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

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ANLAGE/ANNEXE/ALLEGATO/PRILOGA

7 Activity Report of the Transport Working Group for the period between the XV and XVI meetings of the Alpine Conference

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ACTIVITY REPORT OF THE

TRANSPORT WORKING GROUP

FOR THE PERIOD BETWEEN THE XV AND XVI MEETINGS OF THE ALPINE CONFERENCE (April 2019 – December 2020)

1. Overview of the mandate or relevant decision of the Alpine Conference

Summary of the main tasks according to the 2019-2020 mandate (for Working Groups) or decision AC XV / A6 of the XV Alpine Conference (for Boards)
Based on its previous work, the Transport Working Group shall contribute to the achievement of the Alpine Climate Target System 2050, which sets out the following targets for 2050 in the field of transport: • Tr1/ Modal shift of Alpine freight transit; • Tr2/ Reduced car dependency (inner-Alpine and transalpine passenger transport); • Tr3/ Reduced transport demand (passenger & freight); • Tr4/ Decarbonised transport fleet. The Transport Working Group shall also contribute to the proposed 8th Report on the State of the Alps (RSA 8) on Air Quality. This encompasses following tasks: 1. 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 XVI Alpine Conference on the **modal shift of Alpine freight transit** by 2050 (Transport Protocol art. 10 & 14, Climate Target Tr 1). 2. Collect and analyze good practices in **reducing transport demand** through transport saving spatial structures, new working solutions, pooling of shipments, regional distribution chains and changed mobility and behavioral patterns (Framework Convention art. 2 (2) j, Climate Target Tr 3). 3. Study the potential of existing and new **technologies for sustainable passenger transport** in the Alps, such as hydrogen-powered trains (Transport Protocol art. 9, Climate Target Tr 2).

4. Provide an alpine-wide overview of the **impacts of transport in the Alps on air quality** and the effectiveness of **impact mitigation measures** (Framework Convention art. 2 (2) c).

2. Meetings

Summary of the meetings (date, place, main topics and outcomes)
Grenoble, 12-13 June 2019. During this meeting, the first steps to start the work on the mandate were taken. The tasks were divided amongst the members: task 1 "*modal shift of Alpine freight transit by 2050*" was assigned to Chair; task 2 "*reducing transport demand*" to CH and AT, task 3 "*technologies for sustainable passenger transport*" to DE and task 4 "*impacts of transport in the Alps on air quality*" to IT. The countries responsible for each task provided an overview of their approach, methodology and objectives. Each item was discussed commonly by the Group, providing guidance and inputs. **Paris, 22-23 November 2019**.This meeting was the opportunity for each country to update the Group on the developments on their respective tasks, as well as to renew the requests for contributions and for inputs. The Chairman presented already the draft recommendations on the topic of modal shift of Alpine freight transit. AT and CH presented their report, which focuses on passenger traffic and reduction of every-day mobility demand by teleworking and clever spatial development. Their report is based on examples and good practices and will include recommendations and policy measures. DE explained the concept and the aim of its study, i.e. to draft concrete policy recommendations for regional political actors as well as regional transport associations on the implementation of sustainable passenger transport in the Alpine region. IT underlined that it will take into account traffic regulations, sustainable urban logistic strategies and alternative fuels (in particular biomethane) in its contribution on air quality. A possible contribution of the WG to the RSA 8 was discussed. **Audioconference, 12 March 2020**. This meeting was supposed to take place in Munich together with the workshop on environmentally friendly technologies for transport organized by Germany and key to complete Task 3. However, due to the Corona crisis, it was changed at the last minute into an audioconference. The first drafts of the reports for Task 1 and Task 3 had been circulated in the previous days: the Group had therefore the possibility to provide its inputs to those reports. Concerning task 1, FR stressed that transport policy needs to focus not only on road vehicles, but should rather be holistic, encompass all kind of

transport means, as well as realistic in meeting the market expectations. On behalf of the RSA 8 WG, Michel Pinet presented a report of its activities and proposed to the Group some possible topics for the WG's contribution to the Report.

Audioconference, 18 June 2020. During this meeting, a more in-depth discussion on the two reports on freight transit modal shift and reducing need for mobility was carried out. Additionally and concerning the topic of air quality, Michel Pinet, co-chair of the RSA 8 WG, presented the current status of the Report, for which the Transport WG was supposed to prepare a contribution, with the draft report on modal shift providing some accurate input on this topic.

Munich / videoconference, 11 September 2020: the postponed seminar on technologies organized by Germany took place the day before (10 September). It brought together, physically or by means of videoconference, experts from all countries and good practice examples in sustainable passenger transportation. All these contributions will serve as a basis to define the content and the recommendations of the study. Moreover, the Group held a traditional meeting too where it discussed and approved the reports to be submitted to the Alpine Conference as well as the draft mandate for the period 2021-2022

3. Activities carried out

Synthetic report on activities carried out (including outreach and communication activities)

Most of the work of the WG was dedicated to drafting, discussing and amending the reports and studies foreseen in the mandate. Each meeting was the opportunity to present the status quo and the content of each study, as well as for carrying out a collegial discussion and for collecting opinions and remarks. The different reports therefore include contributions from all the members of the Group.

Additionally, during all meetings, a specific point on the agenda was dedicated to an update about parallel international process, especially EUSALP and Alpine Space Programme, thanks to representatives of these organizations taking part as observers in the Transport WG meetings.

Moreover, the Group and its members conducted the following activities over these last two years:

- Grenoble, 12 June 2019: visit to the active mobility services provided at Grenoble,

meetings with the prefect of Isère and the president of the Chartreuse Regional Natural Park.

- Bolzano / Bozen, 3 and 4 July 2019: WG chairman's participation in the workshop of the chairs of thematic working bodies organised by the French presidency and the Permanent Committee.
- Paris, 22 November 2019: brief workshop on Alpine climate board implementation pathways.
- Videoconference, 7 July 2020: status report of the WG activities for the Permanent Committee.
- Munich / videoconference, 10 September 2020: workshop on *Assessing the potential of technologies for the promotion of sustainable passenger transport in the Alpine region* organized by the German federal ministry of transport and digital infrastructure and by the Bavarian ministry of housing, building and transport in the framework of the WG agenda.

4. Results and outputs

Description of main results and outputs achieved
Four reports are being submitted to the XVI Alpine Conference: 1. *Towards a modal shift of transalpine freight transit* (Author: Chairman); 2. *Reduction of mobility demand and shift to environmentally sustainable modes, Strategies and measures in the Alps* (Authors: AT + CH); 3. Interim report on *Analysis of the potential of existing and new technologies for the promotion of sustainable passenger transport in the Alpine region* (Author: DE); 4. Study *Air Quality – Measures on sustainable mobility in the Alpine towns & cities* – as contribution to the topic of the RSA8 (Author: IT). Furthermore, the work on sustainable technologies undertaken by DE will be concluded in 2021 under Swiss presidency. An excerpt of the report on modal shift has been included in the good practices listed in the RSA8.

5. Cooperation

Description of cooperation initiatives and activities with other Alpine Convention Thematic Working Bodies and other relevant bodies and processes (e.g. EUSALP)
Constant exchanges with the RSA 8 WG in order to define a contribution by the Transport WG on the theme of air quality in the Alps. Participation of WG members to the EUSALP AG 4 Workshops and participation of EUSALP AG 4 representative as WG observer. Regular exchanges and updates with the Alpine Space Programme. Workshop on Alpine climate board implementation pathways held in Paris on 22 November 2019.

6. Attachments

List of the documents attached to this report, such as papers proposed for approval by the XVI Alpine Conference (thematic reports, guidelines, statements etc.) and supporting documents (workshop proceedings, survey reports etc.).
1. *Towards a modal shift of transalpine freight transit* 2. *Reduction of mobility demand and shift to environmentally sustainable modes, Strategies and measures in the Alps* 3. Interim report on *Analysis of the potential of existing and new technologies for the promotion of sustainable passenger transport in the Alpine region* 4. Study *Air Quality – Measures on sustainable mobility in the Alpine towns & cities*

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GROUPE DE TRAVAIL TRANSPORTS / GRUPPO DI LAVORO TRASPORTI

ARBEITSGRUPPE VERKEHR / DELOVNASKUPINA PROMET

Mandate 2019-2020

TOWARDS A MODAL SHIFT OF TRANSALPINE FREIGHT TRANSIT

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COLOPHON

This report has been written up within the Alpine Convention Working Group on Transports, whose members are:

President: Michel Rostagnat

National delegates:

- Germany: Lisa-Maria Arnold, Manuel Haußner, Harry Seybert
- Austria: Ernst Lung, Maximilian Koch, Wolfgang Grubert
- France: Isabelle Paillet, François Lamoise, Geneviève Borodine
- Italy: Paolo Angelini, Massimo Santori
- Liechtenstein: Henrik Caduff
- Monaco: Astrid Claudel-Rusin
- Slovenia: Zlatko Podgorski, Blanka Bartol, Majda Lovrenčič
- Switzerland: Franziska Borer-Blindenbacher, Matthias Rinderknecht

Observers: Hélène Denis (Club Arc alpin), Jakob Dietachmair (CIPRA), Anne-Séverine Lay (Interreg Alpine space), Patrick Skoniezki (EUSALP)

Permanent Secretariat of the Alpine Convention: Aureliano Piva.

It did benefit from an expert panel input, with: Eric Ballot, Aurélien Barbé, Geoffroy Caude, Yves Crozet, Pierre Greffet, Eric Guenther, Tomas Hidalgo, Olivier Leloup, Kiarash Motamedi, Michel Nicolas, Michel Savy, Jean-Christian Vialelles, Xavier Wanderpepen.

The report was written up by Michel Rostagnat.

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. 10[1] & 14[2], Climate Target Tr1[3])."

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*km[4], which is rather lower than the estimated amount from the external negative impacts of transport (c€ 4.2/t*km for EU-28[5]). 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 restrictions[6].

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 programme[7] 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 4[8]) 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 Tyrol[10];
- 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-up [11] 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 & I*nnovation*

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 2.0[12]

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 Switzerland[13]. 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

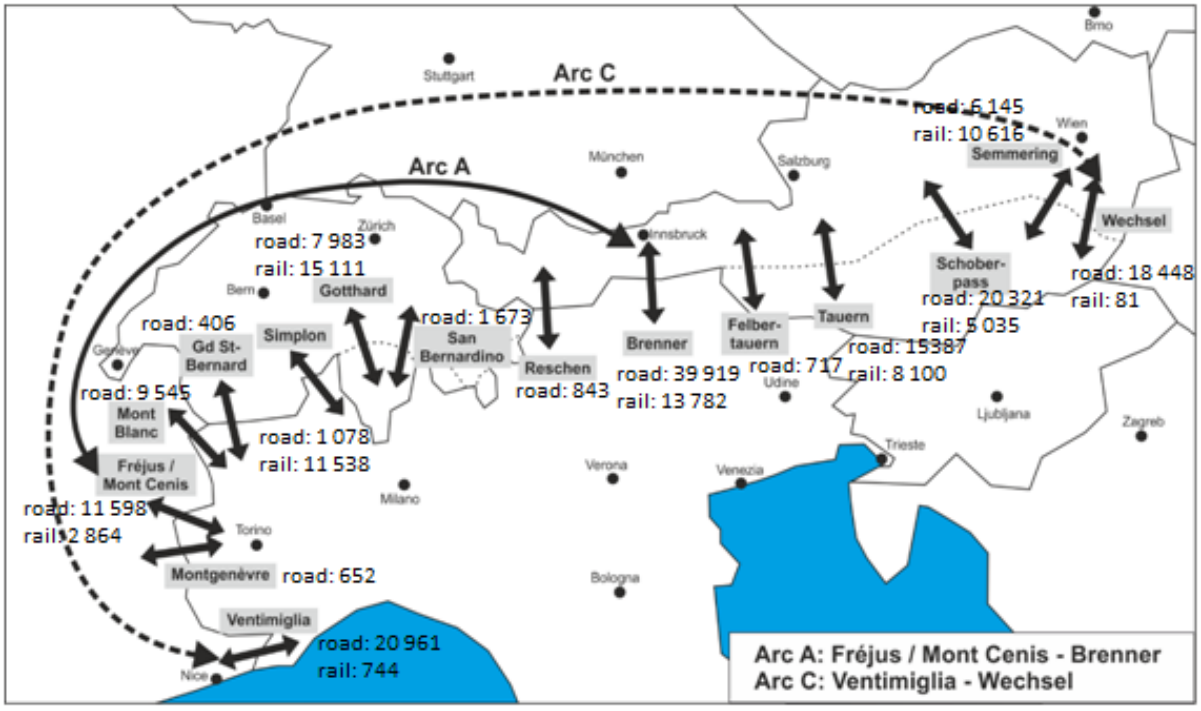
Railenium was founded by French rail academics and professionals as an Institute for testing and research (IRT). It has targeted three research areas: autonomous trains; rail modelling and forecasting; and a testing platform. In this context, Railenium has been working on noise produced by trains and 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 report[14] gave an estimate of road and rail traffic carried via these crossings.

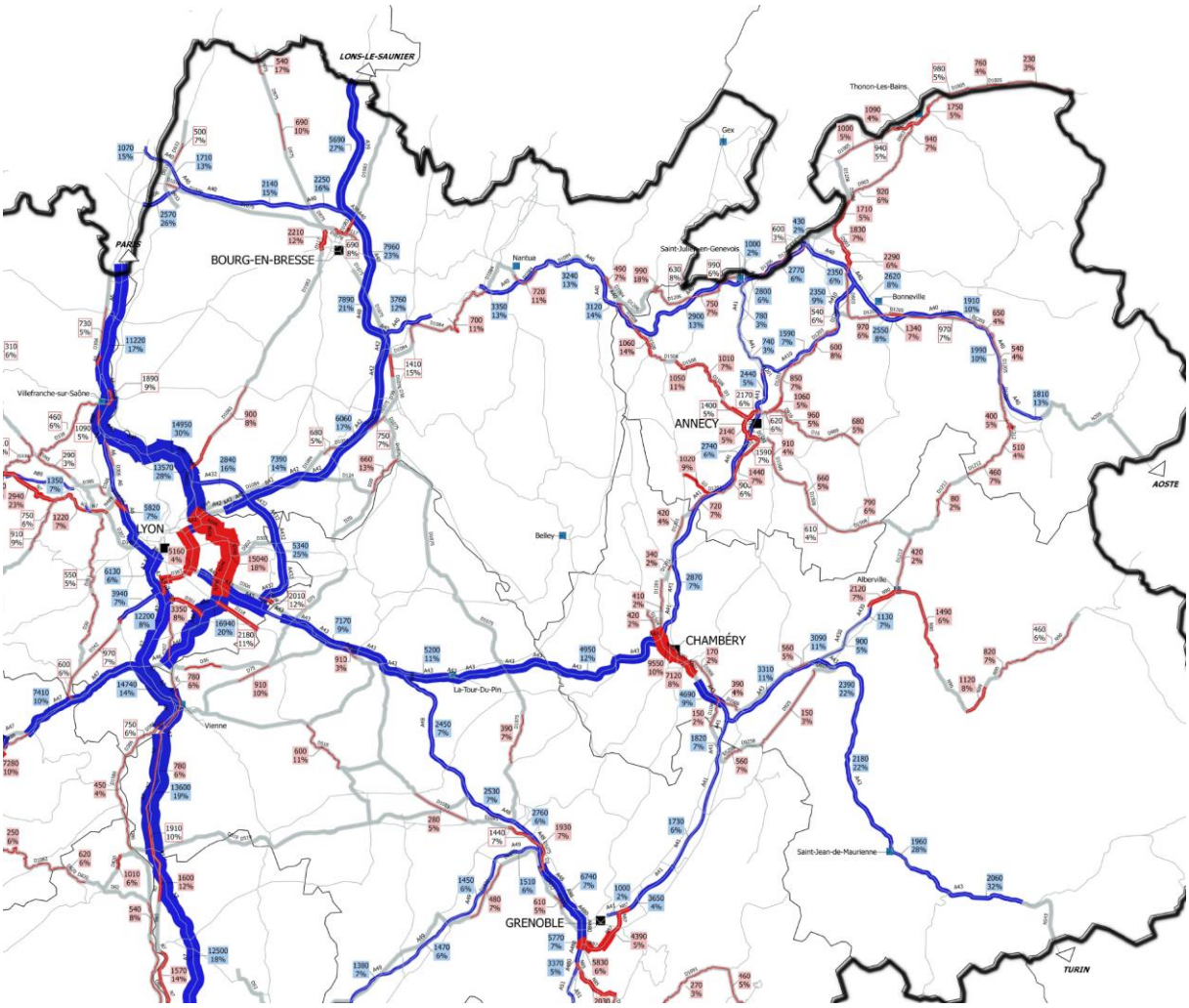


Source: Observation and analysis of transalpine freight traffic flow, Annual report 2019, Alpine Traffic Observatory, May 2020 (values in 1 000 t/Y)

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 Union[15]. 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.

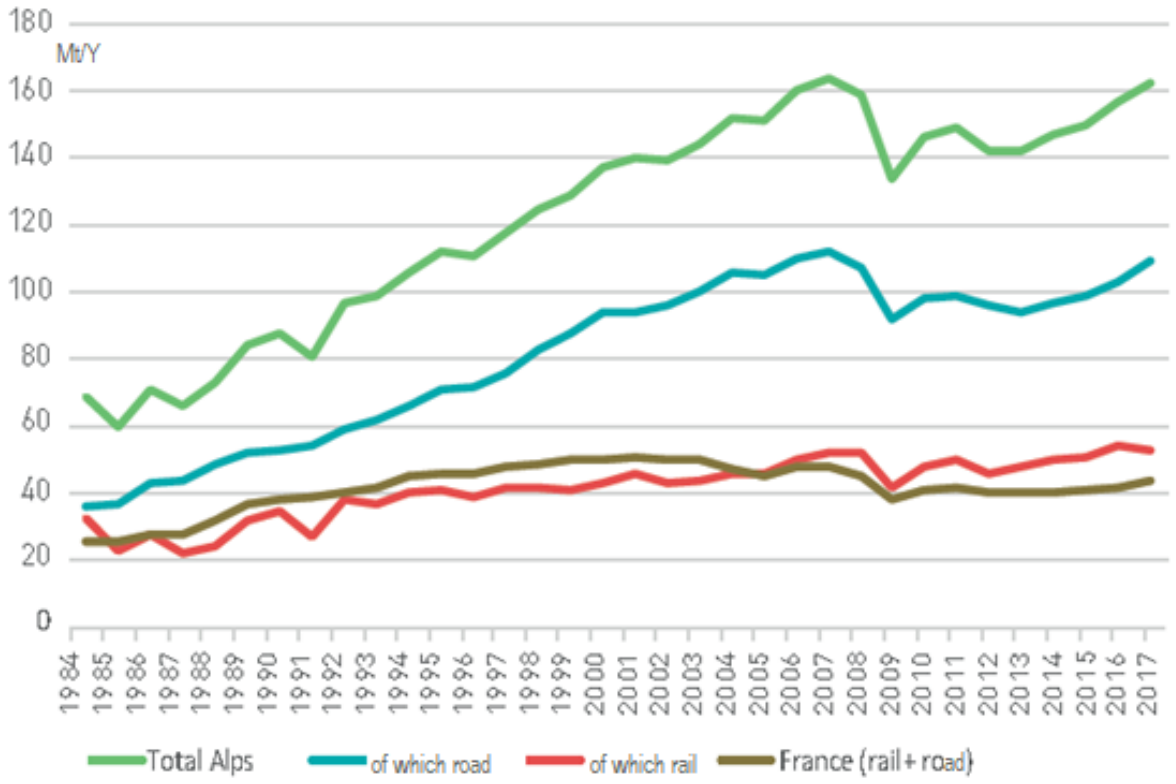


HGV traffic in the northern French Alps in 2015 (total traffic veh/day / % HGV, highways in blue, other roads in red), source: DREAL Auvergne Rhône Alpes

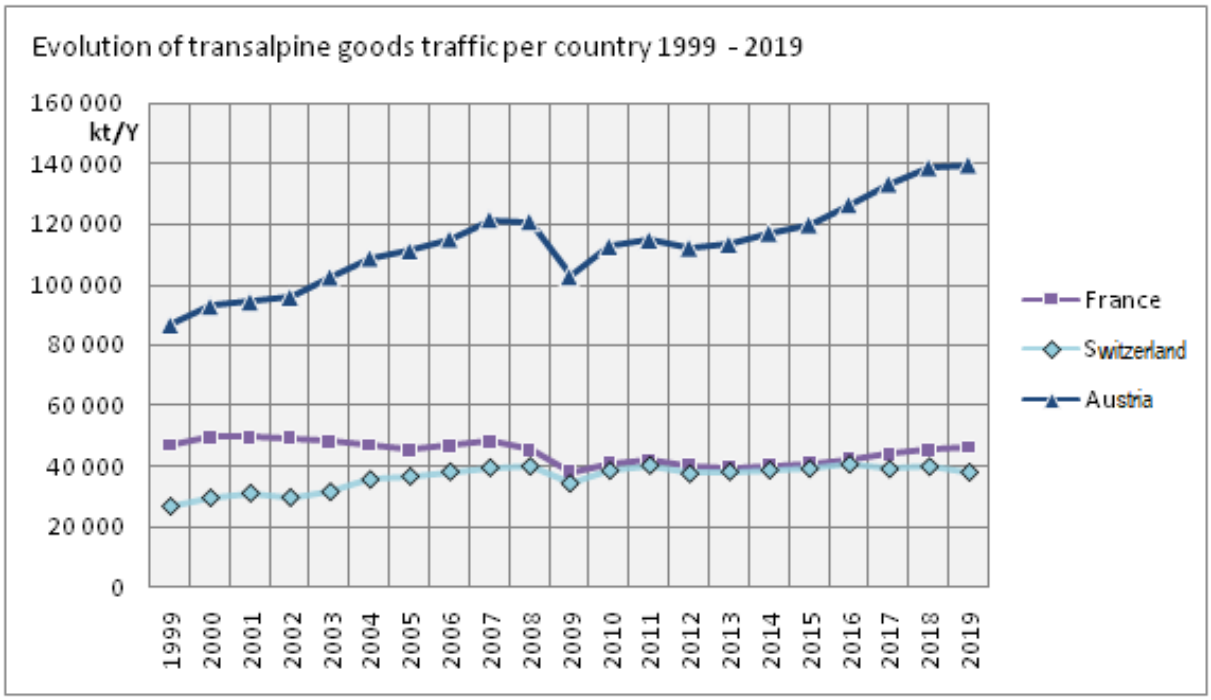
[15] Source: Eurostat, data reported in *Le transport de marchandises*, Michel Savy, Presses polytechniques et universitaires romandes, 2017. Alpifret also reported Eurostat figures but they were slightly different: 16,300 Mt per annum carried by road + rail, including 14,700 Mt per annum by road, i.e.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



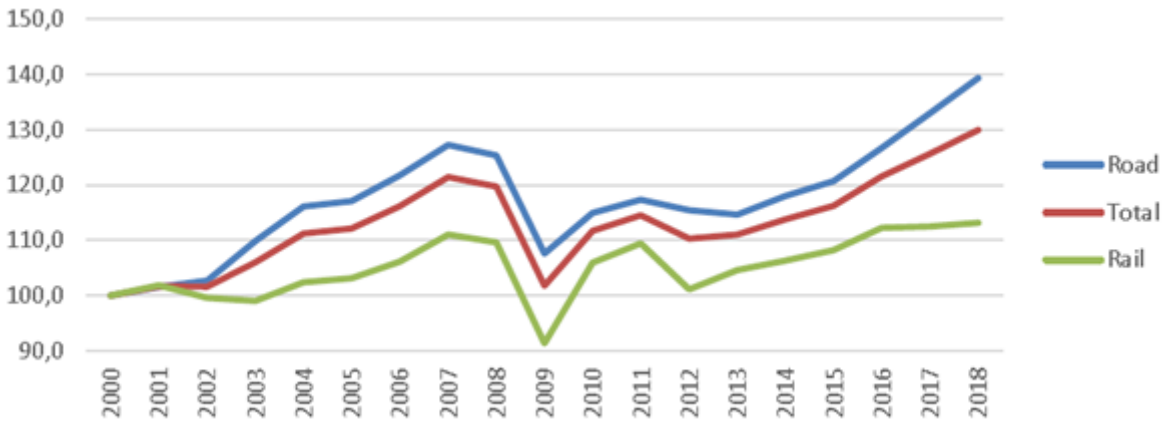
Overall goods traffic flows from Vintimiglia to Tarvisio, source: Carriage of goods through the Alps, AGATE / Département de la Savoie, October 2018, from AlpInfo / BAV – NB: due to lack of traffic data at Tarvisio pass since 2015, updating is impossible



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

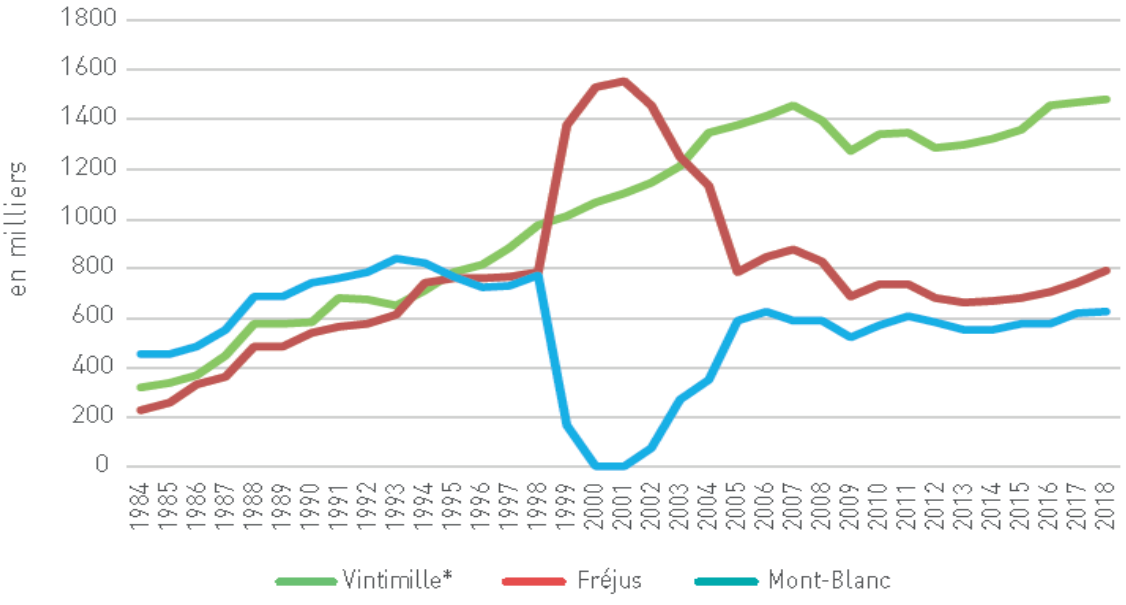
Except in Switzerland, in the Alps as elsewhere in Europe, rail loses ground to road

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 %.

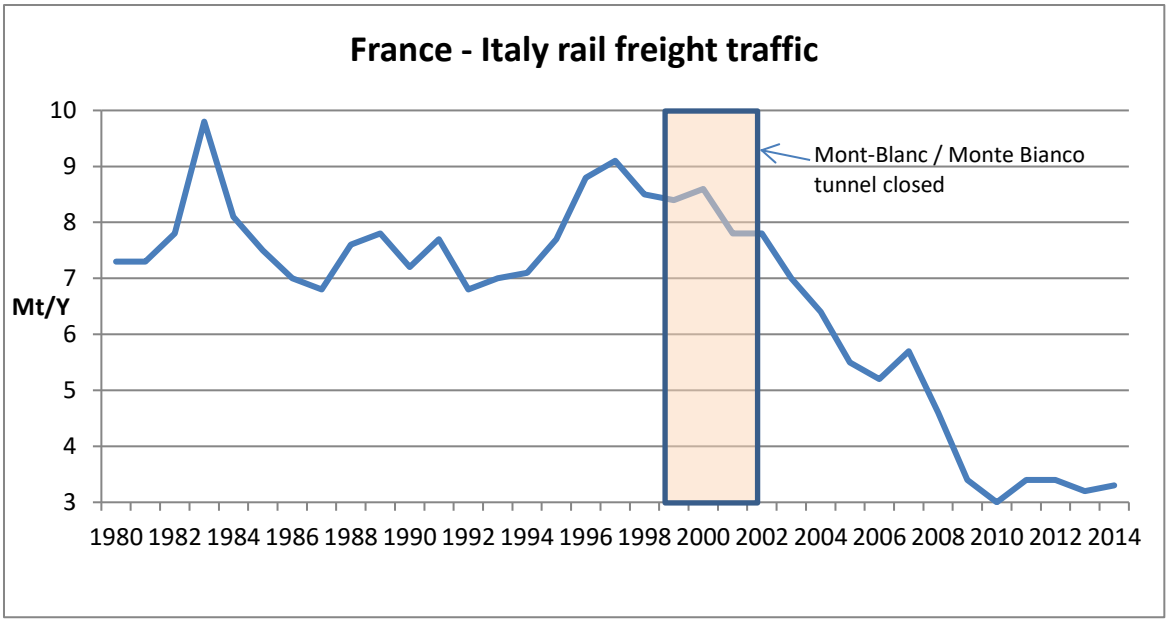


Evolution of transalpine transport (total and by mode) 2000 – 2018 (on the basis of transport volumes; 2000 = index 100), source: *Observation and analysis of transalpine freight traffic flows, Key figures 2018*, Alpine Traffic Observatory

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



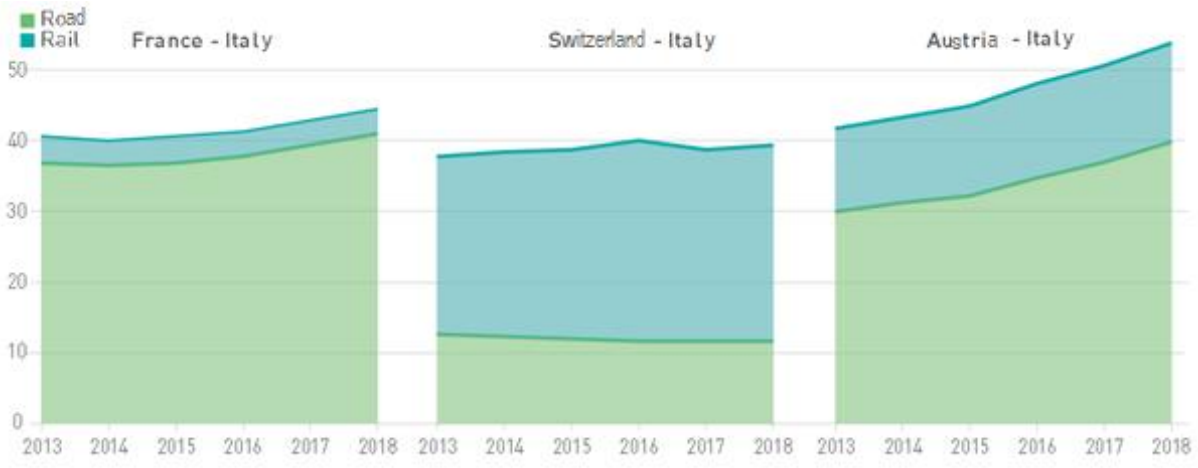
Rail freight traffic France-Italy, source: CGDD, October 2017, according to the Swiss Federal Office of Transport

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 traffic[16], 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 transhipment. 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.

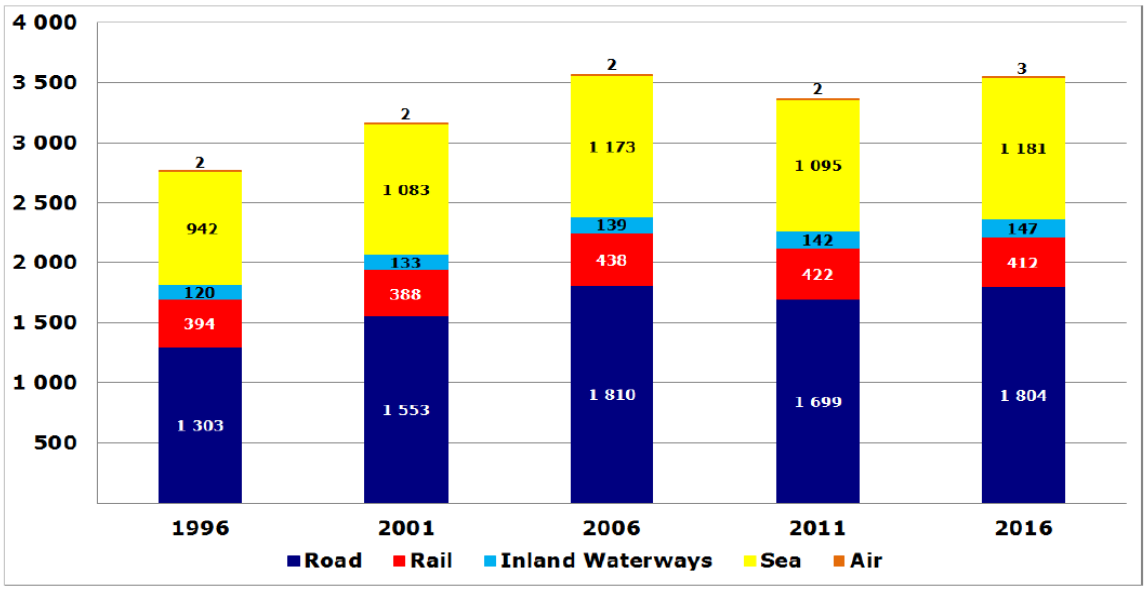
[16] Cf Report on traffic transfers (*Bericht über die Verkehrsverlagerung*), Swiss Confederation, Federal Office of Transport, November 2019.



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 Switzerland[17]. 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.

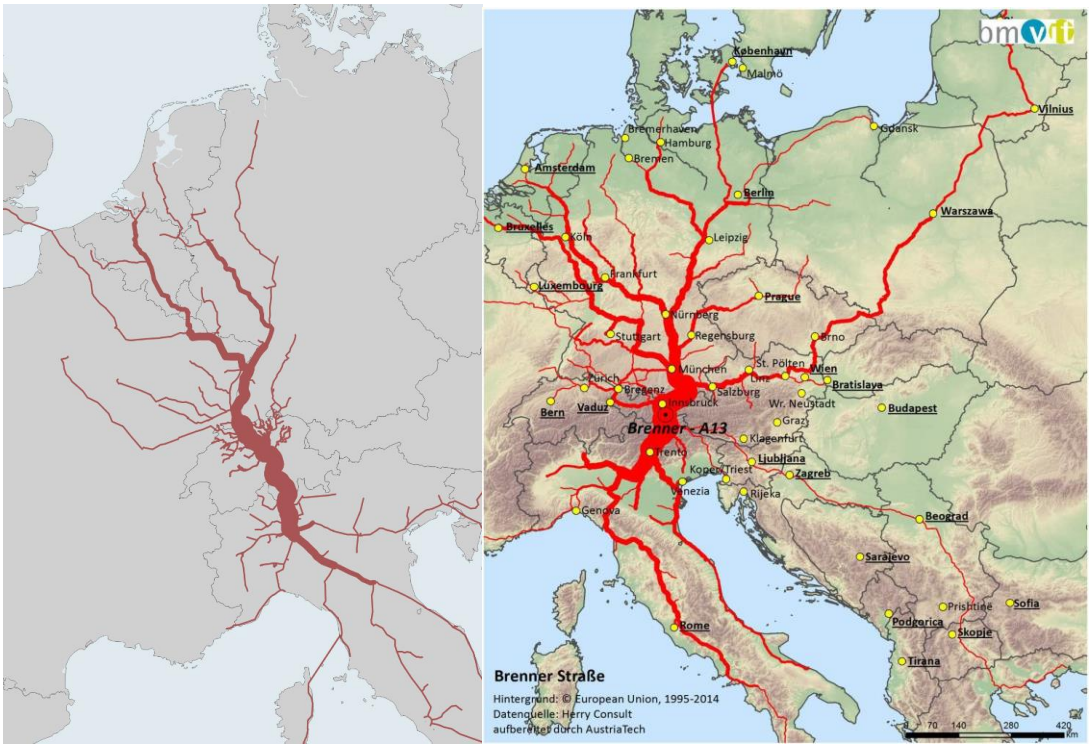
Transalpine traffic remains limited to local rail services between France and Italy, but longer haul inside the blue Banana

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.

