Società Italiana degli Economisti dei Trasporti e della Logistica
XX Scientific Meeting, "Mobility and the city: policies for sustainability"
Milan, 20-22 June 2018

Policy measures to reduce the external costs of freight transport: the case of Brenner

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LAYOUT

1. Description of the Brenner corridor
2. External costs along Brenner
3. Measures to encourage the shift to rail
4. Focus on Toll+
5. Conclusions

WHY BRENNER?

Cento km di coda sull'Autobrennero: il lunghissimo serpentone di Tir

A causare il caos è stata la festività del giorno dell'unità tedesca, celebrato martedì 3 ottobre: il governo di Berlino ha imposto il blocco del traffico pesante.

di Redazione web e Corriere del Trentino

Corriere della Sera, 4 October 2017

Brennero, si consuma lo strappo tra Italia ed Austria

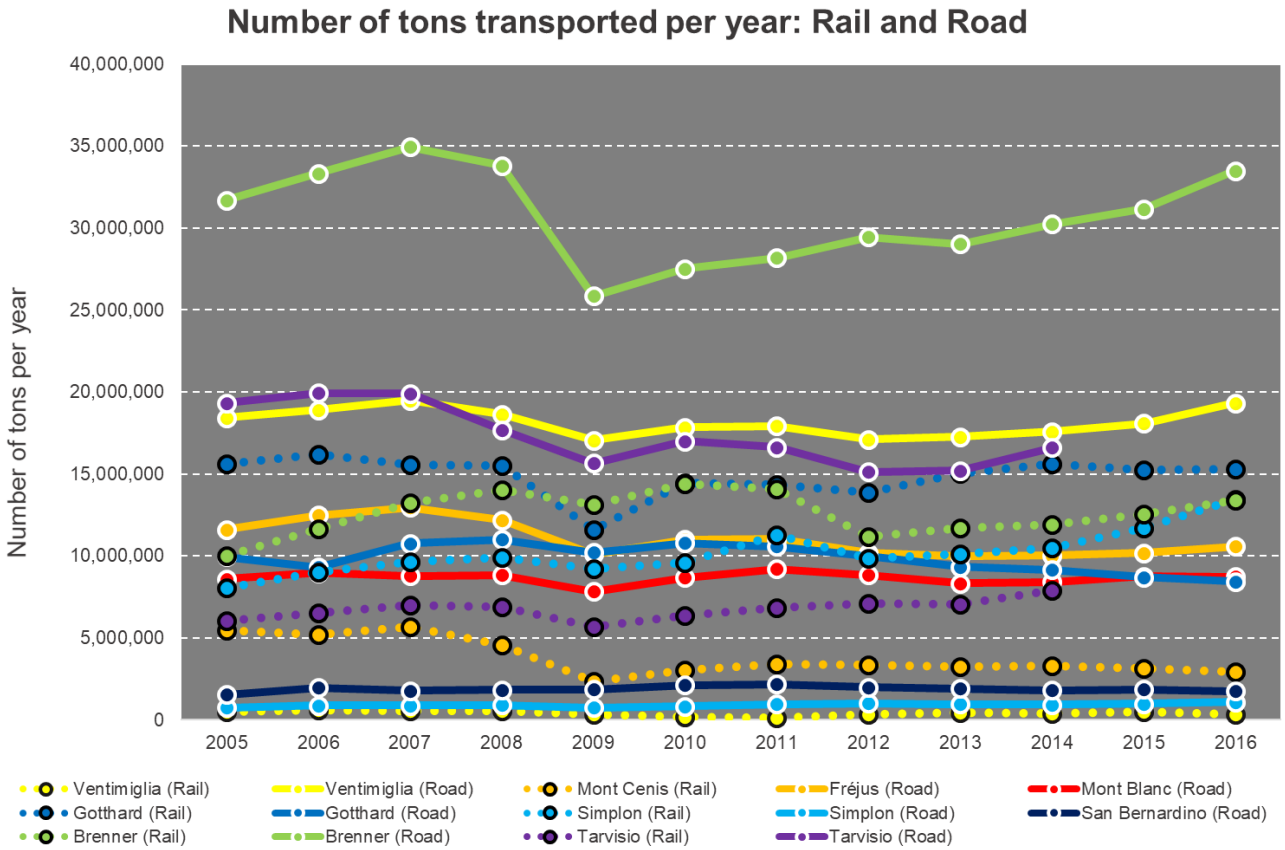
Il Tirolo austriaco ha abbandonato il vertice sul traffico pesante al Brennero senza aver firmato il documento finale. Il ministro Toninelli: "Inaccettabili blocchi unilaterali"

