iMONITRAF! WP 5

The indicator system

Activities 5.2-5.3

ARPA Valle d'Aosta, ARPA Piemonte, ARPA Friuli Venezia Giulia,
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CONTENT

1 Introduction and aim

Indicator set of the iMONITRAF! project

This document presents the results of the activities foreseen within the WP5 of the IMONITRAF! project referring to the elaboration of a set of indicators in order to analyses the effects of heavy transborder traffic on the environmental conditions of the Alpine area crossed by the Brenner, Tarvisio, Gotthard, Mont Blanc and Fréjus infrastructural axes.

The evaluation of the available information coming from Partner countries on the scale of a single iMONITRAF! transalpine traffic corridor imposed a rather strict selection of the first set of indicators perfected within the first project MONITRAF. Precisely the disparity of data in terms of time scale and space and of method of collection or of types of parameters considered, has led the project partners to choose a rather limited number of 12 indicators. The latter selection should, however, allow to depict a global picture of the interactions and the relations between the transport system, the social system, the economy and the territory in view of sustainable mobility.

It is appropriate to point out that many IMONITRAF! indicators have been elaborated with high levels of detail, having as reference the territories crossed by the transalpine infrastructural corridor included within the Alpine borders as defined in the Alpine convention. This approach allows to highlight the relations between international traffic, in particular freight traffic, and certain territorial parameters such as the concentration of pollutants recorded in the various monitoring stations, the populations along the corridors, noise etc. However we shouldn't conceal the fact that in some cases information was not complete enough to guarantee adequate elaboration of the indicator.

Work was done with the collaboration of all the PPs which supported the Aosta Valley ARPA by participating in the selection of the sets of indicators, in the collection of the data required and in the critical review of the indicators processed.

The iMONITRAF! Indicators set is composed by the following elements:

IMONITRAF! INDICATORS LIST AND DATA PROVIDERS

INDICATOR	DATA PROVIDER
n°01: Road traffic fluxes	Every PP
n°02: Composition vehicle fleet	Every PP
n°03: Rail traffic fluxes	Other projects and every PPs
n°04: Air pollutant emissions by road traffic	WP5 evaluation (DB Infras)
n°05: Air concentrations measured	Every PP
n°06: Noise assessment	Every PP
n°07: Toll prices	Every PP
n°08: Fuel prices	Every PP
n°09: GDP per inhabitant	Every PP
n°10: Population living close to the traffic axes	EURAC evaluation
n°11: Transport employments	Every PP
n°12: Health impact	Every PPs

2 Indicator datasheets and evaluations

The main data sources are the National Statistics Offices and, at regional-cantonal level, the national and local administrations in charge, the rail and road infrastructure managing bodies and the local environment monitoring agencies.

So as to organize data collection in the best possible manner, a fact sheet was prepared, that would contain any useful information for the PPs who had to search and produce the sets of data. All the PPs therefore filled in the spreadsheet handed out to them, in the same manner.

2.1 INDICATOR 1 – Road traffic fluxes

METADATA

Indicator:						***Road traffic fluxes***
	Number:	1	**Name:**	Road traffic fluxes		
	MONITRAF indicator	1-2	**Main category:**	Traffic	**Unit:**	vehicles/day (veh/d)
	Level:	Stations				
	Objective:	Basis for assessment of MONITRAF scenarios				
	Definition of indicator:	Yearly average of mean daily traffic of light and heavy vehicles				
	Calculation:	Total number of light and heavy vehicles per year in both directions / 365				
Data:						
	Name:	Vehicules/day (veh/d)	**Unit:**	Number	**Periodicity:**	annual
	Period:	2006-2010	**Reference period:**	2000 and 2005		
	Definition of data to be collected:	Daily number of vehicles in both directions counted at the chosen counting stations, divided into type of vehicle. At the motorway exits access (in) and exit (out) data will be collected.				

	Rhones-Alpes	**Piemonte**	**Valle d'Aosta**	**Switzerland Central Cantons**	**Canton Ticino**	**Tyrol**
Data source (citation basis):	GEIE TMB (Mont Blanc tunnel), SFTRF (Fréjus tunnel) and ATMB and AREA (for A40 and A43 highways)		Data providers: SAV Autostrade and GEIE Mont Blanc	Automatic Traffic Counts Data (1997-2005). Owner: Federal Road Office (FEDRO). Data sources: AVZ database and AVZ PDF on www.verkehrsdaten.ch	Repubblica e cantone Ticino: Osservatorio ambientale svizzera italiana, Marco Andretta +41 91 814 3817	Verkehr in Tirol - Bericht 2010; Amt der Tiroler Landesregierung, Abteilung Verkehrsplanung ; http://www.tirol.gv.at/themen/verkehr/verkehrsplanung/publikationen/
Other Comments:					Data not checked and not completed, if for one month the counter doesn't work the lacking data are not completed with statistic methods. Attention: in 2005 there has been the closing of the St. Gottardo tunnel for almost one month.	

DIFFERENT VEHICLES CLASSIFICATION SYSTEMS:

	Austria	Switzerland	Italia	France
LV	Passenger cars (Pkw)	Passenger cars (PW)	motorways: classe A Motor vehicles with 2 axis and a maximum height of 1,30 metre at the first axis.	motorways: A40: vehicle's length < 7m A43: vehicle's length < 4m
	Motocycles (MR)	Motocycles (MR)	tunnel: classe 1 and 5 (GEIE Mont Blanc)	tunnel: class 1: Travelling Vehicles or sets of which the total height is lower or equal to 2 m
	Non-classified vehicles (NkKfz)			tunnel: class 5: Motor bikes, motorcycle combinations, trikes
	Passenger cars with trailer			
HV	Light Duty Vehicles (Lfw)	Light Duty Vehicles (LW)	motorways: classe B, 3, 4 and 5 (highways)	motorways: A40: vehicle's length > 7m A43: vehicle's length > 4m
	Lorries (SoloLkw)	Lorries (LKW)	tunnel: classe 2,3 and 4 (GEIE Mont Blanc)	tunnel: class 2: Travelling vehicles or sets of which the height is more than 2m and lower than 3 m
	Trailer-Trucks(SLZ)	Trailer-Trucks (SZ+LZ)		tunnel: Class 3 :vehicles with 2 axles of which the total height is equal to or higher than 3 m
	Coaches	Coaches		tunnel: Class 4 :travelling Vehicles or sets with more than 2 axles of which the total height is equal to or higher than 3 m
				tunnel: Class D (Euro 3-4-5 and Euro 2) : Exceptional convoy (refrigerated) "A"
				tunnel: Class E (Euro 3-4-5 and Euro 2) : Exceptional convoy "B"

DATA TABLES

The data filled in the factsheet provided by the project partners were grouped in two classes as reported above with the help of the Dr. Jürg Thudium of OEKOSCIENCE.

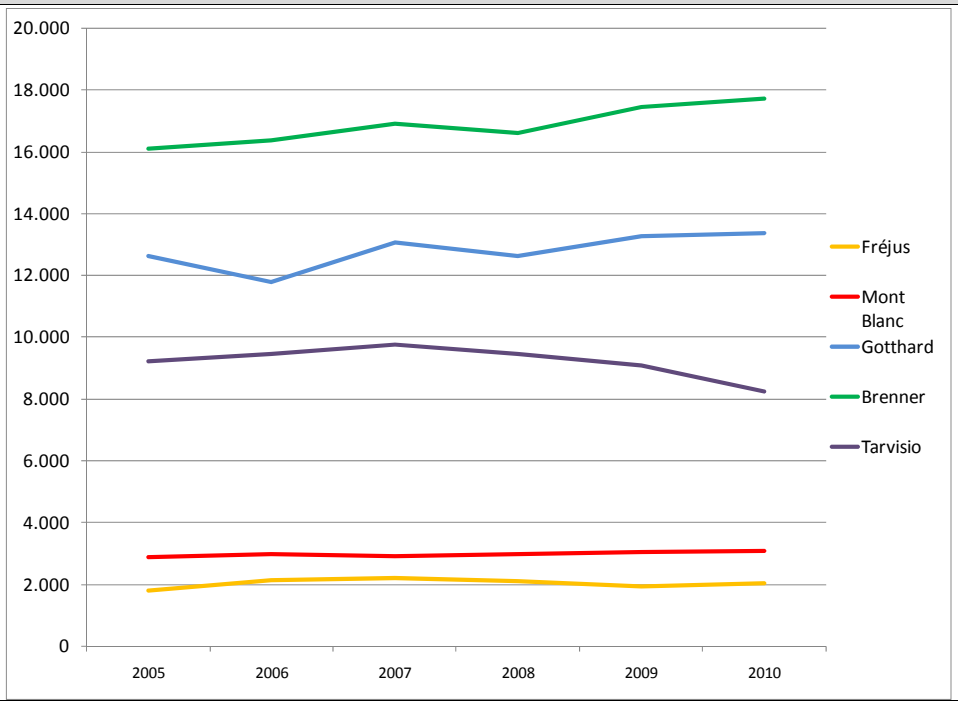
The choice of the vehicles classification is the same than the first Monitraf project: the Light Duty Vehicles were included in the Heavy Vehicles class according to the Italian highways classification system (classes “B”, “3”,”4”,”5”). This grouping avoid an under-estimation (light duty vehicles treated as cars) for the air quality and noise analysis.

The next table shows the data for the stretches of the limits and in the center of every corridor (all data collected are reported in the Annexes).

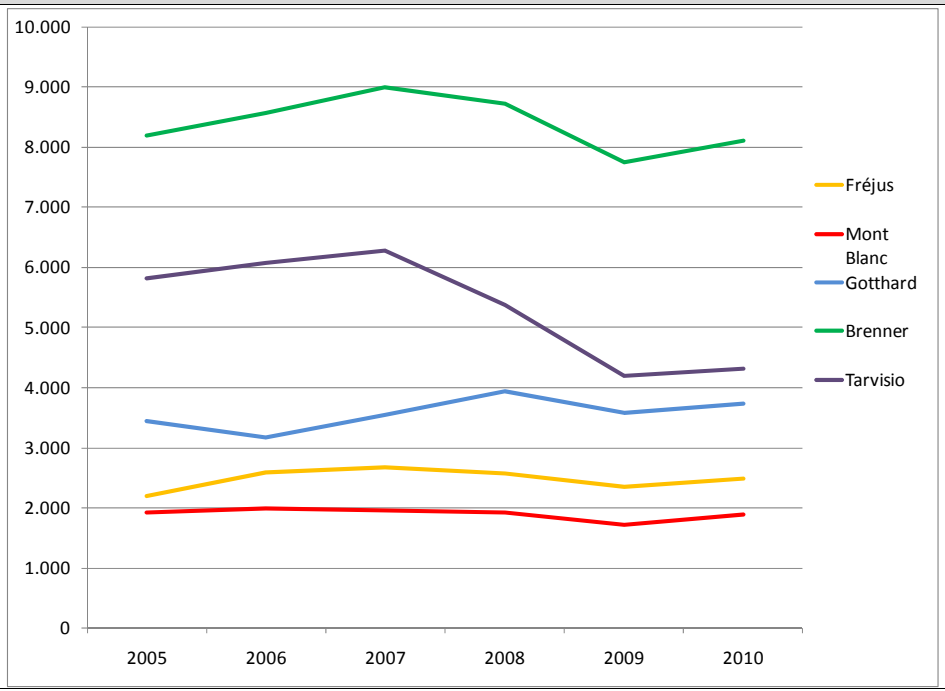
CORRIDOR	ROAD STRETCH	2005		2006		2007		2008		2009		2010	
		LVs	HVs	LVs	HVs	LVs	HVs	LVs	HVs	LVs	HVs	LVs	HVs
Fréjus	***Planaise***	17.813	5.520	18.281	5.742	18.922	5.930	19.496	5.625	20.382	4.698	20.876	5.664
	SFTRF Tunnel	1.787	2.184	2.113	2.583	2.186	2.672	2.100	2.567	1.908	2.332	2.028	2.479
	Avigliana	7.062	2.391	10.061	3.967	10.143	3.998	10.297	3.785	10.210	3.217	10.216	3.334
M. Bianco	***Eloise***	16.104	3.777	NV	NV	16.342	3.833	15.972	3.747	16.117	3.781	16.430	3.854
	ATMB Tunnel	2.867	1.911	2.968	1.978	2.916	1.944	2.976	1.903	3.038	1.709	3.066	1.879
	Pont St. Martin	18.202	4.131	18.206	4.218	18.248	4.191	17.691	4.079	18.145	3.794	17.813	4.000
Gotthard	***Seelisbergtunnel (AB)***	15.919	4.326	15.141	4.064	16.200	4.398	15.636	4.873	16.181	4.378	closed	closed
	Gotthardtunnel	12.636	3.433	11.795	3.166	13.075	3.549	12.643	3.940	13.250	3.585	13.363	3.730
	Biasca S (AS)	21.484	5.516	20.724	5.322	21.979	5.913	21.508	6.238	21.758	6.559	22.156	6.874
Brenner	***Kundl***	33.376	11.125	33.640	11.213	34.199	11.400	33.992	11.331	33.844	11.281	34.893	11.631
	Brennero-Vipiteno	16.101	8.188	16.387	8.564	16.897	8.989	16.603	8.724	17.433	7.750	17.719	8.105
	Ora-Salorno	27.646	11.805	28.462	12.176	29.081	12.517	28.276	12.140	29.343	11.093	29.380	11.484
Tarvisio	***Barriera di Ugovizza - A23***	9.206	5.807	9.421	6.077	9.738	6.274	9.430	5.376	9.062	4.195	8.235	4.319
	Gemona Osoppo	5.401	1.579	5.602	1.628	5.812	1.728	5.605	1.613	5.759	1.376	5.572	1.403

Average number of Light vehicles and Heavy Vehicles per day: trend 2005-2010

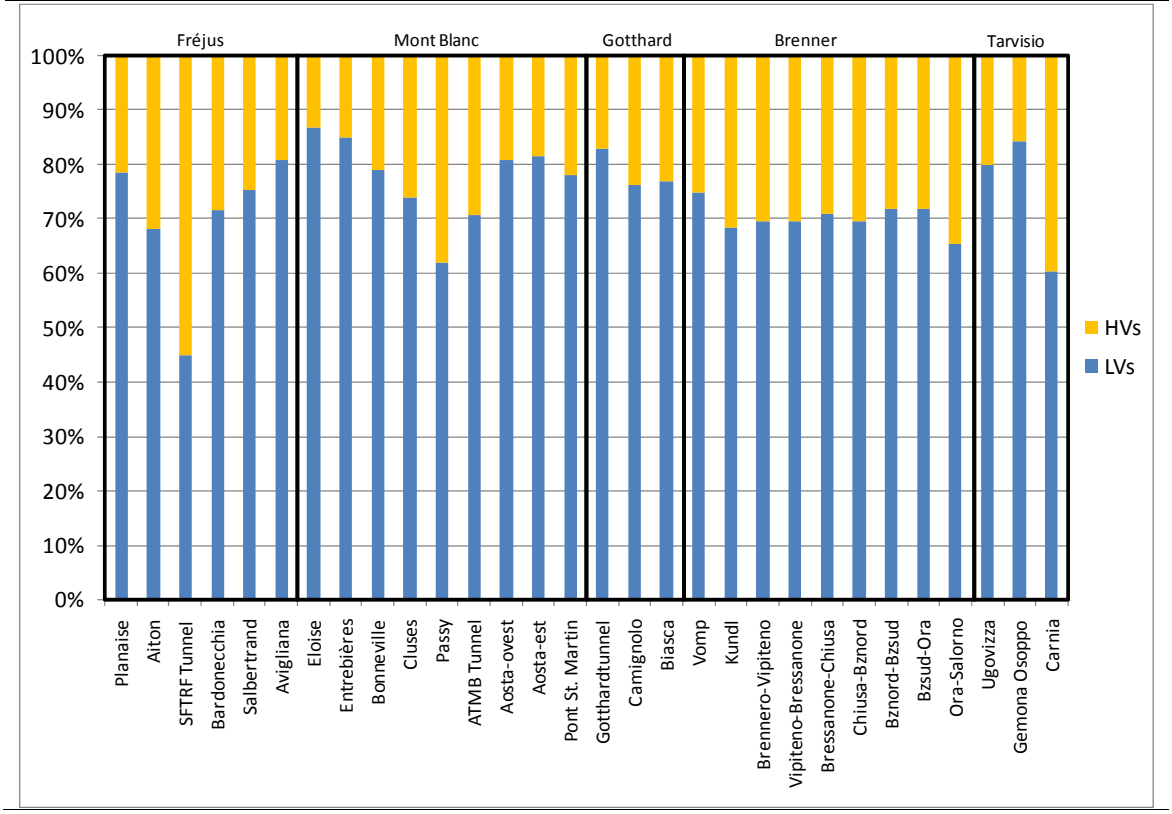
AVERAGE NUMBER OF LIGHT VEHICLES PER DAY:
TREND 2005-2010 PER CORRIDOR NEAR THE ALPINE CROSSING POINT.