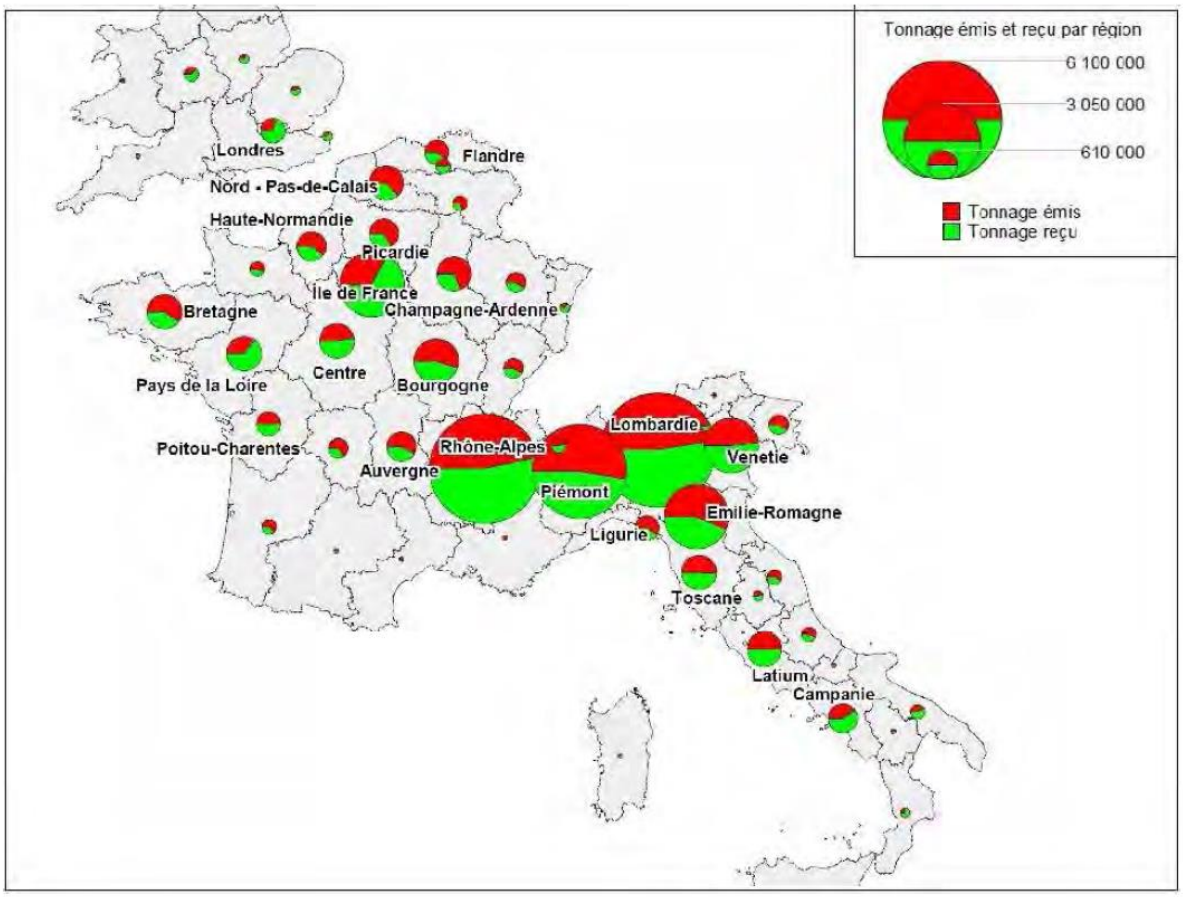


On the left: Freight flows through the Gotthard, source: (CAFT 2014); on the rightFreight flows through the Brenner (source: Austrian ministry for Climate and Mobility, data 2014)

Conversely, a 2013 French study[18] 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.

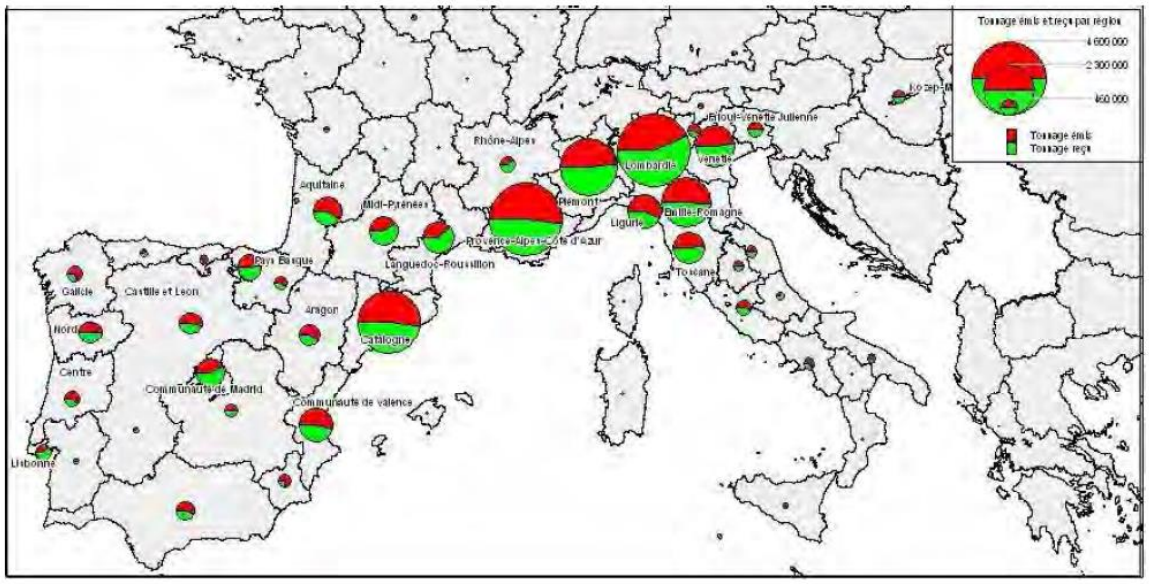
[18] Freight road transport crossing French borders in 2010 (*Le transport routier de marchandises à travers les frontières françaises en 2010*), French Ministry of Ecology— CGDD, France, July 2013.

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 2016[19]. According to the International Union for Road-Rail Combined Transport (UIRR)[20], UIRR operator members transported 75.78 billion t*km[21] 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.

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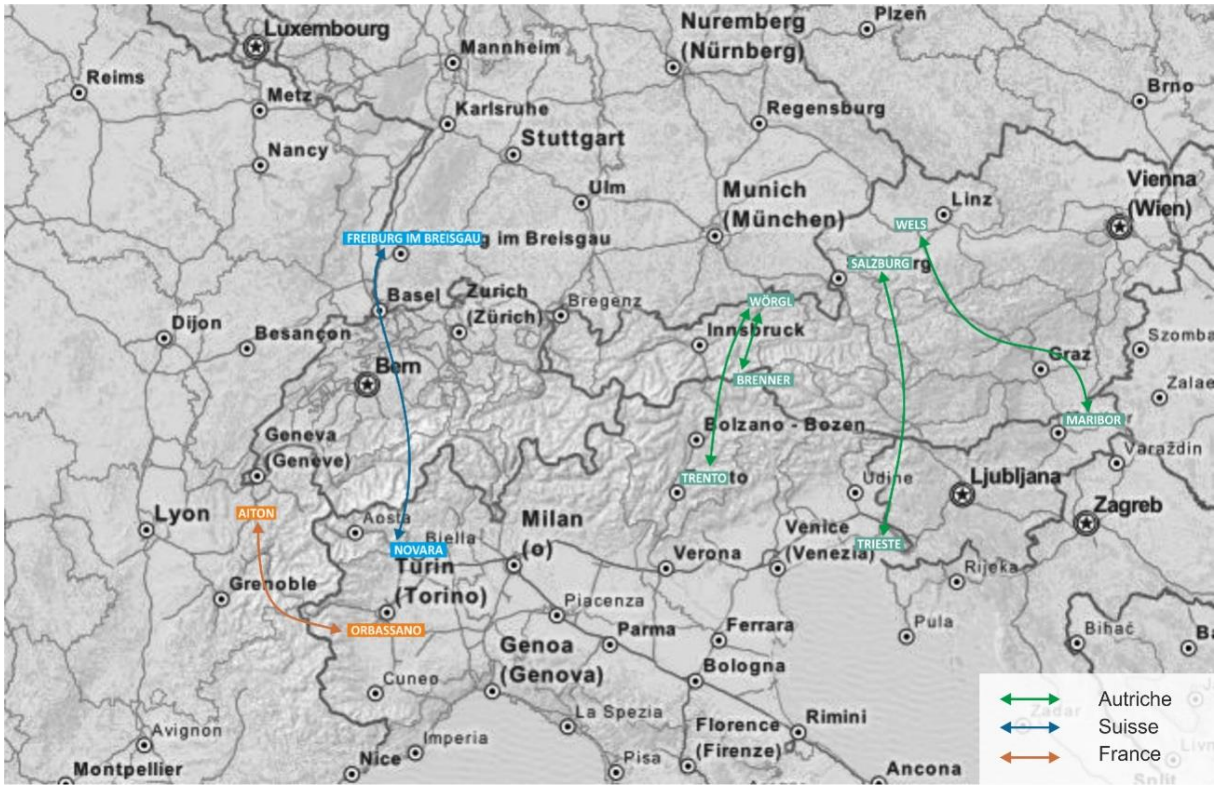
[19] Cf *2018 Report on combined transport in Europe*, BSL for the International Union of Railways, January 2019.

[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 2019[23].

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 2018[24]. 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.

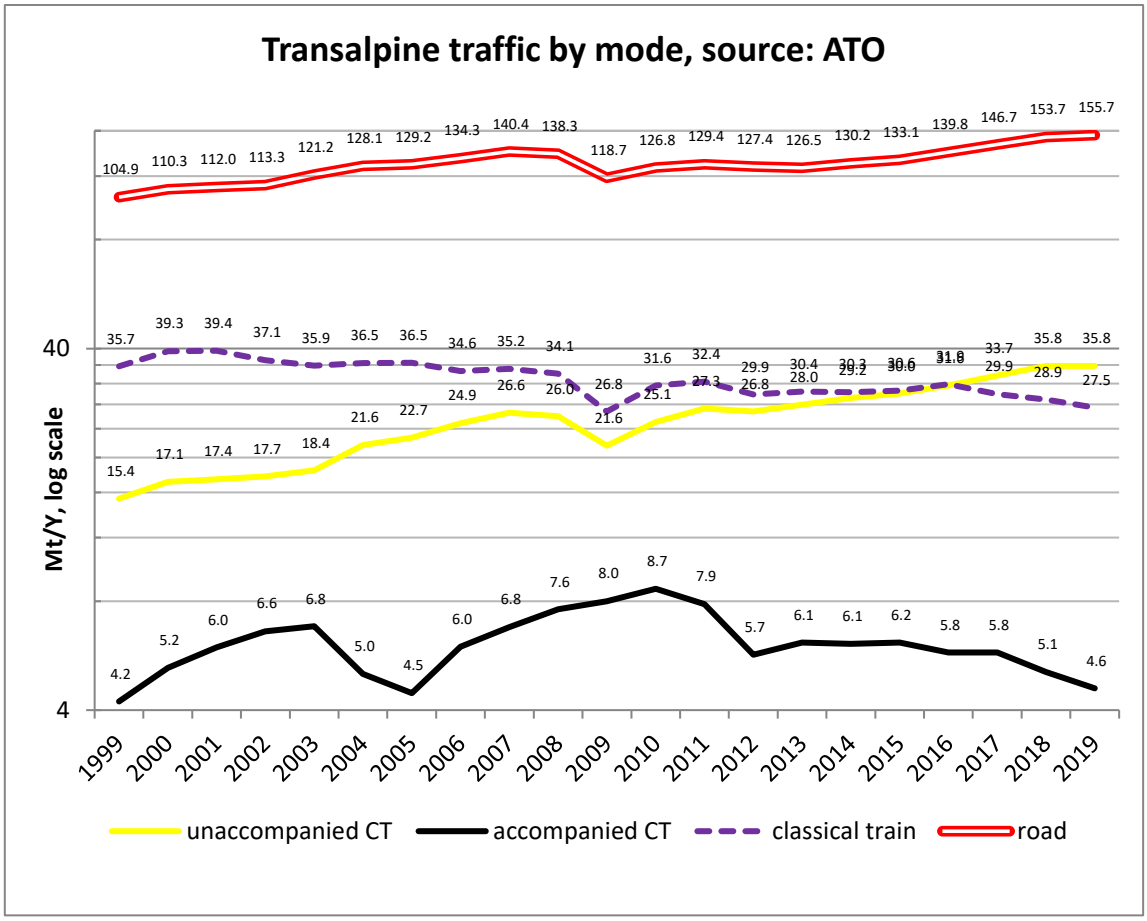
The Aiton - Orbassano Alpine rolling motorway

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.

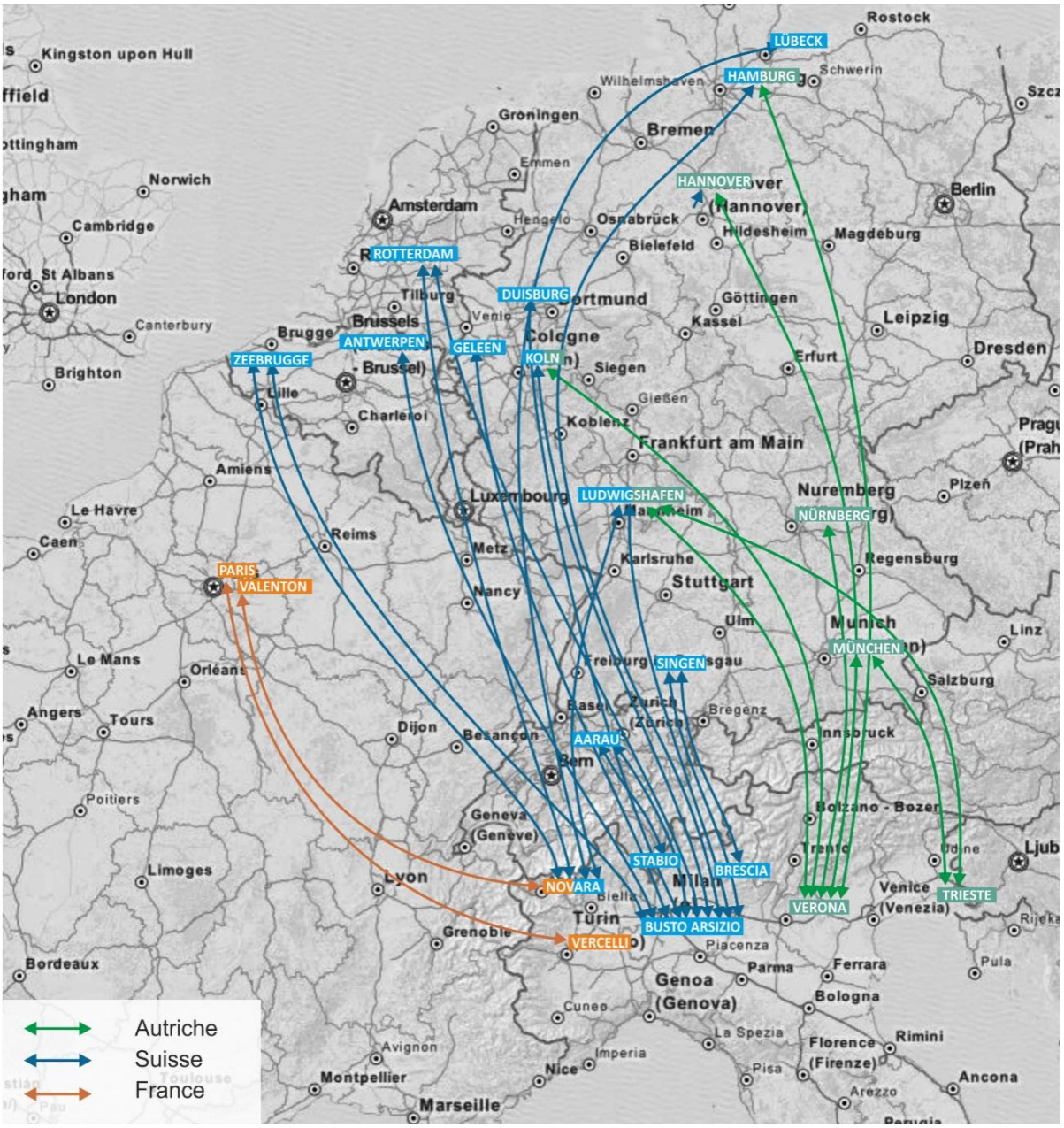
This comes as a confirmation of what ATO has observed over the past 20 years, namely a downward trend of accompanied combined transport, now carrying just 2 % of all Alpine freight, whereas unaccompanied combined transport has exceeded conventional freight transport in volume, as shown in the graph below.

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 combined[25]) 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)

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

Expressed in millions of TEUs [26] per annum, container traffic figures in 2017 the major European ports were as follows[27]:

- 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.

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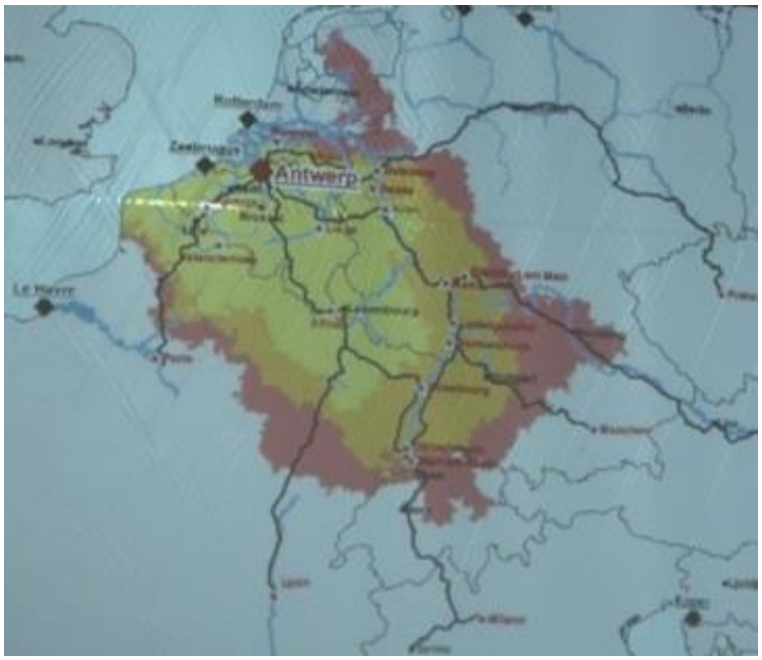
[26]The 20-foot equivalent unit (TEU) is the standard unit for an intermodal container. 1 TEU≈ 20 tonnes maximum.

[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 2014[28].

The 2019 Alpine Transit Observatory report indicated an offer of 46 unaccompanied freight trains per weekday through the Alps[29]. 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.

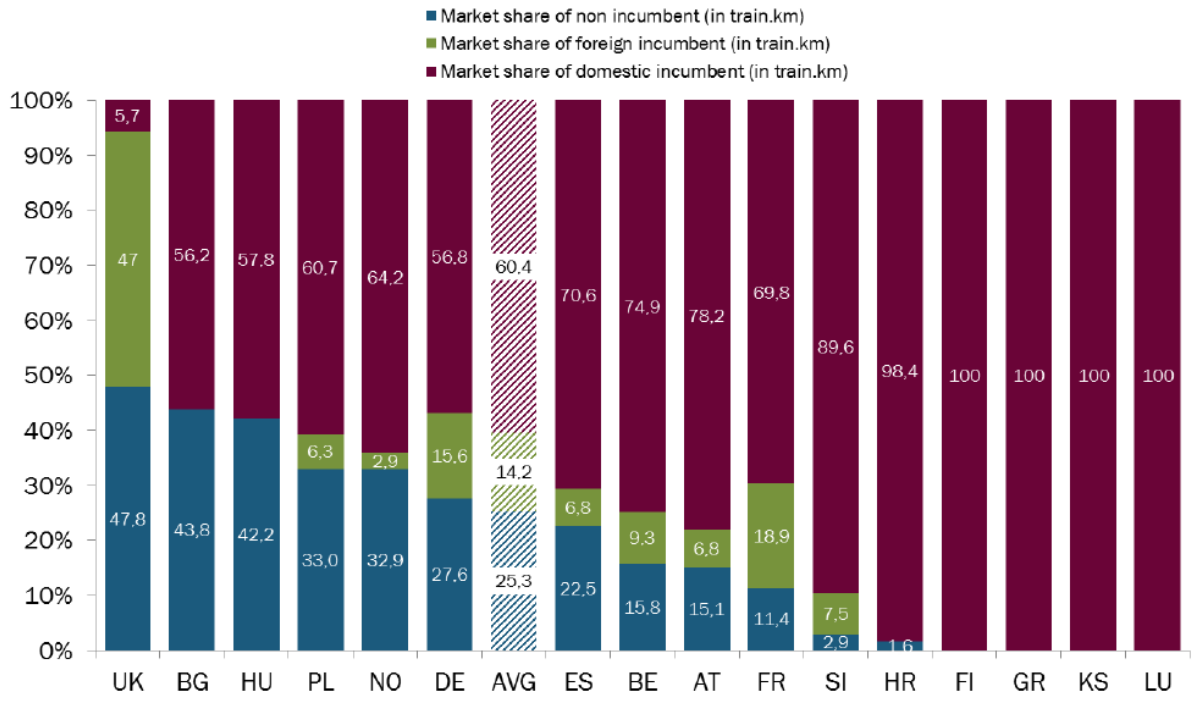
[29]This statistic only takes into account connections having offered at least 9 services per week in October 2019.

[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*km[31].

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 Switzerland[32]. 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 HGVs[34] 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 1,150[35]. 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 trends[36], 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];

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

[36] On 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 Transports 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.

[37] As a reminder, the public interest survey package submitted by Réseau Ferré de France in 2012, A*lpine 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-dacces-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 2020[38], 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 tunnels[39].

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 link[40], 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 /*

[39] A marshalling and transhipment 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):

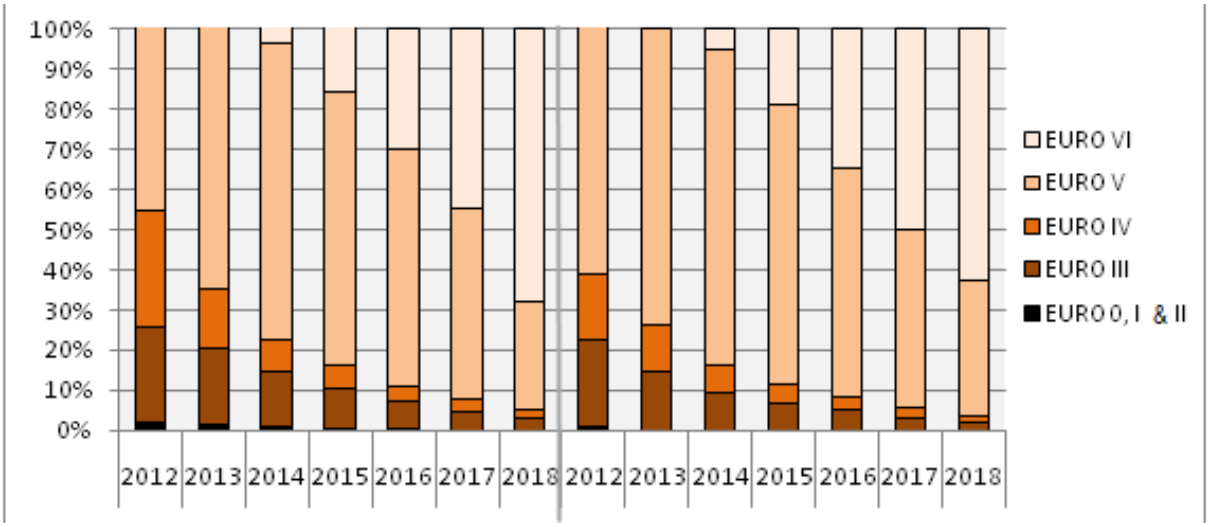
Assess freight transport capacity and the market offered by the new transalpine tunnels (Ceneri, Brenner, Lyon to Torino), factoring in various timetable options allocating different priority levels to freight.

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 Transition[42], "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 lmourd 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 traffic[43]. 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_4558887_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 mode[44].

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 arrival[45]. 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

[44] On 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 (*Groupement 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 environment[47]. 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 regulation[48] and the adoption by the European Parliament, on 8 July 2020, of the Mobility package for road transport[49], 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 payed 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 transport[50] 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 2015[51], 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 2023[52]. 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 2021[53].

[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-schienengueterverkehr-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 transported[54].

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 SOLUTIONS[55]

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 research[56], 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 trains 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 Germany[58]; 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 undertaking[59],
- in France, energy efficiency certificates for shippers[60],
- a guarantee fund for the hiring of rolling stock[61].

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.
-

RECOMMENDATION (7):

Improve interoperability; enable transit of 740 m long trains.

RECOMMENDATION (8):

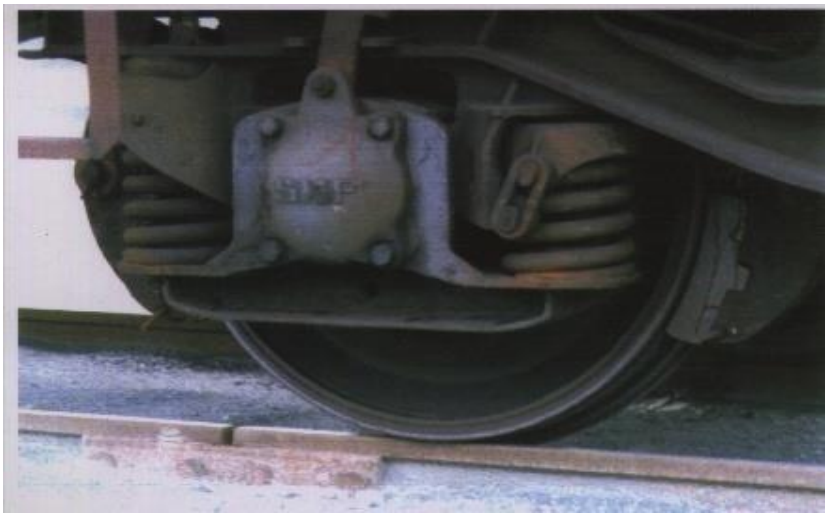
Standardise gauge, targeting UIC Gauge Standard P400.

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 Union[62]. Its execution remains optional, however. Practically, this means that the current wagon fleet, that has been in use for 35 years on average[63], 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 valley[64]. In 2011, retrofitting was estimated at € 4,500 per wagon[65].

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 term[67].

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 line[68]. 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 2015/413[69], 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 transhipment of its container onto a wagon is on-going at present. The most promising options offer to carry out transhipment 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 transhipment 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 hypothetic "internalisation of external costs" which limitations are visible (cf *supra*). We are called to carry out a rather radical thinking exercise in re-engineering[70]. 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 transhipment 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

Bibliography

Author	Title	Editor	Date
Sigmaplan	Observation et analyse des flux de transports de marchandises transalpins, Rapport annuel 2019, First draft (Observation and analysis of transalpine freight flows, annual report 2019, First draft)	Alpine traffic observatory, European commission (DG Move), Swiss Confederation (FOT)	May 2020
Sigmaplan	Observation and analysis of transalpine freight flows, Key figures 2019	European commission (DG Move), Swiss Confederation (FOT)	May 2020
	Programme of the 2020 French Presidency of EUSALP	Ministère de la transition écologique et solidaire - France	4 Feb. 2020
	Bericht über die Verkehrsverlagerung / Rapport sur le transfert de trafic	Schweizerische Eidgenossenschaft – Confédération suisse – Confederazione svizzera	Nov. 2019
	Livre blanc / L'électricité pour la filière des véhicules industriels (White Paper — Electricity for the industrial vehicle sector)	PFA Automotive industry & mobilities, FFC, Avere France, URF	Nov. 2019
Sigmaplan	Observation and analysis of transalpine freight flows, Annual Report 2018	Alpine traffic observatory, European commission (DG Move), Swiss Confederation (FOT)	Nov. 2019
PlanOptimo	Untersuchung der Routenwahl im Alpenquerenden Strassengüterverkehr in Westösterreich und der Schweiz 2014	Amt der Tiroler Landesregierung, SG Verkehrplanung	Oct. 2019

Author	Title	Editor	Date
Patrick Daher, Eric Hémar	Pour une chaîne logistique plus compétitive au service des entreprises et du développement durable (For a more competitive supply chain serving businesses and sustainable development)	Premier ministre - France	16 Sept. 2019
	Innovationsprogramm Logistik 2030	Bundesministerium für Verkehr und digitale Infrastruktur	Sept. 2019
	Annual activity report 2018	Shift2Rail	28 June 2019
	UIRR Report 2018-19	International Union for Road-Rail Combined transport - UIRR	20 May 2019
	Le transport routier de marchandises européen en 2017 (European Road transport of goods in 2017)	Ministère de la transition écologique et solidaire / CGDD - France	May 2019
	Alpenquerender Güterverkehrdurch die Schweiz, Kennzahlen 2018 und Interpretation der Entwicklung	Schweizerische Eidgenossenschaft	March 2019
	Annual Report 2018	iMONITRAF!	5 Feb. 2019
	2018 Report on Combined Transport in Europe	Union internationale des chemins de fer (UIC)	Jan. 2019
WG Transport, Ernst Lung	Innovation in rail freight	Alpine Convention	Jan. 2019
	European freight forwarders' priorities for the EU institutions: 2019-2024	CLECAT European association for forwarding, transport, logistics and custom services	2019

Author	Title	Editor	Date
	Mission possible / Reaching net zero carbon emissions from harder to abate sectors by mid-century / Sectoral focus heavy road transport	Energy transitions	2019
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
TRT TrasportieTerritorio	Overview of existing pricing components that influence the competitiveness between road and rail freight transport	European Union Strategy for the Alpine Region (EUSALP)	Nov. 2018
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

Author	Title	Editor	Date
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
	Strengthening Rail Freight Transport in Europe	CLECAT	Sept. 2017
	Fifth Annual Market Monitoring Report	IRG-rail	March 2017
	Les autoroutes ferroviaires (The rolling motorways)	Cour des comptes - France	Feb. 2017
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 Güterverkehrssystems 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
	Position paper on Sustainable Logistics	CLECAT	Apr. 2016

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 bibliograhic 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 by-passing 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
	Lyon - Turin / APS Lyon - Saint-Jean de Maurienne / Evaluation économique et sociale (Lyon-Turin / APS Lyon-Saint-Jean de Maurienne / Economic and social assessment)	EGIS Mobilités	15 Sept. 2008

Author	Title	Editor	Date
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
	www.portofantwerp.com	Port of Antwerp - Belgium	
	www.portsofgenoa.com	Porto di Genova - Italia	
	www.hafen-hamburg.de	Hafen Hamburg - Deutschland	
	www.luka-kp.si	Port of Koper - Slovenia	
	www.olp.gr	Port of Piraeus - Greece	
	www.portofrotterdam.com	Port of Rotterdam – the Netherlands	
	www.porto-trieste.it	Porto di Trieste - Italia	

ALPENKONVENTION
CONVENTION ALPINE
ALPSKA KONVENCIJA
CONVENZIONE DELLE ALPI

Franziska Borer Blindenbacher, Ernst Lung, Matthias Rinderknecht

with contributions of the French, German, Italian, Slovenian, and Swiss delegations

REDUCTION OF MOBILITY DEMAND AND SHIFT TO ENVIRONMENTALLY SUSTAINABLE MODES STRATEGIES AND MEASURES IN THE ALPS

(Working Group Transport of the Alpine Convention, 2020)

TABLE OF CONTENTS

1. INTRODUCTION: MANDATE OF THE WORKING GROUP ON TRANSPORT 2019 AND 2020 (UNTIL THE 16TH ALPINE CONFERENCE) AND TARGETS OF THE REPORT

Based on its previous work, the Transport Working Group shall contribute to the achievement of the Alpine Climate Target System 2050, which sets out the following targets for 2050 in the field of transport:

- Modal shift of Alpine freight transit;
- Reduced car dependency (inner-Alpine and transalpine passenger transport);
- Reduced transport demand (passenger and freight);
- Decarbonised transport fleet.

The Transport Working Group shall also contribute to the proposed 8th Report on the State of the Alps (RSA8) on Air Quality.

In the mandate the task of our report (task number 2) is described more detailed:

"Collect and analyse good practices in reducing transport demand through transport saving spatial structures, new working solutions, pooling of shipments, regional distribution chains and changed mobility and behavioural patterns (Framework Convention art. 2 (2) j, Climate Target Tr3)."

Source:
https://www.alpconv.org/fileadmin/user_upload/Organization/TWB/Transport/Mandate_Transport_2019-2021_EN.pdf

The short descriptions of the other tasks in the mandate shows some interdependences with our task 2, e.g. task 1 which is focussed on fair prices of mobility, including studies on the internalisation of real costs.

In our analysis, based on questionnaires to the tasks, which we (the teams from Austria and Switzerland) distributed to the Alpine Convention delegations, we got many information on transport saving spatial structures, pooling of trips (covoiturage) and changed mobility- and behavioural patterns. Not so much information we received to new working solutions and regional distribution chains.

Although the title of our report is "Reducing of mobility demand" it includes in a wider sense also the reduction of traffic with more pollutant modes by shifts to environmentally sustainable modes.

Studies on theoretical scientific background are often combined with case studies and specific recommendations for implementation. Therefore, we structured our repot based on the thematic focus (scientific base or case study/implementation) of the received information.