Traffico Brennero

12 giugno 2018 A- A+

Giornale del Trentino, 12 June 2018

COMPARISON BETWEEN TRANSALPINE CORRIDORS



BRENNER:
transalpine corridor with the highest freight volumes

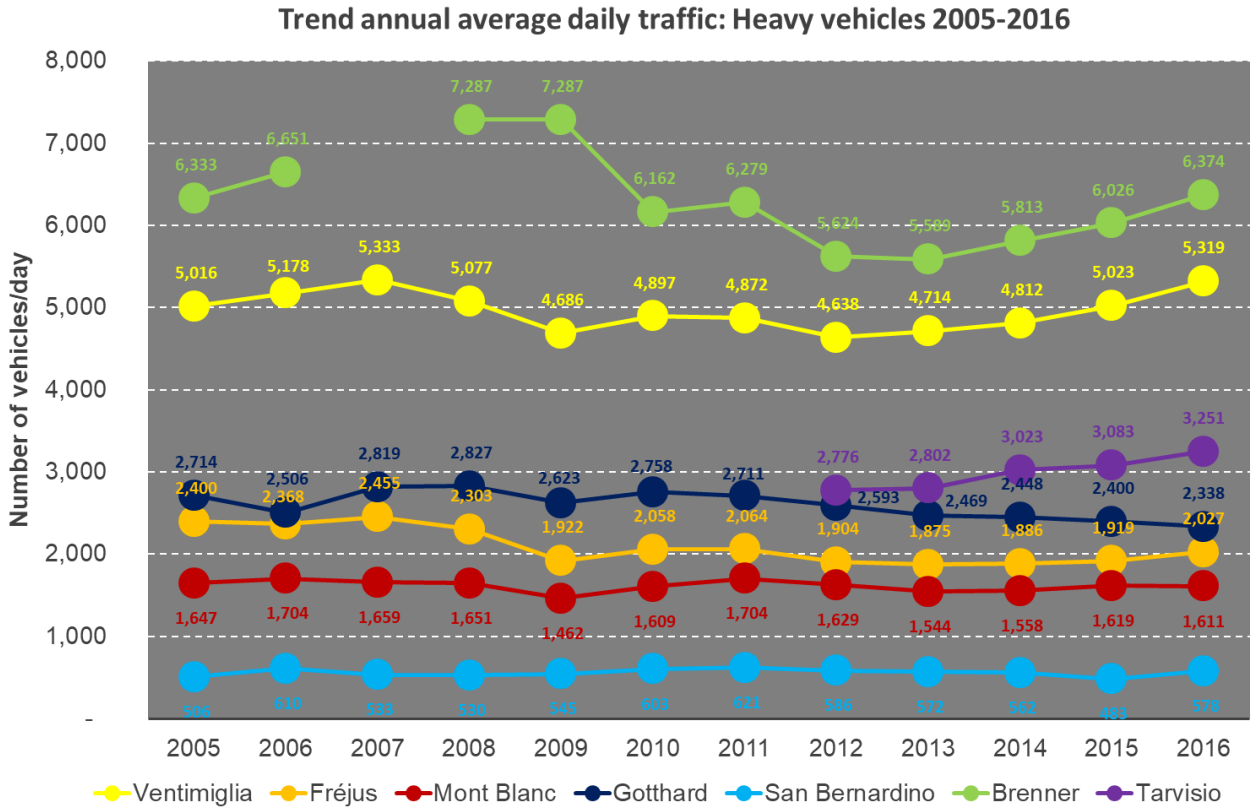
Modal Split:

ROAD: 71%

RAIL: 29%

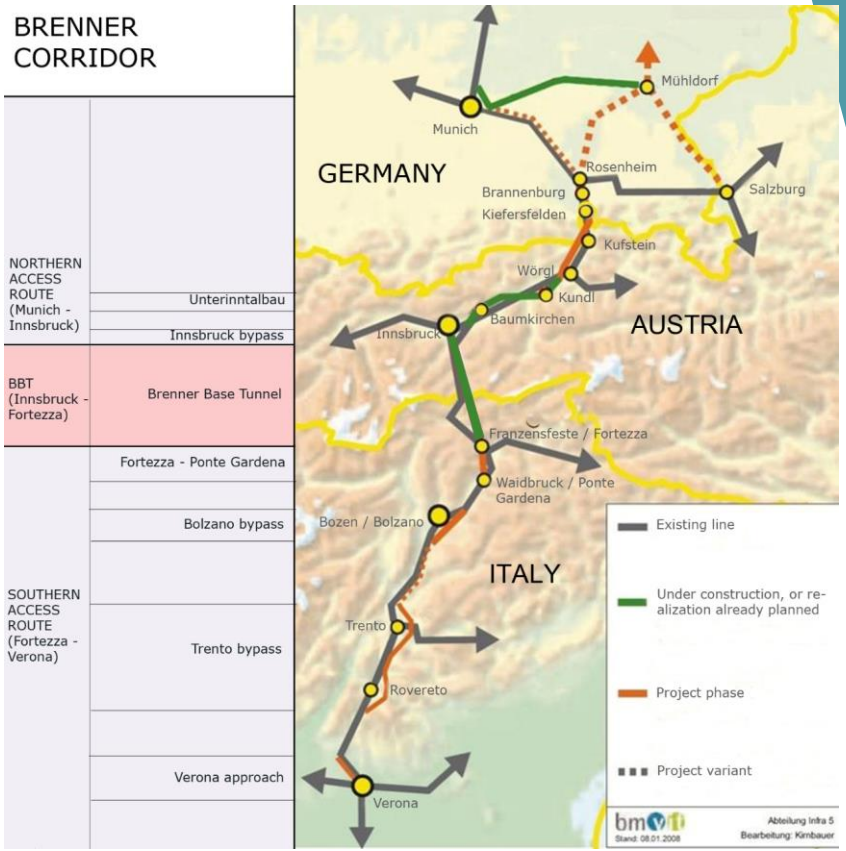
Source: iMonitraf!, 2018

COMPARISON BETWEEN TRANSALPINE CORRIDORS



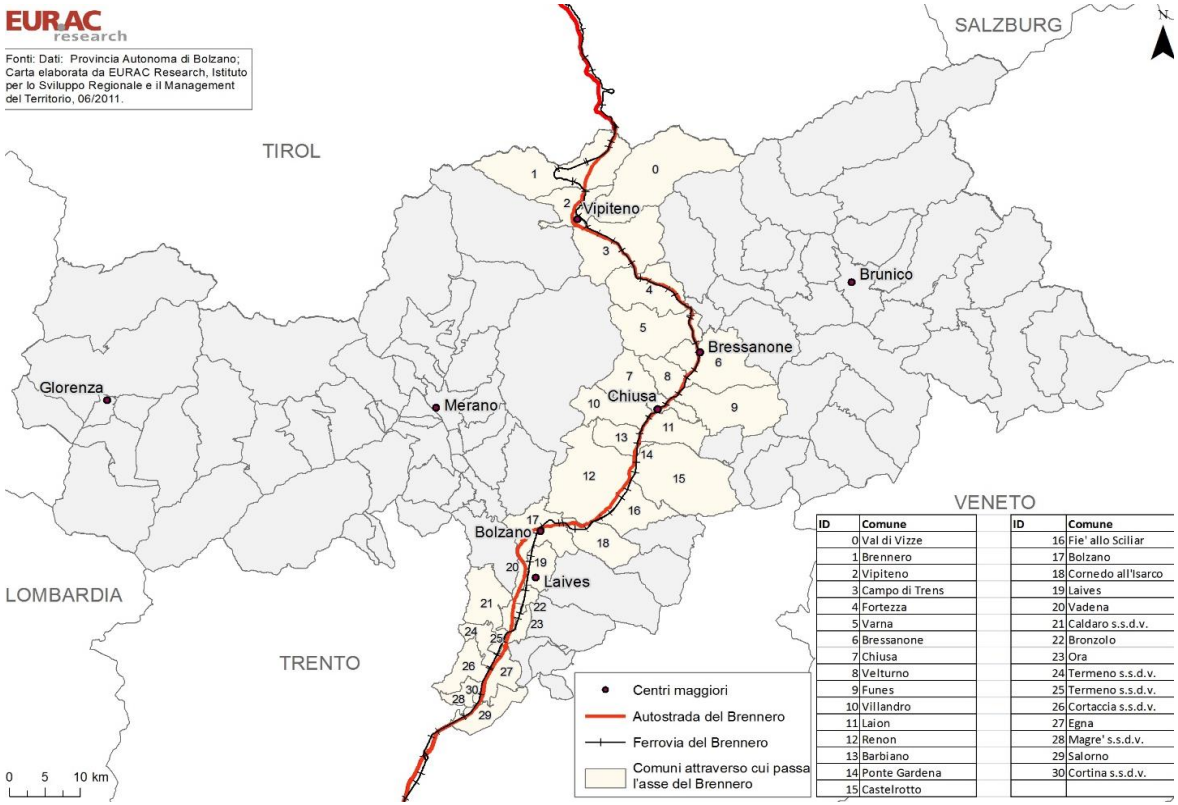
Source: iMonitraf!, 2018

THE BRENNER CORRIDOR:
DESCRIPTION OF THE NEW HS/HC LINE

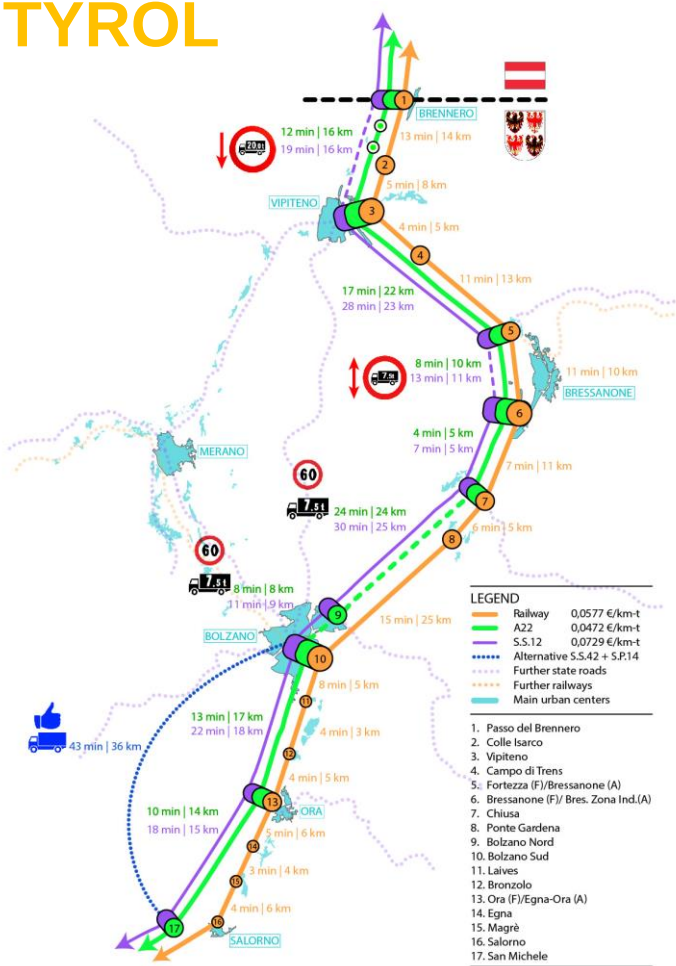


1. **Part of the TEN-T corridor n. 5**
   (Helsinki – La Valletta)
2. **Northern access line:**
   Munich (D) - Innsbruck (A)
3. **BBT:**
   Innsbruck (A) - Fortezza (I)
4. **Southern access line:**
   Fortezza (I) – Verona (I)
5. **Construction:**
   2008-2026 BBT, 2035 (?) Southern access line