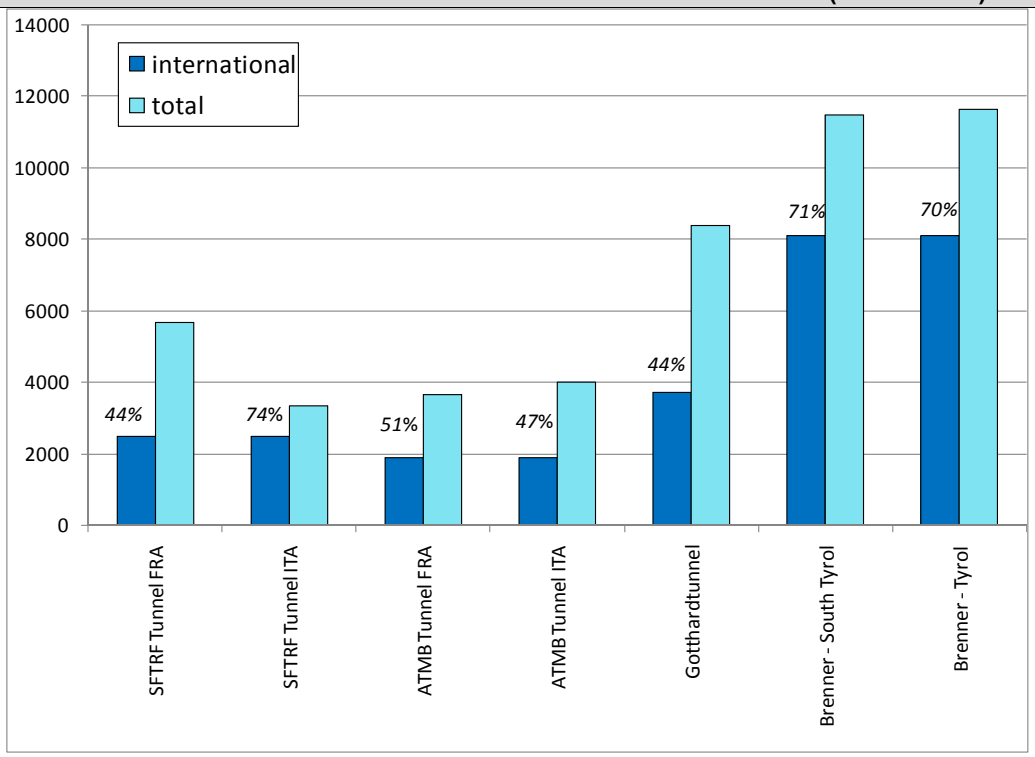
AVERAGE NUMBER OF HEAVY VEHICLES PER DAY:
TREND 2005-2010 PER CORRIDOR NEAR THE ALPINE CROSSING POINT.



HEAVY / LIGHT VEHICLES RATIOS PER CORRIDOR (YEAR 2010)



HEAVY VEHICLES TO INTERNATIONAL DESTINATIONS RATIOS (YEAR 2010)



Key figures:

HVs IMONITRAF! corridors / HVs Alpine Arc = 74% (year 2010)

Trend HVs 2008-2009 (economic crisis indicator):

Fréjus = -9%

Mont Blanc = -10%

Gotthard = -9%

Brenner = -11%

Tarvisio = -22%

Evaluation restrictions:

None.

A. General reading and data analysis

Light vehicles:

→ Two major situations: Brenner, Gotthard, Tarvisio with high fluxes and lower fluxes in the Mont Blanc and Fréjus

→ In general terms, there is an increase of fluxes from 2005 to 2010 for Brenner and Gotthard, stability for Mont Blanc and Fréjus and decrease for Tarvisio who is affected by the economic crisis effect

Heavy vehicles:

→ There are two prominent situations: fluxes in Brenner and Tarvisio are decisively higher than in the Mont Blanc, Fréjus and Gotthard which show an average daily rate below 4000 vehicles.

→ We have a decrease trend from 2005 to 2009 and a little increase from 2009 to 2010, without a return to the fluxes levels before economic crisis.

Total vehicles:

→ In general, there are different quotas between heavy vehicles and the total figures of vehicles along the itinerary of each corridor which show the different uses of these infrastructures. The values ranges are: an average of 30% in Fréjus, 25% in the Mont Blanc, 20% in Gotthard, 30% in Brenner and 20% in Tarvisio.

→ The heavy vehicles who come in the IMONITRAF! Regions passing the international border change among the corridors: from 44% French side to 74% Italian side for Fréjus, about 50 % for Mont Blanc, 44% for Gotthard and 30% for Brenner. For the Tarvisio corridor the heavy vehicles fluxes are increasing proceeding to the border.

→ The average weight rate of heavy vehicles in Fréjus, Mont Blanc and Tarvisio corridors particularly shows that the motorway traffic of heavy vehicles is noticeably related to border crossing transport and is also a constraint to other vehicles in transit. The matter can easily be explained: passages in the Mont Blanc and Fréjus corridors mainly concerns traffic of proximity such as border crossing and backwards and forwards local traffic, which is penalized by a deterrent fee (tunnel toll).

→ High fluxes of heavy vehicles in Brenner can only confirm that freight traffic is significantly present on the whole of the transit corridor

→ Low fluxes of heavy vehicles in Gotthard could be related to Switzerland's particular traffic norms.

→ Tarvisio: the Friuli data confirm a decrease for both light and heavy vehicles starting in 2007, probably due to the economic crisis.

B. Reading of trends

Light vehicles

→ General increasing trend in Brenner and Gotthard, decreasing in Tarvisio, stable in Mont Blanc and Fréjus.
→ Verification of the impact of the economic crisis with a drop of passages in Tarvisio where the diminution of vehicles has been constant for the last four years; the crisis has been significant since its start in 2008 in Brenner and Gotthard (drop in Brenner and stagnant situation in Gotthard), however, there was an evident increase of the traffic in 2009 in both corridors where figures came higher than in 2007. The crisis is not noticeable in Fréjus and the Mont Blanc. In 2010 we observe an increase for the IMONITRAF!, with the exception of the Tarvisio which is still suffering from the crisis.

Heavy vehicles:

→ Trend towards an increase of fluxes in the years 2005-2007, particularly noticeable in Brenner and Tarvisio, hardly perceptible in the other corridors, following a significant decline in the traffic for the years 2007-2009, which clearly shows the impact of the economic crisis. For 2010, the first year after the crisis, the five corridors report a general increase.
→ However, the decline is mainly noticeable in Brenner and Tarvisio, as percentage or final figures show.
→ The curve line varies compared to the line for the light vehicles, which shows a definite lack of growth of the freight traffic throughout the transalpine axes. There is an increase of traffic of passengers instead.

C. Analysis with Monitraf and general objectives

The underlined data for heavy vehicles mirror the general objectives set by the European transport policies towards a reduction of heavy duty traffic in favor of freight transfer by rail. However, such a parallel can be explained in particular with the recent economic crisis.

The Gotthard data are not consistent with the objective of the Swiss heavy vehicle traffic below 650'000 per year.

D. Use for the definition of the scenarios

Monitoring the transalpine traffic fluxes is the main objective to identify either tendencies, or situations directly linked to particular measures. The recent decline of fluxes mainly due to the economic crisis must be taken into consideration during the completion of various scenarios.

Evaluation of environmental sustainability (state at 2010):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
Light vehicles	2	2	4	5	3
Heavy vehicles	2	2	3	5	3

1 to **5** = good to bad

Evaluation of environmental sustainability (trend 2005-2010):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
Light vehicles	--	--	↑	↑	↓
Heavy vehicles	↑	--	↑	--	↓

↑ = fluxes increase

↓ = fluxes decrease

-- = stability

2.2 INDICATOR 2 – Composition vehicle fleet

METADATA

Indicator:						***Composition vehicle fleet***
	Number:	2	**Name:**	Composition vehicle fleet		
	MONITRAF indicator	3	**Main category:**	Traffic	**Unit:**	%
	Level:	Stations and NUTS 2				
	Objective:	Basis for assessment of MONITRAF scenarios				
	Definition of indicator:	Yearly percentage of vehicles referred to EURO classes in all heavy duty vehicles				
	Calculation:	a) (Yearly total number of vehicles EURO X crossing the corridors in both directions / Yearly total number of all heavy duty vehicles crossing the corridors in both directions (indicator n° 1)) * 100 b) (Yearly number of registrations of vehicles EURO X in a region (NUTS 2) / Yearly number of registrations of heavy duty vehicles in a region (NUTS 2)) * 100				
Data:						
	Name:	Vehicles/year		**Unit:** number	**Periodicity:**	annual
	Period:	2006-2008	**Reference period:**	2000 and 2005		
	Definition of data to be collected:	a) Yearly number of vehicles in both directions counted at one counting station (only tunnels and passes), divided into EURO classes.				
	Name:	Registrations/year		**Unit:** number	**Periodicity:**	annual
	Period:	2006-2008	**Reference period:**	2000 and 2005		
	Definition of data to be collected:	b) Yearly number of registrations of heavy duty vehicles divided into EURO classes per region (NUTS 2 level)				
	Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request					

Vehicles/year	Rhones-Alpes	Piemonte	Valle d'Aosta	Switzerland Central Cantons	Canton Ticino	Tyrol	South Tyrol	Friuli Venezia Giulia
Data source (citation basis):	GEIE TMB and SFTRF		Data provider: GEIE - Tunnel Mont Blanc	Traffic Data: Güterverkehr durch die Schweizer Alpen 2009 /Freight traffic through the Swiss Alps 2009 http://www.bav.admin.ch/verlagerung/01529/index.html?lang=de (German); http://www.bav.admin.ch/verlagerung/01529/index.html?lang=fr (French) Split EURO-classes of heavy duty vehicles: Data from the database on the Swiss heavy goods vehicle fee (redevance sur le trafic des poids lourds liée aux prestations, http://www.ezv.admin.ch/zollinfo_firmen/steuern_abgaben/00379/index.html?lang=fr#) provided by the Swiss Oberzolldirektion / Direction générale des douanes, Monbijoustrasse 40, 3003 Bern, www.zoll.admin.ch.		Amt der Tiroler Landesregierung, Abt. Verkehrsplanung	data not available	data not available
Other Comments:				Data provided by Ticino partner, data source FOT (see above). Comment of Ticino partner: "Best quality for 2005-2009, lower quality for 2001- 2004 due to missing data on contingents for empty tours (numbers seem plausible anyway)"	Unit is expressed in %; data are reffered to the yearly total number of heavy vehicles crossing the corridors; from 2001 to 2004 data related to the empty contingent and to the light contingent are not considered.	sample survey at the traffic controll station Kundl and Radfeld (A12) in October/November 2005		
Registrations/year	**Rhones-Alpes**	**Piemonte**	**Valle d'Aosta**	**Switzerland Central Cantons**	**Canton Ticino**	**Tyrol**	**South Tyrol**	**Friuli Venezia Giulia**
Data source (citation basis):	Ministère de l'Ecologie, du Développement Durable, des Transports et du Logement		ACI - Parco Veicolare per la Valle d'Aosta		Repubblica e Cantone Ticino, Dipartimento delle Istituzioni, Divisione degli interni, Sezione della Circolazione, Ufficio Amministrativo, Ala Munda, CH-6528 Camorino, +41 91 814 92 00	Statistic Austria, Amt der Tiroler Landesregierung, Abt. Verkehrsplanung;	Abteilung Mobilität, Amt für Planung und Gütertransport / Ripartizione Mobilità, Ufficio pianificazione e trasporto merci	
Other Comments:					situation available only for 2007 (updating: 23 March 2007), the calculation is: total number of heavy vehicles registered (in circulation) diveded into EURO classes (NUTS 2 level)	only data from a sample survey in 2005 available	a division into EURO classes is not available	

Metadata counting stations

Counting station 150 Gotthardtunnel			
	DB-Code-Nr.:	150	
	Municipality:		
	Coordinates:	latitude:	46,667516
		longitude:	8,591851
	Responsible for counting station:	FEDRO	
	Form of collection:	Motorway exit:	
		Automatic counting station:	yes
Counting station GEIE Tunnel Mont Blanc			
	DB-Code-Nr.:1		
	Municipality:	Courmayeur	
	Coordinates:	latitude:	341061
	UTM 32	longitude:	5075867
	Responsible for counting station:	GEIE Tunnel del Monte Bianco	
	Form of collection:	Motorway exit:	X
		Automatic counting station:	
Counting station TRAFORO DEL FREJUS			
	DB-Code-Nr.:		
	Municipality:	BARDONECCHIA (ITA)	MODANE (FRA)
	Coordinates:	latitude:	X
		longitude:	X
	Responsible for counting station:	1 RESPONSABLE ITALIAN SIDE AND 1 FRENCH SIDE	
	Form of collection:	Motorway exit:	TUNNEL
		Automatic counting station:	X

DATA TABLES

COUNTING STATIONS		Gotthard -SWISS	Brenner - TYROL	Mont-Blanc -FRANCE	Mont-Blanc -ITALY	Fréjus -FRANCE	Fréjus -ITALY	Tarvisio - ITALY
2005	EURO 0	12950	0	0	0	381	32	851748
	EURO 1	14800	166477	7583	6564	28342	26507	191033
	EURO 2	230325	532725	169238	161703	351103	339021	575736
	EURO 3	663225	2497148	424241	416569	421115	418956	501036
	EURO 4	3700	133181	0	0	0	0	0
	EURO 5	925	0	0	0	0	0	0
2006	EURO 0	x	0	0	0	240	x	x
	EURO 1	x	89659	4101	3726	16604	x	x
	EURO 2	x	328748	73831	69566	203094	x	x
	EURO 3	x	1823058	543964	532884	643772	x	x
	EURO 4	x	358634	0	0	0	x	x
	EURO 5	x	388521	0	0	0	x	x
2007	EURO 0	x	0	0	0	129	x	844144
	EURO 1	x	92637	3535	3184	10875	x	211819
	EURO 2	x	247032	48978	45784	147259	x	522003
	EURO 3	x	1420434	510917	500256	705159	x	608980
	EURO 4	x	524943	41961	40680	31481	x	97083
	EURO 5	x	802854	0	0	0	x	4555
2008	EURO 0	6974	x	0	0	47	x	x
	EURO 1	3689	x	2589	2364	11054	x	x
	EURO 2	56419	x	30643	27712	102363	x	x
	EURO 3	516098	x	444696	435435	549824	x	x
	EURO 4	139558	x	57782	55342	135862	x	x
	EURO 5	250262	x	68392	67585	43190	x	x
2009	EURO 0	4017	0	0	0	31	x	149064
	EURO 1	1916	26603	1031	1031	6046	x	86091
	EURO 2	26759	87066	18379	18379	51974	x	230058
	EURO 3	353047	851308	321545	321548	345073	x	223991
	EURO 4	155687	350681	73074	73074	193309	x	276019
	EURO 5	358574	1102831	119518	119518	103273	x	8304
2010	EURO 0	2850	0	0	0	32	x	x
	EURO 1	1639	20984	682	682	3955	x	x
	EURO 2	18256	77401	15022	15022	26347	x	x
	EURO 3	294678	790123	236262	236262	294129	x	x
	EURO 4	156359	325228	119353	119353	230887	x	x
	EURO 5	469447	1652974	216126	216126	192646	x	x

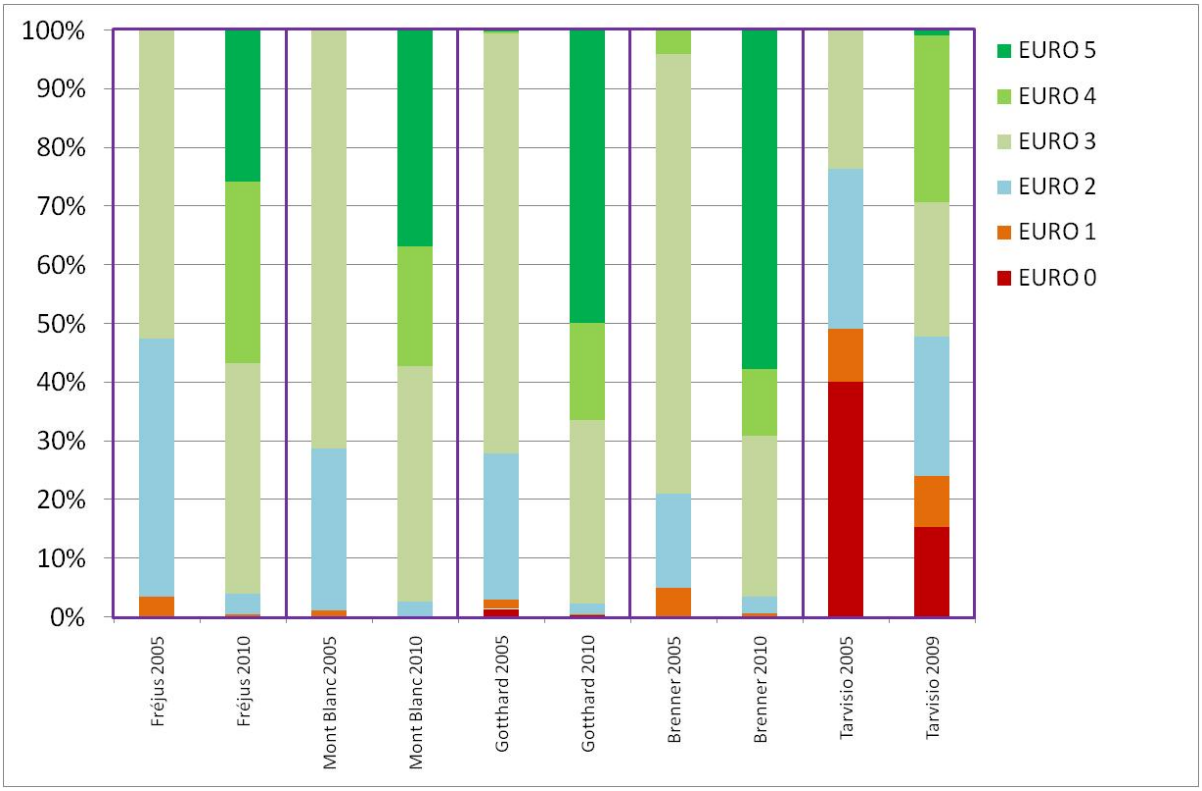
Heavy duty vehicles fleet of the IMONITRAF! corridors: counting stations (data 2005-2010 in units of vehicles, local fleet data for Tarvisio corridor)