Our report is based on a traditional approach of sustainable mobility planning and policy:

- Avoid traffic (e.g. by innovative organisation of work, spatial planning focussed on short distances in every-day-life and regional economic circles):
  The demand for freight transport and passenger mobility can be influenced by framework conditions. We have to distinguish between unchangeable demand in freight transport as well in passenger mobility and demand, which can be reduced. If people in countries in the North of the Alps like to eat oranges, citrons or other products from the South, these goods need to be transported across the Alps. But many goods, which are transported over long distances can be replaced by local products, if the consumer awareness is big enough. It will be almost impossible to replace holiday journeys to foreign countries to see cultural or natural points of interest, but working processes can be decentralized by using IT and maybe also by using 3D- printers in certain production processes. Therefore it`s possible to reduce commuting distances also for the inhabitants of the Alps.
- Shift mobility to environmentally sustainable modes, e.g. from private cars and trucks to electric powered rails and for shorter distances also to cycling and walking, pricing and mobility management are main instruments to achieve the intended shift.
- Reduce environmental impacts of road traffic, e.g. by higher occupancy rates based on car- pooling (covoiturage) and improved vehicle technologies. (Vehicle technologies are analysed under task 3)

Summed up, with our report "Reduction of mobility demand", we want to show that traffic growth in the Alps is no law of nature, changes of mobility behaviour – including freight logistics – are possible and already successfully implemented.

Remarks about the recent situation caused by the coronavirus pandemic

The conception and the main content of the report "Reduction of mobility demand and shift to environmentally sustainable modes; Strategies and Measures in the Alps" was elaborated and developed before the coronavirus pandemic. Therefore, some statements may already be considered as historic. Important changes in mobility behavior since March 2020 are:

- Teleworking in a home office increased rapidly and in most of the cases, employers and employees are satisfied with these solutions. People expect that home office solutions remain part of the general working environment.
- E-commerce (internet trading) is booming even more as is parcel delivery
- Cycling is also increasing
- Public transport use and car-pooling have declined compared to the situation before the pandemic, people use buses and trains a lot less.

2. MEASURES AND STRATEGIES TO REDUCE MOBILITY DEMAND

In the discussion to the draft of this report in the working group transport, we came to the result that we should distinguish between strategies and measures, which avoid physical mobility or long distance freight transports and such shifting passenger or freight traffic to environmentally sustainable modes. Therefore, we changed the sequence of the chapters and began with measures and strategies to avoid traffic.

2.1 - New forms of - IT based - location independent working

An impact of the actual coronavirus pandemic is that working in a home-office became usual. In only a few months, a lot of new experience will be available, therefore the following information is already a historical overview to the situation before the crisis. The new situation trough the coronavirus crisis creates a lot of new case studies and new analysis on this topic will follow.

Concerning teleworking, the French statistical office INSEE estimates that 35% of French workers teleworked during the hot period of the crisis, thus, provided they should at least go to the office one day per week, one could forecast about 28 % lowering of commuting traffic in big towns. (Source: e-mail by Michel Rostagnat,28.4.2020)

2.1.1 Teleworking in Austria, general overview

In Austria, teleworking is usual in many companies and offices, but not much public information to statistics and interesting case studies is available. According to Statistics Austria, 12,7 % of employees in Austria currently have a tele-working place

In summer 2017 a study to teleworking was published by the research institute Deloitte in co-operation with the University of Vienna and the FH Oberösterreich (University of Applied Sciences Upper Austria). In the frame of this study 412 company representatives were interviewed.

Although flexible working models are much discussed, everyday work in most Austrian companies is still quite classic. According to the survey, 90 percent of the companies basically offer home office or telework. However, home-work opportunities are only used by a few individuals in the majority of these companies (52 percent). Only in every fifth company (20 percent) do half or more employees work from home. There are significant differences depending on the sector and company size.

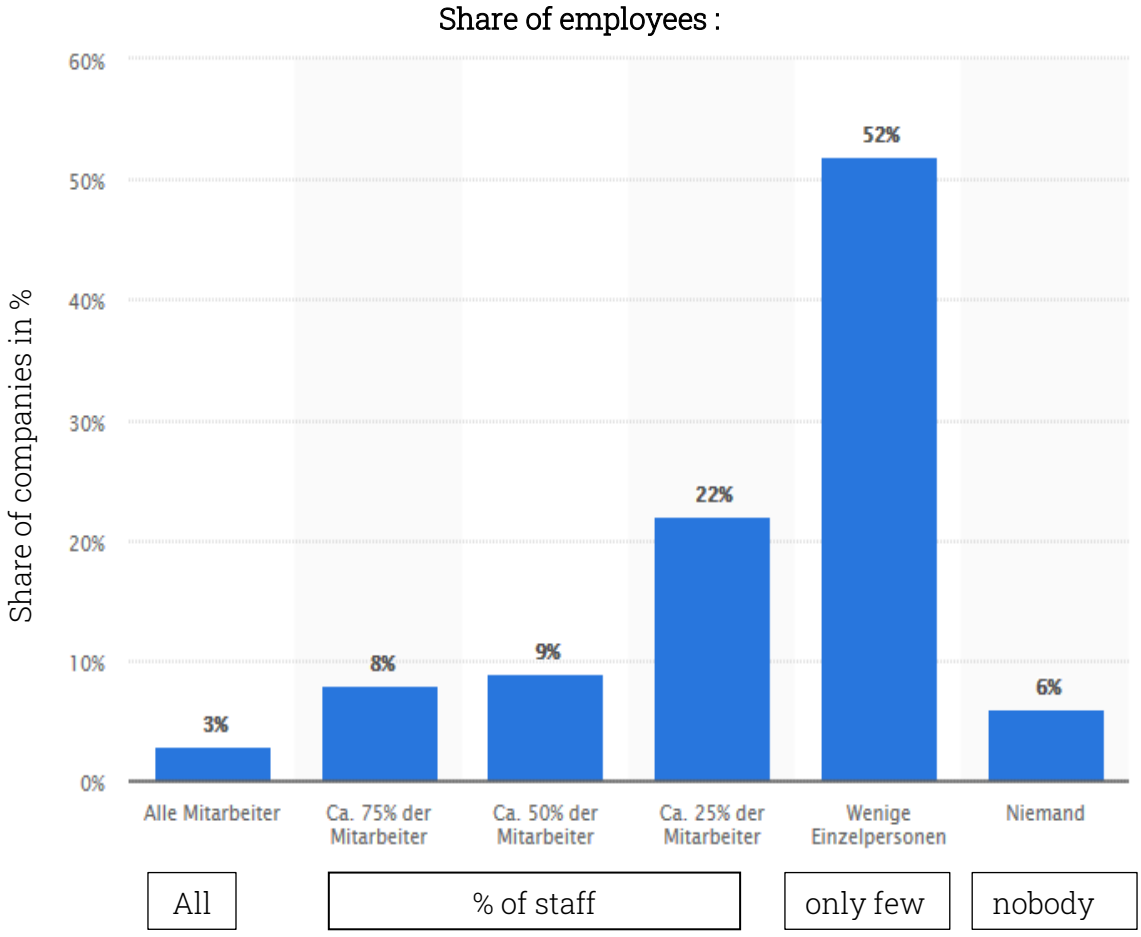
The low use probably also depends on the still desired presence of the employees in the workplace. A share of 77 % of the interviewed companies agreed that the presence of their employees in the company is very important. Against this background, so the assumption of the study authors, many workers feared career risks, if they work from outside. Barbara Keller, an author of the study views this corporate culture critically:

"Presence is still considered an indicator of good performance. That is why home office is often used only to a limited extent." She recommends focussing more the working results of employees, rather than on the personal presence of them.

Interviews with the leaders of companies proved that only for 23% of them the presence of employees in the company buildings is not very important, while 47% underlined that the presence of the staff is (very) important. Further 30 % of the responsible leaders rather agree that presence is important.

Source: Arbeitsorganisation und Arbeitszeitgestaltung, Arbeitskräfteerhebung 2015, edited by Statistic Austria, Vienna 2016, downloaded from https://www.statistik.at/web_de/services/publikationen/3/index.html

Statistics to teleworking in Austria



Source:https://de.statista.com/statistik/daten/studie/733658/umfrage/nutzung-von-home-office-telearbeit-in-oesterreich/ , Martin Mohr,08.08.2017

2.1.2 Case Study Austrian Federal Ministry for Sustainability and Tourism

Teleworking was introduced in the former Federal Ministry for Sustainability and Tourism, but the project goes on , also since in January 2020 some units a part of the new Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology was established in Austria. It is responsible for the national coordination of the implementation of the protocols of the Alpine Convention in Austria.

148 employees (104 women, 44 men, in total 15,7 % of the staff of the former ministry) are teleworkers. Criteria for a permission for teleworking are:

- Care of at least one child up to the age of 15
- Care of dependent relatives, e.g. due to a disability or from nursing level 2
- Own health situation or at least 50% disability
- Management of a farm or forestry operation
- Official requirement or interest
- Travel time between home and office of at least 90 minutes in one direction (basis of calculation: commuter computer) and
- Individually particularly justifiable cases

In the year 2017, teleworking in the Federal Ministry for Sustainability and Tourism was evaluated with positive results:

- Teleworking improves the attractiveness of employers as well as the productivity of the employees who work from home. This is, among other things, due to better concentration, less distraction, no long travelling times to get to the office and therefore more time to do work.
- Thanks to less commuter traffic teleworkers save climate-damaging carbon dioxide. Therefore, teleworking makes an important contribution to environmental and climate protection.
- The option of working from home/Telecommuting opportunities motivates employees in their work performance and they can do thorough work anywhere/ remotely.
- Teleworking enables persons returning to their jobs to work more than part-time after maternity/paternity leave.
- Teleworking enables employees to take on more individual responsibility.
- Reconciliation of family and working life: Teleworking enables mainly women (but also men) having to care for others to work full-time again, as long distances and travel times are eliminated.
- Telework improves the quality of life through a better or optimised work-life balance.

Sources: https://www.bmlrt.gv.at/english/ministry/Statement/Familyfriendliness.html and https://www.bmlrt.gv.at/ministerium/dafuer-stehen-wir/teleworking/telearbeit.html

2.1.3 Case Study Austrian Automobile and Touring Club

With each employee who works at home, the ÖAMTC concludes an individual agreement

as a supplement to the service contract, which precisely regulates the individual framework. In the first year, 33 employees have signed such an agreement.

Especially in the emergency information service, where the club has to ensure a 24-hour accessibility to service, a teleworking agreement brings many benefits. The successfully tested technology makes possible to send calls home to the employees.

On this way, the ÖAMTC can spare them ways, for example at night or early in the morning.

Source:https://www.arbeitswelten.at/neue-arbeitswelten/best-practice-beispiel-einfuhrung-der-telearbeit-beim-oamtc/#das-erste-jahr-und-erste-gute-erfahrungen

2.1.4 Support of teleworking in Styria, Austria

To facilitate location-independent work, the Styrian Business Promotion Agency (SFG) and the Styrian Chamber of Labour support Styrian small and medium-sized enterprises with up to 49 employees from May 2019 onwards if they want to set up teleworking. In concrete terms, the both institutions jointly promote investments in hardware and software at work in the home in the future, but it will also be possible to get IT - technical support for the first year - of course, in addition to the costs for the first hardware investment. The investments must amount to at least 2.000 Euros, the maximum eligible costs are 50.000 Euros per company or 5.000 Euros per telework place. The Styrian business Development Company contributes a half, the Chamber of Labour up to 30 percent, so that a total up to 80% is eligible.

Source: https://steiermark.orf.at/v2/news/stories/2977557/ (date 23.4.2019)

2.1.5 "Legge sul Lavoro Agile" – Italy

The Italian low n.81 of the 22 May 2017 has defined all regulative aspects concerning the remote forms of work, such as the rights of workers, the methods of control by the employer, the technological equipment, and working modalities. Moreover, the law defines the term "smart working" and requires establishing written agreements between involved partners.

Sources: Italian questionnaire , https://blog.osservatori.net/it_it/evoluzione-normativa-smart-working

2.1.6 Rete Cittadina per lo Smart Working – Genova

The Municipality of Genova has been managing this project since April 2018, by involving both public and private entities. The project encourages the diffusion of smart working practices and helps facing also the mobility issues generated by the collapse of the Morandi Bridge. In the smart working contracts for about 10% of the public employees of the municipality were established and various additional projects managed by involved companies were launched.

Sources: Questionnaire from Italy, see also: http://www.comune.genova.it/content/protocollo-dintesa-lattivazione-dello-smart-working-della-rete-cittadina

2.1.7 Smart Way project – Pirelli

After a test period of the project started in 2014, the Italian company Pirelli has now extended the initiative to all employees. This provides workers with up to three days per month to work from an external location. The project has allowed workers to save about 40 km of travel per day, i.e. about 1-2 hours.

Source: Questionnaire from Italy, see also: https://www.osservatori.net/it_it/pubblicazioni/smart-way-pirelli

2.1.8 Work Smart-Initiative, Switzerland

The Work Smart Initiative has been supported and shaped by large employers and by a wide range of partner organizations in Switzerland since 2015. Within the network, everyone supports each other in the introduction and establishment of flexible, new forms of work. A platform for knowledge and exchange, visibility and offers is formed by the partnership.

Big companies e.g. the Swiss Post, the SBB (Swiss Federal Railways), the Federal Office for Informatics and Telecommunication (BIT), Siemens and HP (computers) as well as the Federal Administration are partners in the network.

Main arguments for smart working models are:

- Reducing traffic peaks and traffic emissions,
- improve the motivation of employees,
- increase the productivity

If all rail commuters in Switzerland who can and want to work flexibly would only have to make two journeys a week outside of rush hour, the number of passengers will drop by around 7 percent during peak times.

Some interesting studies can be downloaded from the website of the Work-Smart-Initiative. The Flex Work study from 2016 provides interesting data. See:

https://work-smart-initiative.ch/de/smart-arbeiten/studien-publikationen/neue-flexwork-studie-2016/

Of the approximately 4.65 million employees in the Swiss economy, 1.12 million people, around a quarter, already work largely flexibly. This contrasts with 2.62 million employees who cannot or are not allowed to work flexibly due to their activities, infrastructure, or company regulations. The study shows also that around 30% of all employees wish to work more mobile, while only 6% do not want to work at all and only 3% of the employees want to work less mobile.

Obstacle to mobile work is that teamwork requires local proximity (54%). From the surveyed companies' point of view, other obstacles are the topic of data protection and confidentiality (38 %) and the company regulations, which do not allow flexible work or only allow it in exceptional situations (36%). Bigger companies with more than 500 working places have more smart-work solutions implemented as smaller employers.

For the study, 559 companies and 2003 employees in the field of knowledge-intensive services and public administration from German and French-speaking Switzerland were surveyed.

Source and further information:
https://work-smart-initiative.ch/de/die-initiative/organisation/

2.1.9 miaEngiadina, Switzerland

miaEngiadina is an association that merges together four organisations that offer mountain co-working spaces located in Scuol and Ftan right behind the Flüela Pass in the Swiss Alps. Together they offer 60 work places which offers good possibilities for local and new people to interact right there in the Engadin valley. The co-working places also encompass the centre for Mountain hubs and by the end of 2021 miaEngiadina will establish a hub `InnHub La Punt` that will set new standards for co-working in this innovation and community centre. (CIPRA)

It seems that "mountain hubs" high quality offices are more focussed on working in groups (workshops) in nice Alpine regions with a lot of attractive offers to recreate between the working times but not to reduce every day commuting distances.

Source: Swiss Questionnaire and https://www.miaengiadina.ch/mountain-coworking

2.1.10 Smart village project in the framework of Alpine Space Interreg Programme

Switzerland is also participating in the Smart village project in the framework of the Alpine Space Interreg programme.

Digitalisation, co-working spaces in central locations in rural or mountain areas, optimization of mobility solutions for everyday activities (local administration, shopping, sports and leisure activities) are contributing to reduce the mobility demand and the resulting emissions, at the same time increasing the social coherence of populations in peripheral and mountainous regions. Lucerne West Region is part of the project and specifically testing high broadband introduced in households at a large level. Examples from villages in Valais and Grisons show already positive effects.

Source: https://www.alpine-space.eu/projects/smartvillages/en/home

Regiosuisse is the network unit for regional development in Switzerland and was launched in 2008 by the federal government. Its main task is to build up a knowledge management system for the New Regional Policy (NRP). In this context, smart village activities are developed in several mountainous and peripheral regions.

Source: https://regiosuisse.ch/en/documents/smart-villages-how-ensure-digital-strategies-benefit-rural-communities

2.1.11 Critical evaluation results to teleworking

Although evaluations of location independent working forms come to positive results, teleworking is not in every case considered as the less energy intensive way of work / lifestyle. A British study came to the result, that heating energy consumption in winter for working at home are frequently higher than in offices and can overcompensate the energy savings by reduced commuting traffic.

Source: https://www.bbc.com/worklife/article/20200218-why-working-from-home-might-be-less-sustainable

Teleworking is not always a good tool for reducing travelling. Those who practice it tend to live further away from where they work, and are willing to spend more traveling time for leisure and social activities. The results of analysis of the famous traffic researcher Yacov Zahavy underline the finding mentioned above: Based on a stable travel tine budget, many persons use the saved commuting time (e.g. trough teleworking in the home office for additional trips in leisure time.

Sources: Forum Vies Mobiles, Obsoco 2020 and http://www.surveyarchive.org/zahavi.html

2.2 Spatial Planning for soil saving and short distances in everyday life

Introduction

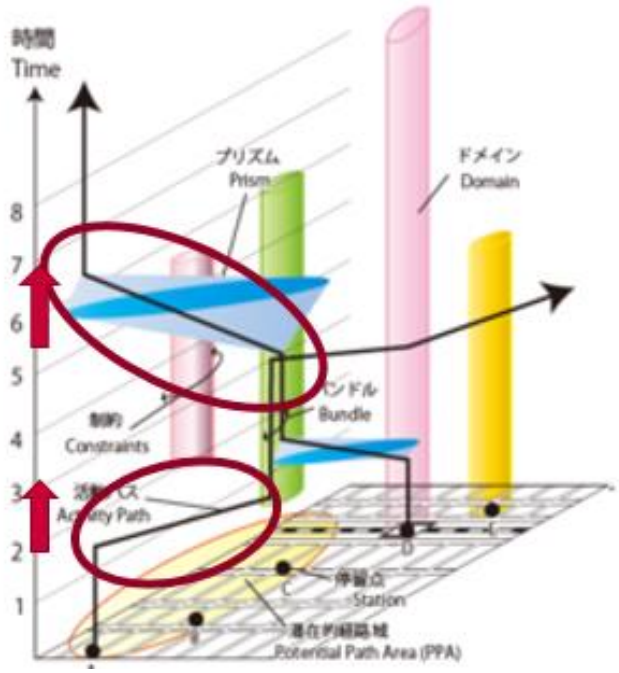
Soil saving spatial planning and a compact development of settlements can also contribute to reduce mobility, especially trips with cars. In the Alpine Convention Declaration "Sustainable Land Use and Soil Protection" positive impacts are well described under point 3:

"The mobilization of inner-urban reserves of building areas, the use of the existing building stock and brownfields and keeping the development of human settlements and commercial and industrial facilities within given boundaries offer manifold positive effects, such as efficiently using existing resources, reviving urban and village centres, strengthening pedestrian and bicycle traffic, due to shorter distances, protecting agricultural land in the surroundings, preserving natural areas for relaxation as well as protecting the climate."

Compact settlements also facilitate the access to public transport, because bus and train stations are situated in walking distance. The following case-studies show that the awareness of decision makers and planners for saving soil is growing.

A theoretical scientific approach to show the advantages of short distances in every-day life is the "time geography", which was created by the Swedish geographer Torsten Hägerstrand in the mid-1960s, (see https://en.wikipedia.org/wiki/Time_geography)

Space-Time Cube created by Torsten Hägerstrand



Source: see above, wikipedia Time geography

Hägerstrand created for graphic presentation the so called "space-time cube", where an illustration of the interdependences of space, distances, speed of used mode and time is possible. Trips need time, which could be used for other activities if the trips are

shorter, see arrows and ellipses in space-time cube above , created by Torsten Hägerstrand.

This theoretical approach is quite simple: Everybody has a limited "time-budget", if a person loses a lot of time by commuting over long distances, he or she has less spare time for shopping, to meet friends or to do sports. Long trips to work, necessary shopping activities or other obligations reduce due to the limited time budget the freely plannable activities.

2.2.1 General Conceptions and knowledge transfer networks

2.2.1.1 Strengthening Town- and Village Centres in Austria

In 2018, the "10 Expert Recommendations for Strengthening Town and City Centres" were prepared within the framework of the ÖREK (Österreichisches Raumentwicklungs-konzept / Austrian Spatial Development Conception) Partnership for Strengthening Town and City Centres. At first, some information to the background could be helpful:

Objectives of strengthening the centres

Strengthening settlement centres is a key issue in the endeavour to ensure sustainable spatial development, basic services, social cohesion and local economic prosperity in Austria. What is called for in this context is a concept of development that prioritizes the interrelatedness of housing, local services, economy, social facilities and public spaces in order to p reserve or revive the centres. The methods and efforts applied up to now have not sufficed to achieve these goals. The federal government, the regional authorities (Länder), the cities and the municipalities in collaboration with this ÖREK Partnership aim to introduce a new quality to their efforts on the basis of the results and recommendations and also the accompanying materials with the aim of sustainably developing and ensuring the vitality and multi-functionality of town and city centres. Therefore, this is a contribution to Sustainable Goal No 11 of the UN 2030 Agenda.

Centres should be liveable, functionally good mixed, attractive areas and districts in which the community citizens comfortable living, working, their everyday walks on foot or by bike and spend their free time. In particular, the strengthening of local and city centres should

- bring more inhabitants to the centres,
- keep and promote low-emission businesses,
- promote the inner development and thus achieve higher densities in centres,
- make meaningful use of existing area reserves,
- promote a suitable, urban building density and the mixed use of buildings (vertical structuring),
- provide an attractive alternative to sprawl development

- facilitate the conservation and further development of protected cultural assets,
- enable area- and building management.

The 10 expert recommendations in detail:

1. Establishing the goal of strengthening settlement centres in legislation: Federal and land laws (laws in responsibility of regional authorities) as well as the relevant instruments of spatial planning should include suitable objectives for strengthening centres to secure the existence of long-term initiatives that work to achieve this goal.
2. Creation and expansion of suitable organizational structures to strengthen centres: Suitable structures to strengthen centres should be established both at the federal level and also at the land- and municipal levels.
3. Definition of demarcation lines for centres: The definition of demarcation lines for centres to serve as guidance for the municipalities when taking further steps to strengthen town and city centres.
4. Preparation of integrated urban development or similar schemes: These schemes or similar schemes are to be defined as a requirement for obtaining funding.
5. Viewing centres from the perspective of a regional context: Regional cooperation projects between municipalities and also existing regional schemes and structures should be used to support efforts to strengthen town and city centres.
6. Informing the population and involving citizens to strengthen centres: Transparent information policies and the participation of specific target groups should help to raise awareness of the significance of centres in the communities.
7. Raising awareness and mobilization of private actors as partners for strengthening centres: The involvement of private actors in relevant measures should be promoted to strengthen town and city centres.
8. Goal of higher funding to create housing in settlement centres: Consideration should be given to higher funding for schemes to promote the creation of housing in town and city centres.
9. Securing the existence and expansion of enterprises and facilities in centres: To secure support for strengthening centres over the long term, efforts need to be made to encourage enterprises and facilities to locate there.
10. Support for experts in matters relating to building-culture in town and city centres: The support of experts for issues relating to building culture should enabled to promote high quality.

The expert recommendations were adopted by the ÖROK "Commission of Deputies" [1] in July 2019 and are available to all ÖROK partners – federal government, Länder (translated federal states or provinces), cities and municipalities – for implementation in their areas of activity.

Two working papers have been drafted within the partnership as a basis for the concrete formulation and content of the recommendations:

1. Working paper "Demarcation of town and city centres: definition, criteria, process"
2. Working paper "Legal measures at the federal and regional levels"

An important aspect is to make the information, knowledge and success stories easily accessible to all relevant actors. Regional cooperation projects, the participation of the population and private partners as well as of enterprises are additional success factors for maintaining the quality of life for people who live and work in the town and village centres.

Source of all information:
https://www.oerok.gv.at/fileadmin/Bilder/2.Reiter-Raum_u._Region/1.OEREK/OEREK_2011/PS_Orts_Stadtkerne/OEROK-Schriftenreihe_205_Materialienband_Gesamtfassung.pdf

Measures to strengthen centres

Although some measures are already mentioned in the recommendations, some examples of implementation are interesting:

As the results of the ÖROK-Study prove, *solid partnerships of all relevant stakeholders* (e.g. owner of buildings and free areas, administration of municipalities, people interesting to live or to work in the city centres) are a base for successful solutions to strengthen centres. They must be aware that they can benefit from win-win measures.

A basic measure is the design of public space, urban green, which also provides shadow on hot, sunny days, perhaps fountains, places to seat and rest, interesting store windows of the shops and gardens of pubs and restaurants can contribute to a good feeling of the people living and visiting the city centres. Pedestrians and cyclists should be a focus of traffic planning. Moreover, the accessibility by public transport is important. Short and save ways for pedestrians to bus stops and train-stations a quality criteria for strengthen centres. In almost all case studies to strengthen centres of communities also the accessibility by car is important, but the car traffic and parked

[1] The Austrian Conference on Spatial Planning (ÖROK), founded in 1971, is an organisation established by the federal government, the Länder and municipalities to coordinate spatial development at the national level. In the "Commission of Deputies" high ranked employees of the public administration represent political decision makers.

cars should not be dominant. Parking areas with trees can be better integrated in historical town and villages as sealed, boring areas.

A main contribution to strengthen the centres of towns and also of villages is the conversation and renewal of historical buildings for new functions, e.g. living, but also for shops, low-emission craft workshops, offices, public facilities and restaurants. Steinbach an der Steyr, which is described in this report is a good example for the re-use of historical buildings. Avoiding vacancies by a farsighted space-management contributes to vital town centres.

New urban design of the centre of Bischofshofen (Salzburg)

Source ÖROK Study: Stärkung von Stadt- und Ortskernen in Österreich, photo: Wolf

2.2.1.2 French Studies on Soil protection

The protection of natural soil resources is an actual topic of policy discussion in France. The ministry for an ecological and inclusive transition / General commissariat for sustainable development published the study:

Trajectoires vers l'objectif « zéro artificialisation nette », Éléments de méthode (How to reach the zero net artificialisation, Elementary method), (CGDD), Dec. 2019,

Sources: French questionnaire and https://www.ecologique-solidaire.gouv.fr/sites/default/files/Th%C3%A9ma%20-%20Trajectoires%20vers%20l%E2%80%99objectif%20z%C3%A9ro%20artificialisation%20nette.pdf

The French prime minister office published a further study to soil protection:

Objectif « Zéro artificialisation nette : quels leviers pour protéger les sols ? (Towards zero net artificialisation goal: leverage tools for protecting soil resource), / (France stratégie), Jul. 2019),

French policies to reduce soil consumption (artificialisation des sols) are successful, in the last years the soil consumption could be reduced.

Sources: French questionnaire, information by Michel Rostagnat and
https://www.strategie.gouv.fr/sites/strategie.gouv.fr/files/atoms/files/fs-rapport-2019-artificialisation-juillet.pdf
https://www.gouvernement.fr/indicateur-artificialisation-sols

2.2.1.3 Urbanism and mobility (French Study)

The French study "Urbanism and mobility" Urbanisme et mobilité (authors Philippe Schmit et al.) was published by the French Ministry for an ecological and inclusive transition / General council for environment and sustainable development (CGEDD), in November 2015, see https://www.actu-environnement.com/media/pdf/dossiers/809-cgedd-urbanisme-mobilite.pdf

Although the study focusses on cities and mobility in general, some recommendations are suitable to contribute to the reduction of car traffic and to save soil consumption in Alpine regions as well. For instance:

- Development of a coherent cycling network, also on a regional level, including the access to main public transport stations
- Public spaces (e.g. Boulevards) which are mainly used for car-traffic, should be regained for cycling, walking and public transport.
- Shopping centres should integrated in the urban environment with a high accessibility by public transport, walking and cycling.
- In the sense of "transit oriented development", station districts should be developed to multifunctional attractive urban areas with the aid of innovative policies with local stakeholders. A suitable urban density facilitate short ways in the areas and to public transport access. Moreover, a balanced social mix should be considered.

Mobility solutions should be main criteria for the qualification of projects under Eco Quartiers labels.

2.2.1.4 Spatial Concept Switzerland (Raumkonzept Schweiz)

The Swiss concept (published in 2012) has the following main goals in relation to transport and mobility:

- Switzerland operates a sustainable, safe, and reliable transport system for passenger and freight traffic.
- The costs of operation, maintenance, and renewal are affordable.
- The population and economy of Switzerland benefit from a good international and regional accessibility. This strengthens regional competitiveness and cohesion of the country.
- The transport system promotes settlement development internally and reduces the negative impact of mobility on quality of life, energy consumption and landscape.
- The Swiss population benefits from short distances between work, living, and leisure activities.
- Strong rural centres with businesses and industry help reduce commuter movements.

- In the planning procedures, the so-called **development poles (Entwicklungsschwerpunkte)** should concentrate additional working places, business, schools, and leisure and sport activities at adequate locations with a view to reduce and concentrate mobility to existing infrastructure (and extended) transport infrastructure and to avoid urban sprawl and additional mobility demand for both, private individual and public transport demand.

At different state levels of planning (local, regional, and national), new areas for housing/settlements, business, working places, shopping centres, leisure, and sports with **transport intensive installations** (>2000 car movements/daily) need a specific "ex ante" mobility plan, which meets most of the expected mobility demand by sustainable modes of transport, e.g. public transport or soft mobility (cycling+walking), before the approval of the project.

Most of these projects with higher transport intensity present so-called "**Traffic contingency models" (Fahrleistungsmodell)** in which the project leader establishes the way, how the transport demand generated by the project will be covered in modal share between public and private modes, mostly by public transport extension (infra+operation), soft mobility, and additional private car-movements. The sum of modelled additional emissions generated by the transport sector and the existing ambient air pollution needs to be within the allowed thresholds defined by the Federal Ordinance on Air Pollution Control (OAPC), more information at https://www.admin.ch/opc/en/classified-compilation/19850321/index.html

In a convention between the project leader/investor and the relevant local or regional authority, the modal share figured out is monitored and provided with a bonus / malus system, if figures are achieved or not. Since 2001, the Bernese Traffic contingency model serves as a planning instrument for municipalities and many experiences on this basis have been made since the its implementation. As a follow up step, the basic rules from the model were integrated in the cantonal plans of spatial planning and mobility planning (kantonale Richtplanung).
The federal government, cantons, cities, and municipalities coordinate planning of the transport infrastructure with their spatial development ideas.

The Swiss "Raumkonzept" especially recommended for the spatial development in the Alps:

- Promote sustainable development of side valleys with their typical landscape.
- The resident population should remain in the still functional areas of the side valleys.
- This requires that a sufficient basic availability of goods, services, and jobs in the alpine tourist areas and rural centres is guaranteed.
- Regional strategies for spatial development should be based on these priorities.
- The aim is to achieve an optimal combination of natural and cultural tourism, agriculture, and trade.

- Traditional cultural landscapes with their typical forms of settlement and their traffic history should be carefully cultivated and developed further.

Source: https://www.are.admin.ch/are/de/home/raumentwicklung-und-raumplanung/strategie-und-planung/raumkonzept-schweiz.html (download Raumkonzept)

2.2.1.5 MORECO Project Mobility and residential costs for sustainable spatial development

Residential development in the Alps is not sufficiently guided by a long-term vision, resulting in problems such as high individual mobility costs, pollution, and long commutes. MORECO developed shared methodologies, frameworks, and tools proposing solutions for residential choices that minimise mobility costs and facilitate sustainable spatial development. Collaborating with institutions such as transport providers, real estate providers, or spatial planners, the project partners created mobility and accessibility solutions for better spatial governance and mobility management.

The long-term aim of MORECO was to promote a sustainable, future-oriented settlement development, which provides access to good quality public transport services and supply facilities. In this way, it improves quality of life. The place of residence is crucial for the means of transport people can use, for the length of daily trips, for the time it takes, how it can be used and the costs. MORECO influences location decisions by providing reliable information and technical tools.

As location decisions are taken by different kinds of stakeholders MORECO provides tools and measures for (1) households looking for a new home and residential building companies (private stakeholders), (2) experts and planners and (3) policy makers (e.g. mayors):

1. For the group of private decision makers MORECO developed an online-cost-calculator, information brochures, GIS-maps showing infrastructure of services and personal counselling services as well as awareness raising-measures.
2. GIS-maps and services provide reliable information for experts and planners (Settlement-assessment, Regional analysis)
3. Politicians are supported by an information-slide-pool to have arguments and justification for the public networking actions, new co-operations and the MORECO-governance strategy.

The tools are implemented in the partner-regions in around 30 pilot actions in 7 pilot sites in different ways and different languages and are available on/via the website www.moreco-project.eu .

Key achievements of MORECO

In the frame of the project decision making tools – ready for using were successfully developed:

Tools for private households:

- MORECO-household calculator + Implementation framework + Guideline after testing and improvement
- School project for awareness raising
- Promotion Video + Postcard for WOMO (Munich Houshold cost calculator)
- WebGIS-maps online with spatial/infrastructural/supply information (e.g. public transport, retailers, schools, medicines, pharmacies), available in Salzburg, Belluno and Mantua
- Mobile App Belluno supporting car-pooling
- Information brochures and studies (e.g. "Checkliste - Meine eigenen 4 Wände)

Tools for experts and planners:

- MORECO-Settlement assessment + Implementation framework + Guideline after testing and improvement
- Regional Analysis
- Stress tests and Scenarios for future spatial planning decisions + Recommendations for municipalities
- New PTCP Provincial territorial plan of Province of Mantua
- Extensive Evaluation Study
- MORECO-Networks between mobility providers and planners, politicians and experts

Tools for policy makers:

- MORECO-Slide pool for information and argumentation in English, German, Slovenian and Italian language gives a comprehensive overview on the topic and all MORECO-activities.
- MORECO Government-Strategy
- MORECO White Book + Appendices (Guidelines of 3 Tools)
- Common Declaration, uniting political decision makers of all project partners in one goal.

Moreover, comics were designed, to show the recommendations of MORECO in a simple and funny way.

Parts of the MORECO project results are about to be implemented in national policies and strategies or influence the procedure of policy making, such as:

1. New spatial planning law in Slovenia
2. Territory Coordination Provincial Plan (TCPP) in Province of Mantua
3. Housing subsidy law in Salzburg

4. The settlement tool in Salzburg is applied to the Pilot site "Salzburg Umgebung - Flachgau". The project partner iSpace has planned to enlarge it to the whole Province of Salzburg.

MORECO was worked out in the Alpine Space Programme in the period from July 2011 until June 2014, the financial contribution by the EU (ERDF) was 1,89 Mio. €, the total budget 2,49 Mio.€.