THE BRENNER CORRIDOR IN SOUTH TYROL

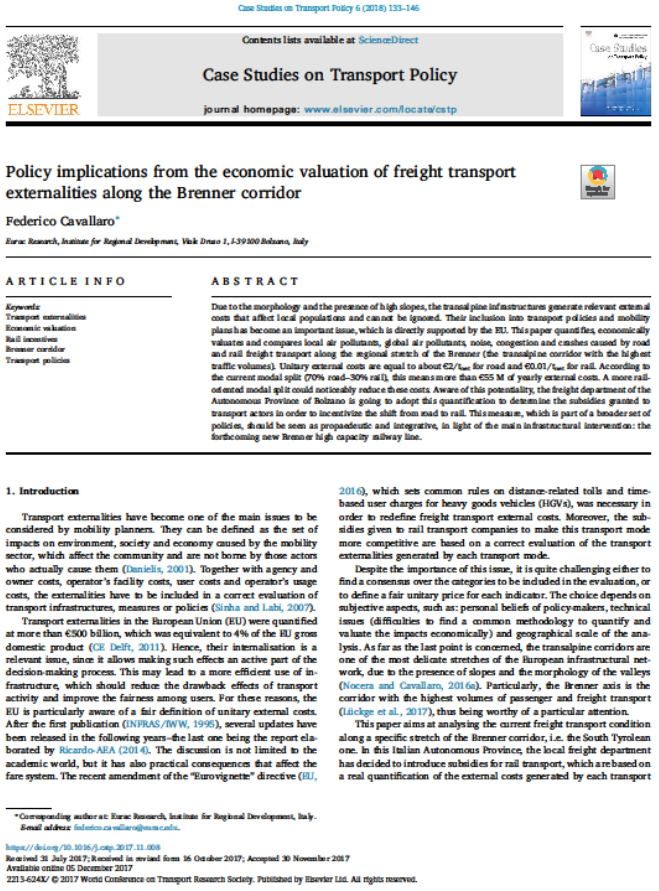


ID	Comune	ID	Comune
0	Val di Vizze	16	Fie' allo Sciliar
1	Brennero	17	Bolzano
2	Vipiteno	18	Cornedo all'Isarco
3	Campo di Trens	19	Laives
4	Fortezza	20	Vadena
5	Varna	21	Caldaro s.s.d.v.
6	Bressanone	22	Bronzolo
7	Chiusa	23	Ora
8	Velturno	24	Termeno s.s.d.v.
9	Funes	25	Termeno s.s.d.v.
10	Villandro	26	Cortaccia s.s.d.v.
11	Laion	27	Egna
12	Renon	28	Magre' s.s.d.v.
13	Barbiano	29	Salorno
14	Ponte Gardena	30	Cortina s.s.d.v.
15	Castelrotto		



THE BRENNER CORRIDOR: EXTERNAL COSTS

- An economic valuation of the external costs deriving from railway and road transport has been performed.
- It constitutes the technical basis for the request of incentives to the EU for ACT and UCT.
- Quantification is made thanks to primary data given by RFI and highway A22
- Adoption of two road type vehicles and one rail vehicle



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Policy implications from the economic valuation of freight transport externalities along the Brenner corridor

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ABSTRACT

Due to the morphology and the presence of high slopes, the transalpine infrastructures generate relevant external costs that affect local populations and cannot be ignored. Their inclusion into transport policies and mobility plans has become an important issue, which is directly supported by the EU. This paper quantifies, economically valuates and compares local air pollutants, global air pollutants, noise, congestion and crashes caused by road and rail freight transport along the regional stretch of the Brenner (the transalpine corridor with the highest traffic volumes). Unitary external costs are equal to about €2/1_{000} for road and €0.01/1_{000} for rail. According to the current modal split (70% road–30% rail), this means more than €55 M of yearly external costs. A more rail-oriented modal split could noticeably reduce these costs. Aware of this potentiality, the freight department of the Autonomous Province of Bolzano is going to adopt this quantification to determine the subsidies granted to transport actors in order to incentivize the shift from road to rail. This measure, which is part of a broader set of policies, should be seen as propaedeutic and integrative, in light of the main infrastructural intervention: the forthcoming new Brenner high capacity railway line.

1. Introduction

Transport externalities have become one of the main issues to be considered by mobility planners. They can be defined as the set of impacts on environment, society and economy caused by the mobility sector, which affect the community and are not borne by those actors who actually cause them (Danielis, 2001). Together with agency and owner costs, operator's facility costs, user costs and operator's usage costs, the externalities have to be included in a correct evaluation of transport infrastructures, measures or policies (Sinha and Labi, 2007).

Transport externalities in the European Union (EU) were quantified at more than €500 billion, which was equivalent to 4% of the EU gross domestic product (CE Delft, 2011). Hence, their internalisation is a relevant issue, since it allows making such effects an active part of the decision-making process. This may lead to a more efficient use of infrastructure, which should reduce the drawback effects of transport activity and improve the fairness among users. For these reasons, the EU is particularly aware of a fair definition of unitary external costs. After the first publication (INFRAS/IWW, 1995), several updates have been released in the following years–the last one being the report elaborated by Ricardo-AEA (2014). The discussion is not limited to the academic world, but it has also practical consequences that affect the fare system. The recent amendment of the "Eurovignette" directive (EU, 2016), which sets common rules on distance-related tolls and time-based user charges for heavy goods vehicles (HGVs), was necessary in order to redefine freight transport external costs. Moreover, the subsidies given to rail transport companies to make this transport mode more competitive are based on a correct evaluation of the transport externalities generated by each transport mode.