DATA REGISTRATIONS		Central Cantons	Canton Ticino	Tyrol	Valle d'Aosta	Piemonte	Friuli Venezia Giulia
2005	EURO 0	1310	x	3.627	5422	x	851748
	EURO 1	598	x	1.533	2013	x	191033
	EURO 2	1527	x	641	2781	x	575736
	EURO 3	2668	x	1.179	16950	x	501036
	EURO 4	75	x	x	1118	x	0
	EURO 5	51	x	x	0	x	0
2006	EURO 0	988	x	x	5800	x	16051
	EURO 1	438	x	x	2121	x	9584
	EURO 2	1396	x	x	3041	x	20100
	EURO 3	2774	x	x	15803	x	22883
	EURO 4	208	x	x	4905	x	2395
	EURO 5	269	x	x	0	x	6
2007	EURO 0	870	1014	x	4172	11368	844144
	EURO 1	385	361	x	2226	2203	211819
	EURO 2	1237	557	x	4345	4338	522003
	EURO 3	2734	772	x	11073	4713	608980
	EURO 4	379	52	x	10739	748	97083
	EURO 5	707	55	x	28	66	4555
2008	EURO 0	616	x	x	3914	10663	x
	EURO 1	281	x	x	2031	2115	x
	EURO 2	895	x	x	4159	4230	x
	EURO 3	2570	x	x	8361	4723	x
	EURO 4	488	x	x	16709	1585	x
	EURO 5	1229	x	x	92	330	x
2009	EURO 0	x	x	x	3691	x	x
	EURO 1	x	x	x	1847	x	x
	EURO 2	x	x	x	3890	x	x
	EURO 3	x	x	x	6647	x	x
	EURO 4	x	x	x	18912	x	x
	EURO 5	x	x	x	170	x	x

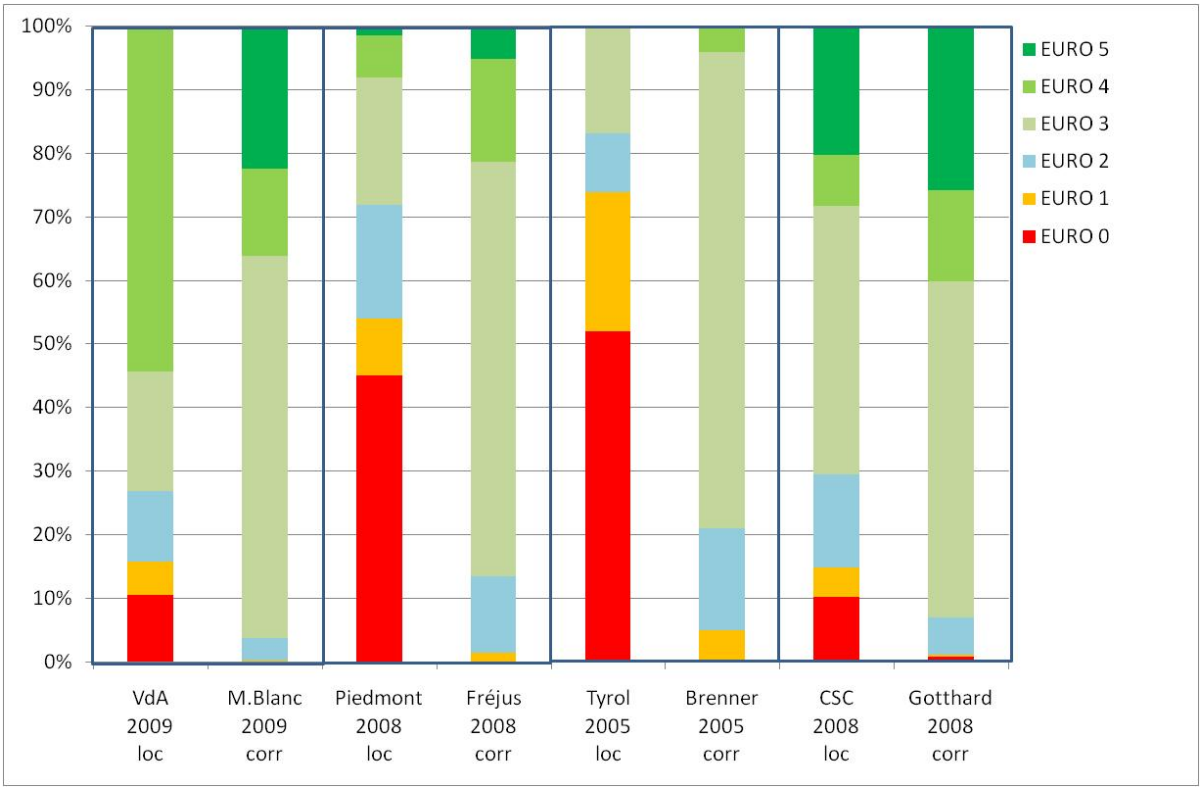
Heavy duty vehicles fleet of the IMONITRAF! Regions: data registrations(data 2005-2009 in units of vehicles)

DATA ELABORATIONS

HEAVY DUTY VEHICLES FLEET OF THE FIVE IMONITRAF! CORRIDORS (TREND 2005-2010, 2009 FOR TARVISIO, LOCAL FLEET DATA FOR TARVISIO CORRIDOR)



HEAVY DUTY VEHICLES FLEET: COMPARISON BETWEEN LOCAL AND INTERNATIONAL FLEETS



Key figures:

Euro5 HDVs 2010:

Fréjus = 26%

Mont Blanc = 37%

Gotthard = 50%

Brenner = 58%

Tarvisio (local fleet) = 1%

Evaluation restrictions:

Data related to the Friuli Venezia Giulia region are only relevant to the local traffic; presumably, the transit vehicle fleet should not be “cleaner”, considering the poor quality of means of transport in Eastern Europe.

For the Gotthard tunnel the values aren’t measured, but calculated.

A. General reading and data analysis

- → For the last year 2010, both Brenner and Gotthard have a high rate of Euro4 and Euro5 vehicles although Euro0 vehicles are being currently used in the Swiss corridor.
- → On both French corridors Euro0 vehicles are inexistent following a ban on tunnel transit. Good rates are still applicable to euro5 vehicles.
- → Figures of the local traffic in Tarvisio show a large presence of old vehicles and consequently polluting ones.
- → Comparing the local heavy vehicle fleet as well as with border crossing passages, the end results show constant reviewed figures and the impact on the environment is lower.

B. Reading of trends

- → General improvement of the vehicle fleet: increase of Euro4 and Euro5 vehicles which reach between 55% and 70% of all road vehicles in 2010, with an exception in Tarvisio reaching 30% in 2009.
- → Euro0 vehicles have been nonexistent in Fréjus and Mont Blanc since 2005 following a ban on tunnel transit, and there is a significant decline in all other corridors. In 2009, they are only a small number in all corridors except in Tarvisio where they still represent almost 15% of the local fleet.
- → Euro1 vehicles are a small number or nonexistent, except in Tarvisio where they remain at a stable figure about of 9%. Strong decline for the Euro2 vehicles for all the corridors.
- → Arrival of the Euro4 and Euro5 vehicles anticipated in Brenner and Gotthard (for both Euro types since 2005) and delayed in Mont Blanc, Fréjus and Tarvisio (Euro4 vehicles have been present only since 2007 and Euro5 vehicles since 2008).

C. Analysis with Monitraf and general objectives

The trend of the conversion data for the heavy vehicles fleet in transit through the transalpine corridors integrating the new road classifications with a lower environmental impact meet the objectives. The situation with regard to the local vehicle fleet is decisively less updated.

E. Use for the definition of the scenarios

The presence of more environmentally performing vehicles on the Swiss and Tyrol road network could be attributed to a major environmental commitment in both territories. The autonomy of the Austrian regions must be taken into consideration with regard to transport policies : this could explain the difference of figures between Brenner and Tarvisio. The Euro 0 ban applied in the two French corridors gives a good results too.

Evaluation of environmental sustainability (state and trend):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
HDVs fleet	2	2	1	1	4

1 to **5** = good to bad

Evaluation of environmental sustainability (trend):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
HDVs fleet	↑	↑	↑	↑	--

↑ = improvement

-- = stability

2.3 INDICATOR 3 – Rail traffic fluxes

METADATA

Indicator:						***Transalpine rail traffic fluxes***
	Number:	3	**Name:**	Transalpine rail traffic fluxes		
	MONITRAF indicator	4-5	**Main category:**	Traffic	**Unit:**	tonnes and number
	Level:	Main alpine crossing				
	Objective:	Basis for assessment of MONITRAF scenarios				
	Definition of indicator:	Transalpine transport on rail: number of trains, tonnes carried and passengers				
	Calculation:	Data elaboration				
Data:						
	Name:	number of trains	**Unit:**	number	**Periodicity:**	annual
	Period:	2006-2010	**Reference period:**	2000 and 2005		
	Definition of data to be collected:	Yearly amount of passenger and freight trains crossing over each alpine corridor				
	Name:	tonnes carried by road and rail	**Unit:**	tonnes	**Periodicity:**	annual
	Period:	2006-2010	**Reference period:**	2000 and 2005		
	Definition of data to be collected:	Yearly amount of tonnes carried by rail on each alpine corridor				
	Name:	number of passengers	**Unit:**	number	**Periodicity:**	annual
	Period:	2006-2010	**Reference period:**	2000 and 2005		
	Definition of data to be collected:	Yearly amount of rail passengers crossing over each alpine corridor				
	Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request					

number of trains	Rhones-Alpes	Piemonte	Valle d'Aosta	Switzerland Central Cantons	Canton Ticino	Tyrol	South Tyrol	Friuli Venezia Giulia
Data source (citation basis):			not applied	Data provided by the Federal Office of Transport (FOT). The Gotthard relation has the oficial timetable number 600 and is available on: http://www.fahrplanfelder.ch/en/welcome/	Data provided by the Federal Office of Transport (FOT). The Gotthard relation has the oficial timetable number 600 and is available on: http://www.fahrplanfelder.ch/en/welcome/	number of passenger trains: Amt der Tiroler Landesregierung, Abt. Verkehrsplanung; number of freight trains: ÖBB Infrastruktur AG, GB Anlagen-/Infrastrukturentwicklung, Wien		
Other Comments:				Data for the number of freight trains are not available.	Data for the number of freight trains are not available.			

tonnes carried by road and rail	Rhones-Alpes	Piemonte	Valle d'Aosta	Switzerland Central Cantons	Canton Ticino	Tyrol	South Tyrol	Friuli Venezia Giulia
Data source (citation basis):	Alpinfo (Swiss Federal Office of Transport, FOT)							

number of passengers	Rhones-Alpes	Piemonte	Valle d'Aosta	Switzerland Central Cantons	Canton Ticino	Tyrol	South Tyrol	Friuli Venezia Giulia
Data source (citation basis):			not applied	Federal Statistical Office; (http://www.bfs.admin.ch/bfs/portal/de/index/themen/11/07/04/blank/01/02.html)	Federal Statistical Office; (http://www.bfs.admin.ch/bfs/portal/de/index/themen/11/07/04/blank/01/02.html)			
Other Comments:				passenger data are published in the A+GQPV every 5-7 years. So for the moment are no data available. The last publication was in 2007. The data for the years 2008 and 2009 are calculated with the long-distance growth rate of these years.	passenger data are published in the A+GQPV every 5-7 years. So for the moment are no data available. The last publication was in 2007. The data for the years 2008 and 2009 are calculated with the long-distance growth rate of these years.			

DATA TABLES

in tons/year	2000		2005		2006		2007		2008		2009		2010	
Alpine crossing	**Rail**	**Road**	**Rail**	**Road**	**Rail**	**Road**	**Rail**	**Road**	**Rail**	**Road**	**Rail**	**Road**	**Rail**	**Road**
Brenner/Brennero	8.700.000	25.400.000	10.026.000	31.689.000	11.636.000	33.336.000	13.256.000	34.954.000	14.012.000	33.815.000	13.117.000	25.842.000	14.374.000	27.509.000
Gotthard/Gottardo	16.830.000	7.600.000	15.596.000	9.947.000	16.201.000	9.322.000	15.585.000	10.754.000	15.485.000	10.990.000	11.606.000	10.212.000	14.440.000	10.812.000
Monte Bianco	na	0	na	8.597.000	na	8.971.000	na	8.790.000	na	8.827.000	na	7.826.000	na	8.694.000
Frejus/ Mont Cenis	8.564.000	25.197.000	5.508.000	11.600.000	5.230.000	12.500.000	5.722.000	13.100.000	4.588.000	12.189.000	2.369.000	10.159.000	3.894.000	11.002.000
Tarvisio	4.800.000	18.161.000	6.058.000	19.338.000	6.506.000	19.937.000	6.974.000	19.917.000	6.881.000	17.677.000	5.680.000	15.642.000	6.400.000	17.012.000

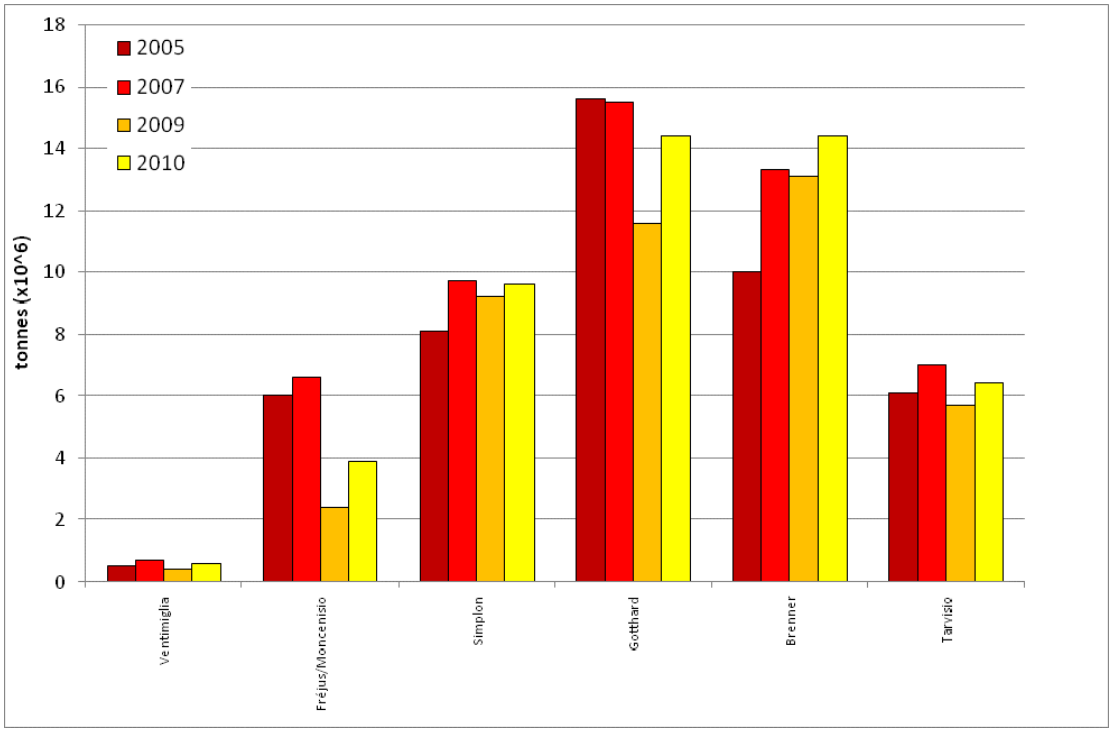
modal shift (share of rail)	2000	2005	2006	2007	2008	2009	2010
Brenner/Brennero_TYR	26%	24%	26%	27%	29%	34%	34%
Gotthard/Gottardo	69%	61%	62%	59%	58%	53%	57%
Frejus/ Mont Cenis	25%	32%	29%	30%	27%	19%	26%
Tarvisio	21%	24%	25%	26%	28%	27%	27%

nb passenger trains/year	2000	2005	2006	2007	2008	2009	2010
Brenner/Brennero_TYR			7.300	6.600	5.600	4.900	6.055
Brenner/Brennero_S-TYR	26.000	29.000	29.500	28.500	34.000	35.000	
Gotthard/Gottardo	x	23.385	23.385	23.385	23.377	27.069	27.600
Frejus/ Mont Cenis	X	2.199	2.190	2.190	2.172	1.977	1.460
Tarvisio	X	6.768	6.709	6.303	5.931	5.030	