Source: http://www.alpine-space.org/2007-2013/projects/projects/detail/MORECO/show/index.html

2.2.1.6 The ESPON 2020 Programme

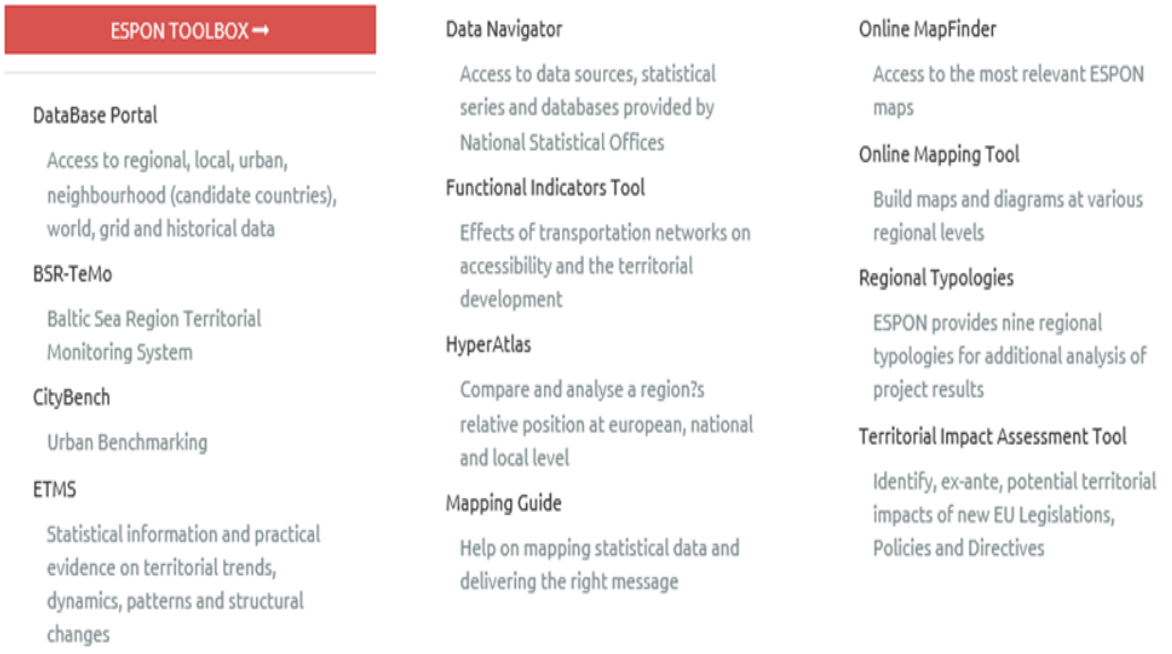
This programme aims at promoting and fostering a European territorial dimension in development and cooperation by providing evidence, knowledge transfer and policy learning to public authorities and other policy actors at all levels.

ESPON 2020 shall continue the consolidation of a European Territorial Observatory Network and grow the provision and policy use of pan-European, comparable, systematic and reliable territorial evidence.

The objectives of the ESPON 2020 Cooperation Programme are to support the reinforcement of the effectiveness of EU Cohesion Policy and other sectoral policies and programmes under the European Structural Investment (ESI) funds, as well as national and regional territorial development policies, through the production, dissemination and promotion of territorial evidence for covering the entire territory of the 27 EU Members States and 4 Partner States of Iceland, Liechtenstein, Norway and Switzerland.

The ESPON tools are shown in the overview on the overview below:

ESPON Tool Box



Sources: Slovenian questionnaire and https://www.espon.eu/

2.2.2 Successful Case Studies for soil saving and short distances

2.2.2.1 Sonnengarten Limberg“, Zell am See, Austria

In the housing project in the regional centre-town Zell am See in hearth of the Alps 200 apartments are situated, moreover a food-shop and a kindergarden are available.

Advantages for mobility are a good accessibility on cycle ways and by a regional railway (Pinzgauer Lokalbahn). Car sharing and e-bikes to rent are organized in “Sonnengarten Limberg. Also a room for repairing bicycles is provided in the new settlement. A special mobility-service is the distribution of info-packages for new inhabitants with free test tickets for public transport. On information- displays in the entrance areas of the buildings the next departures of busses and trains are shown.

In the communication and in advertising to buy or to rent apartments in Sonnengarten Limberg it is underlined, that the smart settlement less private cars are needed than in usual in smaller cities. While in Zell am See 1,5 up to 2 car parking places for every apartment are requested by the parking regulation, in Sonnengarten Limberg the average is only 1,2 car for 1 apartment.

Further strengths of the “smart city” Sonnengarten Limberg are a “clean” energy supply, a high share of it based on photovoltaics and an ambitious planning process for free space including urban green.

Nice apartments with balconies and terraces and green free spaces can provide a living quality almost similar to single family houses. The total area of Sonnengarten Limberg is approx. 22.000 square-meters, including the shop, the kindergarten and other common facilities. 200 apartments, estimated for 600 up to 800 inhabitants will be available. If this area would be used for single family houses, maybe 30 up to 40 with 100 up to 150 inhabitants could live there. In this way the project Sonnengarten Limberg contributes to save soil, to shorten every-day trips and to shift mobility from car-use to cycling and public transport.

View of Sonnengarten Limberg

Sources and further information at:

https://www.sonnengartenlimberg.at/
https://www.ots.at/presseaussendung/OTS_20180919_OTS0037/vcoe-mobilitaetspreis-oesterreich-fuer-wohnsiedlung-in-zell-am-see-bild
https://www.salzburg.gv.at/bauenwohnen_/Documents/Endbericht%20Zell%20am%20See%20Limbergga rten.pdf

2.2.2.2 Spatial development concept of Zwischenwasser, Austria

Zwischenwasser is situated in the mountains near the Rhine valley in the country of Vorarlberg. The community Zwischenwasser is formed by 3 villages, Muntlix (biggest settlement and place of the community administration), Batschuns and Dafins. Zwischenwasser has 3.247 inhabitants and the demand for new housing areas is high.

One focus of the spatial development concept of Zwischenwasser is the reduction of soil consumption by new housing areas. Another focus is to hold working places and to gain additional working possibilities based on IT and high capacity internet in the area of the community.

For reducing soil-consumption by housing the following measures will be implemented:

Vacancy mediation:

In many buildings today do not live so many people as before. Often lead changed family relationships to a partial vacancy of buildings, an utilization for new, additional residents seldom happens. The living potential is not used. For the vacancy mediation by the community it`s necessary to know partial, complete and future vacancies. Based on this knowledge the communities can mediate between people who look for apartments or houses and the owner of buildings.

Contracts as instrument of spatial planning

The objective of contracts is in the most cases to ensure that an area-owner, who gets a permission (in German "Widmung") to build, really starts to build according the permission (construction site mobilization). This is a contribution to increase the density of settlements, to save the soil consumption and to reduce e distances for every-day trips.

Limited permissions for new housing areas, establish borders for the development of built up areas

A moderate increase of the settlement density has priority in favour of changing green land to construction sites. The reserves of possible construction sites should be balanced with the demand to avoid that too big areas lead to a "sprawl" development. The settlements of Zwischenwasser should have clear borders to the surrounding landscape (agricultural areas, wood). New buildings should be constructed in gaps of the already built up areas.

Active role of the municipality in spatial development, transport planning and energy supply

In Zwischenwasser a focus of the construction site mobilization should be the instrument of a “Community Future Fund” as a tool for active land- policy. The community should invest from the fund in local projects and the purchase of suitable construction sites, especially in the centre. On this way it´s possible to invest for a good purpose in the territory of the community. For land owners who prefer to stay on their property should be offered a lease model. The implementation of the funds is still in preparation, but it should be implemented still in 2020

Pilot projects for community housing, affordable living, living and working should be implemented.

In the spatial development concept of Zwischenwasser the impacts of spatial development on traffic are focussed: Small-scale structured, housing-related job

opportunities should reduce forced mobility and increase activity density in the centres.

The reduction in motorized traffic is a main objective of a sustainable mobility concept, considering climate aspects.

The spatial proximity of living and working was in the history especially in the "remote" Alpine areas helpful to keep the daily routes short. The structural change which is actually under way, where the trend towards a service society and new IT-based working cultures is a chance for the creation of job opportunities near to home or in the home.

A "side effect" of the creation of new work opportunities in the community is an increase in activity density, which can attract public space.

Further options to reduce the number of daily trips by private cars, are on the one hand intelligent and networked concepts for public traffic and vehicle sharing concepts, on the other hand the increase of self-sufficiency of the individual villages. In the community of Zwischenwasser the presence of local supply for the daily which can be easily reached by foot or by bicycle is regarded as a contribution to shorter trips.

The attractiveness of getting around on foot or with bikes (including e-bikes) depends on the attractiveness of the public space. Recently street space is usually designed primarily for motorized traffic and with little reference to the surrounding buildings. Therefor walking and also cycling is not attractive. In future the public space in Zwischenwasser should be designed so that pedestrians and cyclists have generous space available. The ways to more attractive public space will be diversified - not just the surface, also lighting, seating, drinking fountains are contributions for an improvement.

Since the elaboration of the “Räumliches Entwicklungskonzept Zwischenwasser” the development of new compact housing areas within the defined settlement borders was

successful. A detailed analysis showed, that only few houses and apartments (20 of 1.400) are vacant, but solutions to implement new, suitable utilizations.

The community is also a pioneer in reducing energy consumption and using renewable energy.

In the frame of the "e5 program" of the country of Vorarlberg [2] for clean energy Zwischenwasser implemented a considerable number of measures in the fields

- economical, efficient use of energy
- promotion of renewable energy sources (sun, especially photovoltaic, wood, biogas)
- promotion of soft mobility (bike, electric powered school bus , train, walking)
- climate protection by reducing CO_2 emissions.

Source: Räumliches Entwicklungskonzept Zwischenwasser (short version, December 2014), downloaded from https://www.zwischenwasser.at/wirtschaft/raeumliches-entwicklungskonzept-rek/raeumliches-entwicklungskonzept

Photovoltaic panels on roofs in Zwischenwasser

photo: https://www.zwischenwasser.at/wirtschaft/photovoltaik-in-zwischenwasser

2.2.2.3 Austrian Case Studies outside the Alpine Convention area: Krummnussbaum and Mank in Lower Austria

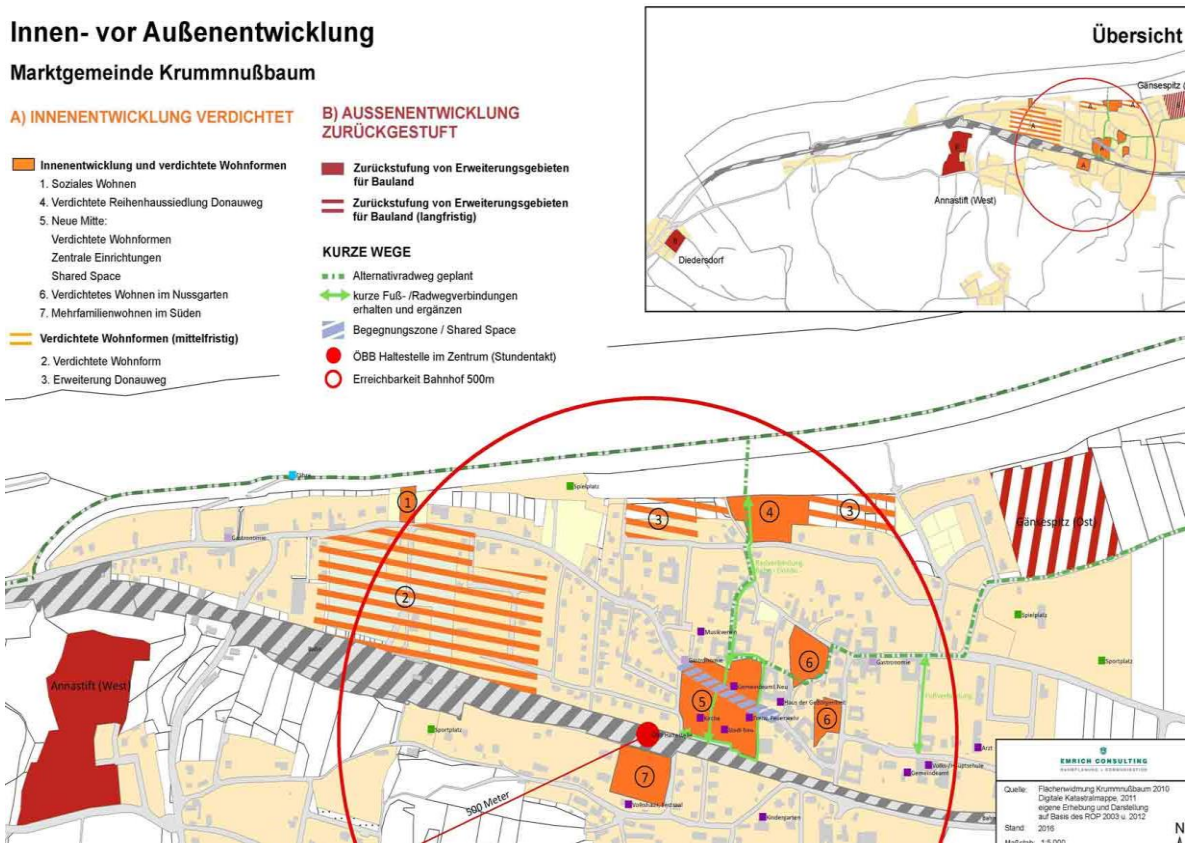
Krummnußbaum, a community with apr. 1.500 inhabitants, situated on the Southern side of the Danube in Lower Austria (Niederösterreich) has dedicated itself to the area-saving and cost-efficient settlement development. Expansion areas on the outskirts have been deleted. The primary objective is to revive the centre and avoid motorized

[2] The e5 programme encourages Austrian municipalities to act in a sustainable manner at all levels: in dealing with energy, consumption, mobility and the economy. As part of klimaaktiv, e5 provides consultancy and certification services to towns and municipalities that are committed to energy transition and climate protection. A network of highly qualified federal state consultants and a standardised rating scheme across Europe make it easier for the e5 municipalities to define measures

traffic. So a new space is developed to and create a community centre. This square will connect the community centre with the church. In urban settlement, further measures were implemented to strengthen the centre by means of consolidation measures and new services in the immediate vicinity of the town centre. By focusing on the town centre, the community is taking an important step in climate-friendly settlement development.

Source: https://www.krummnussbaum.at/Krummnussbaum_gewann_den Klimaschutzpreis_2017

Higher settlement density in the centre of the community Krummnußbaum (near the railway station) instead of spatial development outside with high land consumption



Source: https://gemeindebund.at/krummnussbaum-gewinnt-den-klimaschutzpreis/

Mank

Mank is a small town situated near the Northern border of the Alpine Convention area, with 3.569 inhabitants at the begin of 2019. Although in the rather flat region in the North of the Alps space for settlements is more space available than in the Alps, the community focuses on a space saving spatial development:

In addition to 19 building grounds for single family house, from the year 2020 onwards there will be 28 double houses built in parallel with additional apartments on the old sports field. In the forward-looking concept with short distances and a car-free green axis with playground, there is also the obligation for fossil-free heating systems of the new buildings. The city park is located in the neighbourhood, the 800 meters to the centre can be easily covered by bike.

Traffic measures have the objective to promote sustainable mobility:

- Promoting E-Mobility: charging station, electric car, model township car sharing – "Manker E-Mobil"
- Short distances through compact town centre (e.g. city development project Hippolytgasse)
- Cycle and footpaths as important part of settlement planning, construction of cycle paths at all road entrances
- New bus stops in the settlement areas
- Mank is partner in the Climate- Active -Mobile Program of the Federal Ministry for Sustainability and Tourism

Improving awareness:

- e5 - community (see footnote to Zwischenwasser above)
- Climate tips in the newsletter of the municipality
- E-mobile exhibition
- solar power station for e-cars
- campaigning Shopping in town: city marketing & farmer shops
- role model municipality: photovoltaics plant town hall and other buildings of the municipality, electric car for community services
- Photovoltaics plants on public buildings (e.g. on the sewage treatment plant), presentation of performance data on the Internet http://www.mank.at/Umwelt/Sonnenstrom

Source: https://www.mank.at/Gemeinderat_Flaechenwidmung_fuer_neue_Siedlung_beschlossen

2.2.2.4 Convergenze Metropolitane Bologna - re-use of brownfields

This project has been financed in 2017 by the Italian program for the urban regeneration of outskirts (Bando Periferie). It includes 29 interventions with an investment of ca 40 Mio Euro. These interventions aim to reconnect involved outskirts with the centre of the city e.g. by the renovation of local train stations and their surroundings and with the establishment of cycle and pedestrian axes with related services.

Further projects for the urban regeneration of outskirts in the region of Bologna started:

- San Giovanni in Persiceto: planned works for the renovation of the train station are ongoing as planned
- Calderara di Reno: planned interventions for the upgrade of the productive areas have been almost completed
- Reno-Galliera: works for the implementation of the planned cycle axis are ongoing
- Budrio: interventions for the upgrade of the station and the renovation of cycle and pedestrian spaces are ongoing.

Source: Questionnaire from Italy, additional information at https://www.arpae.it/cms3/documenti/_cerca_doc/ecoscienza/ecoscienza2017_5/servizio_rigenerazione_urbana_Ecoscienza2017_05.pdf and https://www.cittametropolitana.bo.it/portale/Engine/RAServeFile.php/f/comunicati_stampa/20170703Schede_convergenze_metropolitane_bologna.pdf

Riqualificazione dell'ambito della Stazione Ferroviaria in Imola near Bologna

Source: https://www.cittametropolitana.bo.it

2.2.2.5 SOS4LIFE: Save Our Soil for LIFE – Emilia-Romagna region

The project involves municipalities of the Emilia-Romagna region in the development of actions and plans oriented towards soil protection and urban regeneration. Tools, rules and actions implemented within the project are consistent with the objective set at European level "no net land take by 2050", as stated in the Roadmap to a resource efficient Europe [COM(2011) 571].

The following goals are defined on the website of the project SOS4LIFE :

- Definition of urban regulations and implementation tools
- Definition of rules and incentives to support the urban regeneration
- Definition of procedures for the monitoring and evaluation of land take and its impacts on the eco-system
- Definition of a methodology for the detection, evaluation and mapping of ecosystem services
- Implementation of three de-sealing interventions
- effective and large-scale promotion of knowledge and awareness about the social and economic consequences of the processes of land take

De-sealing: soil compensation, case study Forli

Source: https://www.sos4life.it/wp-content/uploads/SOS4Life_Volantino_EN_web.pdf
Folder to the project in English language

The project costs are about 1.8 Mio € (with over 1.0 Mio of European LIFE funds).

Source of all information: Italian questionnaire and https://www.sos4life.it/en/project/

2.3 Reducing passenger and freight traffic by economic cycles and creating jobs in rural regions

2.3.1 Der Steinbacher Weg – the solution of Steinbach (Upper Austria)

The community is situated 20 km away from the town of Steyr and has approx. 2000 inhabitants. Already in the year 1422 the village was mentioned as place of metalworking craft, e.g. blade-smiths. The tradition of metalworking was developed in the next centuries, Steinbach became a centre of cutlery production, which brought high prosperity. Since the late sixties of the last century the metalworking industry in Steinbach and therefor the whole community were among the first victims of globalization, cutlery could be produced cheaper in Asia.

The worst time of the economic development of Steinbach was the year 1986. No more restaurant and no more grocery existed in the community area. Many buildings were empty and in bad state of construction.

Based on the good cooperation of representatives of all political parties, an excellent participation of citizens and their motivation to recognize their strengths – e.g. in crafts or arts - since the crisis years a remarkable economic and social development process in Steinbach began. A strengths- and weakness analysis for Steinbach an der Steyr improved the awareness of the population for economic chances of their community, e.g. of bio-agriculture of fruits and products from fruits. In the area of the community more than 120 traditional apple varieties and together more than 300 varieties of fruits grow. From these resources a commercial production of dried fruits ("Dörrobst") and natural juices was developed.

A further strength of Steinbach is the heating energy supply by biomass ("Wood chips" in German "Hackschnitzel"). 5 heating plants with a performance of almost 1.500 kW were implemented.

An important contribution to the development process of Steinbach was the renovation of old buildings. In the village-centre 15 houses, which are a cultural heritage, were renovated, moreover 23 chapels and 38 crosses (religious symbols) along ways. Long-term unemployed people were employed in the renovation work. Moreover, the local and regional commercial enterprises benefited by the renovation process.

Business start-ups are supported by the community. Sometimes it is the search for a suitable location, at other times the rental of buildings owned by the community (often abandoned workshops of the former metalworking) to a company founder with fair prices. In some cases the municipality itself set up a business branch and then handed it over to a private undertakers. The main building of the former cutlery factory was developed to a museum (called "Messerer Museum") of industrial history.

The results of the development process in Steinbach are remarkable: Since 1986, the number of businesses and services in the community has doubled from 27 to 56 in the year 2006. More than 190 new jobs were created and led to higher tax revenues for the community, reducing the unemployment rate from 9% (1986) to 2.8% (2006) and helping to reduce commuter traffic. Short ways from home to work create quality of life for the residents.

Event on the main square of Steinbach

Photo: www.tips.at

The key success-factors for the positive development of Steinbach an der Steyr were the participation and motivation of a big share of the inhabitants and new culture of creative cooperation of the relevant political parties in the council. 40 % of the inhabitants engaged on a voluntary basis. A very helpful strength of Steinbach was the high potential of creative entrepreneurs in craft branches, who succeeded in "start ups". Summed-up Steinbach is regarded as a role model for the endogenous development of rural communities.

Source and further information: https://mutbuerger.cc/images/miteinander/Der-Steinbacher-Weg.pdf

2.3.2 Bad Eisenkappel (Carinthia, Austria)

Bad Eisenkappel-Vellach in Carinthia is the community situated most in the South of Austria near the Slovenian border and apr. 40 km away from the Carinthian capital Klagenfurt. Bad Eisenkappel -Vellach has appr. 2.300 inhabitants, with a slight shrinking development. The community is also a tourism destination with 50.080 over-night stays in summer 2018 and appr. 34.000 in the winter season 2017/ 2018.

For a rather small community the measures to support young undertakers (start-ups) are remarkable: In the framework of the Local Agenda 21 process, a young entrepreneurship promotion was launched in 2002. Young talented craft-men and -women, who worked before outside of Eisenkappel and commuted daily, were encouraged to become self-employed in their own community and offer their services locally. The community organized counseling sessions, assisting individuals in setting up the premises and facilities and organizing bookkeeping. Moreover, the community supported the young small undertakers to get business licenses for their operations. 16 people could be won this way. Since then, 16 people need not commuting to the centres. The citizens of Eisenkappel benefit by the local access to the services. The support of young self-employed people contributes to the economic life of the community and also to reduce green-house gas emissions from commuting trips.

The mountain farmers from the Vellachtal with initiatives from southern Carinthia and Slovenia have joined together to form the community "Coppla Kaša". Coppel is the old name for Bad Eisenkappel and Kaša is the old name for a "storehouse" as it used to be on every farm.

This association has set itself the task to jointly market the valuable, natural agricultural products and to jointly purchase and use the equipment necessary for the production of the products. In the court of a building on the main square of Bad Eisenkappel a distribution place for the regional products is available.

Selling regional products in the center of Bad Eisenkappel

Sources: https://www.bad-eisenkappel.info/umwelt-energie/energieprojekte/regionale-wertschoepfung.html

2.3.3 GREENCYCLE project (Slovenian Contribution)

The GREENCYCLE project aims to achieve low-carbon objectives of participating cities and stakeholders through introduction of a holistic system of circular economy into urban management. It provides an implementation system that integrates all relevant sectors of urban management (energy, waste, mobility, construction…) into circular economy system.

Objectives

The project GREENCYCLE aims to introduce the system of circular economy as a holistic

approach to support implementation of low-carbon strategies and provide additional 2-4% greenhouse emission reduction to the partner cities. Circular economy deployment will save energy, water, recover critical raw materials, reduce transport-related emissions, boost the eco-innovation, create green jobs and benefit to low income citizens.

Cities as biggest emissions producers and biggest energy and materials consumers will play the pioneering role by developing circular economy implementation strategies.

Expected project results

Main result of the project will be the change it brings to the low-carbon governance because it provides a system of integration of low-carbon sectoral policies (energy, mobility, waste, construction) into circular economy cycle - providing additional reductions of greenhouse emissions, higher resource efficiency, critical raw materials mining and reduction of transport activities. Additionally, it creates a pool of new business opportunities for eco-innovation and green jobs.

GREENCYCLE main outputs are:

- developed urban circular economy strategies for partner cities, integrating several urban fields (waste, energy, transport, construction etc.), with defined governance structures ;
- circular economy implementation toolbox (planning and monitoring e-tool , expert database) will be developed, toolbox will be tested by pilot projects implementation in each partner city, evaluation done and toolbox completed;
- transnational platform consisted of local and regional circular economy managers, published as an on-line platform which will include a marketplace for different materials needing a big-scale approach, a knowledge base (best practices, governance models and a publicly available e-tool for the implementation of circular economy).

The project costs are 1,95 Mio.€, thereof , 1,65 Mio. € EDRF grant. The project started in November 2016 and will be finished in April 2020. The city of Maribor is lead partner.

Sources: Slovenian questionnaire and https://www.alpine-space.eu/projects/greencycle/en/home

3. SHIFTING MOBILITY AND FREIGHT TRANSPORT DEMAND TO ENVIRONMENTALLY SUSTAINABLE MODES

Beside the reduction of physical traffic, all necessary passenger mobility and freight transport should be as environmentally sustainable as possible. Good practice in the Alps shows that - as well in passenger mobility as in freight logistics - many possibilities to achieve the sustainability targets are available and are in many cases already successfully implemented.

3.1 General approaches to shift traffic to environmentally sustainable modes

3.1.1 National Concepts and Strategies

3.1.1.1 Integrated national energy- and climate plan (NEKP) for Austria period 2021 – 2030

According to the impact assessment in the frame of the NEKP, greenhouse gas emissions can be reduced by 27 percent or around 9 million tonnes of CO2 equivalent by 2030. A further 2 million tons of CO2 equivalent can be avoided by reducing counterproductive subsidies. For the remaining 3.2 million tons, there are options proposed in the NEKP that could save additional emissions: one option is the greening of the tax, incentive and duty system and another is the expansion of emissions trading to additional sectors.

The mobility sector should contribute with 7,2 million tons reduction of CO2 equivalents in the period from 2016 to 2030. Recommended measures are:

- Strengthening and expanding public transport, including infrastructure improvement electrification and mobility management offers
- Mobility management for companies, cities, municipalities, regions, tourism and awareness raising
- Stimulate walking and cycling
- Public procurement
- E-mobility in private transport (e.g. funding for infrastructure and vehicle purchases)
- Increase energy efficiency in all modes
- Shift of freight transport from road to rail and combined transport
- Identification and gradual reduction of counterproductive incentives and subsidies (e.g. financial support by commuting by car if public transport alternatives are available

- Considering ecological impacts in the tax- and user-charging system for passenger and freight transport

Source: Table on the pages 9 and 10 of the final document of NEKP, downloaded from https://www.bmlrt.gv.at/umwelt/klimaschutz/klimapolitik_national/nationaler-energie-und-klimaplan.html

3.1.1.2 German Climate Action Programme 2030

Elements of the Action Programme are:

CO2 pricing

- Promotion programmes
- Relieving the burden on citizens
- Refurbishment for energy efficiency to be tax deductible

Replacing central heating systems

Traffic and transport

- Expanding the charging infrastructure for electric mobility
- Encouraging people to switch to electric vehicles
- More attractive local public transport
- Investment in the railways
- Rail travel to be cheaper – short flights to be more expensive

Agriculture

Industry

- Investment programme – energy efficiency and process heat from renewables in industry
- National decarbonisation programme

Energy sector: Renewables to generate 65 per cent of Germany's power

Research and development

- The growing role of hydrogen
- Strengthening battery cell production in Germany
- Storage and use of CO2

Financing

Although the whole content of the German Climate Action Programme 2030 is interesting, we focus on basic goals and measures in the field of transport:

CO2 Pricing

Like in the already working European emissions trading scheme, a price is to be put on CO2 emissions caused by the building sector and by transport and mobility. Experts agree that this is the most economically cost-effective way to reduce emissions and achieve our climate targets.

The German government is to reinvest the revenues generated from CO2 pricing in climate change mitigation measures, or pass it on to citizens in the form of financial assistance and promotion measures. The national emissions trading system will be launched in 2021. A fixed price per tonne CO2 will be specified in advance. The fixed price will initially be 10 Euros per tonne CO2, and will rise to 35 Euros per tonne by 2025. This gives all stakeholders a reliable basis on which to plan. As of 2026, the market will set the price, within a fixed band. The total quantity of certificates issued throughout Germany will be in line with the imperatives of German and European climate targets.

Promotion measures should ensure that everybody can cope with the Climate Action Programme, for instance the costs of refurbishing buildings, to make them more energy efficient will be tax deductible. The programme also provides for high levels of subsidies (40 per cent) to encourage people to replace oil central heating with new more environmentally friendly systems. The environmental bonus for the purchase of electric vehicles will be continued. In the medium term the German government will reduce electricity prices as a counterweight to the new CO2 pricing.

Building and living

14 per cent of all CO2 emissions in Germany (120 million tonnes) come from the building sector. By 2030 this figure must be reduced to 72 million tonnes CO2 per annum. The objective to make building and living in Germany more climate-friendly should be achieved with a mix of incentives, CO2 pricing and regulatory measures.

The costs of refurbishment such as replacing oil heating, fitting new windows, insulating roofs and outside walls are to be tax deductible. To encourage people to replace their oil central heating a "replacement bonus" will be introduced with 40 per cent assistance.

Traffic and transport

In comparison to 1990, transport-related emissions must be cut by between 40 and 42 per cent by 2030. A package of measures to encourage electric mobility, promote the railways and introdce CO2 pricing is necessary to achieve this goal.

In Germany, a total of one million charging stations are to be available by 2030. The German government will promote the development of a network of public charging stations by 2025, and produce a master plan for the charging station infrastructure.

The legal provisions regarding the installation of charging infrastructure are to be simplified.

The aim of the German government is to have between 7 and 10 million electric vehicles registered in Germany by 2030. First-time-registrations and retrofitted electric

vehicles will initially pay no vehicle tax. This regulation is to be extended until 31 December 2025.

For a more attractive local public transport the German government has raised federal funding for local public transport to 1 billion Euros yearly from 2021. The additional funding is to be used to expand local public transport networks. As of 2025 the funding is to rise to 2 billion Euros a year. Incentives are, for instance, to encourage bus fleets to switch to electric, hydrogen- and biogas-powered technology.

Between now (2019) and 2030, the German government and the railway company Deutsche Bahn are to invest 86 billion Euros in the track infrastructure. Goods traffic will also benefit from this modernisation, which will allow more goods to be transported by rail.

Value added tax payable on railway tickets for long-distance travel will be charged at a reduced rate of 7 per cent. In air travel, the German government is to raise the air traffic surcharge as of 1 January 2020 as well as preventing dumping prices.

A reform of vehicle tax is closely based on the CO2 emissions of the vehicles. For vehicles registered for the first time as of 1 January 2021 tax will be calculated primarily on the basis of CO2 emissions per kilometre, and gradually increased above the level of 95 g CO2/km for passenger cars.

Research and development

Transport relevant main fields of research and development are the growing role of hydrogen, battery technologies.

Hydrogen is pivotal to efforts to make the economy more climate-friendly. The German government worked out a Hydrogen Strategy, see also https://www.bmbf.de/de/nationale-wasserstoffstrategie-9916.html

The German government has earmarked about one billion Euros to develop battery cell production. This will result in several production sites in Germany. The overall concept "Forschungsfabrik Batterie" (Research Factory for Batteries) supports capacity and technology development all the way along the battery cell value chain.

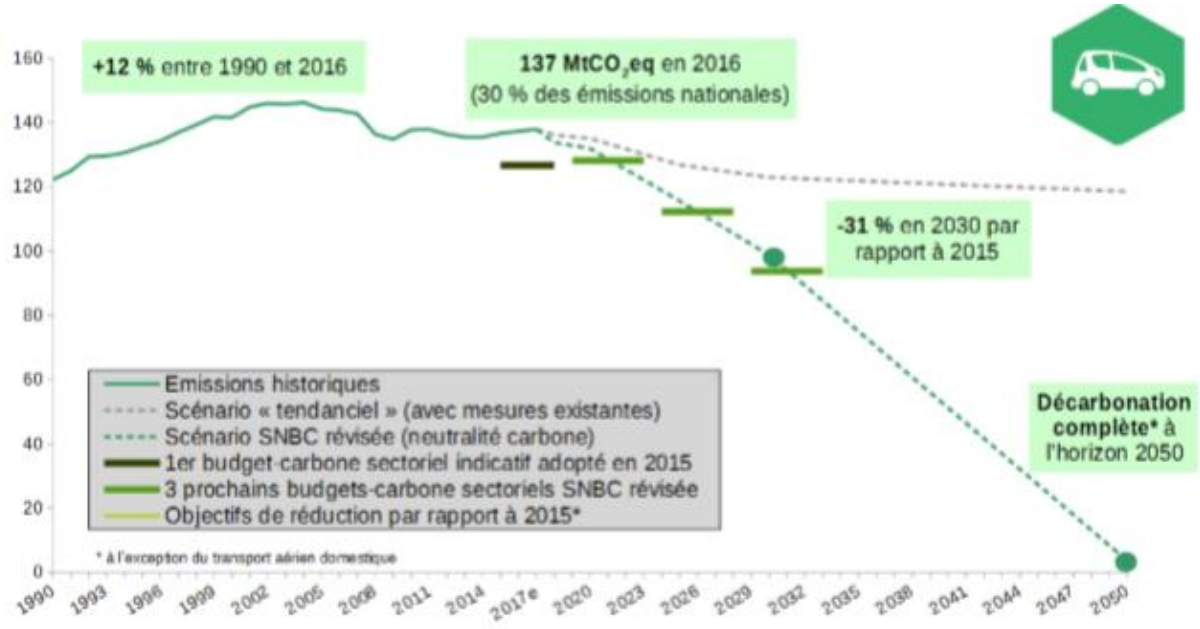
Source of all information to the German Climate Action Programme 2030:
https://www.bundesregierung.de/breg-en/issues/climate-action/klimaschutzprogramm-2030-1674080

3.1.1.3 French Low Carbon Strategy

The "National low carbon strategy" (https://www.ecologique-solidaire.gouv.fr/france-publie-projet-strategie-nationale-bas-carbone-snbcv) is a general frame for the decarbonisation of transport. Main targets of the strategy for the transport sector are:

"Decarbonize the energy consumed by vehicles and adapt the infrastructure to reach 100% zero-emission private vehicle sales in 2040. Improve the energy performance of vehicles with an ambitious target of 4l / 100km in 2030 for new thermal passenger vehicles. Increase the conversion bonus to 1 million beneficiaries by the end of the five-year period to replace vehicles with less emitting vehicles and support the deployment of electric vehicles to reach a fleet of 4.8 million electric vehicles in circulation in 2028."

History and projection of emissions from the transport sector in France between 1990 and 2050 (in million tons CO2eq)



Source: Projet de Stratégie Nationale Bas-Carbone - La transition écologique et solidaire vers la neutralité carbone, page 13, downloaded from https://www.ecologique-solidaire.gouv.fr/sites/default/files/SNBC%20résumé%20vdef7.pdf

The French Bas-Carbone strategy focusses also on the reduction of additional soil consumption by buildings and transport infrastructure. Land use planning should support resilient urban forms. Soil has significant direct and indirect effects on greenhouse gas emissions by bio-sources-production, carbon storage in soils and habitat types. To achieve carbon neutrality, it is particularly important to limit the consumption of natural soils today, by optimizing the use of spaces, while ensuring the promotion of urban forms resilient to the effects of climate change. Settlements with higher density facilitate using public transport, walking and cycling and contribute to less car use in every-day life.

