Savy	Le fret mondial et le changement climatique (World freight and climate change)	Centre d'analyse stratégique - France	22 Sept. 2010
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Christian Brossier et al.	La politique française des transports terrestres dans les Alpes (French policy for inland transport in the Alps)	Ministère de l'écologie, du développement durable et de l'énergie - France	March 1998
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