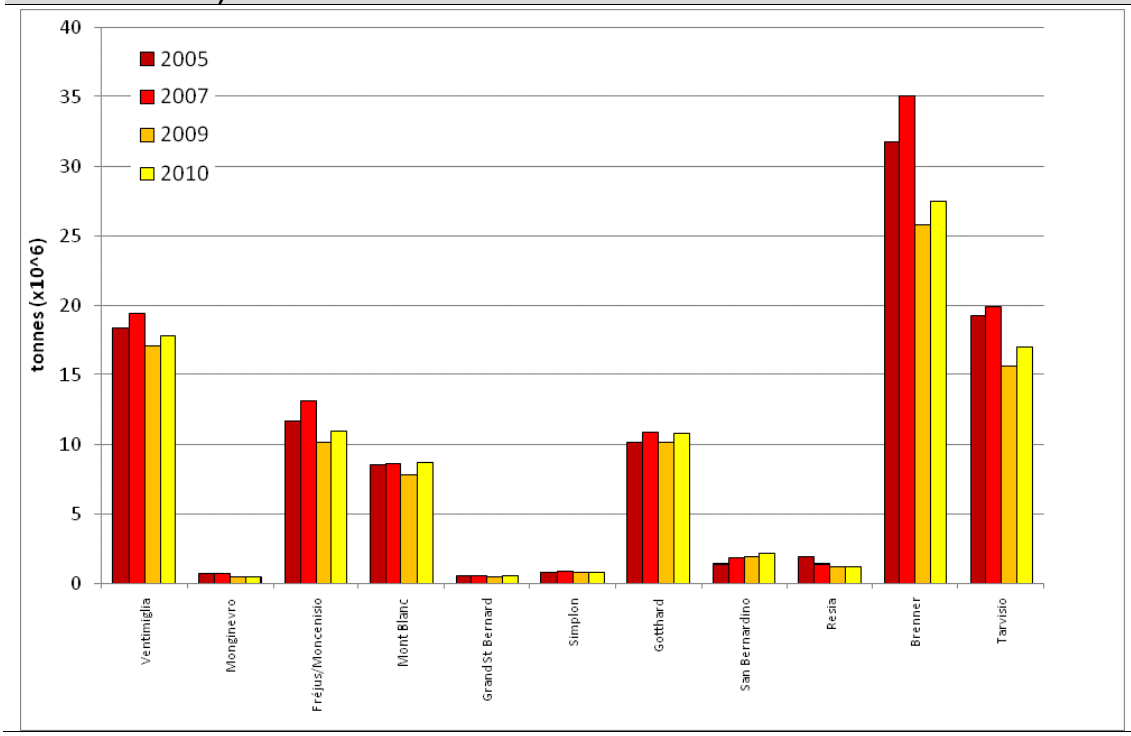
nb freight trains/year	2000	2005	2006	2007	2008	2009	2010
Brenner/Brennero_TYR			20.700	23.800	23.900	20.100	22.750
Brenner/Brennero_S-TYR	29.000	32.000	28.000	31.500	33.500	25.000	
Gotthard/Gottardo	na	na	na	na	na	25.942	28.723
Frejus/ Mont Cenis	X	1.848	1.865	1.869	1.889	1.858	1.805
Tarvisio	X	5.929	7.044	8.085	7.611	6.967	

passengers/year	2000	2005	2006	2007	2008	2009	2010
Brenner/Brennero_TYR			x	x	x	x	
Brenner/Brennero_S-TYR	3.600.000	4.743.000	5.262.000	5.912.000	6.205.000	6.933.000	
Gotthard/Gottardo	x	x	x	3.048.480	3.268.515	3.383.010	3.285.000
Frejus/ Mont Cenis	X	528.320	528.250	514.070	515.320	458.950	343.640
Tarvisio	NV	NV	NV	NV	NV	NV	NV

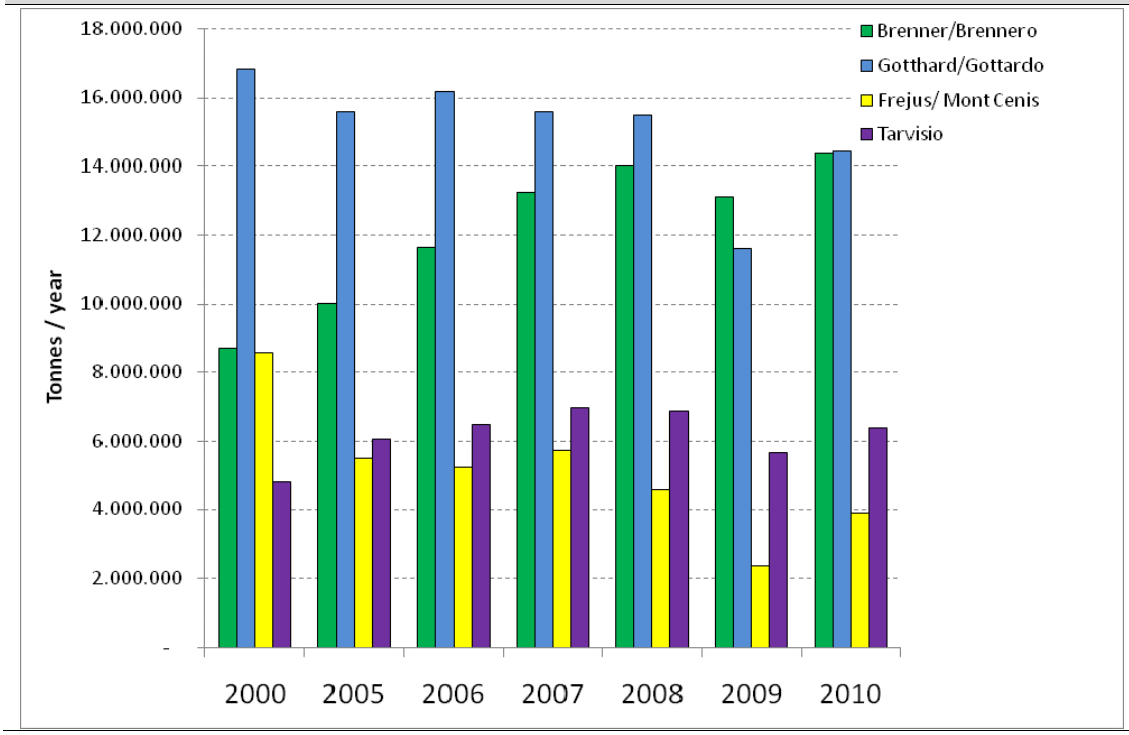
TONNES CARRIED BY RAIL: ALPINE ARC SITUATION (YEARS 2005-2007-2009-2010, ALPINFO DATA)



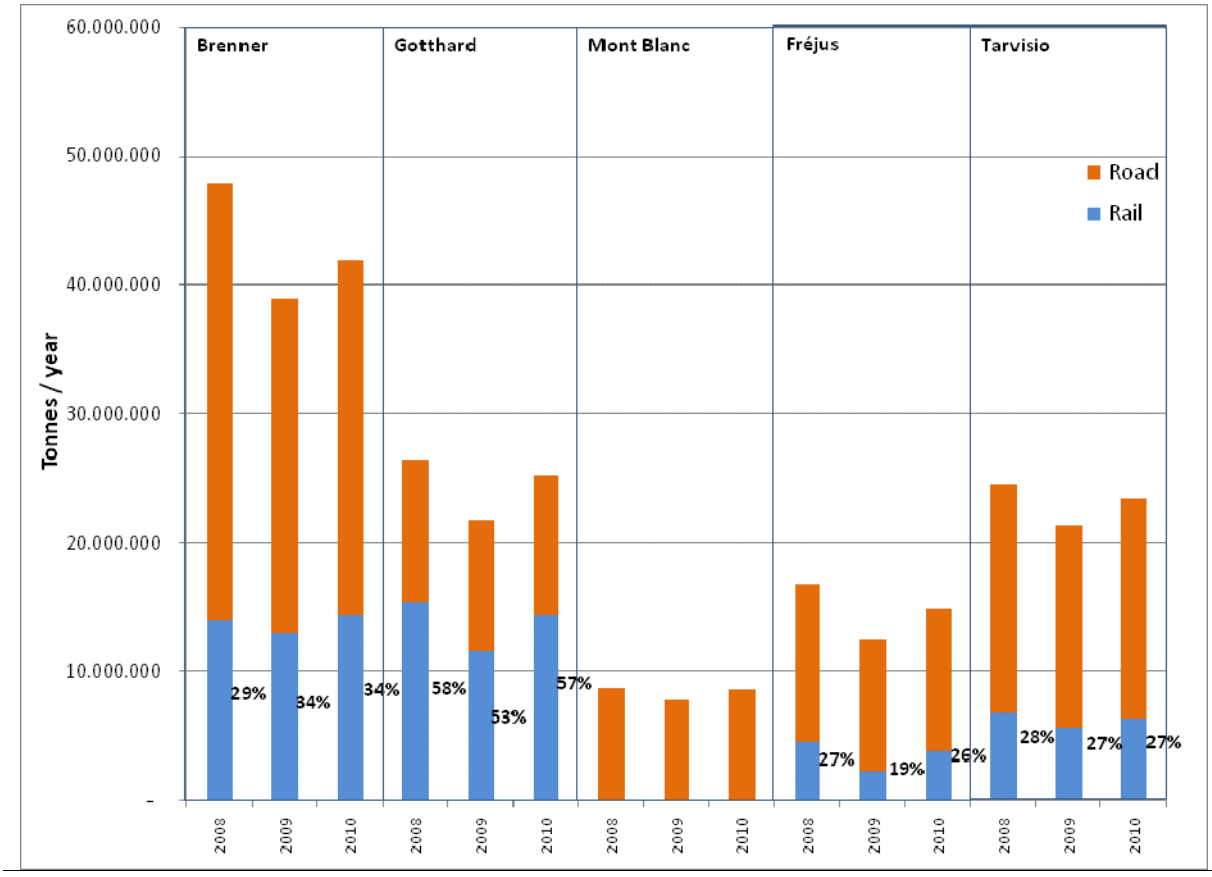
TONNES CARRIED BY ROAD: ALPINE ARC SITUATION (YEARS 2005-2007-2009-2010, ALPINFO DATA)



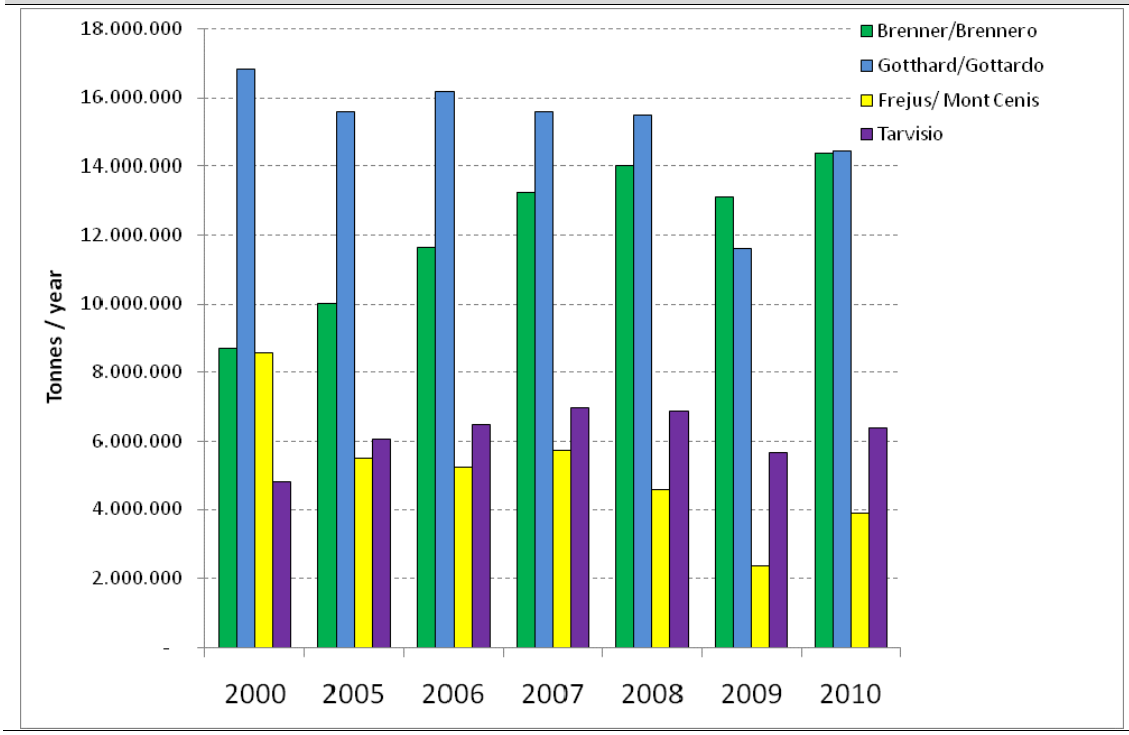
TONNES CARRIED BY RAIL PER CORRIDOR: TREND 2000-2010



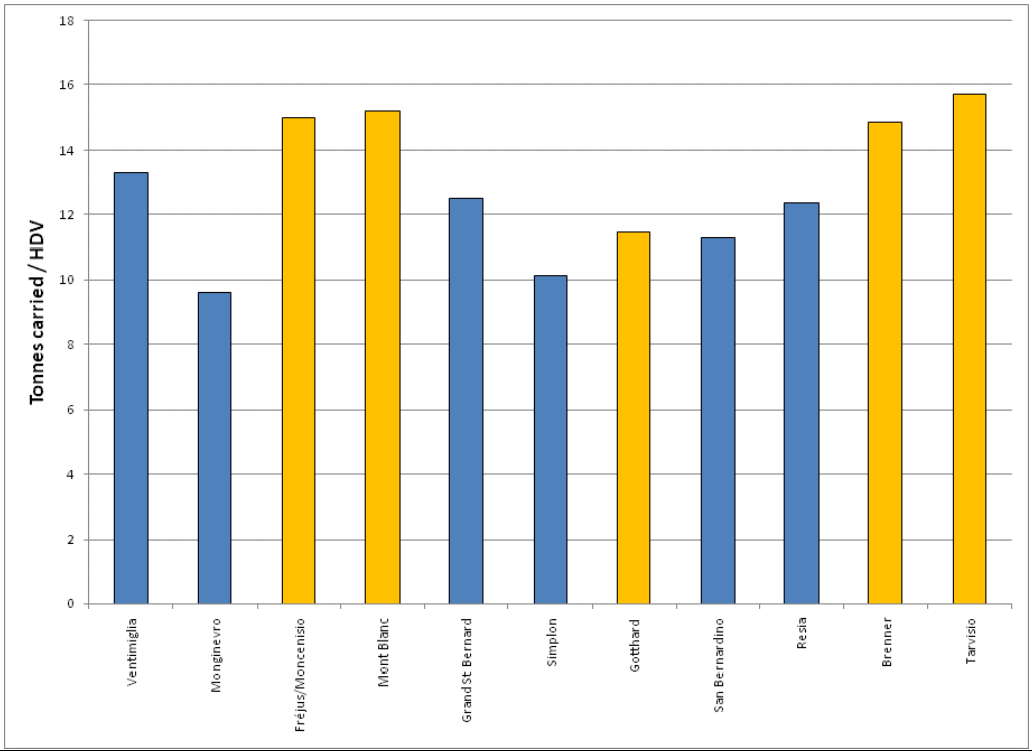
MODAL RATIO OF FREIGHT TRANSPORT: IMONITRAF! CORRIDORS SITUATION (YEARS 2008-2009-2010)