Source: Projet de Stratégie Nationale Bas-Carbone - La transition écologique et solidaire vers la neutralité carbone, page 12 (see link above)

3.1.1.4 Swiss initiatives for sustainable mobility

Institutional framework for sustainable mobility by a Coordination Office (COMO)

A specific inter-sectoral coordination body for sustainable mobility projects had been set up in Switzerland, with a view to promote and facilitate innovative projects contributing to reduce transport-related emissions. The Coordination Office for Sustainable Mobility (COMO) is the central contact and coordination point and the first contact point at federal level in matters of sustainable mobility. It supports innovative projects with a financial contribution and, as a knowledge platform, provides

information on completed and ongoing projects. Six federal offices are responsible for COMO.

A wide variety of project sectors for sustainable mobility is covered:

- IT -Solutions
- Sharing mobility
- Leisure time mobility
- Pedestrian and cycling traffic
- Public transport
- More efficient private motorized road transport
- Freight traffic and logistics
- Children and young people
- Mobility management

In this context, many examples exist in the mobility sector, such as the creation of the "Quality Alliance Ecodrive" (QAED), initiated already in 1999 by the SFOE and Energy Switzerland as a partner association to implement good practices in Ecodriving and as a multiplicator for Ecodriving in instructing driving teachers and specifically fleet operators for heavy vehicles (buses and HGVs).

However, quantify emission savings is still not evident due to different emission factors and heterogeneous types of vehicles.

See also: https://www.energieschweiz.ch/page/de-ch/komo-projekte (available in German, French, Italian)

Switzerland mobility for car-free traveling throughout Switzerland linking tourism, leisure, hotel accommodation and points of interest

Switzerland mobility / Schweiz mobil is the national network, initiated in 1998, for non-motorized individual transport especially for leisure and for tourists. A route planner on the web and a smartphone application (since 2012) linked to summer and winter leisure / cultural events, museums, sports areas etc. and hotel accommodation makes it possible a car-free travelling by public transport (rail, road, cable car, boats, etc.) and human powered active mobility (biking, hiking).

The network and planner were created and supported as a foundation by numerous organisations like Swisstourism, Veloland Schweiz, Swiss Hiking paths, Alpine Club, Inventory of the historical transport routes and others. Financial support is granted by the Swiss Confederation (different Federal Offices), all Cantons, and the Principality of Liechtenstein.

The target is a car-free tourism and leisure mobility, based on the highly developed public transport system and active mobility, promotion of mountainous and peripheral regions of Switzerland by added values through touristic attractions, cultural events and sports.

The contribution to the emission reduction might be difficult to evaluate, nevertheless the number of bookings and reservations exceeds one million per year.

See also: https://www.schweizmobil.ch/en/summer.html

Swiss Energy Strategy 2050 for energy savings

In order to prepare Switzerland for the current challenges of energy supply, economic, environmental and technological requests and needs in a near future, the Federal Council has developed the Energy Strategy 2050. This should enable Switzerland to make advantageous use of the new starting position and maintain its high supply standard. At the same time, the Strategy contributes to reducing Switzerland's energy-related environmental impact.

The energy act had been accepted in a popular vote in May 2017, a first step had been put in force in 2018.

The energy strategy 2050 aims to gradually withdraw Switzerland from nuclear power and to increase its use of renewable energy and at the same time to reduce the dependency of imported energy sources, it consists mainly of three pillars:

- Increase energy efficiency (buildings, mobility, industry, machinery/devices);
- Increase the share of renewable energy (traditional renewable like hydropower and new renewable e.g. solar, wind) by promotion measures and improvement of the legal framework ;
- Stepwise withdrawal from nuclear power.

Concerning the mobility sector, which is responsible for 1/3 of the CO2 emissions and air pollutants, the aim is to reduce energy consumption by 44 % in passenger mobility and 25 % in goods transport by 2050.

The instruments to achieve this objective by increasing energy efficiency, substitution by alternative fuels and propulsion systems, integrating decentralised renewable electricity generation, lightweight construction and experimental aspects of new urban models as well as reduction of transport demand by new societal and economic skills are developed.

On the basis of the declared objective of energy consumption savings of 44 %, the car retailing sector in Switzerland as federative association (Auto Schweiz) declared also the concrete objective of 10/20 which means that in 2020 every 10th new passenger car registered in Switzerland and Liechtenstein should be a battery electric vehicle (BEV) or plug-in electric hybrid vehicle (PHEV). This objective represents a very ambitious one as the share of such vehicles on the overall market of newly registered vehicles was only 5,6% in 2019.

In-depth-analysis of promotion of non fossil-based road transport carriers in public transport in Switzerland

In March 2019, the National Council (parliamentary chamber) of Switzerland has accepted the postulate 19.3000 "Help non-fossil road transport carriers in public transport to breakthrough". The Federal Council (government) had advocated accepting it, especially in order to conduct a comprehensive cost-value ratio analysis of a promotion of busses with alternative propulsion (focus on e-busses) and to point out already existing supporting measures.

The goals of the postulate report are as follows: The report shall give a comprehensive recollection of the current and future potentials and gains of alternative propulsions as replacements for existing diesel busses, as well as demonstrate current and future costs/extra-costs transparently. Additionally, existing and possible new supporting measures on a national level shall be demonstrated. In order to achieve a widely supported and accepted result, a support group has been installed in which the all concerned actors are represented. The aim is to finalize the baseline study by June 2020 and to present the postulate report in autumn 2020.

Rural and alpine regions are being taken into account with a special focus, since there, the application potentials are smaller and the challenges are big (weather conditions, differences in altitude, long distances, small financial power etc.). In the support group, there are consequently also representatives of rural transport companies (RBS and Postauto) and alpine transport companies (Engadin Bus). The technical application potential as well as the extra-costs are being analysed for diverse existing example routes in clusters, including challenging rural and mountainous routes. From exchanges with pilot projects, it has already been learned that missing charging stations for electric propulsion (and related infrastructure, i.e. strong enough electricity supply) is a prohibitive issue in rural and alpine regions, that should also be addressed.

3.1.1.5 Swiss Concept for Mobility Pricing (Car traffic)

In July 2017, the Federal Council commissioned the Department for the Environment, Transport, Energy and Communication (UVEK) to deepen the topic of mobility pricing with a theoretical impact analysis using the example of the Zug region. The aim was to investigate how user-related traffic taxes affect mobility and the population. In addition, the technical feasibility and data protection issues should be analysed. At the meeting on December 13, 2019, the Federal Council took note of the results of this work.

Impact analysis shows positive results:

In the impact analysis, the dedicated mineral oil taxes, the motorway vignette and the

Automobile-tax were replaced by a distance-based levy (mileage levy) for road traffic. A performance-based tariff was also assumed for public transport. In addition, time-differentiated tariffs were included for the narrow circle of the city and agglomeration Zug. This is with the aim of mobility pricing to smooth out traffic peaks. The mileage tariffs at peak times (07: 00-09: 00 and 17: 00-19: 00 hours) were higher than during the off-peak times, but in such a way that road users as a whole would not be burdened more than today.

The analysis has shown that mobility pricing can make a significant contribution to smoothing out traffic peaks in congested urban areas. According to the main scenario, the amount of traffic in motorized private transport (MIV) can be reduced by 9% to 12% during peak hours, and in public transport (public transport) by 5% to 9%. This results in a noticeable reduction in congested routes.

Mobility pricing would be technically feasible:

The clarifications further showed that the technologies required for mobility pricing are available. Data protection can be guaranteed and specifically defining the specific data protection requirements in a future mobility pricing law. The clarifications also showed that the implementation is very complex. There are also very different goals and expectations associated with mobility pricing: for some players, the focus is on smoothing out traffic peaks, while others want to reduce mobility demand, secure financing for the transport infrastructure or promote public transport. It should also be noted, that there are different responsibilities, which is why the cantons and communes must be included in addition to the federal government.

Proceed further:

For this reason, the Federal Council continues to proceed in stages and in a modular manner with mobility pricing. He commissioned UVEK and the Federal Department of Finance (EFD) to develop a concept for securing long-term financing of the transport infrastructure. Existing taxes and levies are to be replaced by a mileage-related levy. This is necessary because due to the growing number of electric cars and other vehicles with alternative drive, the income from mineral oil taxes is falling. The trend away from diesel and petrol also shows that the climate goals can be achieved. The concept is intended to specifically check whether the national road tax ("Autobahnvignette"), the automobile tax and the tax on electric vehicles are to be integrated into the new tax to be created.

The biggest traffic problems are in cities and agglomerations. Therefore, they can only be solved together with the cantons and communes. The Federal Council has therefore commissioned UVEK to search for cantons, cities and municipalities that would like to conduct pilot tests with mobility pricing. In order to make such pilot tests possible, he commissioned UVEK to prepare a consultation proposal that creates the legal basis for carrying out pilot tests.

Source: https://www.astra.admin.ch/astra/de/home/dokumentation/medienmitteilungen/anzeige-meldungen.msg-id-77534.html, media information by the Bundesamt für Strassen (ASTRA) 13. December 2019

3.1.2 European research projects and networks for sustainable mobility

3.1.2.1. Sustainable Mobility Behaviours in the Alpine Region (SaMBA)

The goal of the project is to gain some lessons from the best international experiences on mobility change behaviour policies, as well as to elaborate a common method to analyse and compare different case studies. The international best practice analysis helps to define the most appropriate features and the best solutions that SaMBA pilot cases should implement, in order to be effective and result-oriented. In the SaMBA-project for 9 pilot cases (work package T3) in five Alpine Space countries (Austria, France, Germany, Italy, Slovenia) solutions are worked out.

SaMBA is focussed on the most important points for behaviour change policies implementation such as:

- citizens/stakeholder engagement,
- reward/pricing schemes,
- costs benefits,
- barriers/solutions,
- territorial cultural peculiarities.

The SaMBA) project is co-financed by the European Union via the Interreg Alpine Space Programme and implemented by 13 partners and the support of 36 observers. Lead partner is the Regione Piemonte (Italy). SaMBA has started in April 2018 and will end in April 2021. The total costs of the project are 2,02 Mio. €, thereof 1,72 Mio. € are an ERDf grant from the Interreg Alpine Space Programme. SaMBA is still under work, but some interesting results are already available:

Reports on Reward and Pricing Schemes

SaMBA's goal is to test rewards and pricing schemes in mobility for the impact on behaviour and their potential to trigger changes. To this end, project partners are developing a tool, which supports public authorities in the design of these schemes.

The report on the methodology of co-creation explains the tool and how to use it.

Furthermore, the SaMBA project supports public authorities looking for effective incentives by providing this extensive overview report on behaviour change theory and the use of rewards for long-term behaviour change. Pilot case findings will be published by June 2020.

Best practice report: Behaviour change policies

This report collects lessons from the best international experiences on mobility change behaviour policies to elaborate a common method to analyse and compare different case studies, in order to support the implementation of the 9 SaMBA Pilot Cases in five Alpine Space countries. It focuses on the most important points for behaviour change policies implementation (see list above).

Final remark to the SaMBA project

Although the project is mentioned in the Slovenian questionnaire under pricing aspects, in SaMBA also many mobility management measures are analysed. As a new tool for the evaluation of behaviour change policies and measures is developed in the project, it fits well to the category scientific basis work.

Sources: Slovenian questionnaire and https://www.alpine-space.eu/projects/samba/en/home

3.1.2.2 Mobility Ecosystem for Low-carbon and Innovative moDal shift in the Alps (MELINDA)

MELINDA generates a participative development of a low carbon and sustainable urban, suburban and transnational mobility by smoothing the way to citizen awareness and engagement, through a better understanding of user demand and conceiving alternative/innovative modalities. Its general objective is to support policy making on mobility, air quality, territorial development, contributing to EU/local strategies. MELINDA implements a social innovation approach aimed at inducing a behavioural change in the mobility, such change is targeted thanks to a very innovative bottom-up initiative that includes:

- Better integrating of data on mobility and mobility services, and on air quality, especially at transnational level, where data are generally not corresponding and on other factors that affect mobility (such as weather conditions).
- Real-time monitoring of mobility behaviours and mobility patterns during a test (by means of a mobile app to collect data on volunteering citizens' movements and analytics to understand their behaviour and mobility patterns in real-time).
- Increasing citizen awareness through the real-time suggestion of more sustainable styles and modes (by means of a mobile app to represent information, offer alternative solutions, give evidences on carbon impacts).
- Supporting the development of value-added services for multimodality and modal shift.
- Participatory policy-making/action-planning based on the test results and consistent with the value-added services, realized during a transnational open lab.

Project target groups

Target groups are: national, regional and local authorities – in particular those addressing environment, mobility and spatial development policies - sectoral agencies (environmental and mobility agencies/institutes), universities, transport companies, and service providers. In addressing a common and sustainable behavioural change of general public and citizen's needs, they will be the direct target that will use project outputs.

Pilot projects in MELINDA:

- "Building Network of Hitchhiking Benches", Landkreis Ebersberg, Germany
- "Health as an Incentive for Behaviour Change In Mobility", Greater Lyon and Greater Annecy, France
- "Mobility E-Tool in Maribor – The Way to attractive and Sustainable City", Maribor, Slovenia
- "Data Gathering on Bicycle Mobility", Uti Del Noncello, Italy
- "Ridehailing in Urban and Rural Areas of Switzerland"
- "Carpooling In Rural Areas of Switzerland"

- V-Mob: “Cross-Border Smart Mobility within the Greater Region of Vorarlberg”, Austria

This project is co-financed by the European Union via Interreg Alpine Space:

Total costs 1,83 Mio.€, ERDF grant, 1,55 Mio.€

Duration: April 2018 until April 2021

Source: Slovenian questionnaire and https://www.alpine-space.eu/projects/melinda/en/about

3.1.2.3 Alpine Smart Transport and Urbanism Strategies (ASTUS)

The ASTUS project (Alpine Smart Transport and Urbanism Strategies) aims to help local

authorities to identify and implement long-term alternative mobility solutions for inhabitants, using both transports and spatial planning levers. The main objective of the project is to reduce in a long-term perspective the carbon impacts and atmospheric pollution linked to daily trips in the Alps.

ASTUS assists local authorities in identifying and adopting an adequate local low carbon strategy and action plan, in order to foster long-term low carbon options. By working on five different regions as a sample, project partners define transnational solutions, as ASTUS covers smart options from a sustainable perspective fitting to different alpine territorial types. The following table provides an overview on the project results and are linked to the project homepage:

List of the project results

State of art of alpine territorial dynamics

- ASTUS transnational typology
- Methodology evaluating the impacts of mobility
- SWOT analysis

Decision making tools

- CO2 minimizer toolbox
- Transnational methodology for low CO2 scenarios
- Collection of existing tools for low CO2 options

Local experimentations for transnational solutions

- First ASTUS School
- Second ASTUS School
- Low CO2 scenarios, strategies and action plans
- Transnational conslusions report and recommendations
- ASTUS pilot sites

Pilot sites

ASTUS partners worked with 17 pilot sites in 7 alpine regions, as a sample. The pilot sites were involved in every steps of the ASTUS project, from the typology of ASTUS territories to the implementation of ASTUS methodology. The linked posters below describe the main characteristics and activities of some ASTUS pilot sites.

astus-pilot-site-posters---coeur-de-savoie_final-9-10-2019.pdf

astus-pilot-site-posters---massif-des-bauges_final-9-10-2019.pdf

astus-pilot-site-posters---thonon_final-9-10-2019.pdf

astus-poster_sir_werfen_2019-10-17.pdf

poster-ispace-pongau.pdf

poster_muc_neubiberg_haar.pdf

poster_uncem.pdf

astus-pilot-site-novo-mesto-.pdf

astus-pilot-site-poster_ebersberg-furstenfeldbruck-munich-starnberg.pdf

The ASTUS project was worked out in the Alpine Space Programme of the EU, the total budget was 2,4 Mio.€ , the EU contribution (ERDF grant 2 mio.€) The project duration was 3 years from November 2016 until October 2019.

Source of all information to ASTUS: https://www.alpine-space.eu/projects/astus/en/home

3.1.2.4 ELTIS - The Urban Mobility Observatory

Eltis facilitates the exchange of information, knowledge and experience in the field of sustainable urban mobility in Europe. It is aimed at individuals working in transport as well as in related disciplines, including urban and regional development, health, energy and environmental sciences. Created more than 10 years ago, Eltis is now Europe's main observatory on urban mobility and financed by the European Commission's Directorate General for Mobility and Transport.

Main topics of ELTIS

- Autonomous and connected vehicles
- Clean and energy-efficient vehicles
- Collective passenger transport
- Intermodality
- Mobility management
- Monitoring and evaluation
- Policy and research
- Public and stakeholder involvement
- Quality, audits and benchmarking
- Safety and urban mobility

- Urban Mobility Scheme appraisal
- Shared mobility
- Traffic and demand management
- Transport for people with reduced mobility
- Urban freight/city logistics
- Urban mobility planning
- Urban Vehicle Access Regulations
- Walking and cycling

Eltis resources to promote sustainable forms of mobility in regions or cities.

- Tools, guides, handbooks and reports to support and inform urban mobility professionals in their work
- Photos hosts a gallery of images you can use to promote urban mobility
- Videos features outstanding examples of sustainable urban mobility approaches
- Training materials presents training and educational materials produced in the sustainable urban mobility fields
- Case studies presents and analyses successful local examples of sustainable urban mobility initiatives and strategies
- Press & promo: contains Eltis and Mobility Plans platform promotional materials (such as logos, templates) as well as materials from events and seminars

Eltis allows its participants to share examples of best practice and discuss new and innovative ideas on sustainable urban mobility.

Sources: Slowenian questionnaire and https://www.eltis.org/

3.1.3 Participation and decision-making processes

3.1.3.1 Grenelle Environnement: High ranked discussion process to prepare decisions in France

The Grenelle de l'environnement was an open multi-party debate in France that brings together representatives of national and local government and organizations (industry, labour, professional associations, non-governmental organizations) on an equal footing, with the goal of unifying a position on a specific theme. The aim of the "Grenelle Environment Round Table" (as it might be called in English), instigated by the former President of France, Nicolas Sarkozy in the summer of 2007, was to define the key points of public policy on ecological and sustainable development issues over the following five-year period.

The working groups at Grenelle have set ambitious goals in many areas, in the field of transportation the construction of 2000 km of high-speed railway, creating a tax system favouring the least polluting vehicles, establishing an environmental tax levied on trucks on the roads, various urban transport projects including light rail.

Grenelle Environment has helped to slow down the soil consumption and enhanced citizens and institutions awareness of ecological stakes.

Sources of information: French questionnaire and
https://en.wikipedia.org/wiki/Grenelle_Environnement and more detailed at
https://web.archive.org/web/20080523111146/http://www.legrenelle-environnement.fr/grenelle-environnement/spip.php?rubrique112

3.1.3.2 Assises Nationales de la Mobilité (French National Transport Foundations, or short 'ANM')

The ANM forum (translated National Mobility Conference) was launched 2017 by the new government in order to gather ideas and best practices inspiring the future mobility law ("loi d'orientation des mobilités"). The ANM represent an open and contributory approach. Tasks of ANM are to bring together citizens, transport users, local councils, industry professionals and NGOs across the country, gathering as many contributions as possible. The transport solutions of the future must do more to meet the needs of individuals, communities and regions. The aim of the ANM is to gain a clearer picture of these needs, and identify how they can ensure that future transport services are:

- cleaner: reducing the environmental impact of our journeys;
- more connected: accelerating the digital revolution in transport in order
- to plan ahead for future developments in the sector;
- more socially inclusive: reducing regional disparities, using physical mobility to improve social mobility;
- more inter-modal: working to link different transport options in order to make networks more attractive to users, acting as a genuine alternative to personal vehicles;
- safer: reducing accidents and transport-related risks;
- more sustainable: balancing economic models, releasing financial resources in line with our needs and governing with greater efficiency.

The strategy of ANM has 4 focuses:

1. *Focus on Citizens Views: local workshops*

The objective is to engage directly with citizens, allowing them to express their needs and expectations regarding mobility in their daily lives. The used approach to achieve this goal uses local and regional workshops, reflecting the diversity of communities within our country. Members of the public may also express their views directly via the Assises Nationales de la Mobilité internet platform. (www.assisesdelamobilite.gouv.fr).

2. Focus on Expertise: 6 thematic workshops

Transport networks are facing new social developments and a number of challenges. The ANM serves as an opportunity to debate these issues, and suggest new strategies to public authorities.

The topics of the thematic workshops were:

- Cleaner Transport - Environment
- Connected Transport - Digital
- Transport and Solidarity
- Increasing inter-modal transport - Inter-modality
- Safer Transport - Safety and Security
- Sustainable Transport - Financing and Governance

Synthesis reports to all 6 workshop topics are published at:
https://www.assisesdelamobilite.gouv.fr/syntheses.html

For rural areas, especially the discussed questions to transport and solidarity, are interesting:

- How can we improve travel in rural and suburban areas?
- How can we ensure that all our citizens are able to travel for work, education, healthcare and cultural activities?

3. Focus on Innovation: Innovation workshops

A number of innovations are emerging in the transport sector - these may be organisational, technological, industrial, etc. The method being applied here is to structure an approach to support innovation, with three objectives to give greater visibility to initiatives and best practices:

- to identify conditions for disseminating these best practices, which will require understanding of both catalysts and impediments to innovation;
- to build a method to support organisations for the full duration of the initiatives and finally
- to provide the government with a strategy for supporting transport innovation.

The implementation of the platform France Mobilités (described above) can be regarded as result of the "Assises Nationales de la Mobilité" strategy.

4. Focus on Strategy: the Infrastructure Orientation Council

The President of France has stated in July 2017 that the maintenance and modernisation of our existing networks will be a priority, leading to "pause" on major infrastructural projects due to; table and realistic investment schedule, which is submitted to Parliament as part of the forthcoming Transport Development Bill. This area of focus is overseen by an Infrastructure Orientation Council. The Council is made up of 16 members (10 political decision-makers and 6 experts).

Sources: French questionnaire and https://www.assisesdelamobilite.gouv.fr/index.html

3.1.3.3 France Mobilités

France Mobilités is a collaborative approach to promote the development and dissemination of innovative mobility solutions in the regions. Initiated by the Minister responsible for transport, France Mobilités is open to all actors of mobility: local authorities, transport companies, start-ups , associations, incubators, investment funds, training organizations, etc.

France Mobilités aims to support both:

- territories that want to implement new mobility solutions;
- stakeholders who wish to develop and propose concrete innovations and operational solutions that meet the needs of users and regions.

France Mobilités participates in the promotion of French innovation carried by many institutional actors and relies on all existing approaches: French Tech, France Experimentation, investment program for the future.

Measures to support innovative mobility projects are:

- Financial support: The state provides it to territories that carry out projects for innovative mobility solutions. 57 territories have been already supported.
- Coaching: The state accompanys the territories and the carriers of solutions to carry out their projects. Regional support units are being set up in each region, in order to bring together for the regions carrying projects all of the engineering and support offer available to them (e.g. by the research and planning institutes Ademe, Cerema and Banks of the territories) This system is already operating in the first three pilot regions)
- Facilitate innovations: The State is mobilizing alongside the territories and the carriers of solutions to remove all obstacles to innovation.
- Dissemination: The State is committed to publicize innovative solutions and helping them to spread. The "France Mobilités platform" shows the territories implementing innovative projects and the actors proposing new solutions, to make them better known, inspire others and help them to get in touch easily. When launched in March 2019, more than 70 territories and 350 solutions were already listed.

Sources: French questionnaire and https://www.francemobilites.fr/ https://www.ecologique-solidaire.gouv.fr/france-mobilites-french-mobility , dossier « L'Etat au service des territoires pour déployer des solutions innovantes de mobilités »

3.1.4 Sustainable urban mobility plans (SUMP)

3.1.4.1 Masterplan of the city of Bolzano/ Bozen

This masterplan – published in the year 2009 - has set – in strategic terms – the main elements for the urban development of the city of Bolzano. Maintaining a compact structure of the city is a crucial aspect included in this plan, also in order to limit the future growth of transport demand. At the same time, the development of cycling

infrastructures and green areas is included to support the decrease of the demand for motorized means.

Sources: Italian questionnaire. More information at https://www.comune.bolzano.it/UploadDocs/7361_Masterplan2009_A01_IT_rid.pdf (The Masterplan is available only in Italian language.)

3.1.4.2 Sustainable Urban Mobility Plan (SUMP) of the City of Turin

The SUMP adopted by the city of Turin in 2011 and now under revision merges transport and urban planning to head the city towards a more sustainable mobility paradigm. Among the considered measures, the recovery of public spaces, the enforcement of pedestrian areas, and the development of a polycentric network should support an increase of slow mobility.

Sources: Italian questionnaire More information at http://geoportale.comune.torino.it/web/sezioni-tematiche/piano-urbano-della-mobilita-sostenibile-introduzione
(The Sustainable Urban Mobility Plan is available only in Italian language.)

3.1.4.3 I PUMS e le isole ambientali, AIIT and INU Lazio

This document deal with the so called "Isole Ambientali" i.e. pedestrian areas established both in urban and peripheral contexts to discourage road transport and promote slow mobility. The document explains the technical implications related to the introduction of these areas, describes the advantages they may provide in terms of traffic reduction and improvement of public space, and discuss their integration into the sustainable urban mobility plans.

Sources: Italian questionnaire. More information at https://www.aiit.it/wp-content/uploads/2019/03/190302_PUMS-IA_finale.pdf
(only in Italian language) .

3.2 Shifting demand in passenger traffic

3.2.1 Improving public transport in Alpine cities and regions

3.2.1.1 Innsbruck: Tram - Regionalbahn

In the Tyrolian capital the tram-network is enlarged step by step, it will be developed to a network including the neighbour communities as Tram/Regionalbahn project

The state of Tyrol and the city of Innsbruck passed resolutions in 2007/2008 on the implementation of the regional and tram system for the central region of Tyrol. The route of the tram / regional train runs from Völs over the University for Technology, through the centre of Innsbruck, further into the Olympic village up to the final stop in the suburb Rum. The tram / regional railway project covers between Rum and Völs a distance of 13,4 km. The timetable for opening the new extensions of tram/ regional railway project is:

- Rum (in the East of Innsbruck): Opening of the line at the end of the year 2022
- Völs (in the West of Innsbruck): Opening of the line at the end of the year 2023

At both end stations connections with short ways to the regional trains and to the S-Bahn will be offered and reduce the commuting time of many people who work in Innsbruck.

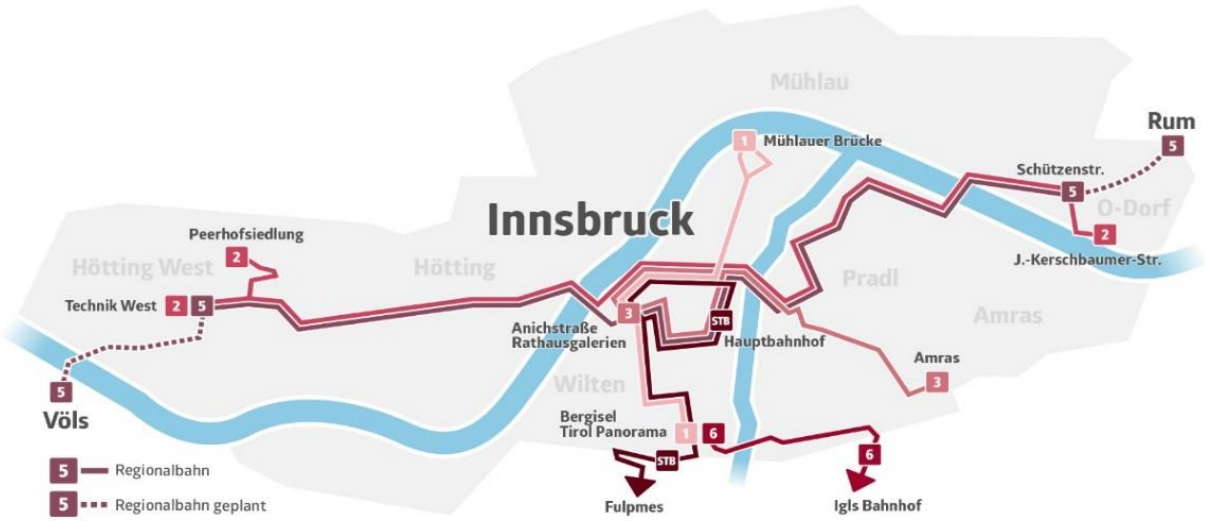
The whole public transport network in Innsbruck has a length of approx. 341 km.

Appr. 65 Mio passengers yearly use trams and busses. In 2018 the number of passengers compared with 2017 could be increased from 61,7 million up to 65.5 (+ 6,2%). In the urban area an increase of plus 63% of the number of passengers since 2011 is reported. Reasons are more attractive, cheaper tickets for some user-groups, parking fees in the city, but also tram extensions (e.g. to Technik West and Peerhofsiedlung in the West of the city.)

Low floor tram from Bombardier in Innsbruck

Source: https://www.ivb.at/de/unternehmen/presse.html

Tram network in Innsbruck and planned extensions in the surrounding region



Sources (also of the figure above):
https://www.ivb.at/fileadmin/downloads/zwei_fuenf_Magazin_3_Herbst_2019.pdf
https://www.ivb.at/fileadmin/downloads/Geschaeftsbericht_IVB_2018_01.pdf

For operating the tram / regional train-network 20 additional trams are necessary. The new vehicles will be more energy-efficient and environmentally conscious than older trams. The air conditioning and heating systems are energy-optimized. All vehicles are equipped with the usual passenger information system and wide-screen monitors. A larger multifunctional space in the trams offers more comfort of use and guarantees that the new vehicles are barrier-free attainable. Moreover, these vehicles are approved for inclines or slopes up to 9 percent. In 2018 the train production company Bombardier delivered 6 new trams, further units up to now .

Sources: https://www.ivb.at/fileadmin/downloads/Geschaeftsbericht_IVB_2018_01.pdf and http://www.strassenbahn.tk/inntram/index.html

3.2.1.2 Salzburg: Innovative trolley busses and city tunnel for a S-Bahn network

Trolley busses with range extension by batteries

Salzburg has a long tradition with trolley busses. Increasing demand for public transport solutions also in the surrounding communities lead to an innovation, the e-Obus to the centre of Grödig and the station of the cable car on the Untersberg.

In Austria for the first time in trolley-busses the technology of "in-motion charging" is used. The trolleybus can run on electricity without a catenary, because it has batteries, which are charged while driving on the overhead line or at the end station. As a result, the southern neighbour community Grödig is connected with the city of Salzburg without change by the trolley bus line 5. Grödig will supplement the extension of the

trolleybus line with the "Grödig 2020" traffic concept, which includes traffic calming and season tickets for public transport on reduced prices. The community centre is to be redesigned pedestrian and cycling friendly.

Source: https://service.salzburg.gv.at/lkorrj/Index?cmd=detail_ind&nachrid=60334

E-Obus on the line without catenary

Source : Salzburg AG Presse , downloaded from https://urban-transport-magazine.com/salzburg-batterie-oberleitungs-busse-von-hess/

City Tunnel for a S-Bahn network in Salzburg

Currently not so successful as the cycling strategy and extensions of the trolley bus network in Salzburg are efforts to extend the "Salzburger Lokalbahn" in the city centre by the construction of a city tunnel with approx. 3,3 km length. Plans for this city rail tunnel were discussed at least since 25 years and all studies on this project have already a weight of 70 kilogram.

The Salzburger Lokalbahn is currently connecting Salzburg main station with the Northern region of the country called Flachgau. On this line some improvement were implemented in the last years, e.g. an extension to the community Ostermiething and the addition of low floor sections in articulated train units, build since the eighties. As the map below shows, a city tunnel could be the core of a "S-Bahn" network in the region of Salzburg. The constructions of an underground end station in the city of Salzburg beside the main train station of the federal railway (ÖBB) was a first step for the city tunnel.

Many initiatives of citizens support the project of a city tunnel for the S-Bahn in Salzburg. The figure on the next page shows possibilities to develop a S.Bahn network in the Salzburg region with the core city tunnel (marked with red ellipse). The figure is no official plan and shows proposals of citizen initiatives.

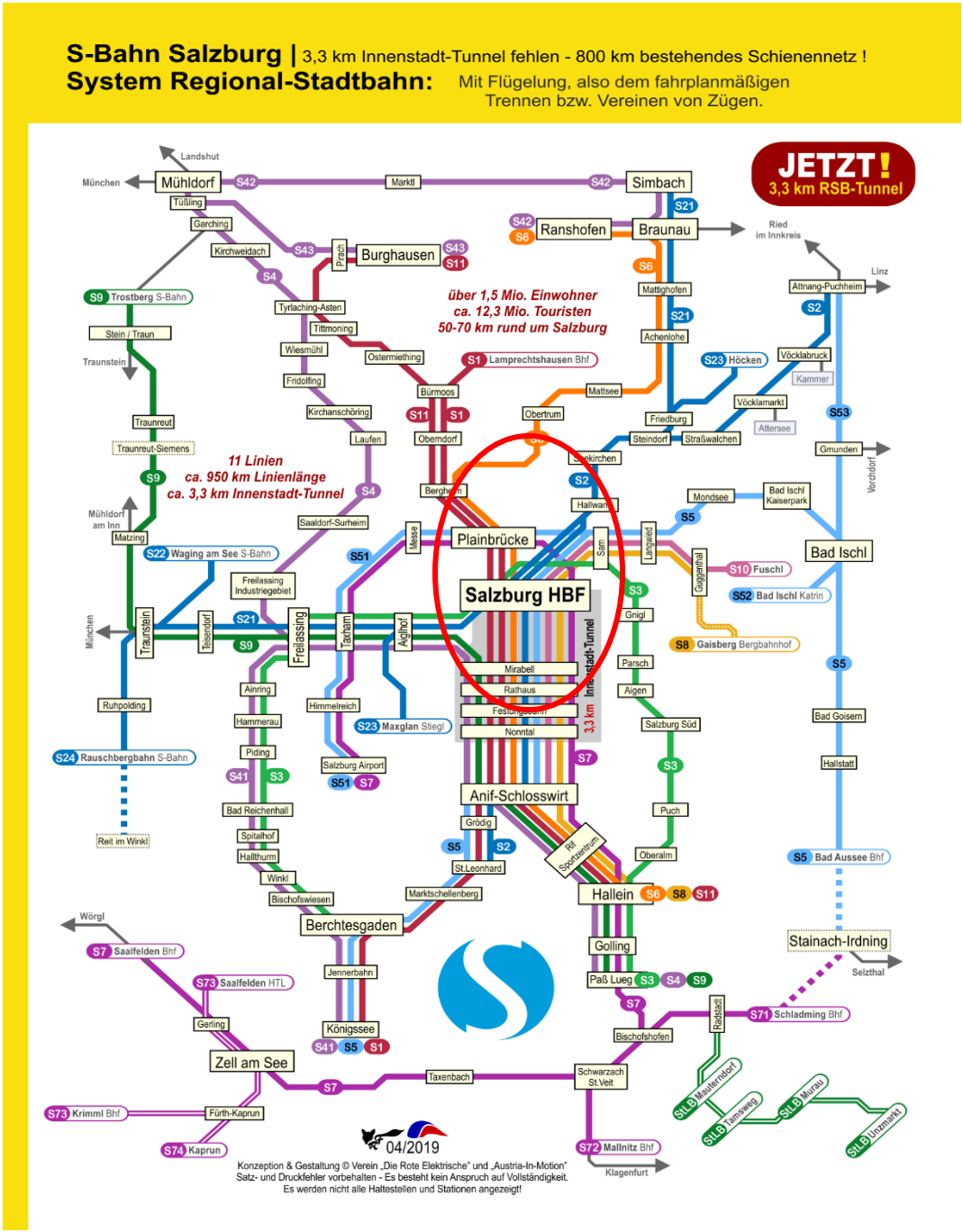
On the political level, a planning association was founded in April 2019, in this frame cooperate the municipality of Salzburg, neighbouring municipalities, the government of the country (Land) Salzburg and experts.