Despite the importance of this issue, it is quite challenging either to find a consensus over the categories to be included in the evaluation, or to define a fair unitary price for each indicator. The choice depends on subjective aspects, such as: personal beliefs of policy-makers, technical issues (difficulties to find a common methodology to quantify and valuate the impacts economically) and geographical scale of the analysis. As far as the last point is concerned, the transalpine corridors are one of the most delicate stretches of the European infrastructural network, due to the presence of slopes and the morphology of the valleys (Nocera and Cavallaro, 2016a). Particularly, the Brenner axis is the corridor with the highest volumes of passenger and freight transport (Lückge et al., 2017), thus being worthy of a particular attention.

This paper aims at analysing the current freight transport condition along a specific stretch of the Brenner corridor, i.e. the South Tyrolean one. In this Italian Autonomous Province, the local freight department has decided to introduce subsidies for rail transport, which are based on a real quantification of the external costs generated by each transport

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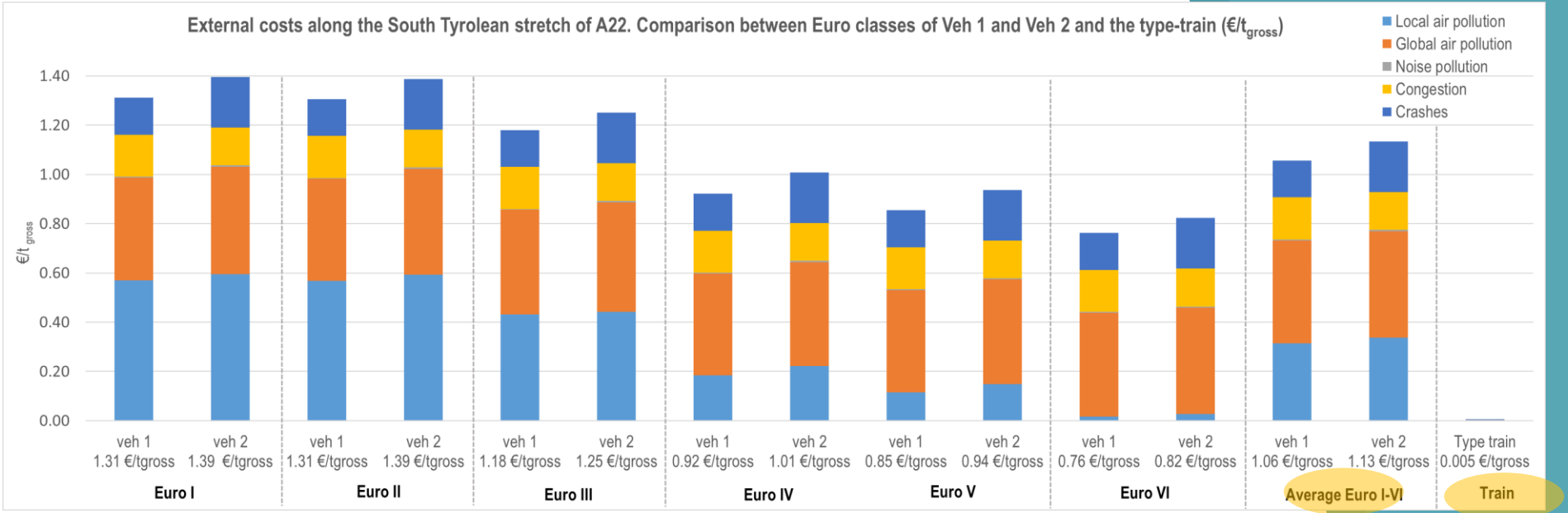
THE BRENNER CORRIDOR: EXTERNAL COSTS



Main characteristics of the type-vehicles considered in this paper								
	Type	Gross weight	Unladen weight	Load capacity	Loading coefficient	Quantity of freight	Max speed	Fuel
		t	t	t	n	t	km/h	
Veh 1	Truck trailer/articulated truck	40	8	32	0.5	16	80	Diesel
Veh 2	Rigid truck	26-28	7.5	20	0.5	10	80	Diesel

Characteristics of the type-train						
Max speed	Gross weight	Locomotives	Weight of a locomotive	Load capacity	Loading coefficient	Quantity of freight
km/h	t	n°	t	t	%	t
100	1,200	2	90	1,020	0.61	597

Fonte: Eurac Research, 2017

THE BRENNER CORRIDOR: REASONS FOR A MODAL SHIFT

Infrastructure	Distance (Km)	Time (Min)	Operational costs (€/t)	External costs (€/t)
Highway A22	116	96	5,47	1,58
Railway	120	100	6,92	0,01
Source:			MIT, 2015; Trenitalia, 2016	Eurac Research, 2017

The Autonomous Province of Bolzano, together with Trento and Land Tirol, supports the shift from road to rail with the adoption of **concrete measures**. In South Tyrol, an economic subsidy for each loading unit is provided (25€ for conventional rail transport, 33€ for combined transport).

The question that the Province tries to answer is how subsidies can be integrated by other measures and which one can be more effective.

We have made an analysis based on the literature review of existing measures and on the discussion with local stakeholders, operators and politicians, in order to understand which of them are more appreciated and are expected to provide the best results.