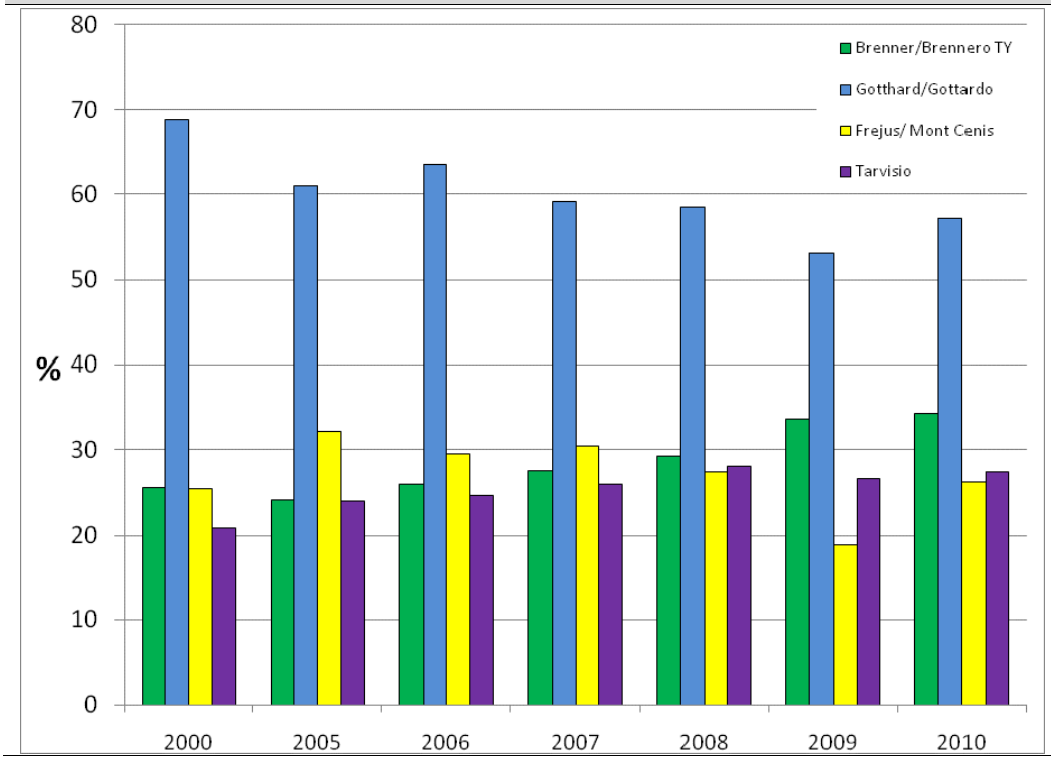
TONNES CARRIED BY RAIL PER CORRIDOR: TREND 2000-2010



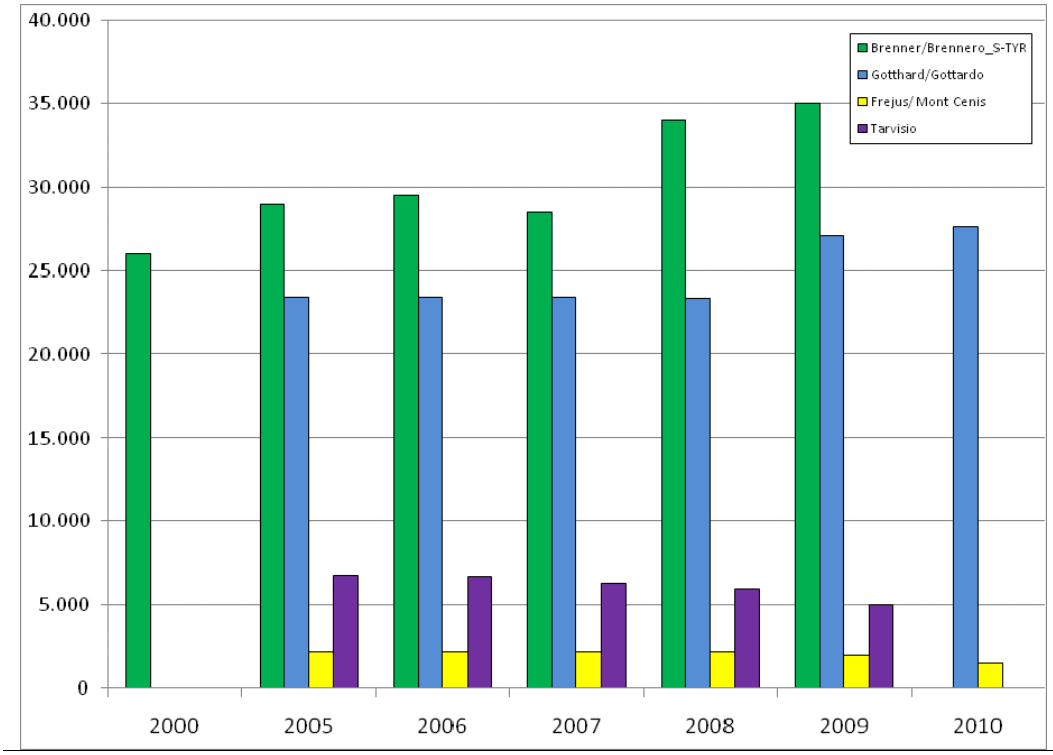
AVERAGE TONNES CARRIED BY ONE HEAVY DUTY VEHICLE: ALPINE ARC SITUATION (YEAR 2010, ALPINFO 2010 DATA)



MODAL SHIFT: TONNES CARRIED BY RAIL RATIO FOR THE IMONITRAF! CORRIDORS



NUMBER OF PASSENGER TRAINS PER YEAR FOR THE IMONITRAF! CORRIDORS



Key figures:

- Total freight on IMONITRAF corridors/ total freight on the entire alpine network = 77% (Alpinfo 2010)
- Modal rate ratio on the entire alpine network = 33% rail and 67% road (Alpinfo 2010)

Evaluation restrictions:

Data on large passengers movements are difficult to obtain and not easily comparable.

The IMONITRAF data and ALPINFO data have a little difference relative to the Light Duty Vehicles classification with the Heavy Vehicles, the first system, and with Light Vehicles, the second one.

A. General reading and data analysis

- → There are three different levels of volume of freight carried by rail: over 14 million tons per year in Gotthard and Brenner, around 8 million in Tarvisio and around 4 million in Fréjus.
- → Gotthard has heavily invested in transport by rail reaching 53% goods carried by rail. The rate of goods carried by rail for the other 3 intermodal corridors goes down to 30%.
- → Brenner shows the largest amount of quantity of goods being carried, almost twice as much as in Gotthard and Tarvisio.
- → ALPINFO data show that the modal ratio in Ventimiglia attains only 2% of goods travel by rail.
- → The average load index per single heavy duty vehicle in the Ventimiglia, Fréjus, Mont Blanc, Brenner and Tarvisio corridors extends around and over 14 tons. For the other alpine corridors, the figures go down to under 12 tons per vehicle.
- → In the Brenner and Gotthard corridors the railways is used to carry passengers more than Tarvisio and Fréjus corridors.

B. Reading of trends

- → High growth of the freight transport by rail in the Brenner corridor
- → More limited growth in Tarvisio correlated to the regional measure to encourage the transfer rail freight (ROLA)
- → Diminution in Fréjus since the situation in 2000 due to the works on the rail infrastructure and in Gotthard for the last years
- → Evident economic crisis effect in 2009 for Gotthard and Brenner trends, for 2009 and 2010 Brenner has more tons carried by rail than Gotthard
- → According to the ALPINFO data, there is a great increase of freight transport by road compared to a slight increase or even a drop in the numbers of vehicles in the Brenner and Tarvisio corridors.
- → Freight transport by rail is generally increasing. A stable situation is noticeable in Gotthard whereas Fréjus registers a perceptible decline.
- → The trend of the passenger transport by rail is increasing for Brenner and Gotthard.

C. Analysis with Monitraf and general objectives

Transport of goods by rail is following the road transport trend, especially in the 2009 economic crisis. The new 2010 data show a return of the values ante crisis. The five IMONITRAF! corridors with Ventimiglia are the most important transport directions across the Alpine Arc.

D. Use for the definition of the scenarios

Such an indicator is useful for studying various situations of increase in the modal shift in all the alpine corridors.

Evaluation of environmental sustainability (noise impact):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
Rail transport	4	not applied	1	2	3

1 to **5** = good to bad

Evaluation of environmental sustainability (trend 2005-2010):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
Rail transport	↓	not applied	↓	↑	↑

↑ = increase

↓ = decrease

-- = stability

In order to evaluate the environmental impacts of the railways system we use the air quality impacts logic, the noise impact analysis will be performed in the Indicator 12 evaluations.

2.4 INDICATOR 4 – Air pollutant emissions by road traffic

METADATA

Indicator 4:							***Air pollutant emissions by road traffic***
	Number:	4	**Name:**	Air pollutant emissions by road traffic			
	MONITRAF indicator	na	**Main category:**	Environment	**Unit:**	tons/km x year	
	Level:	IMONITRAF! Corridors					
	Objective:	Basis for assessment of MONITRAF scenarios					
	Definition of indicator:	Annual pollutant emissions evaluated for the transalpine road network stretches					
	Calculation:	Annual vehicle fluxes x emission factors					
Data:							
	Name:	tons/km x year	**Unit:**	Number	**Periodicity:**	calendar year	
	Period:	2006-2008	**Reference period:**	2000 and 2005			
	Definition of data to be collected:	Vehicle fluxes per road stretch, vehicles fleets and emission factor database.					
	Data source (citation basis):	**Emission Factors for Road Transport ("HBEFA 3.1") - INFRAS EF DATABASE**					
	Other Comments:						
	Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request (nb of data is deficient)						

Input data for the emissions evaluation

1) Vehicles fluxes: from Indicator 1
2) Vehicles fleets: from Indicator 2 (Heavy vehicles) and national vehicles fleets (Light vehicles)
3) Emission factors from the Handbook Emission Factors for Road Transport of INFRAS (CH)

Some hypothesis are used to perform the choice of the emissions factors:

- Light vehicles: 50% diesel and 50% gasoline
- Heavy duty vehicles: 100% diesel
- Average slope for the corridors: 2%
- Type of road: Highways
- Type of traffic: 90% “free flow” and 10% “hard flow”.

DATA TABLES

The average Emission Factors are collected in the next tables, the PM10 factors incorporate the non-exaust quota of emissions.

LIGHT VEHICLES

g/km		CO	Nox	CO2	PM10
EURO 0	BENZ	6,64	2,17	226,96	0,068
EURO 1	BENZ	1,97	0,54	223,04	0,061
EURO 2	BENZ	2,22	0,20	220,89	0,068
EURO 3	BENZ	1,87	0,06	212,28	0,054
EURO 4	BENZ	1,08	0,06	188,88	0,051
EURO 5	BENZ	0,80	0,06	178,69	0,050
EURO 6	BENZ	0,60	0,06	170,59	0,050
EURO 0	DIESEL	0,91	1,04	204,41	0,320
EURO 1	DIESEL	0,26	0,87	161,60	0,189
EURO 2	DIESEL	0,06	0,91	171,75	0,132
EURO 3	DIESEL	0,01	1,04	147,29	0,088
EURO 4	DIESEL	0,01	0,65	136,62	0,083
EURO 5	DIESEL	0,01	0,64	131,75	0,048
EURO 6	DIESEL	0,01	0,22	126,38	0,048

HEAVY DUTY VEHICLES

g/km		CO	Nox	CO2	PM10
EURO 0	DIESEL	1,50	10,13	697,86	0,361
EURO 1	DIESEL	0,96	6,42	609,76	0,290
EURO 2	DIESEL	0,68	6,52	600,43	0,169
EURO 3	DIESEL	0,75	4,73	616,02	0,173
EURO 4	DIESEL	0,47	3,26	625,58	0,098
EURO 5	DIESEL	0,48	1,93	628,62	0,098
EURO 6	DIESEL	0,49	0,34	609,39	0,076

2010 [tonn/km]	CARS				HDVs				TOTAL			
	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10
Fréjus												
Planaise	5,19	4,50	1256,69	0,60	1,31	8,39	1280,25	0,29	6,50	12,89	2536,94	0,89
Aiton	1,75	1,52	423,74	0,20	0,76	4,84	739,60	0,17	2,51	6,36	1163,33	0,37
SFTRF Tunnel	1,49	0,56	187,17	0,07	0,41	2,60	397,32	0,09	1,89	3,16	584,49	0,16
Salbertrand	4,08	1,53	513,23	0,20	0,69	4,42	675,07	0,15	4,77	5,96	1188,31	0,36
Avigliana	5,53	2,08	695,53	0,27	0,77	4,94	753,57	0,17	6,30	7,01	1449,10	0,45
M. Bianco												
Eloise	4,09	3,54	989,04	0,47	0,84	4,85	875,23	0,18	4,93	8,40	1864,27	0,65
Entrebières	9,24	8,01	2234,52	1,06	1,21	6,98	1259,66	0,26	10,44	14,99	3494,18	1,33
Bonneville	6,21	5,38	1501,35	0,71	0,96	5,54	999,53	0,21	7,16	10,92	2500,88	0,92
Cluses	3,42	2,96	826,66	0,39	0,79	4,60	829,01	0,17	4,21	7,56	1655,67	0,57
Passy	2,83	2,45	684,98	0,33	0,87	5,03	907,95	0,19	3,70	7,49	1592,93	0,52
ATMB Tunnel	1,66	0,62	208,74	0,08	0,41	2,37	426,76	0,09	2,07	2,99	635,50	0,17
Aosta-ovest	2,83	1,06	355,60	0,14	0,47	2,72	490,22	0,10	3,29	3,78	845,81	0,24
Aosta-est	5,65	2,12	710,92	0,28	0,54	3,10	559,03	0,12	6,18	5,22	1269,95	0,40
Pont St. Martin	9,63	3,62	1212,69	0,48	0,87	5,04	908,47	0,19	10,50	8,66	2121,17	0,67
Gotthard												
Seelisbergtunnel (AB)	no fluxes data											
Gotthardtunnel	5,96	1,60	915,33	0,32	0,78	4,29	849,21	0,17	6,74	5,88	1764,54	0,48
Camignolo	18,36	4,92	2820,26	0,97	1,76	9,64	1909,65	0,38	20,12	14,55	4729,91	1,35
Biasca S (AS)	9,88	2,65	1517,65	0,52	1,44	7,90	1565,21	0,31	11,32	10,54	3082,86	0,83
Brenner												
Kundl	8,68	7,53	2100,45	1,00	2,51	14,31	2644,30	0,55	11,20	21,83	4744,75	1,55
Vomp	10,33	8,96	2499,35	1,19	2,69	15,31	2829,47	0,59	13,02	24,26	5328,81	1,78
Matrei am Brenner	no fluxes data											
Brennero-Vipiteno	9,58	3,60	1206,35	0,48	1,75	9,97	1842,66	0,38	11,34	13,57	3049,01	0,86
Bressanone-Chiusa	11,85	4,46	1491,43	0,59	2,05	11,69	2159,58	0,45	13,90	16,14	3651,01	1,04
Bznord-Bzsud	12,21	4,59	1537,30	0,61	2,13	12,14	2243,13	0,47	14,35	16,73	3780,43	1,07
Ora-Salorno	15,89	5,98	2000,19	0,79	2,48	14,13	2610,98	0,54	18,37	20,10	4611,17	1,33
Tarvisio												
Ugovizza	4,45	1,68	560,63	0,22	1,24	8,96	988,65	0,30	5,69	10,64	1549,28	0,52
Pontebba	0,38	0,14	47,90	0,02	0,13	0,96	105,34	0,03	0,51	1,10	153,24	0,05
Carnia	4,12	1,55	518,58	0,20	0,40	2,91	320,40	0,10	4,52	4,45	838,98	0,30
Gemona	3,01	1,13	379,34	0,15	0,40	2,91	321,06	0,10	3,42	4,04	700,41	0,25

Emissions calculated for the road stretches of the five IMONITRAF! corridors (year 2010)

FOCUS ON LOCAL EMISSIONS INVENTORIES

In order to analyses the ratio between the road emissions linked to the international traffic and the others produced by different local pollutant sources (industry, domestic heating, anthropic activities,...), we collected the local emissions inventories data available of the IMONITRAF! Region.

Piemonte - Fréjus

Emissions (tonnes/year)	CO	Nox	PM10	CO2
Motorways	898	408	30	91678
Local traffic	2203	459	97	112324
Total	5841	2258	290	596200

Rhones-Alpes - Fréjus

Emissions (tonnes/year)	CO	Nox	PM10	CO2
Motorways	2824	1934	131	317348
Local traffic	3164	1791	168	374874
Total	20632	6112	1715	1921222

Rhones-Alpes - Mont Blanc

Emissions (tonnes/year)	CO	Nox	PM10	CO2
Motorways	1694	1090	83	190702
Local traffic	4176	2428	217	483943
Total	14864	4468	1410	1403905

Valle d'Aosta – Mont Blanc

Emissions (tonnes/year)	CO	Nox	PM10	CO2
Motorways	498	255	58	71855
Local traffic	2226	639	142	200395
Total	4306	2028	425	660948

Canton of Uri – Gotthard

Emissions (tonnes/year)	CO	Nox	PM10	CO2
Motorways		439,152	26,78	95777,75
Local traffic		225,859	16,932	58743,18
Total		911,453	114,168	247024,1

Other Cantons

Gotthard (Schwyz, Nidwalden, Luzern, Obwalden and Zug)

Emissions (tonnes/year)	CO	Nox	PM10	CO2
Transports		3001	307	1255927
Total		6580	1449	3575274

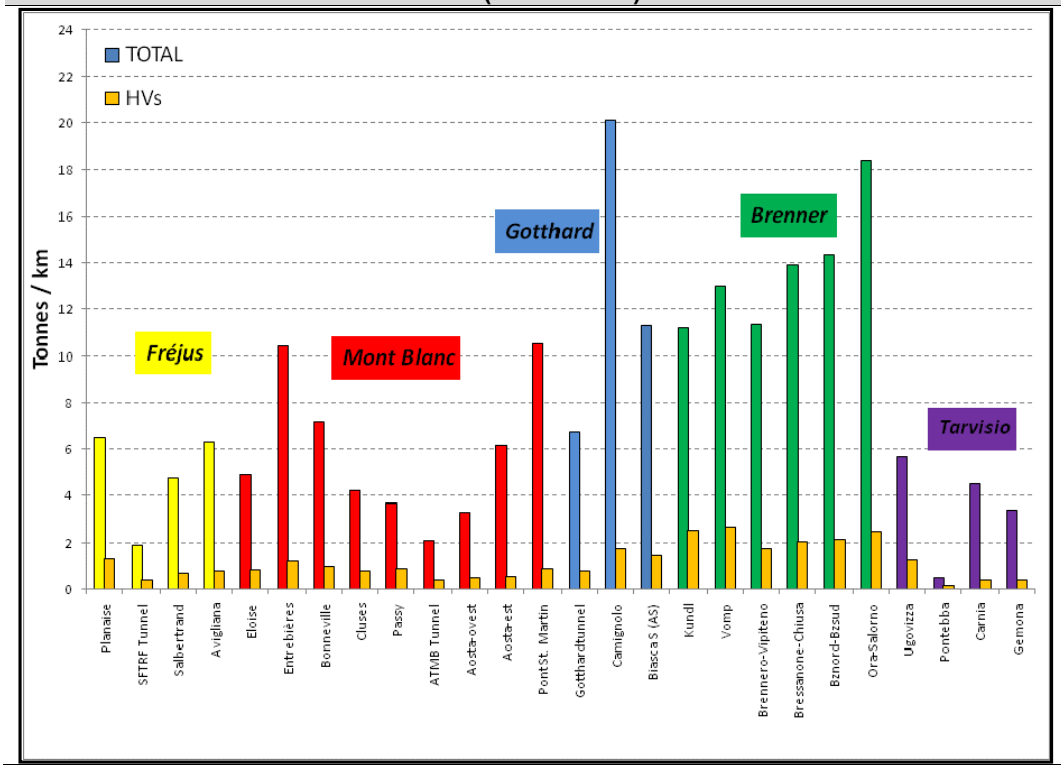
Tyrol - Brenner

Emissions (tonnes/year)	CO	Nox	PM10	CO2
Motorways	3863	4549	625	736000
Local traffic	7936	3765	77	881520
Total	43911	13425	2401	3829057