Source: https://service.salzburg.gv.at/lkorrj/Index?cmd=detail_ind&nachrid=61521

The costs of the project are estimated 675 Mio. Euros. In a period of ten years 50 % of these costs should be paid by the Federal Republic of Austria, 25 % by the country (Land) Salzburg and 25% by the town of Salzburg.

Source: https://service.salzburg.gv.at/lpi/viewExtern?id=33281 (report of a session of the Salzburg state parliament)

Possible S-Bahn network in the Salzburg region with the core city tunnel



Source: Verein "Die Rote Elektrische and Austria in Motion, downloaded from https://www.in-motion.me/articles/2019-11-12_Pressemappe-der-Verkehrsinitiativen-%7C-Salzburg---Bayern---Oberösterreich

New attractive tickets for public transport

The government of the country (Land) Salzburg is aware that for avoiding CHG and pollutant gas emissions and traffic congestions in the urban areas, especially in the town of Salzburg a shift from car traffic to public transport is necessary. An important measure is the offer of advantageous tickets for public transport passengers.

On 1 January 2020, the tariffs in the Salzburg Transport Association (Salzburger Verkehrsverbund, SVV) were changed for weekly, monthly and annual passes. Compared to before, the new annual passes for buses and trains cost up to 70 percent less. A ticket for a region costs 365 Euros, two regions are around 495 Euros. The annual pass for the whole state of Salzburg costs 595 Euros, instead of before 1.539 Euros.

Source: https://www.salzburg.gv.at/themen/verkehr

Critical remark: Extension of the Mönchsberg- Garage in Salzburg – a problematic incentive for more car traffic

In opposite to the measures to promote sustainable mobility mentioned above is the impact of the planned enlargement of the garage in the Mönchsberg (the hill in the city-centre where the castle Hohensalzburg is situated). 650 additional places for cars are planned in the "cave" garage. This is an incentive to drive by car in the city, although the access streets are frequently crowded.

Source: https://salzburg.orf.at/stories/3009600/

3.2.1.3 Public transport in Vorarlberg

Vorarlberg is with 2.601 square-kilometres on of the smaller states (Länder) of Austria, situated on the Austrian borders to Switzerland, Liechtenstein and Germany. The valleys of the rivers Rhine and Ill have a polycentric settlement structure. Vorarlberg has 395.000 inhabitants.

For a region outside of big cities an excellent public transport system is offered, the backbone are the rail lines Lindau – Bregenz- Feldkirch - Bludenz – Schruns with connections to Switzerland and Liechtenstein with the lines Bregenz – Sankt Margrethen and Feldkich – Liechtenstein- Buchs in Switzerland. On the most train lines S-Bahn services with trains every hour in each direction are offered, on the main line Bregenz – Bludenz on working days additional trains circulate. The train network is supported by a dense bus network also with frequent service, also in remote regions like the "Bregenzer Wald". The brands are "Landbus" and "Stadtbus" for a lot of urban services.

In the new mobility conception 2019 (Mobilitätskonzept Vorarlberg 2019 https://vorarlberg.at/documents/21336/42919/Mobilitätskonzept+Vorarlberg+2019+-+Endbericht/640218bc-18f3-44c8-96d6-e1aae25d7298), the successes of recent traffic policy and traffic planning are reported:

Around 73.000 of the Vorarlberg residents travelled in 2018 with an annual pass of the Verkehrsverbund Vorarlberg (co-operation of public transport companies) with which passengers are mobile in the whole federal state (Land) for 365 Euro. Since the tariff reform in 2014, when the cheap annual cards were introduced, the ownership has risen sharply.

With 1.850 bus and train stops almost all (98 %) Vorarlberg residents have a stop within walking distance.

Source: https://presse.vorarlberg.at/land/servlet/AttachmentServlet?action=show&id=31018 , based on a survey on accessibility commissioned by the administration of Vorarlberg 2017.

The improvements in public transport have significantly increased demand over the last ten years. In 2007, this amounted to around 73 million passenger kilometres. By 2017, the transport performance (passenger kilometres) by 40 percent.

Some trains stations were rebuilt to multimodal nodes, they are easily accessible by bike and have attractive short ways to the busses. In many cases. Municipalities have also set activities in the course of station extensions: station surroundings have been redesigned to attractive public spaces.

The Mobility Concept Vorarlberg 2019 presents a comprehensive catalogue of measures based on solid analysis, the table of measures fills many pages, planned measures for public transport are:

- Further improvements of the rail infrastructure, especially the lines to Switzerland Bregenz – St. Margrethen and Feldkirch - Liechtenstein – Buchs, including noise protection,
- improvement of securing connections in nodes,
- low or zero emission propulsion for busses

Short distances for changing between busses and trains at the public transport node Schruns in Vorarlberg

Source: Mobilitätskonzept Vorarlberg 2019, downloaded from https://vorarlberg.at/documents/21336/42919/Mobilitätskonzept+Vorarlberg+2019+-+Endbericht/

3.2.1.4 CROSSMOBY project (Italy and Slovenia)

The project – elaborated in the Interreg V-A Italia-Slovenija 2014-2020 programme - addresses the challenge of improving capacity in sustainable mobility planning and providing cross-border public transport links based on a strong institutional cooperation approach to achieve concrete results for citizens in the Programme area, including in terms of reducing transport emissions. The main objective of the project is to set up new sustainable cross-border transport services and to improve mobility planning within the whole area. The expected substantial changes will take the form of testing new rail passenger services and a new approach to mobility planning, based on the existing SUMP (sustainable urban mobility plan) methodology applied to a limited number of pilot projects.

The main outputs of the project are the reactivation of cross-border rail passenger services and a cross-border strategic action plan on sustainable mobility, which contribute to making CROSSMOBY an original and new project, since there have never been previous projects in the Italy-Slovenia cooperation programmes that have led to similar results. In addition, in order to address the lack of sustainable mobility options and to improve accessibility across borders, cross-border cooperation proves to be necessary where the competent authorities and other organisations in Italy and Slovenia are able to develop services in a coordinated manner.

The total budget of CROSSMOBY is 4.2 Mio. €, thereof ERDF funds: 3.5 Mio. €, the duration of the project is three years and will be finished in September 2021.

New low floor Slovenian train set

Sources: Slovenian questionnaire, https://www.rrc-kp.si/en/projects/current-projects/crossmoby.html , https://www.ita-slo.eu/en/node/1133

3.2.1.5 Renaissance of night trains to Alpine destinations

Night trains are a relevant alternative for flights over short and middle distances and save greenhouse gas and pollutant emissions (e.g. NOx and particles). In the Alps, a big share of electric energy is produced in hydro-power plants. For instance in Austria, 100 % of the electric energy for train traction is produced from renewable sources (most of it in hydro power plants but also smaller share from wind and solar energy (see more at https://infrastruktur.oebb.at/de/unternehmen/umwelt-und-klimaschutz/gruener-bahnstrom).

Also from an international point of view, rail travelling saves CO2-emissions: While a flight from Paris to Venice generates around 105 kg of CO2 per passenger, the train only weighs around 29.4 kg. Source: Contribution in the Presse, printed edition 5.12.2019.

Night trains are suitable for many relations to travel from main European agglomerations in Alpine destinations (which are often situated far away from an airport with international flights). Moreover, night trains can offer attractive overnight connections across the Alps like Paris – Milano – Venezia or Vienna – Roma.

Although some European railway companies cancelled their night trains some year ago, still many night trains circulate trough Europe (see map below) and – as it is shown below – they will become more.

ÖBB as pioneer for the Renaissance of night trains

Unlike many others, the ÖBB (Austrian Federal Railway Company) has never entirely given up its night trains. When the German Railway Company (Deutsche Bahn) informed, that it would stop operating night trains in 2016, ÖBB announced that it would step in. At that time, ÖBB took over routes such as Hamburg-Zurich and Zurich-Berlin. The number of night train passengers is expected to increase by ten percent this year. Some connections such as Vienna-Zurich have increased by more than 20 percent. The Vienna-Venice connection was also resumed. The Vienna-Brussels route was launched in January 2020.

The night trains as whole can be considered as a success story (at least before the corona-crisis): The strongest passenger growth of 20 percent was recorded on the Vienna-Feldkirch route. There are 19 percent more passengers on the night trains Vienna-Zurich and Munich-Milan than in the previous year. On average, the number of passengers on night trains to all destinations rose by 11 percent. The night train is increasingly seen as a real alternative to the plane. "The current climate discussion naturally plays into our hands," said the ÖBB CEO Andreas Matthä. In the entire ÖBB balance sheet, the night train remains a niche product, albeit a very successful one.

Since January 19, 2020, the Vienna-Brussels night train adds a new destination twice a week. With the change of timetable in December 2020, a night train should connect Vienna with Amsterdam. Other destinations are currently being negotiated. "We are in talks with some European governments and railway managers," explains Mr. Matthä. There is a phased plan for expansion by 2026. He could imagine night trains to Paris, Barcelona or the far north.

ÖBB currently operates 18 night train lines under the "Nightjet" brand, in addition there are another 8 lines with partner trains that do not run under the "Nightjet" brand, for example the Budapest-Zurich connection with Hungarian sleeping cars. A total of 1.5 million passengers travel on night trains.

The places in the sleeping carriages are actually always fully booked (before the corona crisis). The ÖBB ordered 13 new night trains sets, which will be available 2022 /2023. In

the new couchette carriages the modernization with "capsule carriages" should bring a further growth of passengers . The capsules should are said bring more privacy to travellers, and then a compartment is only occupied by four people. And the seats on the night trains offer "price-sensitive" travellers, especially at a younger age, a real alternative to low-cost airlines.

Source: https://www.diepresse.com/5743720/obb-plan-aufgegangen-nachtzug-ist-ein-erfolg

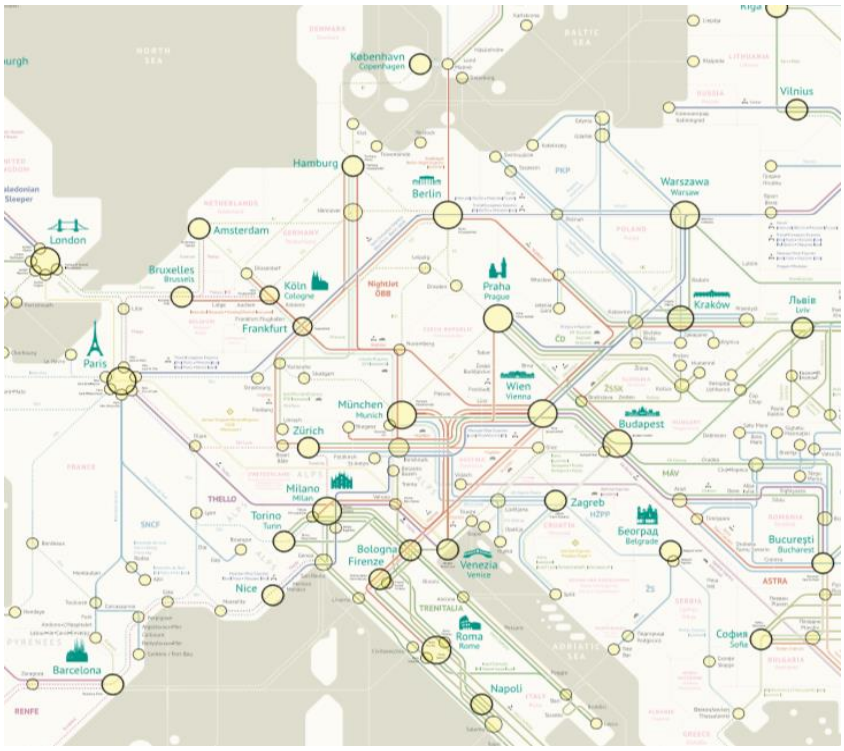
Other European Initiatives for a Renaissance of night trains

The Deutsche Bahn (German Railways) may also be reactivating its sleeping car business. In contrast to the past, the company wants to make the connections with partners, rumours announced in autumn 2019. Sweden is also currently preparing a public tender for new night train connections to other European countries after passenger numbers on night trains from Gothenburg and Stockholm to the Arctic have increased by 43 percent since their low in 2014.

ÖBB nightjet planned design of new ÖBB night train

Sources: https://vasutmodell-szemle.blog.hu/2017/10/20/ujdonsagok_nightjet_flotta_az_l_s_models and https://www.unsereoebb.at/de/artikel/2019/die-nightjets-der-neuen-generation

Excerpt of Night Train World Map



Source: http://www.night-trains.com/files/night-trains-world-map.pdf

In November, the Norwegian Railway Authority recommended increasing night train capacity. The Swiss Railways are also considering to bring in service again their sleeping cars which were out of service since 2009. Trenitalia, which stuck to domestic night trains, plans to spend EUR 300 million on new locomotives and modernizations. The Caledonian Sleeper, which connects London and Scotland, has also been revitalized.

Source: https://www.diepresse.com/5733459/das-comeback-des-schlafwagens

Also private rail companies offer night train service, like the company Thello (based in Paris) a night train between Paris and Venice an 3 day- trains between Milan and Nice, one of them in each direction continues to Marseille., see https://www.thello.com/en/ For connection from Milan to Rome Thello cooperates with Trenitala. Thello offers low prices and addresses especially young travellers.

Network of Thello trains

Source: https://www.thello.com/en

Another example for a private organized night train is the connection Salzburg -.Sylt:

Starting at 4th July 2020 new night trains will run between Salzburg and Sylt near the German border with Denmark. Twice a week, the American-German railway company RDC plans to get its "Alpen-Sylt-Night Express" on the rails in both directions. The RDC-company addresses price-sensitive passenger groups with low prices in couchettes.

Source: https://salzburg.orf.at/stories/3052568/

Moreover, some operators offer seasonal and occasional night trains, like the Alpen Express Österreich, which circulates in the winter season on weekends between Cologne and Austrian destinations, see more at

https://www.bahnreiseladen.de/winter-zuege/osterreich/alpen-express-osterreich

Night train operators demand harmonisation and fair competition with air traffic

While there is complicated structure of national regulations for train traffic in the EU, air traffic is harmonized. In addition, kerosene is not taxed and for international flight

tickets no value added tax is taken by the states. For instance in Austria the missing kerosene tax was in the year 2019 a fiscal advantage of 56o Mio. Euros (compared to taxes on Diesel). Considering the advantages of train traffic for the environment and to brake global warming Given these figures, there is a demand from EU regulators for a revision of the regulations. Lower rail infrastructure usage fees at night are high on the wish list of night train operators, which also includes harmonized cross-border systems with integrated tickets and timetables.

3.2.2 Improving conditions for cycling

3.2.2.1 Promotion of cycling in Salzburg

Salzburg, the capital of the country (Land) Salzburg with 156.159 inhabitants recently focusses on the improvement of the conditions for cycling.

The cycle path network was continuously enlarged for more than 30 years. There are now 187 km of trails for cyclists and over 6.000 bicycle-parking facilities. More than two-thirds of all one-way streets are open to cycling and can be used by cyclists also in the opposite direction. Cycling is allowed in almost all pedestrian areas and bus lanes.

The main target of the cycling strategy 2025 + is a share of cycling of 24 percent of the total number of trips by 2025. This means 20.000 fewer car journeys a day in Salzburg.

Important measures in the frame of the cycling strategy are:

- Development of a safe and comfortable main cycle path network with optimization of the winter service
- Introduction of the rental bike system "S-Bike", in the first stage with 50 stations and 500 bicycles
- Implementation of a first “Premium Cycle Path” in the region Salzburg to Freilassing (Bavaria) with a new bridge over the river Saalach as a "model" for the importance of cycling also for connections between communities in the hinterland and the city
- Campaigns and public relations for more cycling
- Using all federal- and EU-funding programs to increase the budget for measures to promote cycling.

Cycle paths along the river Salzach

Source: Stadt Salzburg / Johannes Killer

Due to the already good cycling infrastructure, around 100.000 trips daily are done by bicycle in the city of Salzburg, this means a share of 20%. But still the share of cars is with 45% of the trips is rather high, while the share of riding in public transport with 15 % of all trips has a high potential for growth. 20 % of the trips in the city of Salzburg are done on foot.

Source: https://www.stadt-salzburg.at/internet/wirtschaft_umwelt/verkehr.htm

3.2.2.2 Promotion of cycling in Vorarlberg

Compared to 2003, the share of cycling on the trips of the population increased by 2 percentage points to 16 percent - compared to 2013 by one percentage point. These increases are an expression of consistent cycle infrastructure planning and implementation, the promotion strategy for cycling and public relations. At the train and bus stops, bicycle-parking facilities were also continuously expanded in high quality. Moreover, good co-operation within the framework of integrated road planning by the state and municipalities has contributed to a high proportion of cycling traffic.

E-mobility has prevailed especially in cycling. E-bikes also make cycling popular in hilly terrain and among a broader segment of the population, especially the elderly. About 5 percent of the population own an e-bike. Despite high growth rates, the absolute number of e-vehicles is still very low for cars, albeit the highest in all of Austria. In 2018, it was 0.8 percent of the total car vehicle collective in Vorarlberg. In rail passenger and long-distance transport, only electric vehicles circulate in Vorarlberg.

In the mobility concept Vorarlberg from 2019 the following measures to promote cycling are recommended:

- continuing of promotion cycling by a special budget for fast cycle routes, role model projects and supporting municipalities in cycling measures,
- improving the quality of cycle parking stations and increasing the number of places,
- more bicycle renting facilities,
- charging stations for e-vehicles on park and ride places,

Source: https://vorarlberg.at/documents/21336/42919/Mobilitätskonzept+Vorarlberg+2019+-+Endbericht/640218bc-18f3-44c8-96d6-e1aae25d7298

3.2.3 Mobility Management

3.2.3.1 Mobility Concept of the Mahle Company in Carinthia

The companies Mahle-Filtersystems and Bosch-Mahle together with around 3.000 employees are the largest employers in the region around St. Michael ob Bleiburg in Eastern Carinthia. As an extension of the business became necessary, Mahle decided to motivate employees to switch from private cars to public transport and the bicycle through mobility management.

The measures in the frame of the mobility concept were coordinated by the Verkehrsverbund Kärnten (cooperation of public transport companies in Carinthia) on behalf of the province (Land) of Carinthia. Already in December 2017, the S-Bahn service was improved, which offers employees of Mahle more train connections. Since August 2018, an electric bus circulate between the train station St. Michael and the operating sites, bringing the staff to the company premises. The e-bus replaces the diesel-operated works traffic, the service is included in the public transport network and is therefore also available for all passengers (not only for employees of the Mahle factories). The employees of Mahle get tickets on reduced prices.

In order to move all those who live in the cycling distance to the workplace to the change, improvements in the bike connections were implemented and the number of bicycle parking spaces significantly increased. In addition, lockable bicycle boxes were built at the train station St. Michael.

The sustainable mobility solution for the Mahle-Bosch company proves itself as successful, detailed data analysis are under way.

Source:
https://www.vcoe.at/files/vcoe/uploads/Mobilitaetspreis%202019/MP19_PreistraegerInnen_Mappe.pdf

Electric bus as shuttle for Mahle employees and other passengers

Source: ÖBB PV-AG and
https://www.vcoe.at/files/vcoe/uploads/Mobilitaetspreis%202019/MP19_PreistraegerInnen_Mappe.pdf

3.2.3.2 Oùra (Où Rhone-Alps) journey planner

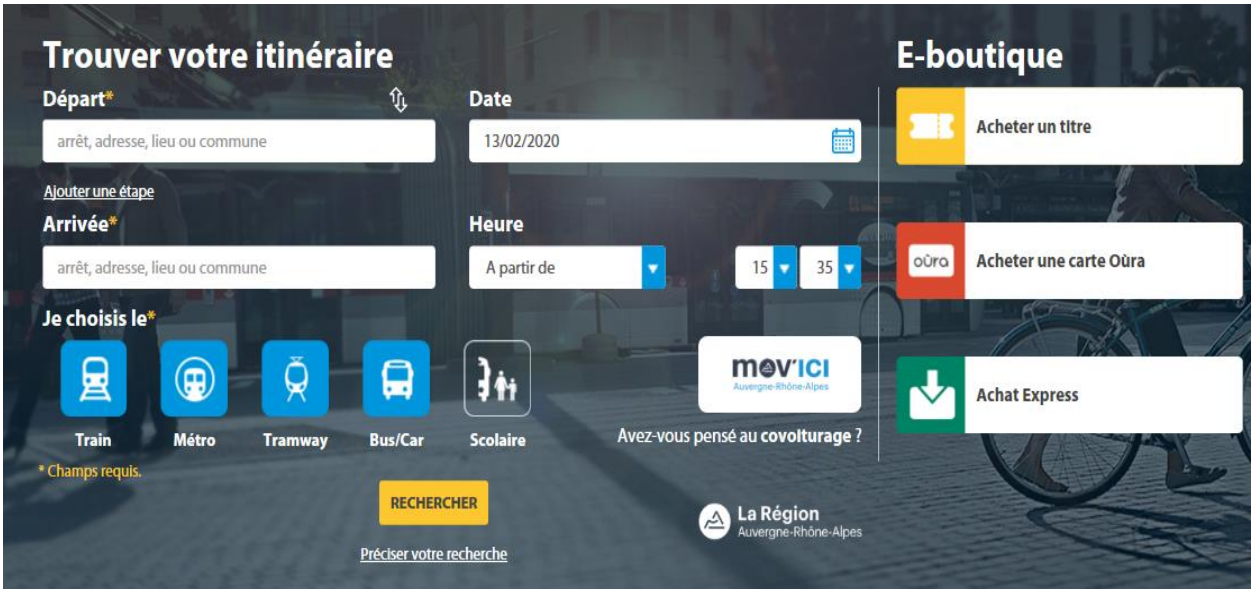
Intermodal transport information and ticketing, including car-pooling and car-sharing can be regarded as form of mobility management.

Oùra is a comprehensive tool to plan journeys in the Auvergne-Rhône-Alpes Region and also to buy suitable tickets for public transport.

The authorities organizing mobility in the Auvergne-Rhône-Alpes Region have been working for over 15 years to make life easier for users of public transport using different networks (TER + bus, TER + interurban, etc.). They therefore work to provide the best possible information, to facilitate the purchase and use of multimodal tickets using the Oùra card, to offer advantageous multimodal pricing, etc.

Since January 1st, 2019, new partners have joined the Oùra Community, which now includes 51 transport networks spread over the Auvergne-Rhône-Alpes Region. It is thus a question of consolidating the ambition of an efficient Oùra service adapted to the needs of the territories, and extended to all fields of mobility (bikes, parking lots, carpooling, car sharing …). The Oùra website provides maps of public transport networks and stops, facilities for car-pooling and information on prices of mobility services.

The start page of Oùra gives a good overview to the offered mobility-services, also a link to the car- pooling platform mov-ici exists.



Sources: French questionnaire and : https://www.oura.com/

3.2.3.3 Multimodal Mobility (MMM) or Mobility-as-a Service (MaaS), Switzerland

Digitalisation will make it easier to combine different transport modes such as public transport, car-sharing, taxi, cycling and walking in a more targeted manner. Transport can also be combined with other services such as booking concert tickets or hotel accommodation to create special deals that may be purchased over the Internet or on an app with a single click. This will make it easier for users to travel or book entire service packages. Environmentally friendly public transport should play a key role in this networking process and be the backbone of the whole system. To enable this, public transport services must be easy to link together and should be geared to the needs of customers.

The Confederation (Swiss Federal Government) is therefore pursuing activities in two main areas:

- It wishes to open up the public transport network to third-party companies so that they can put together and distribute such multimodal offers. The Confederation is planning to amend legislation to this end. This should give

third-party companies permanent access to public transport networks and thus legal certainty for their investments. At the same time, the Confederation seeks to ensure that this access is controlled. There are no plans to liberalise public transport, nor will any public funding be withdrawn from public transport. Third party companies wishing to gain access to the Swiss public transport network must be based in Switzerland.

- The Confederation also intends to work with cantons and communes to collect and provide mobility data. The aim is to enable third-party companies to develop neutral, transparent and user-optimised route planning systems. At the same time, it will allow the authorities to more effectively report free capacities on the road and rail networks. The mobility patterns of users is influenced by every route planning provider and other digital services. Today, only companies that have sufficient data themselves can develop such products. Moreover, current transport services are often optimised from the company's rather than the customer's perspective.

To achieve these targets, the Swiss law for passenger transport (Bundesgesetz über die Personenbeförderung) is adopted.

Source: https://www.bav.admin.ch/bav/en/home/topics/mmm.html

3.2.3.4 Reducing car traffic by intermodality in passenger traffic supported by the app MobiVerbier (Bagnes Switzerland)

The municipality of Bagnes/CH in 2017 started a mobile App MobiVerbier to facilitate a better transport to and from the municipality. The aim of the platform is to encourage a switch in modes of transport and to facilitate and streamline mobility in the region of Verbier. The digital platform includes offers such as shuttles, trains, cable cars, car-sharing etc., which makes it to an optimized travel planning option. The app shows the user the mode of transport that suits best according to the price, time and emission levels. Therefore for the user is facilitated to find an alternative to drive by the own car.

The success of MobiVerbier is considerable, up to 20% of car-trips switched to public transport and 10% to park and ride.

Sources: Swiss questionnaire and
https://www.mobitool.ch/de/aktuell/best-practice/beispiel-mobiverbier-59.html
https://www.mobilservice.ch/de/home/news/news-dossiers/innovationen-zur-nachhaltige-mobilitaet-in-bergregionen-1885.html?mobilservice_filter_fulltext=mobiverbier

3.2.4 - E-Mobility (passenger traffic)

3.2.4.1 - Alpine Pearls E-Mobility Concept (new)

E-mobility plays an important role especially in tourism. The member communities of the umbrella organization Alpine Pearls have been focusing for years on sustainable mobility in tourism. The tourist destinations of the Alpine Pearls already

offer a large number of mobility services in order to guarantee guests the most environmentally friendly and convenient on-site mobility. E-mobility now offers an additional opportunity for holiday destinations. Integrating electro-mobile services into the already existing range of tourist mobility services creates added value for the guests, but also for the municipalities themselves, considering the possibility of emission-free transportation (both in terms of pollutants and noise). It is not only important to take the mobility on-site during the stay into account, but the tourist mobility begins with the planning of the arrival in the holiday destination.

Objectives of the Concept and Target Groups

The concept is intends to present the current e-mobility situation in the Alpine Pearls communities and, based on the current needs and assessable trends in e-mobility in tourism, to propose possible measures aimed at expanding tourist e-mobility offerings in the Alpine region. Based on practical and successful examples of measures already implemented, it is shown how the implementation can be approached in each case.

As a target group with regard to a possible implementation of the measures mentioned above, the following are especially considered:

- municipalities
- regions
- tourist offices / associations / boards
- tourist establishments and institutions (accommodations, restaurants, leisure establishments, etc.)
- energy Associations
- mobility organizations

Some of the Alpine Pearls communities are already working intensively on expanding local mobility services by including e-mobility services to provide added value for their guests. In recent years, e-mobility has been promoted in the Alpine Pearls communities, for example by the expansion of e-charging infrastructure. A total of around 70 charging stations for electric vehicles with a total of about 160 charging points are available in all 25 Alpine Pearls municipalities at the time of the survey (as of July 2018).

Based on analysis of trends in tourist mobility and preferences of guests of tourist destinations in the concept the following recommendations were elaborated:

- Expansion of the charging station network at important tourist points
- Tourist e-car sharing and e-car rental
- Tourist e-bike sharing and e-bike rental
- Electric shuttle services in tourist use
- Tourist (e-) mobility cards / guest cards
- E-mobility packages for guests

- E-mobile tours through the Alps
- Concept of collective car parks in tourist destinations
- Communication of e-mobility offerings
- E-mobility events
- General recommendations to implement tourist e-mobility
- Recommended measures for the Alpine Pearls communities
- Travelling by e-cars in the Alpine Pearls
- Routes for electric cars:Visiting more Alpine Pearls by e-cars
- Places of arrival of public transport – renting places for electric cars

Methodologic approaches for analysis as well as interesting presentation of good practice for tourist e-mobility are strengths of the concept , but also important benefits of e-mobility for the inhabitants of tourist communities were only addressed in the concept in few cases.

Electric dial-a-ride transit "E-LOIS" in Werfenweng

Source of the photo: https://www.werfenweng.eu/SAMO/Ganzjaehrige-Angebote/taxi.php

Source of the report:
TOURIST E-MOBILITY CONCEPT for the electromobile journey in / through the Alps, elaborated by Pia Buchhartand Matthias Zawichowski, im-plan-tat Raumplanungs-GmbH & Co KG
on behalf of Alpine Pearls
Krems an der Donau, August 2018
See also: https://www.alpine-space.eu/projects/e-moticon/testi-scritti/project-result/d.t2.3.1-e-moticon-regional-action-plans-at.pdf

3.2.4.2 - Alpmobil – With e-mobility over the border

The project Alpmobil offers sustainable mobility for tourist and leisure activities around the Gotthard tunnel. The idea is to reduce CO2 emissions and reduce the constant noise pollution in this traffic-intense region by using e-bikes and e-cars. The region bought 60 e-cars to promote sustainable mobility and to include a number of mountain passes to release them of heavy polluting traffic. The story line of crossing mountain passes and living an adventure is picked up, just as a sustainable version

nowadays. The other aspects are the local value creation, creation of workplaces in various sectors and the push for sustainable tourism through a diversification in offers for the people crossing the Alps.

Source: Swiss questionnaire based on CIPRA and https://www.ebp.ch/de/projekte/alpmobil-elektromobilitaet-im-gotthardgebiet

3.2.5 Car-Pooling Networks (Covoiturage)

3.2.5.1 - BlaBlaCar

The private company organize the common use of cars (drivers and passengers) specialized on long distance traffic. Moreover, tickets for long distance buses can be booked on the homepage www.blablacar.com . From the point of view of environment-protection is a weakness, that no train connections are offered. An advantage is the assurance protection for drivers and passengers. Organizing the common use of cars (car-pooling) with assurance and quality checks is an interesting option for last-mile connections also in remote Alpine areas.

Sources: French questionnaire, https://en.wikipedia.org/wiki/BlaBlaCar and homepage of the company: https://www.blablacar.de/

3.2.5.2 Klaxit

Klaxit is a big organisation for car-pooling (in French language covoiturage), with the focus every day trips like commuting. 2 million journeys are offered every day throughout France. Klaxit has 265 corporate clients on thousands of sites, including big companies: BNP Paribas, Carrefour, Decathlon, Essilor, Nestlé, Orange, Safran, etc. Moreover, 30 local authorities, including Nantes, Clermont-Ferrand, Poitiers and Toulouse use the services of Klaxit. The Klaxit team now has 40 employees spread over 4 offices in Paris, Angers, Bordeaux and Grenoble, to ensure the deployment of its offers as close as possible to the needs of the regions.

Already present in Switzerland, Klaxit will now operate in Luxembourg also.

The growth of Klaxit in a period of only 18 months is considerable:

- Multiplication by 2.5 of the turnover achieved with companies;
- Multiplication by 10 of the number of journeys made on the application;
- Launch of the Klaxit Mobilités offer for local authorities with 6 new partnerships in Nantes, Poitiers, Clermont-Ferrand, Toulouse, Lannion and Lunéville.

Klaxit cooperates with RATP, the public transport company in Paris and offers a sustainable Mobility Pass with Sodexo allowing companies to benefit from the new sustainable mobility package of € 400 / year / employee, exempt from charges.

The Klaxit offers are a good example for Mobility as a service (MaaS). Cooperations with public transport services exist, but they seems not be focus of Klaxit services.

Sources: French questionnaire, https://www.klaxit.com/

3.2.5.3 - Mov ìci

The Mov'ici platform connects drivers travelling with free seats in their vehicles and passengers wishing to make the same journey, throughout the territory of Auvergne-Rhône-Alpes. An integration of the car –pooling platform with public transport is not mentioned at the webpages, but OÙRA provides a link to the car- pooling platform mov-ici (see under mobility management)

Sources: French questionnaire, https://movici.auvergnerhonealpes.fr/ https://en.laclusaz.com/carpooling.html (English text

3.2.5.4 - Jojob – Carpooling for companies in Italy

The private company Bring-me SRL is the main provider of carpooling services for companies in Italy. About 2.000 companies (among them 150 large companies) are already cooperating with this start-up to improve the transport habits of their employees.

The results prove the success of "Jojob":

- About 420,000 kg of CO2 saved thanks to the sharing of travels
- About 650,000 € saved by workers thanks to the sharing of travels
- Achievement of an average occupancy rate of 2.33

Source: Questionnaire from Italy and https://www.jojob.it/lavoratore/ , Data from Bring me annual report 2018

3.2.5.5 Prevoz.org - the transportation exchange portal, Slovenia

The Slovenian portal is focussed on car-pooling. The portal support people to find a suitable ride home or to offer rides it to anyone looking for it. A goal of the portal is to save fuel- consumption.

Sources: Slovenian questionnaire and www.prevoz.org

3.2.6 Parking polices

3.2.6.1 Good Reasons for Parking Management, Push & Pull project (2015); Catalogue on Case Studies for Parking Management Solutions, Push & project (2015).

Both studies, elaborated by the Austrian Mobility Research AMOR in Graz and partners deepen the potential of parking management measures to reduce road traffic in urban areas. Measures may concern the prices of parking spaces, the introduction of limits for their use, their removal or relocation. Such measures have already led to reductions in overall car usage in several cities. The first study is a basic analysis, while the implementation case studies are presented in the catalogue.

The main objectives of the European project PUSH&PULL are to:

- Save energy through a modal shift from car to other more sustainable modes;

- Help local economies by encouraging a more rational and managed approach to parking and helping cities to save money by avoiding the costs of construction of additional parking; and
- Build the capacity for followers who want to implement a similar system with the knowledge required to help to alleviate parking problems, and build political arguments to support them.

Case studies in or near the Alps are Freiburg im Breisgau. Graz, Vienna, Zürich, Treviso, Strasbourg, Torino, Lyon and Ljubljana.