THE BRENNER CORRIDOR: EGCT RESOLUTION

/Staatsstraße, Schiene), insbesondere auch die Entwicklung der Lärmemissionen von Strasse und Schiene, unter Berücksichtigung des Projektes iMonitraf!, das Ende 2018 auslaufen wird, sowie in enger Abstimmung mit den anderen Institutionen, die entlang der Brennerachse tätig sind, wie EUSALP, BCP und das Forum für den Korridor Scan-Med einzurichten. Auf dieser Grundlage soll eine mögliche Lkw-Obergrenze bis 2020 geprüft werden, damit diese Ziele erreicht werden.

- Verkehrssicherheit: Um die Leichtigkeit, Flüssigkeit und Sicherheit im Straßenverkehr zu gewährleisten und die Versorgungssicherheit in den Ländern aufrecht zu erhalten, sind zudem weitere kurzfristige Maßnahmen, wie Kontrollstellen für LKW zur gesetzeskonformen Abwicklung des Verkehrs sowie zur Dosierung des Verkehrs zu nutzen, zu erweitern bzw. zu installieren.
Im Rahmen dessen verpflichtet sich die Europaregion zu gezielten Kontrollen zur Einhaltung der sozialen Standards für LKW-Fahrer, sowie der Wochenendruhezeiten.

Bis 2020 wird zu diesem Zweck auf der südlichen Anfahrt zum Brenner eine LKW-Kontrollstelle, in Anlehnung an die Erfahrungen in Tirol, eingerichtet, um die Verkehrssicherheit zu verbessern.

- Güterverkehr auf der Schiene: Der Modal Split, das Verhältnis zwischen Güterverkehr auf der Straße und Güterverkehr auf der Schiene, welcher aktuell bei 71 zu 29 Prozent liegt, ist bis zum Jahr 2027 auf ein ausgeglichenes Verhältnis und bis zum Jahr 2035 in ein umgekehrtes Verhältnis zur Ausgangslage zu bringen.
Dies bedeutet einerseits die konsequente Umsetzung einer neuen Infrastruktur (Brennerbasistunnel und Zulaufstrecken) genauso wie das Setzen verkehrspolitischer Rahmenbedingungen um die Auslastung auf der Schiene bis zur Eröffnung der neuen Infrastruktur maßgeblich zu stärken, auch durch den Ausbau von koordinierten, begleitenden Maßnahmen. Dies beinhaltet zielgerichtete Maßnahmen

all'inquinamento acustico stradale e ferroviario, lungo l'asse del Brennero (autostrada, strade statali, ferrovia), con riferimento anche a quanto ad oggi elaborato dal progetto iMonitraf!, in scadenza alla fine del 2018, e in stretto coordinamento con gli altri organismi attivi sull'asse del Brennero, quali Eusalp, la BCP e il Forum del Corridoio Scan-Med. Su tali presupposti andrà esaminata entro il 2020 l'eventuale introduzione di un limite massimo per il transito dei mezzi pesanti al fine di raggiungere i predetti obiettivi.

- Sicurezza stradale: Per garantire l'efficienza, la fluidità e la sicurezza del trasporto su strada nonché la sicurezza degli approvvigionamenti nei territori interessati vanno utilizzate, potenziate o introdotte ulteriori misure a breve termine, come l'istituzione di punti di controllo dei mezzi pesanti per gestire il traffico conformemente alla legge ed eventualmente attivare il contingentamento.
In tale contesto l'Euregio si impegna a effettuare controlli mirati ai fini del rispetto degli standard sociali minimi per i conducenti di mezzi pesanti e dei riposi nei fine settimana.

A tale scopo entro il 2020 sarà istituito in corrispondenza dell'accesso da sud al valico del Brennero un punto di controllo dei mezzi pesanti per migliorare la sicurezza stradale, così come già sperimentato in Tirolo.

- Trasporto merci su rotaia: Il modal split, che attualmente è di 71 a 29 per cento, dovrà andare in pareggio entro il 2027 per poi essere invertito rispetto ai valori attuali entro il 2035.

Ciò significa che è necessario da un lato realizzare coerentemente la nuova infrastruttura – il tunnel di base del Brennero e le sue tratte di accesso – e dall'altro mettere in atto politiche complessive in materia di trasporti volte a incrementare massicciamente l'utilizzo della rotaia fino all'entrata in esercizio della nuova infrastruttura, anche con il rafforzamento di misure di accompagnamento coordinate. Ciò

Resolution N.01/2018 of the European Region Tyrol-South Tyrol-Trentino

⇩

BRENNER CORRIDOR – FREIGHT TRANSPORT – MODAL SPLIT:

⇩

Currently: 71% by road, 29% by rail

⇩

Milestone #1 - 2027: 50% by road, 50% by rail

⇩

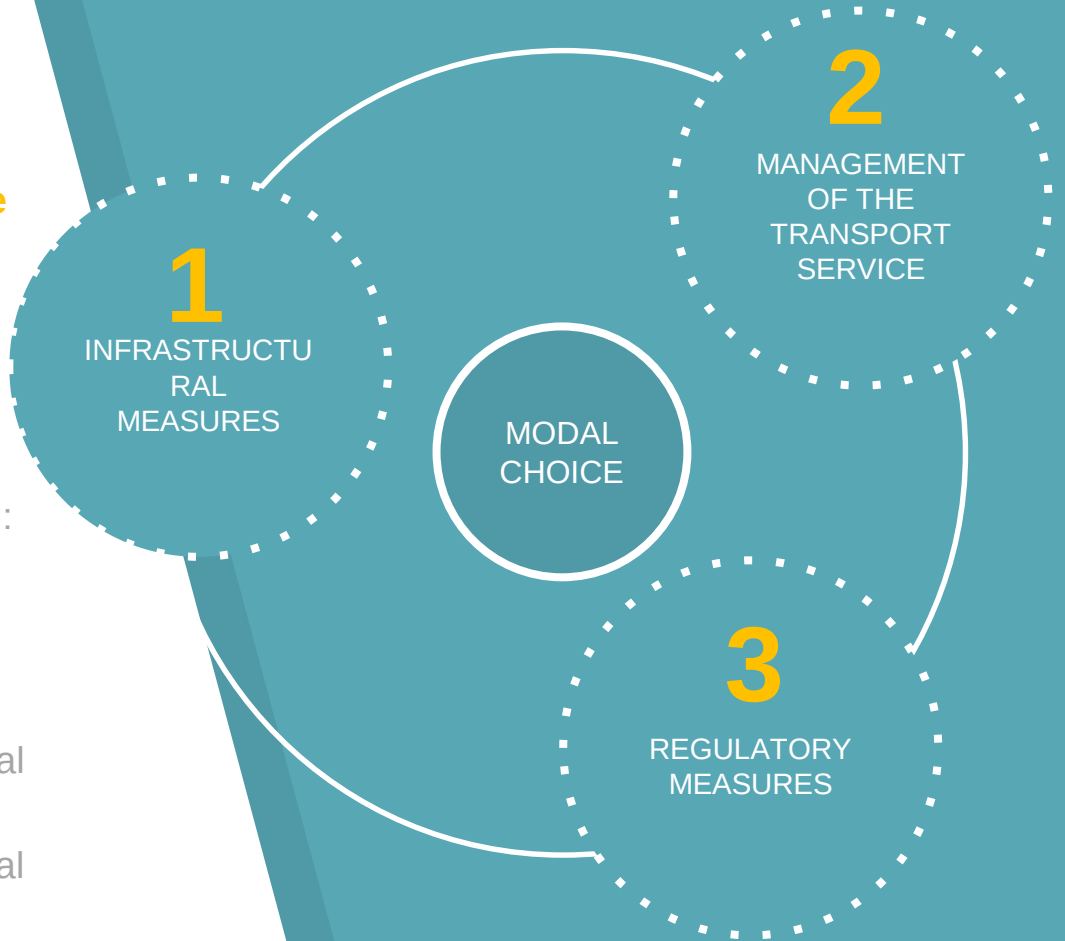
Milestone #2 - 2035: reverse trend compared to 2018 (about 29% by road and 71% by rail)

MEASURES TO SUPPORT THE MODAL SHIFT: A TAXONOMY

1. **Infrastructural measures** (railway line, wagons, intermodal terminals, etc.)
2. **Measures about the management of the service** (speed, travel time, costs, reliability, flexibility, intermodality, interoperability, etc.)
3. **Regulatory measures**

Each measure has been described concerning:

- Legislative framework
- Technical description
- Application at the different territorial levels
- Priority assigned by the provincial political level
- Possibility to be implemented at provincial level



FIRST GROUP: INFRASTRUCTURAL MEASURES

- Not possible to be implemented
- Not implemented, or implemented only partially
- Already implemented

N.	Measure	Legislation	Application							Value	Implementation at Provincial level
			UE	Italy	Interregion	Province	A22	S.S.	Railway	1-5	
1	**Renewal** of exsting **railways**	UE, N, P	●	●	●	●	●	●	●	5	**Yes**
2	**Renewal** of exsting intermodal **terminals**	UE, N, IR, P	●	●	●	●	●	●	●	5	**Yes**
3	Construction of **new railways**	UE, N, IR, P	●	●	●	●	●	●	●	5	**Yes**
4	Construction of **new intermodal terminals**	UE, N, IR	●	●	●	●	●	●	●	2	**No**

SECOND GROUP: MANAGEMENT OF THE SERVICE

N.	Measure	Legislation	Application							Value	Implementation at Provincial level
			UE	Italy	Interregion	Province	A22	S.S.	Railway	1-5	
1	Subsidies for combined transport	UE, N, P	🟢	🟢	🟡	🟢	🟢	🟢	🟢	2-3	**Yes**
2	Measures to simplify administrative procedures and controls	UE, N, IR, P	🟢	🟢	🟡	🟡	🟡	🟡	🟡	5	**Yes**
3	Accessibility to intermodal centers	UE, N, IR, P	🟢	🟢	🟡	🟡	🟡	🟡	🟡	4	**Yes/No**
4	ITS and technological measures	UE, N, IR	🟢	🟢	🟡	🟡	🟡	🟡	🟡	4	**Yes**
5	Research project	UE, N, IR	🟢	🟢	🟢	🟡	🟡	🟡	🟡	3	**Yes**
6	**Interoperability**	UE, N, IR	🟢	🟢	🔴	🔴	🔴	🔴	🟢	5	**No**
7	**ERTMS/ETCS/GSM-R**	UE, N	🟢	🟢	🔴	🔴	🔴	🔴	🟢	5	**No**
8	**Liberalization of the railway market**	UE, N	🟢	🟢	🔴	🔴	🔴	🔴	🟢	5	**No**

THIRD GROUP: REGULATORY MEASURES (PUSH)