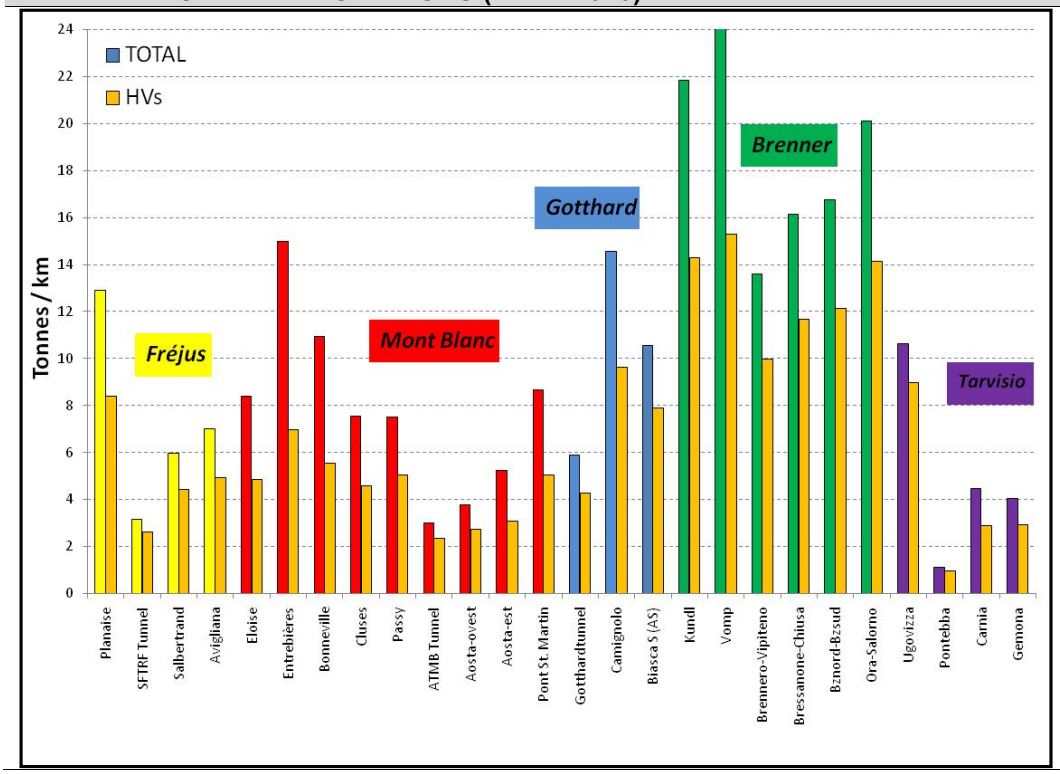
Friuli Venezia Giulia – Tarvisio

Emissions (tonnes/year)	CO	Nox	PM10	CO2
Motorways	2332	410	12	410000
Local traffic	1497	171	20	171000
Total	5653	935	114	935000

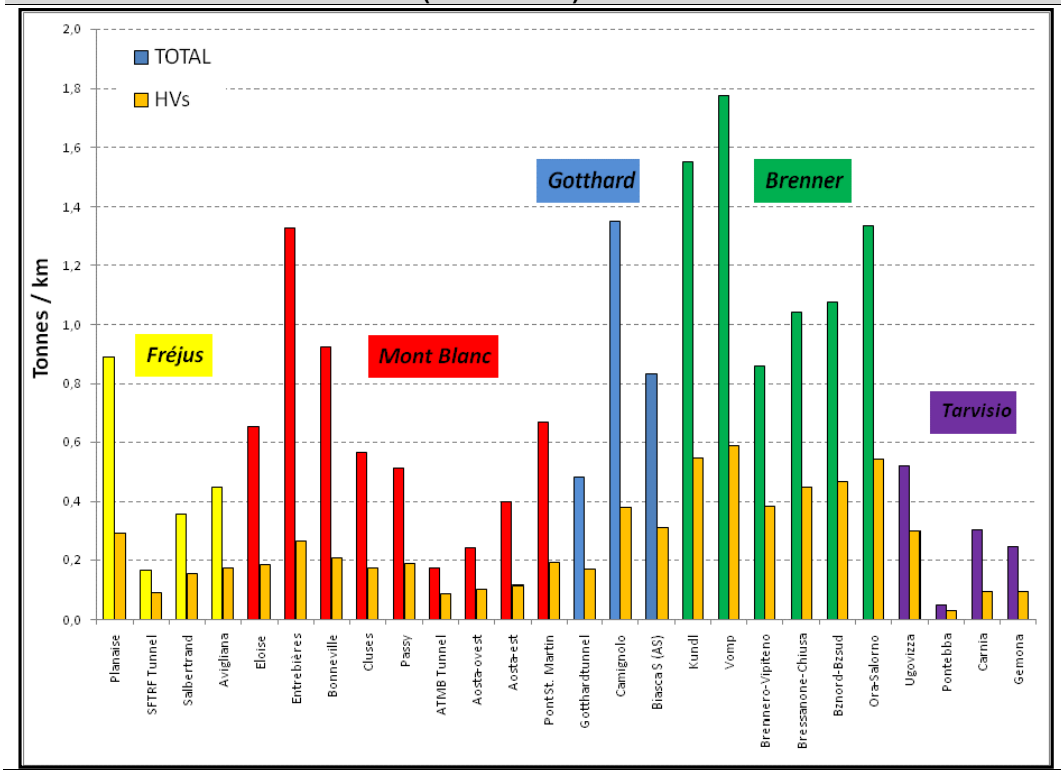
EMISSIONS OF CARBON MONOXIDE (CO) CALCULATED FOR THE ROAD STRETCHES OF THE FIVE IMONITRAF! CORRIDORS (YEAR 2010)



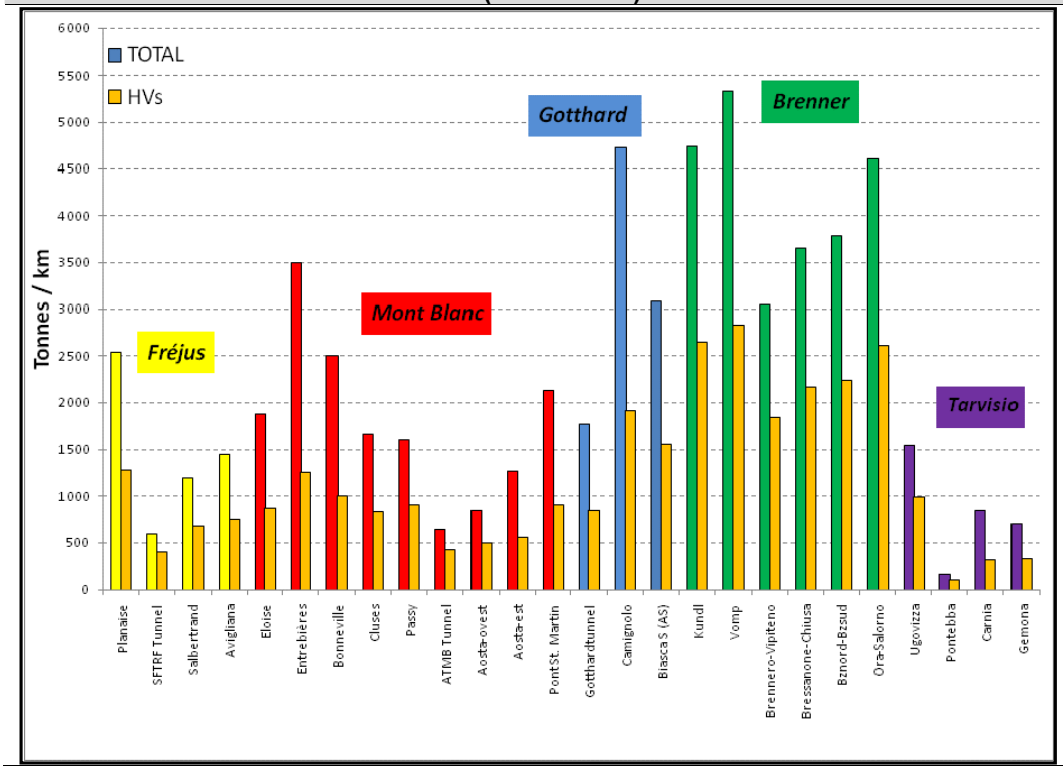
EMISSIONS OF NITROGEN OXIDES (NOX)CALCULATED FOR THE ROAD STRETCHES OF THE FIVE IMONITRAF! CORRIDORS (YEAR 2010)



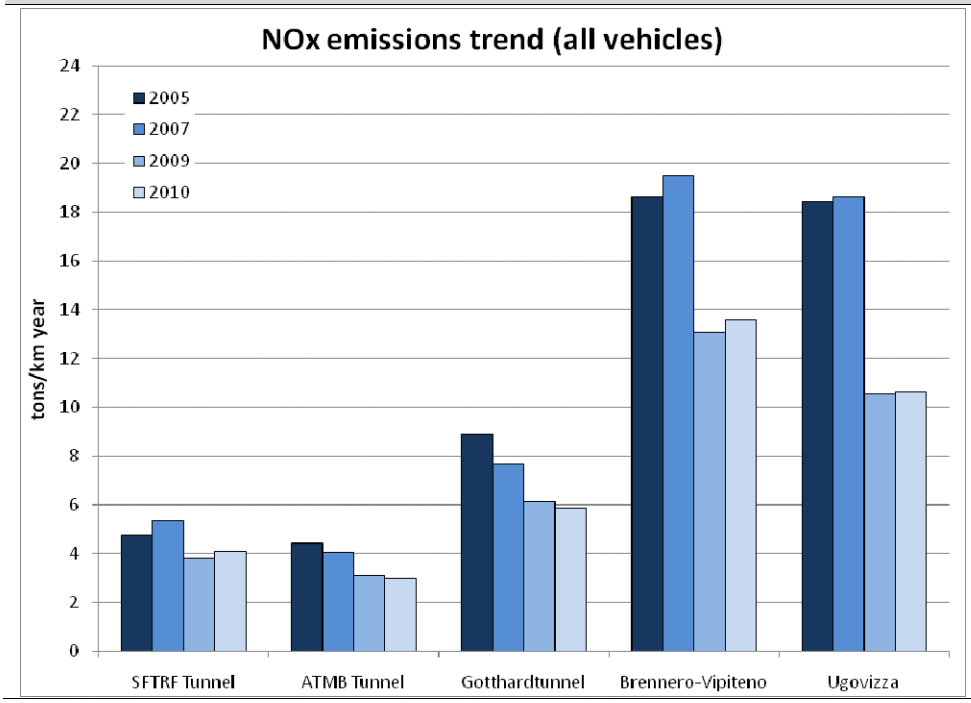
EMISSIONS OF PARTICULATE PM10 CALCULATED FOR THE ROAD STRETCHES OF THE FIVE IMONITRAF! CORRIDORS (YEAR 2010)



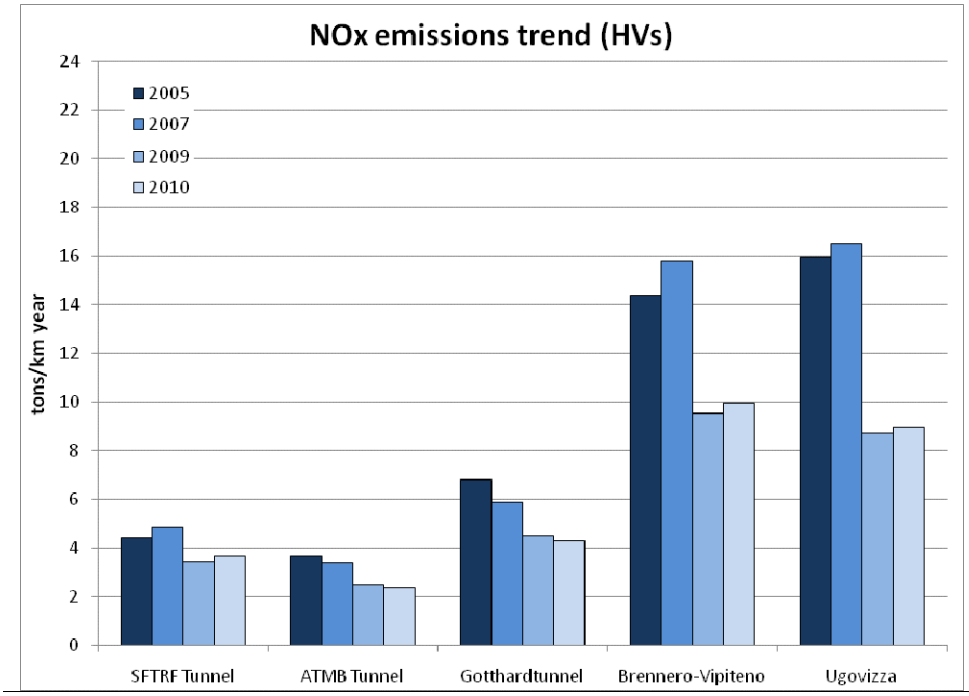
EMISSIONS OF CARBON DIOXYDES (CO2) CALCULATED FOR THE ROAD STRETCHES OF THE FIVE IMONITRAF! CORRIDORS (YEAR 2010)



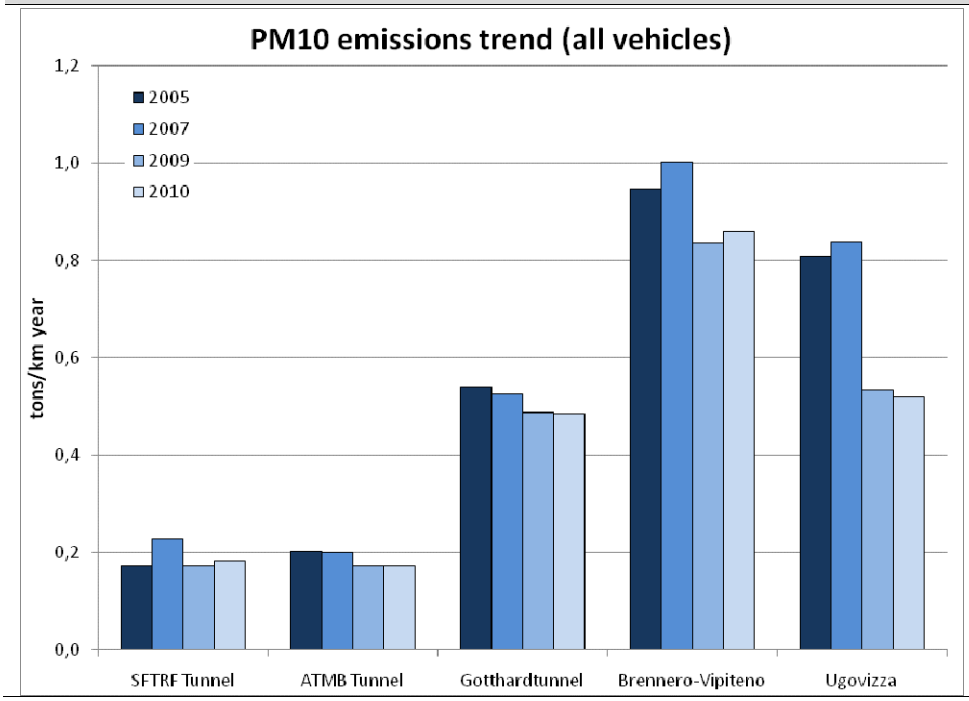
EMISSIONS OF NITROGEN OXIDES (NOX) TREND CALCULATED FOR THE FIVE IMONITRAF! CORRIDORS: ALL VEHICLES



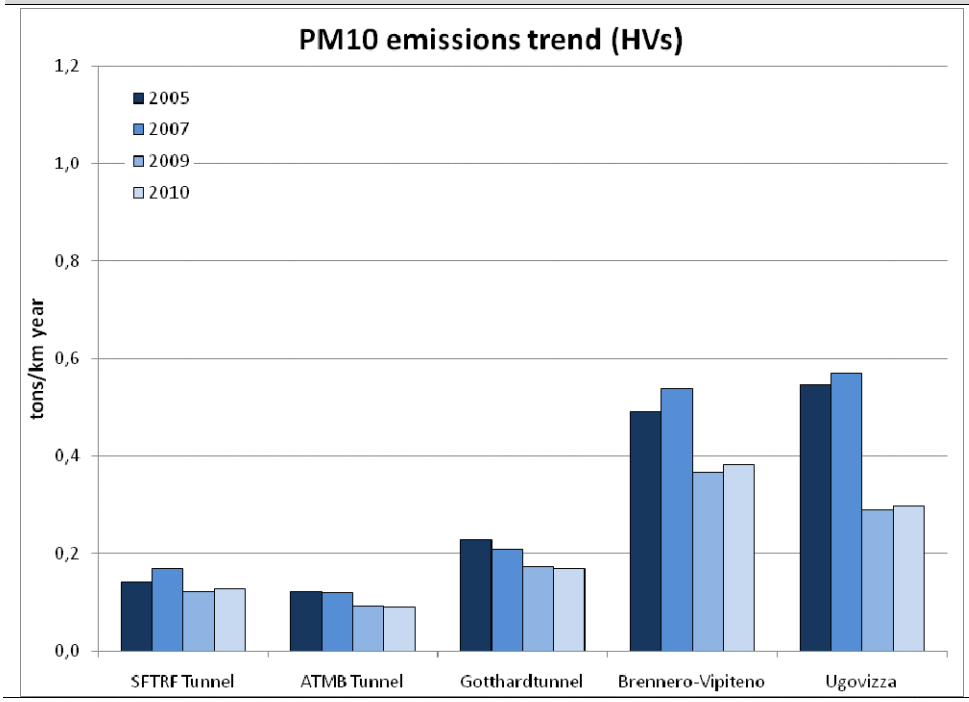
EMISSIONS OF NITROGEN OXIDES (NOX) TREND CALCULATED FOR THE FIVE IMONITRAF! CORRIDORS: HEAVY VEHICLES