Sources: Italian questionnaire and
http://push-pull-parking.eu/docs/file/20160606_push_pull_A4_EN_web.pdf
http://push-pull-parking.eu/docs/file/pp_pm_catalogue_01062015_final.pdf

3.2.6.2 Parking zones – Bolzano/Bozen

The city of Bolzano provides parking zones. This system allows the usage of free of charge spaces only to inhabitants, according to their zone of residence. In contrast, visitors cannot use such spaces. The targets of the introduction of parking zones are

- Managing the large number of tourists that reach the city especially during summer and the Christmas period
- Discouraging visitors to reach the city with cars
- Promoting the use of bicycles and public transport to access the city centre from main parking areas located at the entrances of the city.

The result of the parking policy in Bolzano is a reduction of the traffic generated by visitors within the city. For inhabitants it became easier to get a parking space for their cars.

Source: Questionnaire from Italy, more information at:
http://www.gemeinde.bozen.it/mobilita_context02.jsp?hostmatch=true&area=123&ID_LINK=1911 / (German) and
http://www.comune.bolzano.it/mobilita_context02.jsp?hostmatch=true&ID_LINK=1911&area=123 (Italian)

3.2.6.3 Areas C and B – Milano

These areas discourage the use of cars to access the inner part of the city. Indeed, the access to the historical city is subject to payment or ban in Area C, while it is forbidden to most pollutant and large vehicles in Area B since 2019 . The objectives of the zoning are:

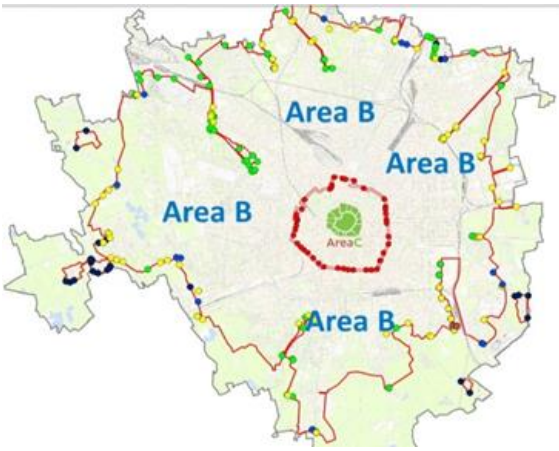
- Limiting the use of cars (and especially the passing-through traffic) in the most sensible parts of the city
- Establishing an effective control system at the entrances of the established areas
- Encouraging a higher use of public transport in the inner part of the city

The zones with limits for car traffic in Milan are successful by a relevant reduction of congestion in the inner part of the city (ca -35% of car entering Area C in 2017 compared

to 2011). About 45% of vehicles entering Area C pay the entrance ticket (the other are authorized or low pollutant vehicles)

The enlargement of the zone with limited access for cars and trucks by area B in 2019 was necessary, because area B is expected to affect a part of the city traffic that currently produces about 65% of the annual city GHG emissions.

Map of areas C and B in the centre of Milano:



Source: Italian questionnaire and https://www.comune.milano.it/aree-tematiche/mobilita

3.2.6.4 Croce Verde Lugano - Car-park management

The Green Cross in Lugano does not only take care of patients, but also of the environment. In 2018, the association Croce Verde started a mobility plan, which facilitates sustainable modes of transport mobility by supporting the public transport as well as bike traffic through e-bikes. They also tackled the topic of car-park management, a very sensitive topic for employers as it encompasses the aim to reduce parking areas with the implementation of tariffs. The strong motivation of the association was also supported by the local municipality, which was backed up by a whole campaign to increase their impact and to reduce the number of daily car-trips (on average 40 less trips in motorized vehicles per day so far).

Source: Swiss questionnaire based on CIPRA

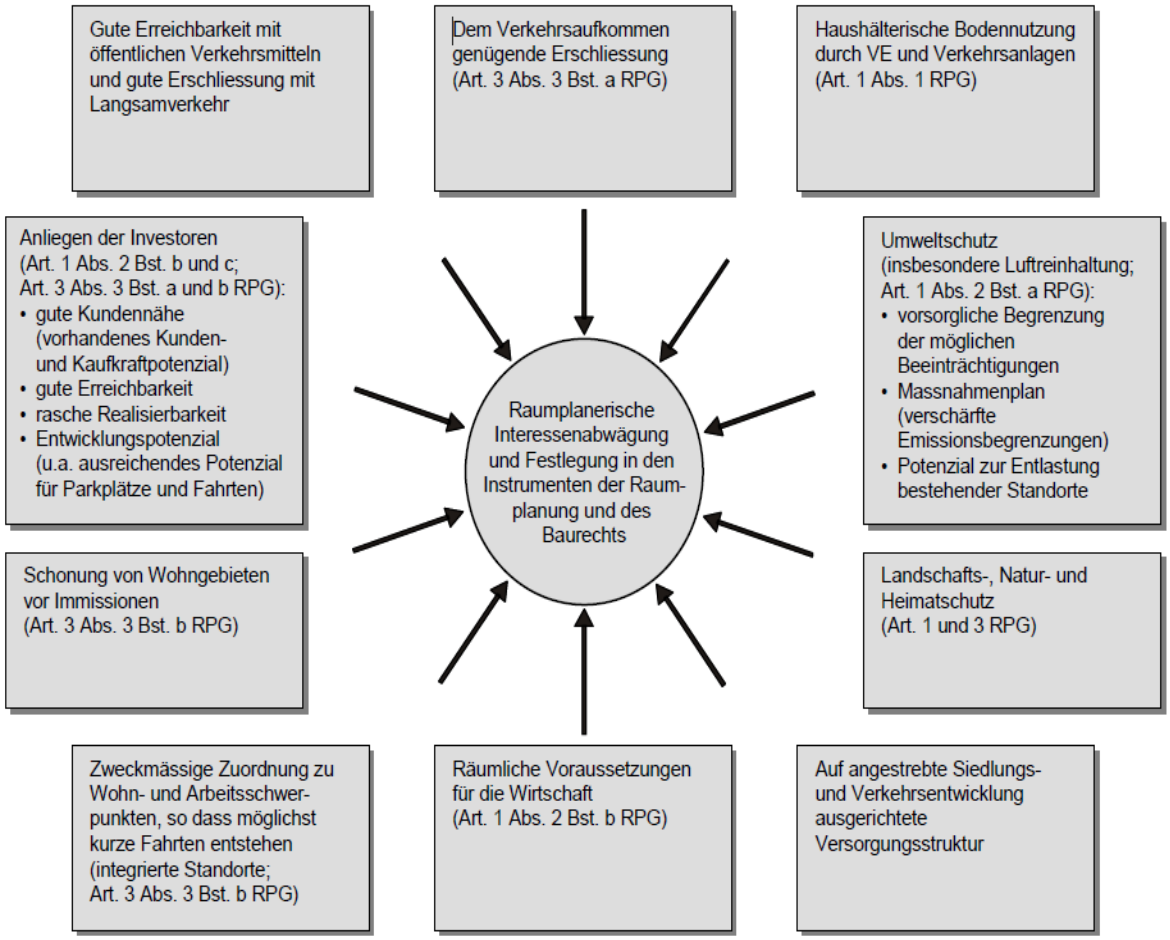
3.2.6.5 Swiss regulations for traffic intensive shopping centres, working areas, and leisure facilities

Traffic-intensive facilities have a significant impact on space and the environment and therefore must be dealt within the cantonal structure plan. The Swiss Federal Office for Spatial Development (ARE) and the Swiss Federal Office for Environment (BAFU) worked out recommendations for sustainable solutions in the Swiss cantonal structure plans.

In the recommendations, advantages and difficulties with different measures to organize the traffic induced by traffic intensive facilities are compared. The measures include also traffic limitations by reduced parking space and limits for the induced traffic performance.

For understanding the decision criteria is the following overview is helpful:

Swiss spatial and traffic planning criteria for traffic intensive



A short English summary of the figure to the decision criteria:

- Accessibility (by public transport, cycling and walking),
- Short distances between living and working areas,
- Limits for noise and air pollution and protection of living areas
- Nature and landscape protection
- Saving soil consumption

Source: https://www.are.admin.ch/are/de/home/staedte-und-agglomerationen/spezialthemen/verkehrsintensive-einrichtungen.html

3.2.6.6 L'accesso alle aree metropolitane (access to metropolitan areas) Aree di intervento e prospettive di soluzione

The study in Italian language was published by the University Bocconi and by Autostrade per l´Italia (2014). This study presents several case studies and policy recommendations concerning the introduction of congestion charges. This push measure introduces the payment of tolls to access certain urban areas. It can

discourage the use of road transport in sensible parts of the city, improve the performance of operating collective means, and encourage slow mobility.

Sources Italian questionnaire, more details at https://www.unibocconi.it/wps/wcm/connect/c046c202-9991-4edb-860a-55e6852f44b2/ASPI_Report_2014.pdf?MOD=AJPERES

3.2.7 Car-free settlements

3.2.7.1 Living areas with few car traffic and car-free settlements in Switzerland and Europe

On the website https://wohnbau-mobilitaet.ch/beispiele/bestehende-siedlungen-ch/ Swiss case studies for settlements with few car traffic and car-free living areas are presented, in addition also examples from other countries. Up to now, there exist 16 settlements in Switzerland, which are car-free or have low car traffic.

The following list and the interactive map on the website show that most case studies are situated in the agglomerations of bigger cities in Switzerland:

- Aegerten, Kochermatte
- Baden, Gartenstrasse
- Basel, Erlenmatt Ost
- Bern-Bümpliz, Burgunder
- Bern, Stöckacker Süd
- Biel, FAB-A
- Biel, Wasenstrasse
- Dübendorf, Zwicky Süd
- Genf, Soubeyran
- Neuenburg, Vieux-Châtel
- Ostermundigen, Oberfeld
- Winterthur, Giesserei
- Winterthur, Hagmann Areal
- Zürich, Avellana
- Zürich-Leutschenbach, mehr als wohnen
- Zürich, Kalkbreite
- Zürich, Kronenwiese
- Zürich-Leimbach, Sihlbogen
- Zürich-Manegg, Wogeno

By a click on the interactive map of Switzerland, detailed information on the case studies is provided. The website: https://wohnbau-mobilitaet.ch/beispiele/bestehende-siedlungen-ch/ is one of the best documentations of car-free living areas and of low car traffic zones in Switzerland and Europe.

Success factors

The responsible persons of Switzerland's existing or planned settlements were asked: "What were the success factors in the development of their projects?" The following aspects are often mentioned as success factors:

- early involvement of all those affected (authorities, politics, residents), broad support in the local community, strong cooperative
- open communication, professional public relations
- clear objectives from the start, permanent will to achieve them
- good public transport connection
- car freedom is enforceable for successful rental and is not a problem
- exemptions, visitor parking spaces, and goods handling as well as sanctions hold potential for conflict and should be clearly regulated

Planned car-free and car-poor settlements in Switzerland

In addition to the existing settlements, some projects are under construction, e.g. Basel (LeNa Haus), Bern (Burgernziel), Bern (Huebergass), Lausanne (Plaines-du-loup), Neuenburg (Vieux Châtel), Wallisellen (Neugutstrasse), Winterthur (EinViertel) and Zurich (Zollhaus).

Moreover, other car-free or low-car settlements in Switzerland are in a planning stage, but they do not yet have the same level of specification , including projects in Bern, Schaffhausen, Solothurn and Winterthur.

Overview on car-free or car-poor settlements in Europe:

The overview of car-free or car-poor settlements in Europe underlines the pioneer role of Switzerland in this field of sustainable urban development and transport planning.

- Amsterdam, GWL-terrein
- Bremen, Hollerland
- Freiburg im Breisgau, Vauban
- Hamburg-Barmbek, Saarlandstrasse
- Köln-Nippes, Stellwerk 60
- Luxemburg, Limpertsberg
- Malmö, Cykelhuset Ohboy
- Münster (Westfalen), Gartensiedlung Weissenburg
- Wien, Floridsdorf

Source of all information: https://wohnbau-mobilitaet.ch/waswarum/ (Plattform autofrei/autoarm wohnen)

3.2.7.2 Swiss car-free alpine municipalities

The Community of Car-free Swiss Tourist Resorts (GaST) is responsible for the development and promotion of the joint interests of Switzerland's car-free tourist resorts. As a pioneer in low-impact tourism, since 1988 the interest group "GaST" has propagated a holiday philosophy in close touch with nature: the aim being to give the holidaymaker the greatest possible level of relaxation.

In the Swiss Alps, the following Alpine communities, which are also touristic destinations, are car-free: Belalp, Bettmeralp, Braunwald, Falera, Fiesch-Eggishorn, Grächen, Lauchernalp, Melchsee-Frutt, Mürren, Riederalp, Rigi, Rosswald, Saas-Fee, Stoos, Wengen, Zermatt. Most of them cooperate in the "Gemeinschaft autofreier Schweizer Tourismusorte" ("Community of car-free Swiss tourist resorts"), the main quality criteria for these resorts are:

- All guests are advised to travel by public transport. All the car-free tourist resorts in Switzerland are easily accessible by public transport.
- Guests profit from the high quality of the air and the privilege and freedom of being able to move around the village safely. We are committed to keeping the roads largely free of traffic. It is this policy, which is the basis for creating a relaxed holiday atmosphere and giving the village a romantic character without the stress of motorised traffic.
- We are in favour of restricting mobility within the villages. The number of permits granted for combustion engines is kept to an absolute minimum.
- We promote the freedom to move about in a natural environment in all the car-free resorts. The car-free environment itself therefore itself becomes a

recreational space for the guest, who can relax and let his senses take in all the different impressions.

Sources: Swiss questionnaire and http://auto-frei.ch/index.php/en/

3.3 Environmentally sustainable freight logistics

3.3.1 Support measures for Rail and Combined Transport

3.3.1.1 German Support Programs for Combined Transport(CT)

CT is by far the strongest growth segment of long-distance freight transport in Germany and makes significant contributions to protecting the climate and reducing the amount of lorries on the roads. CT between Italy (especially Northern Italy) and Germany is one of the most important CT-links in Europe. The volume of goods in 2017 was 1.5 million TEU or 20 million tons. Germany supports CT and the strengthening of the intermodal transport system by funding.

The funding guidelines make it possible to provide financial aid for the construction of new and the upgrading of existing private sector CT- terminals. In this way, each mode of transport can be deployed such that it exploits its inherent strengths, and a shift to the rail and waterway modes is promoted. The level of the financial aid is up to 80 % of the components eligible for funding. Not only the transhipment equipment, also the purchase of suitable areas for CT-terminals is eligible for funding. A detailed list of these components can be found in the guidelines, see at https://www.bmvi.de/SharedDocs/EN/Documents/G/guidelines-combined-transport.pdf?__blob=publicationFile .

These guidelines are valid from 1 January 2017 to 31 December 2021. The financial assistance for private sector terminals does not favour a specific technology and can be provided for both vertical and horizontal terminals. One of the conditions of funding is that the terminal must be open to all users on a non-discriminatory basis.

To evolve combined transport in Germany, the Federal Ministry of Transport and Digital Infrastructure commissioned, in 2012, a development strategy for combined transport in Germany with a time horizon of 2025. On the basis of the existing network of terminals and trends in freight traffic, the study formed regional areas of combined transport in Germany. In addition to the analysis of traffic and the establishment of handling capacity, the regional area-based need for railway and waterway handling capacity over the period to 2025 was identified.

https://www.bmvi.de/SharedDocs/DE/Anlage/G/metastudie-status-quo.pdf?__blob=publicationFile

3.3.1.2 No energy taxes for rail transport in Italy

In contrast with most Alpine countries (excluding Switzerland), Italy does not apply any

energy taxes for the use of electric energy in freight rail transport. According to the positive examples of Italy and Switzerland, a common approach to the energy taxes should be adopted in the entire Alpine space, in order to make these national initiatives effective even on the broader scale of transnational transport (which is essential in the Alps).

Source: Questionnaire from Italy and https://ec.europa.eu/transport/sites/transport/files/studies/2017-01-24-study-taxation-charges_final_background_report.pdf

3.3.1.3 Incentive "Ferrobonus" – Italy

The incentive called "Ferrobonus" focusses on encouraging the shift of freight transport from road to rail and the use of intermodal transport solutions. It provides incentives for the intermodal shipment of freights. Although nationally regulated, it is customized in certain Italian regions. The subsidy tires to support the diffusion of combined transport and is available for both railway companies, multimodal transport operators and companies that chose to carry their goods with intermodal transport solutions.

20 Mio € per each year covered by the incentive, over 70 recipients have been selected for the assignments of the incentive (Italian and foreign companies). Some Italian regions have linked regional funds to the national incentive to further encourage rail freight transport.

Ferrobonus has been reconfirmed by the Italian Government (with the Legge di Bilancio 2020) in March 2020, with an allocation of 14 million € for 2020 and 25 million € for 2021.

Sources: Italian questionnaire and http://www.ramspa.it/cosa-facciamo/incentivi/nuovo-ferrobonus and telephone call with Prof. Federico Cavallaro, Politecnico di Torino on 23rd September 2020.

3.3.1.4 Slovenian measures to promote rail transport

The national investment programme envisages 9 billion € in infrastructure investments for the period 2016-2022, and a further 7.9 billion € to be invested by 2030. A focus is to improve the rail-accessibility of the harbour Koper e.g. by a reconstruction of the Divača–Koper railway-line to facilitate intermodal transport ship and rail. This project should be finished in 2025. More competition in the rail market should contribute to customer friendly and innovative solutions.

The port of Koper

Sources: Slovenian questionnaire and https://industriemagazin.at

3.3.2. Urban (multimodal) hubs and local distribution by low emission freight vehicles (including cargo bikes)

3.3.2.1 General remarks on trends in urban freight logistics

Owing to re-urbanization and the triumph of e-commerce, logistics locations are gaining importance within the centers and their immediate vicinity. Due to the prevailing shortage of space, logistics solutions are called for that are based on the conversion of existing properties as well as flexibility and cooperation. More and more real estate investors are becoming aware of this fast growing sector.

The biggest driver of logistic processes in urban areas is **e-commerce** (internet trade). Smaller and therefore more numerous households, rising consumer expectations, the expansion of the spectrum of tasks in e-commerce, increasing bottlenecks in the transport infrastructure and a high regulatory burden (e.g. ban on night driving for trucks) are posing major challenges for logistics in the agglomerations.

Concepts to improve the efficiency of urban goods traffic and overcome the **last mile** have, for some years, been the subject of lively discussion among experts and subsumed under the term **"urban logistics"**. These concepts essentially adopt four approaches:

- First of all, alternatives to traditional delivery by truck/van are proposed: e-mobility, autonomous vehicles, drones, etc.
- Secondly, new delivery models are launched or tested: e.g. collection points and parcel boxes at central locations.
- A third approach for achieving more efficient urban logistics is based on cooperation: Logistics providers, parcel services, and retailers should share their transport and storage capacities as well as their data in order to enhance resource efficiency.
- A fourth approach is geared toward real estate. The ideal type of urban logistics facility concept is considered here to be a cascaded system consisting of supply points (regional depots and e-fulfillment centers) in the urban areas and a network of smaller distribution centers and micro depots within the city.

Such cascaded systems of urban logistics are still largely pie in the sky not only in Switzerland, but also in Germany. The construction investments for logistics

properties exceeded the threshold of CHF 1 billion in 2015 . However, the geographical focal points remain the traditional locations at freeway interchanges outside the urban areas. There are several reasons for this: First of all, same-day and same-hour delivery are today still marginal phenomena as next-day delivery has only become widespread in the last few years. Secondly, there is a shortage of space prevailing in the major centers so that logistics properties are forced to compete with other uses such as residential and office facilities. Thirdly, the Swiss centers are spatially small when compared internationally so that locations beyond the city boundary often suffice for overcoming the last mile with sufficient speed.

(See real estate report of Credit Suisse of 2018: https://www.credit-suisse.com/ch/en/articles/private-banking/schweizer-immobilienmarkt-2018-aufschwung-kommt-wie-gerufen-201802.html)

Thus, the last mile to the client is becoming more and more important in logistics. The competition among the contenders is increasing, especially in urban areas. Many of the pre-mentioned reasons and consequences are true for Alpine Areas as well.

The first and last mile inclusion in trip planning, both for passenger and freight logistics, is also analyzed in a general, not alpine specific context by EEA, allowing also potential positive impacts for Alpine Areas.

Source: https://www.eea.europa.eu/publications/the-first-and-last-mile
Source of all general remarks on urban freight logistics: Swiss questionnaire

3.3.2.2 Hôtels logistiques, exemple Paris La Chapelle International

Such logistic hubs are characterized by

- innovative architecture, often on wasteland industrial or railway or former large
- parking lots / garages
- multi floors
- multi-use: logistics, commercial, offices, residential spaces
- sometimes they are multimodal

Paris La Chapelle international has rail connection to the Paris North rail network. The hub is situated near the motorways Boulevard périphérique and A1. The area of Paris La Chapelle International has a size of 2,4 hectars, the buildings : 45 000 sqm. The area has 390 m of length and 57 m of width.

The urban hub « Hôtel logistique Paris La Chapelle International » shows that logistic facilities can be integrated in the urban environent, if low- or zero emission road vehicles are used especially for local and regional deliveries and collection of goods.

For better understanding of the urban hub La Chapelle the following figure is helpful:

Vertical structure of the urban hub Paris La Chapelle

Sources: La logistique urbaine : tendances mondiales, presentation of Laetitia Dablanc, Université Gustave Eiffel in CGEDD/MT, 5 February 2020
http://www.citylab-project.eu/presentations/160526_Paris/Chapelle.pdf , Presentation of the logistics company SOGARIS

3.3.2.3 "Cityporto" – Padua

This service is managed by the "Interporto" of Padua, i.e. the logistic hub located in the outskirts of the city. Here freights from different shippers are collected and then delivered to sensible urban areas with a fleet of low-emission vehicles that optimize the number of needed travels. The core target group of "Cityporto" are 55 subcontracted and direct good operators working in the city

Main objectives of "Cityporto" are:

- Minimizing the number of logistic vehicles entering the most sensible parts of the city
- Reducing the environmental impacts of logistic in urban areas

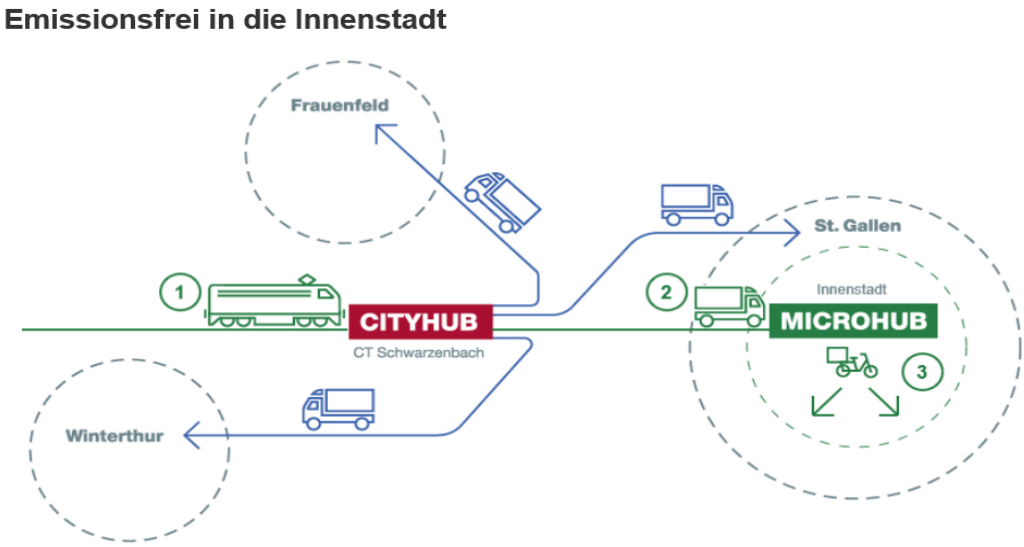
Cityporto is successful, the number of deliveries is increasing (from about 44,000 in 2004 to over 100.000 in 2013 (newer data would be helpful). The deliveries with low emission vehicles contribute to a reduction of pollutants (e.g. 219 tons of CO2 were saved in a 2- year period). Cityporto is using CNG (natural gas) driven delivery vehicles. The vehicles used for the service have preferential lanes, free access to the city and are able to park inside the limited traffic zones at any time of the day.

Sources: Italian questionnaire ; http://www.interportopd.it/files/Cityporto_eng.pdf;
http://www.interportopd.it/en/cityporto/

3.3.2.4 Pilot project in St. Gallen: «Emission free» by the company Camion Transport

It started in June of 2019 and will last for one year.

Working scheme of the Cityhub Schwarzenbach near St. Gallen



1. Güter kommen per Bahn aus der ganzen Schweiz in den Cityhub Schwarzenbach
2. Per Lastwagen werden die Waren in die Städte und zu den Kunden verteilt, neu fährt ein Elektro-Lkw zum Microhub in der Innenstadt von St.Gallen
3. Mit leistungsstarkem Cargo eBike und eScooter sowie Velos erreichen die Sendungen ohne Emissionen die Kundschaft

Wir bauen die emissionsfreie Auslieferung in die Innenstadt auf. Im Juni 2019 startete die einjährige Pilotphase. Der erste schwere Elektro-Lkw «eActros» von Mercedes-Benz transportiert dabei Waren vom Cityhub in Schwarzenbach nach St.Gallen. Dort übernimmt unser Partner Die Fliege Velokurier die Feinverteilung. Die Erfahrungen und Erkenntnisse aus diesem Testjahr fliessen in die weitere Umsetzung unseres langfristigen Ziels, ab spätestens 2025 die Innenstädte emissionsfrei zu bedienen.

For the transport between the Cityhub Schwarzenbach and the Microhub St.Gallen electric powered trucks are used, for the local distributions cargo bikes.

Sources: Swiss questionnaire and https://www.camiontransport.ch/de/umwelt/emissionsfrei/

3.3.2.5 Canton of Geneva: Action plan urban freight logistics /« Plan d'action marchandises et logistique urbaine 2019-2023 »

The Canton wishes to complete its master plans through a first "Goods and Logistics Urban Action Plan (PAM)". The issue of goods and urban logistics, and more generally professional transport, is underlying mobility issues without having been dealt with before. However, its interaction with road traffic, public transport or parking is strong. The infrastructures are common to all and their limited nature does not allow unlimited use. Mobility must once again become one of the fundamental levers of the attractiveness of the region.

The plan is produced in the form of a multi-year operational roadmap (5 years), it identifies the actions that the state and its partners will have to implement at the scale of the canton of Geneva and its living area.

Sources : Swiss questionnaire and https://www.ge.ch/document/plan-action-marchandises-logistique-urbaine-2019-2023

3.3.2.6 Espace Tourbillon in Geneva by the Swiss Federal Railways

This is a real estate project in Geneva by the Swiss Federal Railways (SBB AG), a big site development with flexible use of industrial and trade areas. Planned is a subsurface logistics terminal that has connections to all buildings around it. The 5 buildings are served by an underground logistics terminal that can accommodate trucks up to 40 tons and 4.5 meters high to ensure safe and efficient logistics operations. The loading and storage areas allow the distribution of goods to all buildings on the site. All upper floors are accessible through a goods lift with a 4-tonne working capacity. A disadvantage of the project is that no direct for rail freight will be available.

Construction began in June 2017 and all buildings will be constructed in one stage and be finished in 2021. The logistics terminal and the parking areas will be opened simultaneously with the first buildings. The new tram line linking Lancy-Pont-Rouge to Perly station will start operating at the end of 2021. ESPACE TOURBILLON will be four stops away from the Léman Express station, which offers six trains every hour, including two direct services to Lausanne.

View on Espace Tourbillon

Sources: Swiss questionnaire and https://www.espacetourbillon.ch/en/project/

3.3.2.7 Freight City Hub Basel

The main goal of the project is a reduction of freight delivery trips by optimization of freight delivery. Single deliveries are replaced by bundled collective delivery. Freight deliveries are collected in a hub at the edge of the city (Wolf Areal), last mile delivery in the city is performed und bundled by electric vehicles, cargo and e-bikes to reduce empty courses and motorized traffic as well as environmental damages (air, noise, accidents).

Initiator of the project is the cantonal authority Basel-Stadt in the frame of a "cantonal cargo logistics transportation concept". Cooperation partners are various undertakings in the freight/logistics sector. Based on preparation steps since 2011 the full project started in 2018.

Sources: Swiss questionnaire and https://mobilsalon.ch/wp-content/uploads/2019/02/Präsentation_LucaOlivieri_StadtBasel.pdf (presentation in German language)

3.3.2.8 Carvelo2go - Bike sharing

Carvelo2go is an e-cargo-bike sharing platform in various cities and regions in Switzerland lead by the mobility academy and the group of `Engagement` of the Migros-group. It works similar to the car-sharing concept, meaning that you can rent a "carvelo" (cargo bike) for a low price at your preferred host (e.g. your favourite bakery). A carvelo is able to transport up to 100kg on a distance of maximum 50-60km. The network of carvelo hosts is spread out all over Switzerland where it is easily accessible to everyone.

The offer is available and accessible after a simple online registration and the payment of the yearly subscription, which also brings a 50%-discount for all rides.

Sources: Swiss questionnaire (based on CIPRA) and https://www.carvelo2go.ch/de/

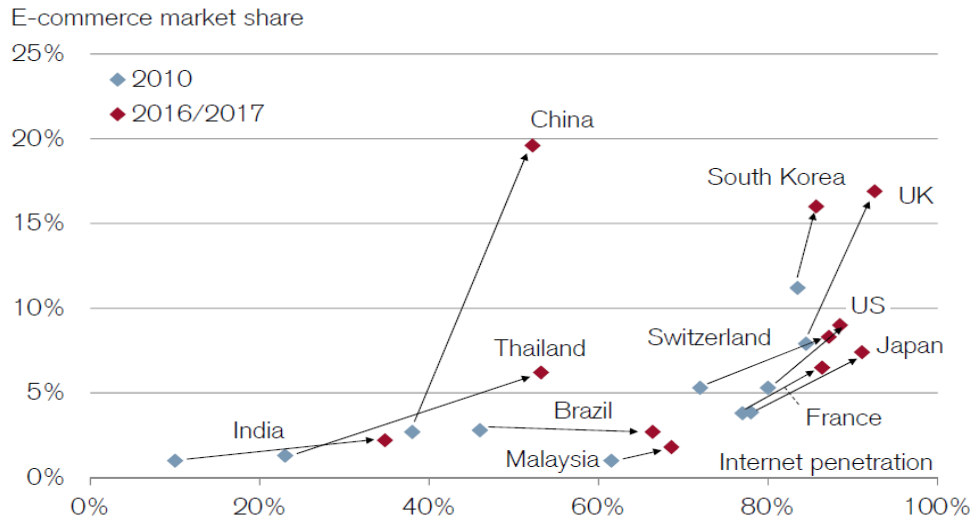
3.3.3 Consequences of growing E-Commerce (Internet-Trade): Overview of Recent Study Results

At first, we have to be aware that all information on E-Commerce is about to become or already is history! Due to the coronavirus pandemic, all forms of E –Commerce have been growing rapidly within only some weeks. New and interesting analysis will be coming forth after these experiences.

3.3.3.1 Data to E-Commerce

All available analysis come to the result that the share of e-commerce is growing:

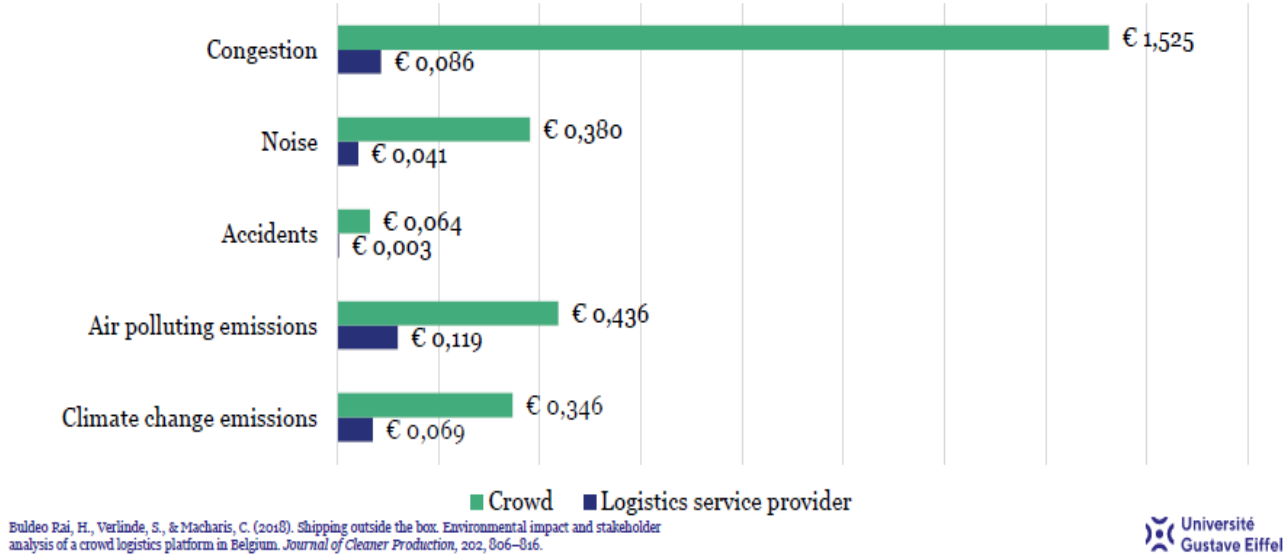
Development Market Share of e-commerce (internet trading) before Corona



Source: GfK, BAK Economics, diverse country-specific sources, Credit Suisse

Source: https://www.credit-suisse.com/ch/en/articles/private-banking/schweizer-immobilienmarkt-2018-aufschwung-kommt-wie-gerufen-201802.html

Comparing external costs of crowd logistics (Bringr) and logistic provider (bPost)



Source: La logistique urbaine : tendances mondiales, presentation of Laetitia Dablanc, Université Gustave Eiffel in CGEDD/MT, 5 February 2020

Although the conditions for the presented calculation need an additional, more detailed interpretation, this example shows how different the environmental impacts of urban logistic services – focused on internet - trade can be, depending on the organisation form.

Boxes for a coordinated internet trade delivery to reduce many single deliveries

Source: http://german.winnsen.com/sale-7069870-intelligent-automated-parcel-lockers-for-fresh-foods-fruits-vegetables-parcel-express-delivery.html

3.3.3.2 Analysis of impacts of E-commerce (Internet-trade) - Traffic and urban development effects of online trade (German study)

The study was ordered by the German Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (Federal Environment Ministry) and the Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) im Bundesamt für Bauwesen und Raumordnung (Federal Institute for urban and spatial development research). The final report was elaborated by Prognos AG (Sven Altenburg, Hans-Paul Kienzler), KE Consult (Dr. Klaus Esser, Dr. Judith Kurte), ILS Institut für Landes- und Stadtentwicklungsforschung (Dr. Dirk Wittowsky, Dr. Kathrin Konrad, Anna-Lena van der Vlugt, Sören Groth) and published in August 2018.

The main findings to the effects of e-commerce were summed up in three scenarios:

"As result, all scenarios show quite similar basic trends of different emphasis:

- Growing e-commerce will significantly increase the number of shipment processes in residential areas. Especially the so far rather weak e-commerce of daily goods will highly contribute to this.
- Most of the shipments will remain home deliveries. So, residential quarters will be affected in their whole spatial extents, not only at certain (pick-up-)points.