N.	Measure	Legislation	Application							Value	Implementation at Provincial level
			UE	Italy	Interregion	Province	A22	S.S.	Railway	1-5	
1	Weight and size limits for road trasnport	UE, N, P	🟢	🟢	🟡	🟢	🟢	🟢	🔴	3	Yes
2	**Driving ban** (days/hours/seasons)	N, IR, P	🟢	🟢	🟢	🟢	🟢	🔴	🔴	2	No
3	**Driving ban** (Euro classes)	(Austria)	🟢	🟡	🟡	🟡	🟡	🔴	🔴	4	Yes
4	**Sectoral driving ban**	(Austria)	🟢	🔴	🔴	🔴	🔴	🔴	🔴	1	No
5	**Low Emission Zone/Corridor**	UE, N, IR, P	🟢	🟢	🟢	🟢	🟡	🟢	🔴	4	Yes
6	Speed and overtaking limits	N, IR	🔴	🟢	🟢	🟡	🟢	🟡	🔴	4	Yes
7	**Toll differentiation** – external costs	UE, N, IR	🟢	🟡	🟡	🟡	🟡	🔴	🔴	5	No
8	**Toll differentiation** – infrastructural costs	UE, N, IR	🟢	🟢	🟡	🟡	🟢	🔴	🔴	4	No
9	Differentiation of **registry tax** according to Euro classes	UE, N, P	🟢	🟡	🟡	🟡	🔴	🔴	🔴	5	Yes

THIRD GROUP: REGULATORY MEASURES (PULL)

N.	Measure	Legislation	Application							Value	Implementation at Provincial level
			UE	Italy	Interregion	Province	A22	S.S.	Railway	1-5	
1	Exemption from load and size limits for HGVs involved in CT	UE, N	🟢	🟢	🟡	🟡	🟢	🟡	🔴	3-4	**Yes**
2	**Exemption** from circulation bans for HGVs involved in CT	UE, N, IR, P	🟢	🟢	🟡	🟢	🟢	🟢	🟢	5	**Yes**
3	Exemption from registry tax for HGVs involved in CT	(Slovenia)	🟢	🟡	🟡	🟡	🟡	🔴	🔴	4-5	**Yes/No**
4	Reduction of registry tax and tolls for HGVs involved in CT	UE, N	🟢	🟢	🟡	🟡	🔴	🔴	🔴	5	**Yes**

THE CHOICE OF THE MEASURES: METHODOLOGY

Toll+: differentiation of the highway tolls according to the external and infrastructural costs

TOLL+

Definition: tariff system based on the **differentiation of tolls** to reduce congestion, noise and air pollution. Based on the **polluter pays principle**, as defined at the European level by the Directive «Eurovignette».

Aim: Alpine regions require a **harmonized** toll system. Toll+ encourages the **differentiation** of highway tolls, in order to support the modal shift and the financing of the infrastructures relevant for the intermodal transport.

Rationale:

- Internalization of external costs
- Environmental protection
- Support to modal shift
- Financing of relevant projects for intermodal transport

Approaches:

- Tariff schemes based on external costs: «polluter pays principle»
- Tariff schemes based on the use of infrastructures: «user pays principle»
- 30-50% of revenues for Regions to finance projects related to intermodal transport

TOLL+ and i-Monitraf! - SCENARIOS

Scenario 0 – Status quo

Highway tolls at the same level than today

Scenario 1 – Bottom-line

Highway tolls **+8%** than today (maximum allowed according to the current directive «Eurovignette»)

Scenario 2 – Extended Mark-Up

Highway tolls **+ 16%** than today

Scenario 3 – Internalization of External Costs

Minimum: Highway tolls **+40%** than today

Maximum: Highway tolls **+90%** than today

Fonte: Luckge et al., 2017

ROAD CIRCULATION IN DIFFERENT SCENARIOS

Scenarios developed by **RIGHETTI&MONTE Ingegneri e Architetti Associati** and representing the number of Km covered by each **class** (distinguishing between heavy and light vehicles), referred to the peak hour of the standard working day.

	Variation (%) compared to Scenario 0					
SCENARIO	Highway		National road		Other roads	
	Light	Heavy	Light	Heavy	Light	Heavy
Scenario 0	-	-	-	-	-	-
Scenario 1 - +8%	0%	-1%	0%	2%	0%	0%
Scenario 2 - +16%	0%	-4%	0%	6%	0%	0%
Scenario 3 – Minimum +40%	1%	-20%	-1%	31%	0%	2%
Scenario 3 – Maximum +90%	3%	-66%	-2%	98%	0%	10%

- Increase of light vehicles, which are visible in Scenarios 3 (Minimum and Maximum) are consequence of the significant decrease of HGVs, which make congestion lower and circulation along highway more competitive.
- A general shift from highway to national road can be detected.
- Being a mono-modal model, no information about rail variation can be measured.

CONCLUSIONS

1. Brenner and freight transport need a specific attention in terms of policies, in order to reduce the number of HGVs (highest at the transalpine level)
2. Existing differentiation of costs between mountain and flat areas is not sufficient to internalize the external costs produced by freight transport
3. Subsidies given to ACT and UCT by the Province (and calculated on the basis of real costs) can be a first step
4. Toll+ can be a further element to discourage the road transport
5. iMonitraf! is the ideal platform to share this idea along the entire corridor
6. The Province cannot implement Toll+ alone; a debate at the national level is necessary

Thanks for your attention!

Società Italiana degli Economisti dei Trasporti e della Logistica
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