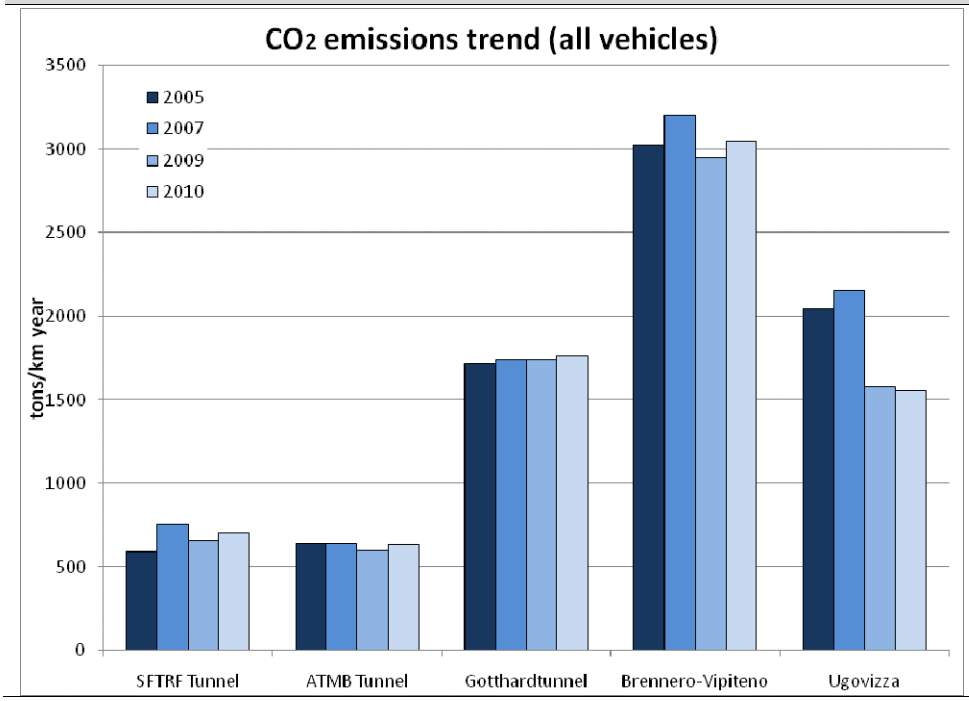
EMISSIONS OF PARTICULATE PM10 TREND CALCULATED FOR THE FIVE IMONITRAF! CORRIDORS: ALL VEHICLES



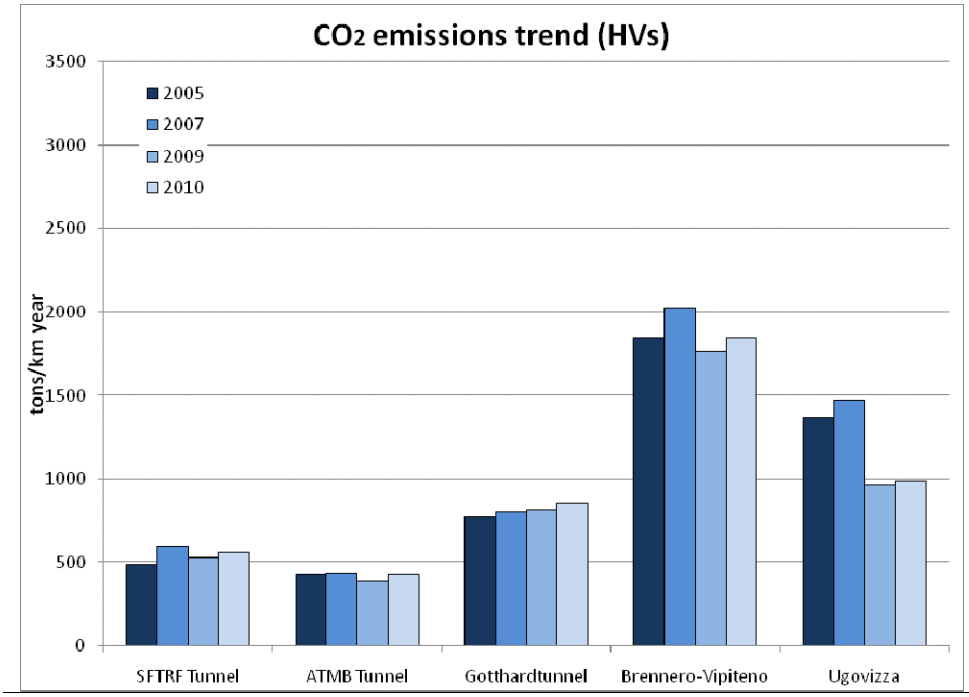
EMISSIONS OF PARTICULATE PM10 TREND CALCULATED FOR THE FIVE IMONITRAF! CORRIDORS: HEAVY VEHICLES



EMISSIONS OF CO2 CALCULATED FOR THE FIVE IMONITRAF! CORRIDORS: ALL VEHICLES

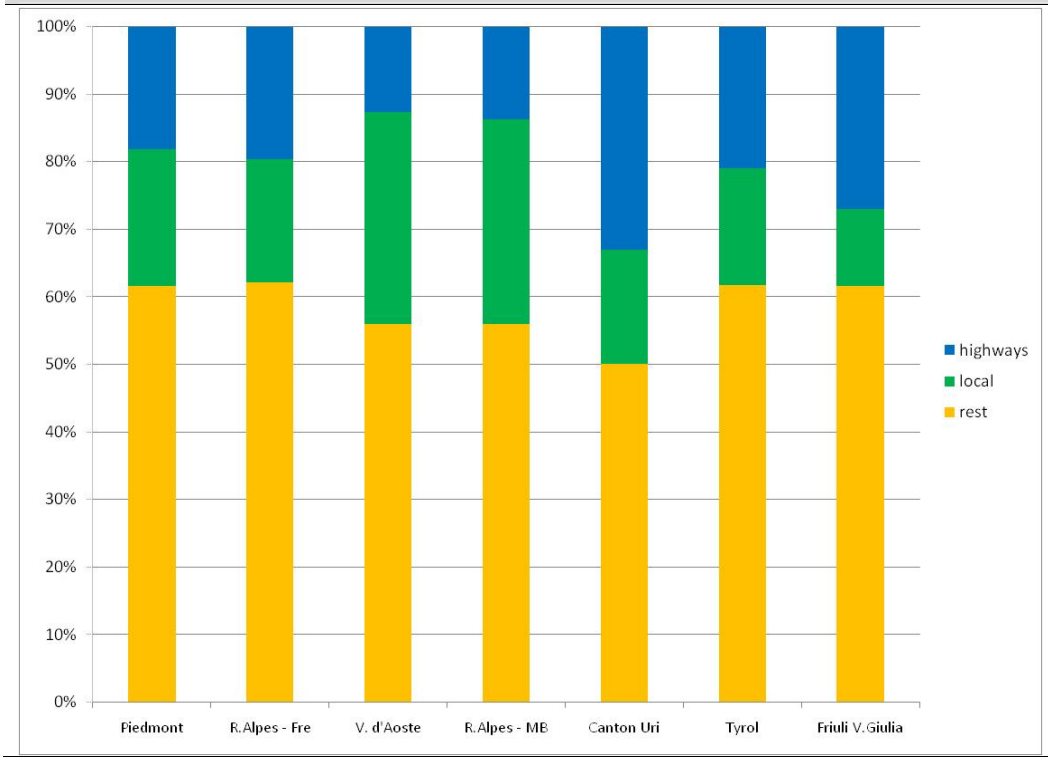


EMISSIONS OF CO2 TREND CALCULATED FOR THE FIVE IMONITRAF! CORRIDORS: HEAVY VEHICLES

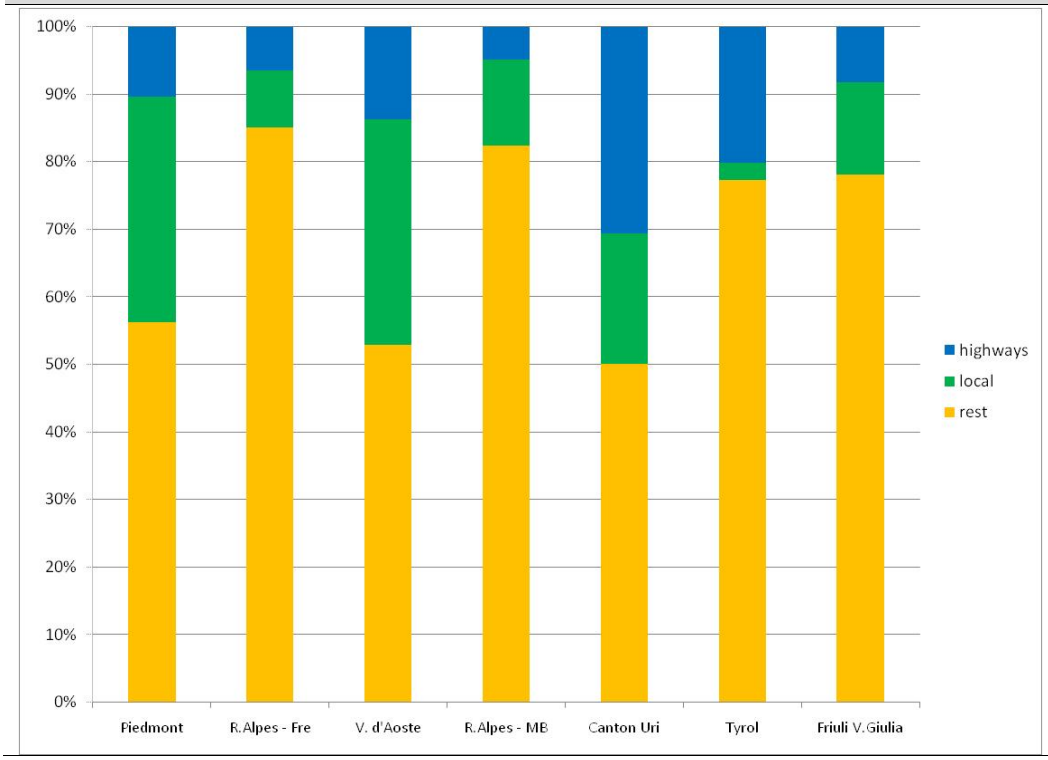


Emissions estimated for local inventories in the municipalities along the border corridor

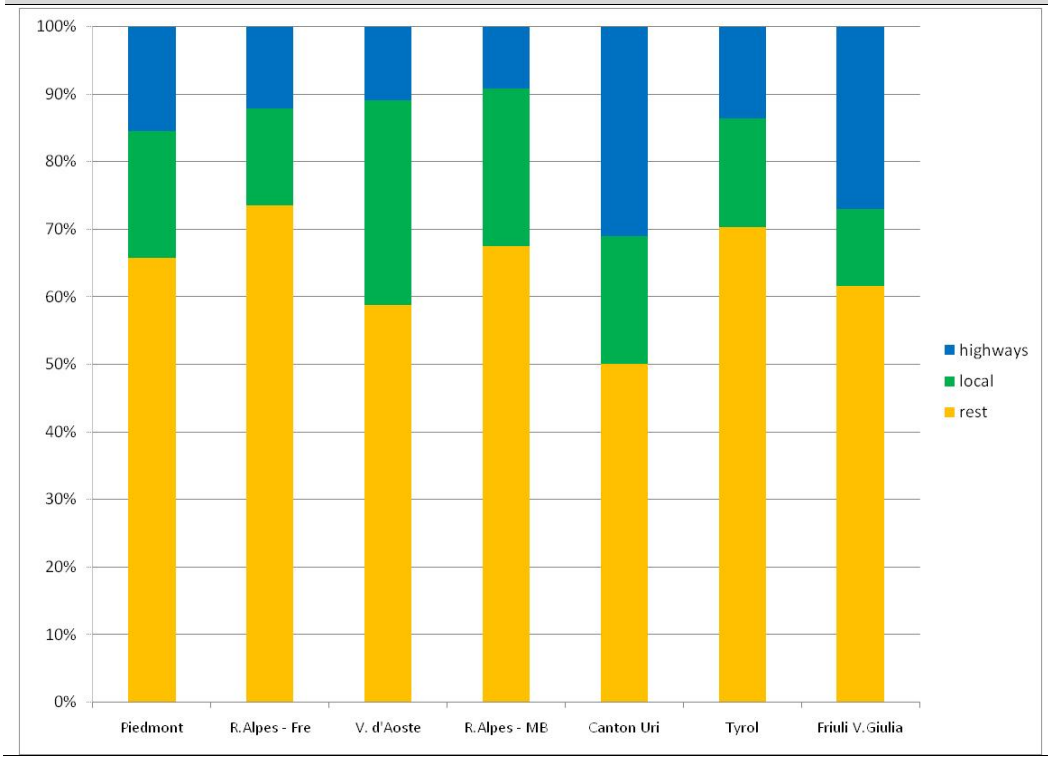
NOX EMISSIONS



PM10 **EMISSIONS**



CO_2 EMISSIONS



Key figures:

Emission variations from 2008 to 2009 (ante economic crisis):

NOx: from -9% to -35%

CO2: from -3% to -18%

PM10: from -5% to -29%

Emission variations from 2009 to 2010 (post crisis):

NOx: from -4% to +6%

CO2: from -2% to +7%

PM10: from -3% to +6%

Highways NOx emissions on total emissions on local scale (regional inventories):

Fréjus: 20%

Mont Blanc: 14%

Gotthard: 33%

Brenner: 21%

Tarvisio: 27%

Evaluation restrictions:

Local inventories are built with different methodologies (the emission factors are different).

A. General reading and data analysis

TRAFFIC FLUXES

- → There are minor traffic flows at border crossings, marked only by cross-border traffic, while we have the highest values at the ends of the corridors because of the addition of the local traffic volumes

POLLUTANTS EMISSIONS

- → There are two different situations along the five Alpine corridors: on one hand the Brenner and Gotthard with higher values, the other the remaining corridors
- → Emissions follow the trend day traffic flows within each corridor with minimum values at the crossings

CO 2010

Carbon Monoxide emissions are particularly related to cars

NOx 2010

For Nitrogen Oxides emissions the contribution of heavy vehicles is proportionally more significant than Carbon Monoxide

PM10 2010

Heavy vehicles dust emissions are less incisive than Nitrogen Oxides

CO_2 2010

For Carbon Dioxide emissions will be seeking the Nitrogen Oxides position.

Local emissions inventories situation for the municipalities of the IMONITRAF! corridors

NOx

The ratio of the highways emissions is similar among the IMONITRAF! local inventories and it is from 13% to 33%.

PM10

The weight of highways emissions is very different among the region, this fact is probably due to different estimations of other sources emissions (heating system and wood combustion calculation)

CO_2

The international traffic ratio is similar as NOx: from 9% to 31%.

B. Reading of trends

NOx

- → Reduction trend for every corridor from 2005 to 2009, fort he last year, 2010, a little increase is noticed
- → Particularly positive is the trend of Brenner, Tarvisio and Gotthard following vehicles fleets improvements

PM10

- → Trends similar to those of NOx, but with less marked changes, given that the emission factors are less sensitive to the renewal of the fleet (the non-exhaust emissions quota isn't depending on the Euro classes).

CO_2

- → Mainly influenced by traffic flow patterns, all corridors show a swinging trend also constant from 2005 to 2010, with the exception of Tarvisio in which the trend is decreasing as the HVs fluxes.

C. Analysis with Monitraf and general objectives

This indicator is useful to verify the effectiveness of measures to reduce greenhouse gases linked to the European objective 20-20-20.

Analyzing the trends and the ratios between the concentrations in the air and the estimated emissions from the sources identified in the local emissions inventories, and set a reduction target IMONITRAF! For the concentrations measured (indicator 5), it would be possible to detect the slippage from the objective.

D. Use for the definition of the scenarios

Ability to analyze scenarios of air quality related to traffic flow and vehicle fleet transiting measures and evaluation of the related measures effectiveness.