- Presumably, the large majority of delivery vehicles will be electric. Nonetheless, they will have similar sizes like the conventional ones operating today.
- Conflicts in dense urban and residential areas will sharpen as land use conflicts, congestions, and security issues will increase.
- Passenger transport will face changes as well, as e-commerce induces new types of activities (fetch deliveries, drop return shipments). How much additional motorized traffic will be linked to this cannot be answered yet, but it absolutely has to be considered under certain circumstances.
- Innovative delivery concepts require real estate close to customers for new types of infrastructure such as pick-up-points, delivery bases, and micro hubs.
- At the same time, space requirements for shops are likely to decrease in certain spatial contexts.

These seven basic theses make up the "risks" of a growing e-commerce for the transport system and urban planning and mark the need for political action.

Political options

The need for political action can be highlighted by two basic tasks:

The unavoidably growing transport flows have to be managed with a minimum of emissions and conflicts especially in residential areas.

At the same time, additional passenger trips to fetch and bring deliveries have to be done with a minimum of car traffic. To meet these challenges, there are several political options on municipal level:

- Inner city restrictions for diesel vehicles
- Privileging small vehicle types by granting special rights to them such as reserved parking bays
- Encouraging the implementation of pick-up-points at places of high accessibility
- Reassigning free urban spaces to pick-up-points or micro hubs
- Initiating regional strategic processes between stakeholders (CEP-providers, residents, planners and retailers) at an early stage

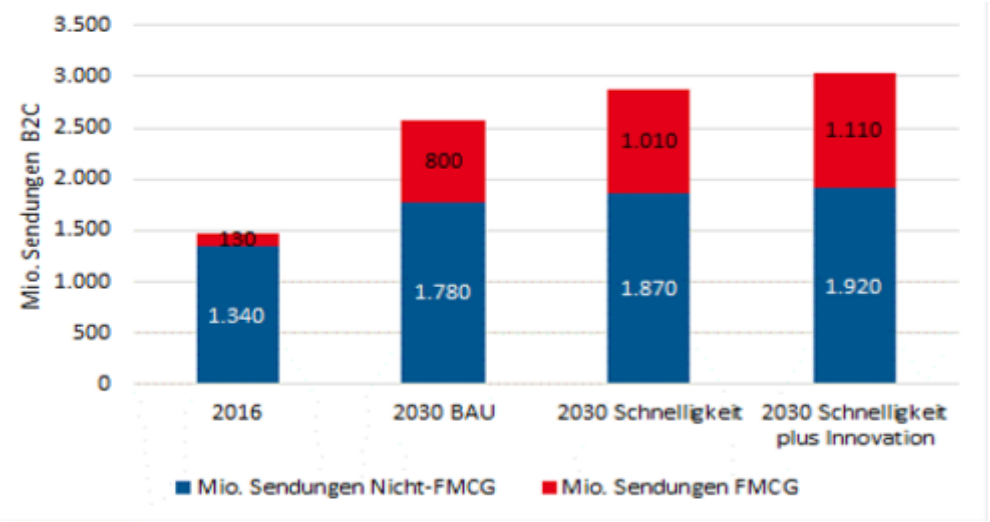
In order to grant an effective set of tools to municipalities for this, the following measures on federal or state level should be taken:

- Defining strict and mandatory emission-standards such as the "blue plate"
- Funding e-mobility not only focused on vehicles and charging, but also supporting aspects of electric logistic concepts (e.g. micro hubs)
- Reliable regulatory frameworks for pick-up-points and micro hubs in planning laws

- Actualisation of parking lot legislation in order to create inner city spaces
- Expand subsidies for biking not only for passengers but for goods as well
- Creating legislative frameworks for innovative vehicle concepts such as drones.

If these political options on different levels are combined in a comprehensive way, it will not only be possible to manage the growing number of deliveries with a minimum of conflicts, they can even be used as a general nucleus to implement electric commercial transport.

Forecast of business 2 consumer deliveries in the 3 scenarios
(final report of German study p 98)



FMCG = "Fast moving consumer goods", Sendungen = consumer deliveries , BAU = business as usual, Schelligkeit = speed/vitesse

Source: https://www.bbsr.bund.de/BBSR/DE/Home/Topthemen/Downloads/online-handel-lieferverkehr.pdf?__blob=publicationFile&v=1

4. CONCLUSIONS AND RECOMMENDATIONS FOR THE ALPINE REGION

At first, we as authors of this report think, the conclusions and recommendations of the report should be developed in a discussion process in the whole transport group, considering the impacts of the recent coronavirus pandemic. Conclusions, which are highly dependent on this pandemic, are collected below and highlighted in the text box.

- Due to the coronavirus pandemic, teleworking boomed within some weeks, experience is in most cases positive and will lead to a revolution of working environment with less commuting traffic. Video-conferences will replace some business trips. Many studies on this topic already started.

  Recommendations to employers:

  - ✓ Establish together with the employees clear rules for remote working and ensure sufficient contacts of teleworkers in meetings.
  - ✓ Provide teleworking places e.g. in tele-houses for people who have no suitable home-office space.

  Recommendation for public transport (PT) companies and responsible politicians:

  - ✓ Prepare PT tickets, which are advantageous for people who travel only e.g. twice during a week.

- Also in schools and universities tele-learning is successful and will be more used after the recent crisis.

  Recommendation for universities, schools and responsible politicians:

  - ✓ Ensure that in addition to tele-learning social contacts between teacher and students remain and a good discussion culture can be built up.

- But we have to be aware that working from home or remotely can also have negative consequences, like few contacts with colleagues or a shift to higher traffic performance – often by cars with combustion motors - in leisure time.

  Recommendation to municipalities, sport clubs, environment organizations, public transport companies and media:

  - ✓ Motivate people to spent leisure time near home and use bicycles, PT or walk to leisure facilities.

- First analysis show also a fast growing internet trade.

  Recommendation to politicians and logistics companies:

  - ✓ Support clever logistics, like optimized delivery tours, the use of environmentally sustainable vehicles and establishing delivery points for coordinated deliveries.
  - ✓

- Public transport (PT) is a loser of the coronavirus pandemic. In Austria, the number of passengers in trains and urban PT decreased by 80-90 % at the peak of the crisis and in June 2020, in many busses and trains are still only the half number of passengers as before. Only a reliable medication against severe impacts of corona disease can avoid a longer lasting crisis of PT. The obligation to wear a mouth and nose protection mask is not comfortable for passengers and separating them means a reduced use of vehicle capacities.

- It can be expected that also car-pooling schemes are impaired by the actual crisis and further success is depending on medical progress. On the other hand, the private car traffic is growing almost everywhere after the end of the complete lock-down.

  Recommendations to politicians, medical experts, and media (valid for public transport):

  - ✓ Inform people as soon as possible when the danger (of the pandemic) is over that they trust again travelling together.

- Cycling in every-day life seems to be a winner of the actual situation, and the improvement of cycle networks, also in smaller municipalities and rural regions, seems be a good investment for the future.

  Recommendation to politicians and traffic planners:

  - ✓ Improve and enlarge the infrastructure for cycling as well for pedestrians.

- A possible consequence of corona is, that also space-saving buildings for more families should provide private green, e.g. on terraces.

  Recommendation to urban planners and responsible politicians:

  - ✓ Consider this requirement by greening existing buildings, development of new building forms and support the implementation by planning laws

- The consumption of regional products (e.g. bio-food) and craft services reduce transport and can keep workplaces also in remote regions. Moreover, compared to global markets, the resilience against crisis is often higher.

  Recommendation to decision makers, opinion leaders, chambers of commerce, and agriculture:

  - ✓ Support the trend to regional products by suitable, motivating information.

Many considered case studies show that awareness of decision makers and the population for the problems of Alpine regions, like too much space consumption, growing traffic, congestion on roads, and negative environmental impacts is growing.

- Examples of **space saving settlements** prove that also in remote regions and not only in urban agglomerations, the mentioned problems are recognized.

- Our analysis shows **many good solutions to make traffic more environmentally sustainable by using "clean" modes** (public transport, cycling) and by increasing the occupancy rates of cars (Car-pooling, French "Covoiturage").

- **Innovative freight logistics** contribute to coordinate goods deliverables and to reduce trips of vehicles.

- Many local and regional delivery services use electric powered trucks and cargo bikes.

- A network of clever situated hubs – also in cities - is helpful for sustainable freight logistics.

- The **participation of all relevant stakeholders including citizens** will also be important in the future for spatial planning as well as for traffic planning – and policy to find clever and well accepted solutions.

- Internet based information is not only helpful in the recent crisis. It can improve the awareness and knowledge of all stakeholders and facilitate decisions at any time.

- **Mobility management for various target groups**: schools, companies, municipalities, tourism, and private persons, e.g. if they move to a new living

location, contributes to the implementation of environmentally sustainable mobility and freight transport solutions.

- Mobility management is multimodal and looks for combining the advantages of the different transport modes. It includes incentives and some guiding measures like the organization of car parking.

<u>Common Recommendation to both points above to experts, politicians, and media:</u>

- ✓ Present well good practice cases and their advantages to motivate to copy the pioneers and have courage to try new, innovative, and environmentally sustainable solutions.

Finally, as authors we like to thank all colleagues, who filled in the questionnaires and gave us other valuable information. We hope the findings in this report will be discussed widely.

ALPENKONVENTION
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CONVENZIONE DELLE ALPI

TRANSPORT WORKING GROUP

OF THE

ALPINE CONVENTION

2019-2020 MANDATE

ANALYSIS OF THE POTENTIAL OF EXISTING AND NEW TECHNOLOGIES FOR THE PROMOTION OF SUSTAINABLE PASSENGER TRANSPORT IN THE ALPINE REGION

—

INTERIM REPORT

The objective of the project is to assess the potential of new and innovative technologies for passenger transport in the Alpine region. For this purpose, existing innovative passenger transport projects in the Alpine region are identified initially. On this basis, the advantages and disadvantages of these projects as well as their potential for application to other Alpine regions will be discussed in consideration of characteristics which are specific to the Alps, and recommendations for action will be elaborated. The findings gathered are to be made available to the member states of the Alpine Convention, their local authorities and regional stakeholders involved in the passenger transport sector.

This interim report summarizes the first steps of the project – the stock-taking and selection of sustainable and innovative transport projects in the Alpine region. Further steps include the discussion of selected projects within the context of a workshop as well as the development of specific recommendations for the implementation of further projects.

In a first step, desk research and an online survey were conducted in parallel to compile an inventory. The project search was performed using publicly accessible and, especially, web-based sources. Initially, projects of national and European organizations, financial assistance programmes and research projects were identified. Building on this, a regional search for projects was conducted in the member states of the Alpine Convention. The projects thus identified were supplemented by projects which were mentioned by the participants of the online survey. For the online survey, a questionnaire had been prepared in German and English. It was sent to a total of 111 stakeholders and was fully answered by 29 of them. Apart from the identification of already existing projects, the evaluation of the questionnaires showed that it was useful to classify the projects according to user groups. The stock-taking resulted in the compilation of an Excel file with a total of 112 projects and their specific characteristics.

In a second step, 12 projects were selected based on the user groups identified in the questionnaire which will now be discussed in the context of a workshop. These projects were selected because they provide solutions for specific problems in the fields of commuter, leisure, transit and tourism traffic. Moreover, these projects were to be attractive and sustainable as regards the application of technologies, take account of the specific characteristics of the Alps and be feasible in the Alpine region. In addition, projects from various member states of the Alpine Convention were to be presented, if possible.

The third step was to organize and hold a workshop to discuss the selected projects. The workshop had initially been planned and organized to be held in Munich on 13 March 2020; it had to be cancelled two days before this date due to the coronavirus outbreak. The workshop, which is now scheduled for 10 September, will take place in conditions which are in line with the corona safety rules. Therefore, the workshop is conducted in a hybrid form with due regard to strict hygiene and distancing rules. This means that a maximum of 35 speakers and participants will attend the workshop at the Bavarian State Ministry of Housing, Building and Transport and the other speakers and participants will take part virtually via WebEx.

The final programme of the workshop comprises the presentation of 12 projects. After clustering, it was found that the projects in the sectors of tourism and leisure traffic were often similar in practice; therefore, they were merged to form one thematic block for the workshop. To provide a look ahead, a further thematic block on the future of mobility was added.

Assessing the potential of technologies for the promotion of sustainable passenger transport in the Alpine region

10 September 2020

Bavarian State Ministry of Housing, Building and Transport

Franz-Josef-Strauß-Ring 4, 80539 Munich

08:30 – 09:00	Registration
09:00 – 09:20	Introductory Words and Organisational Issues Discussion led by: Christian Trescher (TÜV Rheinland) Welcoming Speech: - Michel Rostagnat (Chairman of the Transport Working Group of the Alpine Convention) [online] - Harry Seybert (Bavarian State Ministry of Housing, Building and Transport)
09:20 – 09:40	Introduction by Dr Stephan Tischler (Centre for Mobility Change, University of Innsbruck)

PART 1	**Reviewing the current situation: Project presentations**
	Projects: Commuters
09:45 – 10:00	Keynote Dr Büttner & Julia Kinigadner (Technical University of Munich)
10:00 – 10:15	Presentation Zillertalbahn 2020+ (Dr Nikolaus Fleischhacker & Dr Helmut Schreiner)
10:15 – 10:30	Presentation Cityjet-Eco (tbd)
10:30 – 10:45	Presentation Léman Express (Professor Laurent Guihéry)
10:45 – 11:05	Discussion
11:05 – 11:25	Coffee break

	Projects: Leisure and Tourism
11:25 – 11:40	Keynote Dr Rumana Sarker (University of Innsbruck)
11:40 – 11:55	Presentation MyBuxi (Andreas Kronawitter)
11:55 – 12:10	Presentation E-Bus St. Gallen (Cornelia Graf)
12:10 – 12:25	Presentation U-Bahn Serfaus (Andrea Koolen)
12:25 – 12:45	Discussion

12:45 – 13:45	Lunch Break

	Projects: Transit Traffic
13:45 – 14:00	Keynote Federico Cavallaro, Politecnico di Torino [online]
14:00 – 14:15	Presentation LinkingAlps (Katharina Leeb)
14:15 – 14:30	Presentation Brenner Low Emissions Corridor (Ilaria De Biasi)
14:30 – 14:45	Presentation Gotthard-Base-Tunnel (Hans-Peter Vetsch) [online]
14:45 – 15:05	Discussion

15:05 – 15:20	Coffee break

PART 2	**Looking ahead: The future of mobility?**
15:20 – 15:35	Keynote Professor Barbara Lenz (Institut für Verkehrsforschung, DLR - Transport Research Laboratory)
15:35 – 15:50	Presentation Arc Mobilité (Andreas Fuhrer)
15:50 – 16:05	Presentation Autonomous Bus Bad Birnbach (Dr Thomas Huber)
16:05 – 16:20	Presentation ECOTRAIN (Philippe Bourguignon) [online]
16:20 – 16:40	Discussion

16:40 – 16:45	Concluding Remarks

The last step focuses on the analysis of the potential as well as the development of specific recommendations for action to be given to target groups in the Alpine region who are interested in the implementation of sustainable and innovative projects in passenger transport. Owing to the postponement of the workshop which had become necessary, the project schedule had to be adapted accordingly. Therefore, this work package can only be concluded within the framework of the next mandate under the Swiss Presidency.

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THE ALPINE CONVENTION IS THE FIRST INTERNATIONAL AGREEMENT FOR THE PROTECTION AND PROMOTION OF THE SUSTAINABLE DEVELOPMENT OF A CROSS-BORDER MOUNTAINOUS REGION

italian delegation
alpine convention

GROUPE DE TRAVAIL TRANSPORTS / GRUPPO DI LAVORO TRASPORTI

ARBEITSGRUPPE VERKEHR / DELOVNASKUPINA PROMET

Mandate 2019-2020

AIR QUALITY – MEASURES ON SUSTAINABLE MOBILITY IN THE ALPINE TOWNS & CITIES

1. INTRODUCTION

The analysis activities of the measures for mobility policies, aimed at safeguarding air quality and identification of the related Recommendations to the Member States of the Alpine Convention, are recalled by the WGT Transport Mandate of the Alpine Convention, approved at the 15th Alpine Conference in Innsbruck (April 2019), which identified the following priorities:

Point 4. Coordination activities assigned to the Italian Delegation - Provide for the RSA8 a summary of the impact on air quality of transport in the Alps and the effectiveness of impact mitigation measures (Framework Convention art. 2 paragraph 2 letter c)

The object of the analysis is:

- the European regulatory framework for the reduction of emissions generated by mobility and the implementation of charging infrastructure and distribution of alternative fuels;
- policies applied to urban and regional mobility aimed at reducing greenhouse gas and pollutant emissions;
- focus on urban logistics and its impacts on air quality in urban and regional settings.

2. URBAN SUSTAINABLE MOBILITY IN THE MOUNTAINS – BASIC PRINCIPLES

Analysis of the air pollution in the Alpine area reveals the overlapping of different sources and, with reference to the contribution of the transport sector, different traffic typologies: residential, tourist, commuting, urban logistics, heavy and light duty).

All Interreg studies on environment and mobility in the Alpine Space shows that most of the emissions sourced by the transport activities originate from traffic and moves around the urban areas of the Alpine regions.

Specific critical factors for mobility in the mobility urban areas include weather conditions and climate, as there is an evident correlation between thermal inversion and the concentration of polluting emissions in the mountain valleys, in the same that the former is favoring the latter.

Moreover, socio-economic and development factors often play a role in determining a specific stress in urban centers, due to concentrations of pollution from different sources in the same locations.

Historically, several towns have developed along in the main transalpine corridors, where international freight flows, regional logistics, e-commerce drop activities, tourist displacements as well as local and urban traffic overlap.

Externalities in the Alpine urban and metropolitan areas are to be in correlations to the scale economies, efficient trade and development of business districts and supply chains.

At the same time, also different sources of pollution and greenhouse emissions tend to sum one to the other in the Alpine urban areas.

3. THE EUROPEAN LEGISLATION

The sustainable mobility paradigm was first fully affirmed by the European Commission in the 2011 Transport White Paper, in which the European strategy takes a broader character, setting a target of -20% reduction of greenhouse gas emissions from the transport sector by 2030 compared to 2008.

The Commission subsequently pursued the development model outlined in the White Paper: the decisive turning point was given by Regulation 443/09, updated in 2014, and Regulation 510/11, with limits for CO2 emissions from new cars and light duty vehicles.

With the publication of the "Clean Mobility Package" on last November 2017 and subsequent upgrades, the European Commission proposed a series of measures aimed at accelerating the transition to low emission vehicles, promoting the use of alternative fuels and supporting the competitiveness of European industry to meet the challenges of sustainability and "Green New Deal" programs.

Such push has also been promoted by the EU Regulations on "Green Public Procurement", implemented by Member States, which has defined increasingly strict criteria ("Minimum Environmental Criteria") to ensure that the purchase of vehicles by Public Companies is oriented towards products with low environmental impact.

The most recent legislation, with EU Regulation 2019/631 of the European Parliament and of 17 April 2019 of the European Council, has defined new performance limits on CO2 emissions from passenger cars and light duty vehicles, defining a reduction of -15% of emissions by 2025 and -30% by 2030.

The Directive 2014/94/Eu dealt with the development of infrastructure in support of green fuel vehicles (BEV, PHEV, CNG, LNG, Bio-CNG, Bio-LNG, FCEV, LPG), setting specific targets for the development of production and distribution plants and networks that Member States will have to comply with by specific deadlines.

Finally, the European Parliament Resolution of 13 March 2019 on Energy and Clean Air urges Member States to implement actions and policies to improve air quality in urban areas.

4. INTERVENTIONS AND MEASURES

In mountain cities, some main trends of mobility can be identified on the basis of specific vocation of the city centers, generating 3 macro-policies finalized to improve the air quality, according the characteristics of the urban areas:

- Towns with tourists and environmental vocation: car free zones are widely introduced and public transport services are improved, allowing in any case the sharing mobility by alternative fuels vehicles.
- Towns with remarkable development of trade: mobility policies aim to an efficient use of commercial areas, through parking management and time limits encouraging short-time parking; selected accessibility based on the vehicles typologies, favouring the

soft mobility (bike and electric scooter) and circulation of the alternative fuels vehicles, both cars and commercial vehicles.

- Towns with industrial and productive vocation : modal integration policies and park pricing management are intended to discourage long-time car parking and select flows in the central business districts. In the last time, also under the boost of Covid-19 crisis, the increasing "Smart Working" activities are contributing to reduce the impact of private commuting displacements on the industrial and productive areas

Accurate, knowledge-based and dedicated planning is required in mountain urban areas. It should consider several aspects and adopt an integrated approach, in which some principles (briefly recalled below) are often included.

- Planning harmonization – short and long-term plans should aim evolution of an integrated transport system. Harmonization can also be the result of the engagement of different levels of government, having distinctive responsibilities on planning policies at different step (local, regional, macro-regional, national, trans-European).
- Flexible & multi-vehicle mobility management – different vehicles should be selected according to the mission of displacement and relative distance to the city center. The car/bike sharing and soft mobility can integrate the public transport services, to be implement by tramway and/or low and zero emission buses.
- Limits to the accessibility of the city center – a reduction of the number of vehicles accessing to the historical city centers can be achieved by a access-pricing policies, banning the circulation and parking and developing Park&Ride areas and appropriate shuttle services to get to the center of town. In many towns, the access on the historical centers is allowed only to the electric cars, scooters and bikes and to the alternative fuels commercial vehicles to the urban logistics activities. The enforcement is ever more efficient following the improvement of ITS system.
- Shuttle Buses and Light Transit lines to the city center – integrated shuttle lines – using low emission buses or tramways) to link the center of the town are often successful. Moreover, some towns more keen on tourism consider as an important factor for their mobility systems linking the bus lines with the direct link to main European cities offered by the Railway Network.
- Advanced parking management – a correct planning of parking network is a strategic factor for sustainable mobility policies, it is relating to the spatial distribution of car parks, roadside parking spaces, P&R network and charging policies (increasing charges closer the center of town). Time limits are also an effective tool to regulate the parking of shopping and touristic commuters.
- Loading Management – usually, consists of a limited timetable and dedicated places to freight drop activities (distribution and loading) inside the center of town. Road network management is handled in order to separate crossing trucks and local traffic. Measures on traffic ban for pollutant commercial vehicles (<Euro 4/IV) are growing in the alpine and pre-alpine metropolitan areas and in the transalpine axes. In any case, pricing measures are in force to access in the Central Business Areas, forecasting free accessibility only for the alternative propulsion light duty vehicles (Full Electric, Hybrid, Bio-GNC and Bio-LNG powertrains).

5. OVERVIEW OF THE MAIN CURRENT MEASURES

This overview of mobility restrictions in the urban areas of the Alpine Space includes Member States whose cities have implemented or announced LEZ where restrictions are more stringent relating to the conventional vehicles (above all, diesel vehicles, both cars and commercial vehicles).

The schemes where restrictions are framed are often complex and contain many other detailed elements, not necessarily included in this overview.

Political statements announcing the intention of phasing out certain technologies are included. When the category of the vehicles affected by the restrictions is not specified in the table, it applies to all types (PC, LCV, HDV).

The main source of information used for updating this overview is the information from national associations of mobility and automotive sector. In the table, each Member State and most cities are hyperlinked to the relevant page in the website www.urbanaccessregulations.eu . Hyperlinks to other relevant documents are provided as well.

All Delegations of the Alpine Convention WGT completed the information relating each town / city, both adding other and updated info and/or adding towns / cities promoting significant measures finalized to reduce pollutant and greenhouse gas emissions.

	Type of restriction	In force now or by 2020	2020-2025	2025 and beyond
Member State/ City or region		Rules		
FRANCE	Ban	A National Framework sets out a classification of vehicles that can be used for different purposes, among others, by cities for LEZ. The cities decide whether, where and when to do a LEZ, and what vehicle classes will be required. Windscreen stickers (Crit'Air stickers, from 5 to 1) defined at national level show the vehicle class. To enter the LEZ, the vehicle must have the sticker required by the LEZ standard. The Euro standard requirements to get the Crit'Air stickers 5, 4, 3 or 2 are more stringent for diesel vehicles than for other vehicles. Moreover, no diesel vehicles can be granted the Crit'Air sticker 1, which in practice means that cities that will decide to require the Crit'Air sticker 1 will *de facto* ban diesel vehicles from the city. In the Framework of the national rules, Lyon, Grenoble Strasbourg and Paris have implemented LEZ.		
Chambery		Pollution emergency measures for periods of high pollution: Level 2: alert: Crit'Air sticker mandatory More than two days of alert: Ban vehicles <3.5Ton Crit'Air 1 and 2 If situation continues, aggravated alert comes into place Crit'Air sticker 3 The Prefect can further reduce the number of classes of vehicles allowed to circulate Electric vehicles can circulate during pollution episodes but need Crit'Air sticker.		
Grenoble Metropole		After 6 days of pollution peak: Diesel Euro 2 (Crit'air 5) PC & LCV Diesel Euro 3 (Crit'air 4) PC & LCV Diesel Euro III (Crit'air 5) HDV Diesel Euro IV (Crit'air 4) HDV		
GERMANY	Ban / Incentives	In Germany, there are currently about 60 LEZs in place, covering more than 80 cities. Windscreen stickers ("Plakette") defined at national level show the vehicle Euro standard. Almost all LEZs now require a "Green sticker" for access. To obtain a green sticker, vehicles need to comply with Euro 3/III + DPF or Euro 4/IV, Euro 5/V, Euro 6/VI for diesel vehicles and at least with Euro 1/I with catalytic converter for petrol vehicles. However, many air quality management zones/cities still do not meet NO2 air quality European targets. A federal court ("Bundesverwaltungsgericht") ruled that additional access restrictions are legally possible by existing German law if no other means exist to meet the air quality targets and as long as the restrictions are proportionate. According to the ruling, additional access restrictions might apply to diesel vehicles below Euro 6/VI and to petrol cars below Euro 3/VI.		

		The authorities on local/regional level recently approved their local Clean Air Programmes ("Luftreinhalteplan"), including specific additional access restrictions and sustainable mobility measures. At the federal level, discussions are on-going to update the sticker system and to introduce a new blue sticker with stricter requirements (e.g. only Euro 6/VI for diesel). This could be a basis for a Federal-harmonised implementation of local access restrictions. In all the motorway network (urban rings included) LNG and alternative fuel trucks circulate for free, by the MAUT exemption (untill 31 of december of 2020, Bundestag is approving a new deadline, probably 31 of december 2022).		
MUNICH		Minimum standard of Diesel Euro 4(PM), Petrol Euro 1 / green coloured sticker Police checks if proper sticker is displayed in the windscreen. Even if the vehicle meets the emissions standard, but there is no sticker in the windscreen, the vehicle is illegal in the zone. General exemption for trips to the Market Hall on Schäftlarn Straße. In this case, you do not need an exemption and you can drive into the LEZ without a sticker.	In Ring, LNG and alternative fuel trucks circulate for free, by the MAUT exemption new deadline, probably 31 of december 2022	
ITALY	Ban / Incentives	Italy has many different LEZ with differing standards and time periods. More than 110 cities have implemented them, most apply to PC only and almost all require more stringent Euro standards for diesel vehicles. A special agreement signed by Piedmont, Lombardy, Veneto and Emilia Romagna regions finalized to reduce the pollutant emissions ("Clean Air Dialogue") Free circulation ever for BEV No fuel excise for C-LNG		
MILAN		Traffic ban for >Diesel Euro 5/V or Diesel Euro 4/IV+ DPF Access Pricing in the Area "C" All conventional engines (free for BEV and PHEV) Ownership Tax exemption for Alternative fuels vehicles (both cars and commercial vehicles BEV, CNG, LNG, Hydrogen)	From 1.01.2023 Diesel Euro 6/VI	From 1.01.2028 Diesel ban – Cars From 1.01.2029 Diesel ban – LCV, HDV
TURIN		Traffic Ban for Diesel Euro < 4/IV – all vehicles		
		at times of high pollution: Ban for < Diesel Euro 6/VI or Ban for all Diesel vehicles		
CITIES >30.000 PIEDMONT, LOMBARDY, VENETO		Traffic Ban for Diesel Euro 4/IV – all vehicles Lombardy (+ Trento / Bolzano Prv) Ownership Tax exemption for Alternative fuels vehicles (both cars and commercial vehicles BEV, CNG, LNG, Hydrogen)		from 1.10 2025: Traffic Ban for Diesel < Euro 6/VI

AUSTRIA	Ban	From 1st May 2017 the official Austrian sticker, that shows the Euro standard of the vehicle, has to be put on the windshield of the vehicle.		
TIROL / INNSBRUCK		Minimum standard that has to be met by lorries > 7.5t on the A12 between km 6,35 and 90,00: Ban for non-transit traffic: * From 1 January 2020 o Diesel Euro 4 (lorry without trailer) * From 1 January 2021 o Diesel Euro 5 * From 1 January 2023 o Diesel Euro 3 Ban for transit traffic: * From 31 December 2017 < Diesel Euro 4 * From 31 October 2019 < Diesel Euro 5 * From 1 January 2020 < Diesel Euro 6 and LNG (registreted before sept 2018) Further transit limitation for certain goods Electric and H2 vehicles > 7.5t are allowed to circulate in the area Exempions Journeys to and from the train terminal of Hall in Tirol, driving towards the West and the train terminal of Wörgl driving towards the East for the loading of goods, if this can be proved by a relevant document. When air pollution is high the speed limit for passenger cars is reduced from 130km/h to 100km/h.	From 2023 Ban transit for certain goods for all Diesel Commercial Vehicles Exemption for alternative fuels trucks, only	

SLOVENIA	Ban			
LJUBLJANA		Ljubljana Access Regulated – Pedestrian Zone Ban for all vehicles Residents of the access regulated area are allowed to enter the zone with a special permit Permits only for delivery, transport, emergency transports Electric vehicles are allowed to circulate in the area		
SWITZERLAND	Regulation	In general, Switzerland, air pollutants are regulated by the Swiss Ordinance on Air Pollution Control (OAPC), which is based on the Federal Act on the Protection of the Environment. The Ordinance (status 2018) defines air quality standards for air pollutants according to the WHO recommendations of 2005, which are for some air pollutants stricter than the current limit values set by the EU clean air framework. For PM10, the annual air quality standards are set at 20 µg/m³ in Switzerland and in line with WHO guidelines, and 40 µg/m³ in EU member states. The limit value for the daily mean of PM10 is set at 50 µg/m³ for all countries; For PM2.5, the upper limits of air quality standards are set at 10 µg/m³ in Switzerland in line with the WHO guidelines and at 25 µg/m³ in the EU member states.		
MONACO	Incitation/Action	Mobility is one of the main challenge of the Government of Monaco since it concerns both sustainable development and public health. It plays also an important role at the economic level. The main actions are focuses on: - Development of "clean" public urban transports: all the buses from the Compagnie des Autobus de Monaco are using diester, a cleaner fossil fuel, aiming to an electrical fleet within 2025. - Development of multimodal clean transports: electrical car sharing in free-floating, electrical bike-rental - Incitative rate to encourage the use of the parking (about 15500 parking places) at the entrance of the Principality, and then use of public transport thanks to correlated public transport offers. These parking are under advanced parking management - Development of a huge network of public escalators and lifts to facilitate walking - Financial support, started in 1994, to purchase electrical or hybrid-gasoline-electrical vehicles (about 5% of the road vehicle fleet) - Ban of heavy vehicle transit at the crowded hours (between 8 and 9 o'clock in the morning) to favour the circulation Monaco is collaborating with the PACA Region to favour the intermodal transport, combining offers on bus/train both valid on the two territories.		
	Regulation	Monaco is comparing its data to the European Air Quality Directives limit values, information and alert threshold, on the basis of common methods and criteria, for the pollutants PM, O3, NOx, SO2, CO and heavy metals, with a long term WHO target for 2030.		

6. RECOMMENDATIONS

In the face of an ever-changing demand for mobility, the measures adopted by Member States to improve air quality, reducing emissions of pollutants and greenhouse gases, have the multiple strategic objectives of:

- to directly or indirectly promote the renewal of the fleet of vehicles on the road;
- to build the infrastructure for the diffusion of alternative fuels;
- to encourage the diffusion of low environmental impact fuels from renewable sources, for example Biomethane;
- optimize mobility and accessibility through management with ITS systems;
- encourage parking turnover in parking lots and the integration of parking lots with LPT lines;
- spread soft mobility and sharing mobility;
- to regulate the loading-unloading activities in urban areas, taking into account the growth of e-commerce.

The measures taken in Alpine cities and regions to improve air quality are increasingly geared towards limiting the circulation and parking - as well as delivery activities for urban and regional logistics - of the most polluting vehicles on ever larger urban, metropolitan and regional areas and/or routes.

These tools allow administrations to intervene promptly in cases of exceeding the concentration thresholds of pollutants, in particular for NOx and PM10, in order to avoid incurring the infringement procedures provided by EU regulations.

Taking into account these factors, which are now well established, the following Recommendations are set out in order to determine sustainable mobility policies that can be - as far as possible - homogeneous for the Alpine Space:

1. to strengthen local public transport services, to be exercised with the increasingly widespread use of tramways and/or buses with alternative power supply (Full Electric, Opportunity and In-Motion Charging, Bio-CNG, H2 Fuel Cell);
2. to enhance sharing services, to be exercised through the integrated use of car-sharing, scooter-sharing and bike-sharing, in turn integrated with LPT and rail services;
3. introduce structured traffic limitation measures for cars and vans <euro 5, with homogeneous rules and timetables at least on a regional scale, with premiums for cars and vans with alternative fuel supply to diesel (Full Electric, Hybrid, Bio-CNG, H2 Fuel Cell);
4. optimize traffic and parking management - also from the point of view of tariff integration and payment methods.- through the use of ITS systems and special Apps adequately advertised at the service of users;
5. to introduce with the necessary gradualness measures for the selection of HDV heavy commercial traffic on the Alpine crossing roads tangent to cities that still allow free circulation only to HDV heavy commercial vehicles with alternative power supply to diesel (Full Electric, C-LNG. Bio-C-LNG, H2 Fuel Cell);
6. to organize in a homogeneous and structured way the regulation of urban logistics, in order to reduce the impact of the growing phenomenon of commercial traffic generated by e-commerce activities;
7. to implement the infrastructure for the supply of alternative fuels, in accordance with the AFID Directive 2014-94-Eu

7. BIBLIOGRAFY

ENEA-CNR – “Per una Transizione Energetica Eco-razionale della Mobilità” - 2019

Eu Commission – “Alternative fuels for sustainable mobility in Europe” – 2019

Eu Commission – “Eu Launches Clean Fuel Strategy” – 2020

Eu Commission - “Urban Access Regulations” – 2018-2019-2020

European Regional Development Fund – “Policy Guidelines for Sustainable Mobility in rural and Mountain Areas” - 2014

Fondation Bouygues Immobilier – “Demain la Ville” – 2020

Freight Leaders Q26 – “E-Commerce and Logistics” – 2017

Institute for Competivness – “New Mobility – Matching the Data Revolution and the Sustainabilty Challenge” – 2018

SWOMM – “New Perspectives of Urban Mobility in Mountain Towns” – 2010