Evaluation of environmental sustainability (2010 state):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
NOx emissions	2	2	3	5	4

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
PM10 emissions	2	2	4	5	4

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
CO_2 emissions	2	2	4	5	4

1 to **5** = good to bad

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
Local emission inventories (% highways)	2	2	4	3	3

1 to **5** = good to bad

Evaluation of environmental sustainability (trend 2005-2010):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
emissions	↓	↓	↓	↓	↓

↓ = emissions reduction

2.5 INDICATOR 5 – Air concentrations measured

METADATA

Indicator 5:								***Air concentrations measured***
	Number:	5	**Name:**	Air concentrations measured				
	MONITRAF indicator	6-10	**Main category:**	Environment	**Unit:**	hour/year		
	Level:	Stations						
	Objective:	Basis for assessment of MONITRAF scenarios						
	Definition of indicator:	NO2, PM10 and PM2.5 concentrations on available stations in the project area						
	Calculation:	Statistical evaluation in order to compliance of european limit values						
Data:								
	Name:	Annual average of NO2 concentration	**Unit:**	µg/m³	**Periodicity:**	calendar year		
	Period:	2006-2010	**Reference period:**	2000 and 2005				
	Definition of data to be collected:	NO2 concentration hourly average; the concentrations are normalized for 101,3 kPa (pression) and 293 °K (temperature) (average of hourly averages)						
	Name:	Hours with a NO2 concentration exceeding hourly limit (200 µg/m³)	**Unit:**	hours/year	**Periodicity:**	calendar year		
	Period:	2006-2010	**Reference period:**	2000 and 2005				
	Definition of data to be collected:	Hours per year with a NO2 concentration of more than 200 µg/m³ (hourly average).						
	Name:	Days with a NO2 concentration exceeding daily limit (80 µg/m³)	**Unit:**	days/year	**Periodicity:**	calendar year		
	Period:	2006-2010	**Reference period:**	2000 and 2005				
	Definition of data to be collected:	Days per year with a NO2 concentration daily average of more than 80 µg/m³.						
	Name:	Annual average PM10 concentration	**Unit:**	µg/m³	**Periodicity:**	calendar year		
	Period:	2006-2010	**Reference period:**	2000 and 2005				
	Definition of data to be collected:	PM10 concentration daily average;						
	Name:	Days with a PM10 concentration exceeding daily limit (50 µg/m³)	**Unit:**	days/year	**Periodicity:**	calendar year		
	Period:	2006-2010	**Reference period:**	2000 and 2005				
	Definition of data to be collected:	Days per year with a PM10 concentration daily average of more than 50 µg/m³.						
	Name:	Annual average PM2,5 concentration	**Unit:**	µg/m³	**Periodicity:**	calendar year		
	Period:	2006-2010	**Reference period:**	2000 and 2005				
	Definition of data to be collected:	PM2,5 concentration daily average;						
	Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request (nb of data is deficient)							

	Rhones-Alpes	Piemonte	Valle d'Aosta	Switzerland Central Cantons	Canton Ticino	Tyrol	South Tyrol	Friuli Venezia Giulia
Data source (citation basis):	Air-APS / L'Air de l'Ain et des Pays de Savoie	database of the Regione Piemonte air quality monitoring sistem	Rete di Monitoraggio della Qualità dell'aria - ARPA Valle d'Aosta	FOEN (2003-2006). Emission data Monitoring of Supporting Measures - Environment (MSM-E). InLuft. Emissions measurement. Data available on http://www.in-luft.ch/	Dipartimento del territorio, Divisione dell'ambiente, Sezione della protezione dell'aria, dell'acqua e del suolo, Ufficio protezione dell'aria, Via Salvioni 2a, CH-6500 Bellinzona, +41 91 814 37 39; FOEN (2003-2006). Emission data Monitoring of Supporting Measures - Environment (MSM-E) (for MOLENO MFM-U)	Amt der Tiroler Landesregierung, Abt. Waldschutz		
Other Comments:			indicative measurements in Châtillon site in respect to Directive 1999/30/CE				measurement station VELTURNO exists since May 2004, ORA since December 2005	

DATA TABLES

In the next data tables we have classified the air quality monitoring stations in relation to the pollutants sources presence, the type of the area and the particulate measurement methodology. We have distinguished in different tables the results of the air quality campaigns performed in Fréjus and Tarvisio corridors in 2010.

Air quality stations definitions:

- T = Traffic
- I = Industrial
- B = Background

Air quality sites definitions:

- U = Urban area
- S = Suburban area
- R = Rural area

PM instruments definitions:

- G = gravimetric measures
- B = beta attenuation
- M = oscillating microbalance

NO_2 annual average based on hourly resolution

NAME	PP	STATION	SITE	2000	2005	2006	2007	2008	2009	2010
REIDEN	CSC	T	S	x	33	34	32	34	34	34
ERSTFELD	CSC	T	R	x	40	38	35	33	34	32
ALTDORF	CSC	T	R	30	28	27	26	26	25	24
BIOGGIO	TICINO		S	36	39	37	36	36	37	35
BODIO	TICINO		S	37	40	31	30	31	29	30
CHIASSO	TICINO		U	52	53	48	45	42	40	41
MOLENO	TICINO		S	x	50	45	46	46	46	49
VOMP	TIROLO	T	R	60	74	76	65	66	63	67
MUTTERS	TIROLO	T	R	41	53	53	51	49	50	50
BRESSANONE	SUD TIRO	T	U	31	35	32	32	30	29	28
VIPITENO	SUD TIRO	B	S	34	35	37	34	32	32	34
BOLZANO	SUD TIRO	T	U	51	43	48	43	42	41	x
ORA	SUD TIRO	T	S	x	x	x	51	47	49	45
VELTURNO	SUD TIRO	T	S	x	66	73	69	66	67	67
PLOUVES	VDA	T	U	42	39	38	29	36	34	31
LA THUILE	VDA	B	R	9	7	3	2	3	4	4
CHATILLON	VDA	T	S	x	x	x	x	x	x	
ENTREVES	VDA	T	S	x	43	42	42	41	36	38
SUSA	PIEMONTE	T	S	x	25	29	24	21	22	24
CHAMBERY LE HAUT	FRA	B	S	31	25	22	23	24	24	23
ST JEAN MAURIENNE	FRA	B	S	27	19	19	19	16	16	15
CHAMONIX BOSSONS	FRA	T	R	X	48	42	40	33	40	49
CHAMONIX M.BLANC	FRA	B	U	34	33	33	32	31	31	29
PASSY	FRA	B	U	X	X	X	23	22	26	34
ANNEMASSE	FRA	B	U	30	25	26	26	24	25	25
GAILLARD	FRA	B	U	32	24	25	25	25	24	25
ST. JULIEN MONTDENIS	FRA	T	S	X	28	26	25	22	22	33
CHAMBERY PASTEUR	FRA	B	U	33	28	28	31	28	27	27
OSOPPO	ITA	S	T		18	20	23	24	19	18
TOLMEZZO	ITA	I	U		19	20	17	18	21	20

NAME	PP	STATION	VALUE	2010
SUSA	Piemonte	campaign	hourly average	36
TARVISIO	Friuli VG	campaign	hourly average	18

PM10 annual average based on daily resolution

NAME	PP	STATION	SITE	INSTRUM.	2000	2005	2006	2007	2008	2009	2010
REIDEN	CSC	T	S	G	x	25	24	21	22	23	22
ERSTFELD	CSC	T	R	G	x	24	26	21	17	19	20
ALTDORF	CSC	T	R	G	x	20	20	18	17	18	18
BIOGGIO	TICINO		S	ND	x	36	36	35	31	29	28
BODIO	TICINO		S	ND	28	31	31	26	23	23	24
CHIASSO	TICINO		U	ND	33	46	46	40	35	34	32
MOLENO	TICINO		S	ND	x	28	29	25	24	22	23
VOMP	TIROLO	T	R	ND	x	32	33	27	23	23	24
MUTTERS	TIROLO	T	R	ND	x	24	23	23	22	22	22
BRESSANONE	SUD TIROLO	T	U	B	x	27	23	19	18	18	17
VIPITENO	SUD TIROLO	B	S	B	x	21	22	16	16	18	17
BOLZANO	SUD TIROLO	T	U	B	x	30	26	20	21	20	x
ORA	SUD TIROLO	T	S	B	x	x	29	21	21	21	20
VELTURNO	SUD TIROLO	T	S	B	x	x	29	24	23	24	22
PLOUVES	VDA	T	U	M	40	33	33	25	25	25	24
ENTREVES	VDA	T	S	M	x	25	21	20	18	19	22
SUSA	PIEMONTE	T	S	G	x	29	30	22	25	21	21
CHAMBERY LE HAUT	FRA	B	S	M	19	29	28	25	25	27	21
ST JEAN MAURIENNE	FRA	B	S	M	20	25	25	24	23	27	20
CHAMONIX BOSSONS	FRA	T	R	M	X	X	X	27	21	25	21
CHAMONIX M.BLANC	FRA	B	U	M	25	32	29	29	25	26	25
PASSY	FRA	B	U	M	X	X	X	31	29	31	27
GAILLARD	FRA	B	U	M	21	25	26	24	24	27	27
ST. JULIEN MONTDEN	FRA	T	S	M	X	31	32	28	27	29	23
CHAMBERY PASTEUR	FRA	B	U	M	22	27	27	24	26	26	22
OSOPPO	ITA	T	S	B		18	22	26	27	22	22

NAME	PP	STATION	VALUE	2010
SUSA	Piemonte	campaign	PM10 daily average	25
TARVISIO	Friuli VG	campaign	PM10 daily average	18

Number of days with a PM10 concentration of more than 50 µg/m³ as daily average

NAME	PP	STATION	SITE	INSTRUM.	2000	2005	2006	2007	2008	2009	2010
REIDEN	CSC	T	S	G	x	24	34	7	15	17	21
ERSTFELD	CSC	T	R	G	x	8	37	7	3	6	12
ALTDORF	TICINO		S	ND	6	3	21	4	9	7	
BIOGGIO	TICINO		S	ND	x	84	73	79	42	43	33
BODIO	TICINO		U	ND	25	48	39	23	13	3	10
CHIASSO	TICINO		S	ND	63	139	112	97	63	69	54
MOLENO	TIROLO	T	R	ND	x	52	50	27	30	15	22
VOMP (A)	TIROLO	T	R	ND	x	40	55	13	4	13	22
MUTTERS (A)	TIROLO	T	R	ND	x	10	8	6	7	10	14
BRESSANONE (I)	SUD TIROLO	T	U	B	x	34	22	2	8	3	3
VIPITENO (I)	SUD TIROLO	B	S	B	x	22	26	8	4	7	10
BOLZANO (I)	SUD TIROLO	T	U	B	x	38	33	9	16	7	x
ORA (I)	SUD TIROLO	T	S	B	x	x	34	5	18	6	10
VELTURNO (I)	SUD TIROLO	T	S	B	x	x	38	10	14	5	11
PLOUVES (I)	VDA	T	U	M	82	54	48	14	15	9	13
ENTREVES (I)	VDA	T	S	M	x	12	7	12	11	7	20
SUSA (I)	PIEMONTE	T	S	G	x	43	40	27	39	16	21
CHAMBERY LE HAUT	FRA	B	S	M	32	31	36	33	26	30	12
ST JEAN MAURIENNE	FRA	B	S	M	14	7	15	16	9	12	5
CHAMONIX BOSSONS	FRA	T	R	M	X	X	X	28	19	11	8
CHAMONIX M.BLANC	FRA	B	U	M	57	38	40	43	28	30	24
PASSY	FRA	B	U	M	X	X	X	54	51	39	52
GAILLARD	FRA	B	U	M	52	10	33	38	28	30	22
ST. JULIEN MONTDEN	FRA	T	S	M	X	30	46	22	19	20	11
CHAMBERY PASTEUR	FRA	B	U	M	53	21	36	36	31	31	19
OSOPPO	ITA	T	S	B		3	13	24	22	9	27

PM2.5 annual average based on daily resolution

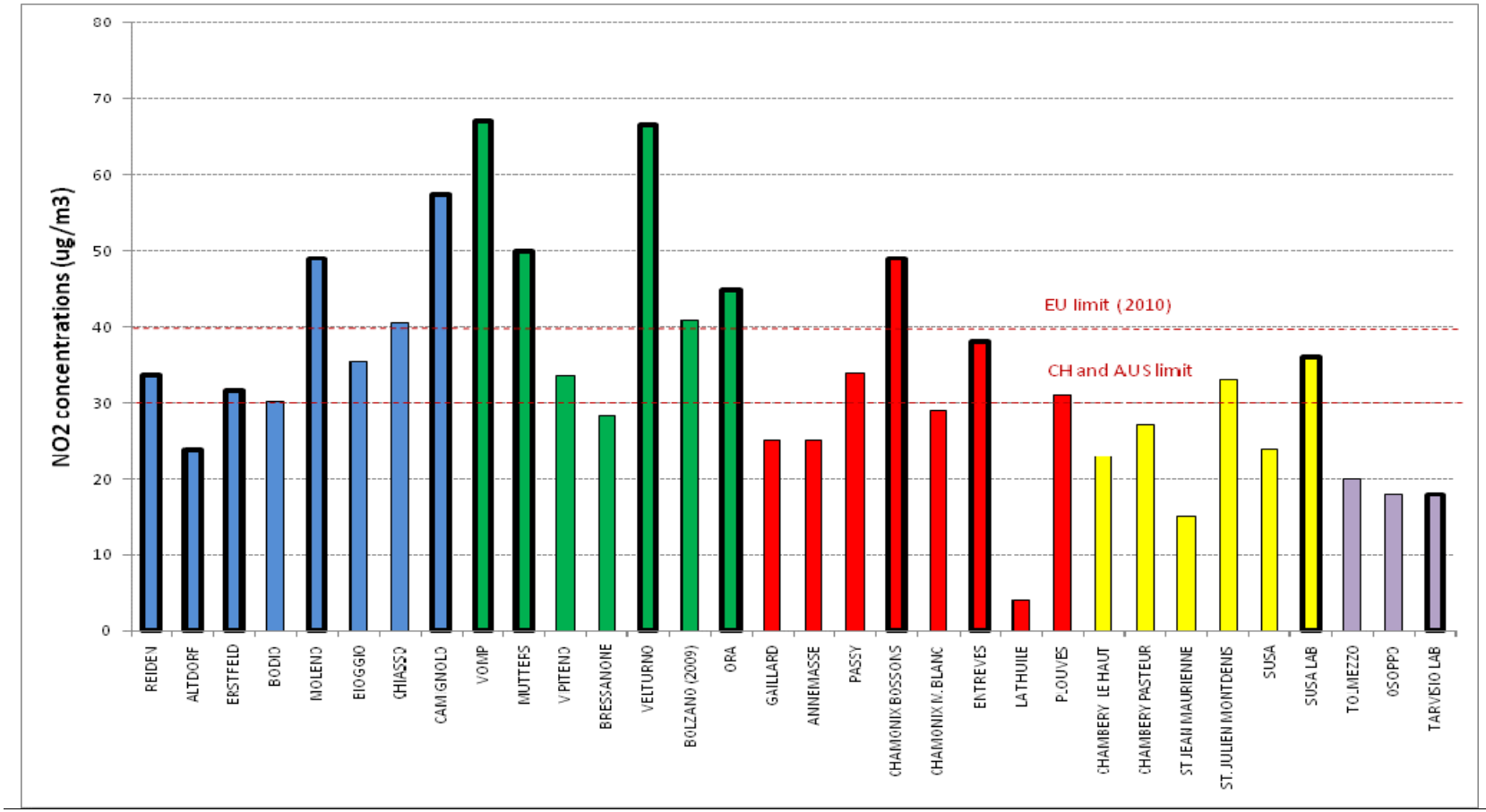
NAME	PP	STATION	SITE	INSTRUM.	2000	2005	2006	2007	2008	2009	2010
REIDEN	CSC	T	S	G	x	x	x	x	x	x	x
ERSTFELD	CSC	T	R	G	x	x	x	x	x	x	x
ALTDORF	CSC	T	R	G	x	x	x	x	x	x	x
BIOGGIO	TICINO		S	ND	x	36	x	x	x	x	x
BODIO	TICINO		S	ND	x	x	x	x	x	x	x
CHIASSO	TICINO		U	ND	33	46	x	x	x	x	x
MOLENO	TICINO		S	ND	x	x	x	x	x	x	x
VOMP	TIROLO	T	R	ND	na	na	na	na	na	na	na
MUTTERS	TIROLO	T	R	ND	na	na	na	na	na	na	na
BRESSANONE	SUD TIROLO	T	U	B	x	x	x	x	x	x	x
VIPITENO	SUD TIROLO	B	S	B	x	x	x	x	x	x	x
BOLZANO	SUD TIROLO	T	U	B	x	x	19	16	16	16	x
ORA	SUD TIROLO	T	S	B	x	x	x	17	15	16	16
VELTURNO	SUD TIROLO	T	S	B	x	x	17	15	14	16	16
PLOUVES	VDA	T	U	M	x	x	19	17	17	15	15
ENTREVES	VDA	T	S	M	x	x	x	x	x	x	x
SUSA	PIEMONTE	T	S	G	x	x	x	x	x	x	x
CHAMBERY LE HAUT	FRA	B	S	M	X	X	13	12	X	X	X
ST JEAN MAURIENNE	FRA	B	S	M	X	X	X	X	X	X	X
CHAMONIX BOSSONS	FRA	T	R	M	X	X	X	X	X	X	X
CHAMONIX M.BLANC	FRA	B	U	M	X	X	X	X	X	X	X
PASSY	FRA	B	U	M	X	X	X	X	X	X	X
GAILLARD	FRA	B	U	M	X	X	X	X	X	X	15
ST. JULIEN MONTDEN	FRA	T	S	M	X	X	X	X	X	X	X
CHAMBERY PASTEUR	FRA	B	U	M	X	X	13	13	X	21	17
OSOPPO	ITA	T	S	B		X	X	X	X	X	X

NAME	PP	STATION	VALUE	2010
SUSA	Piemonte	campaign	PM2.5 daily average	20

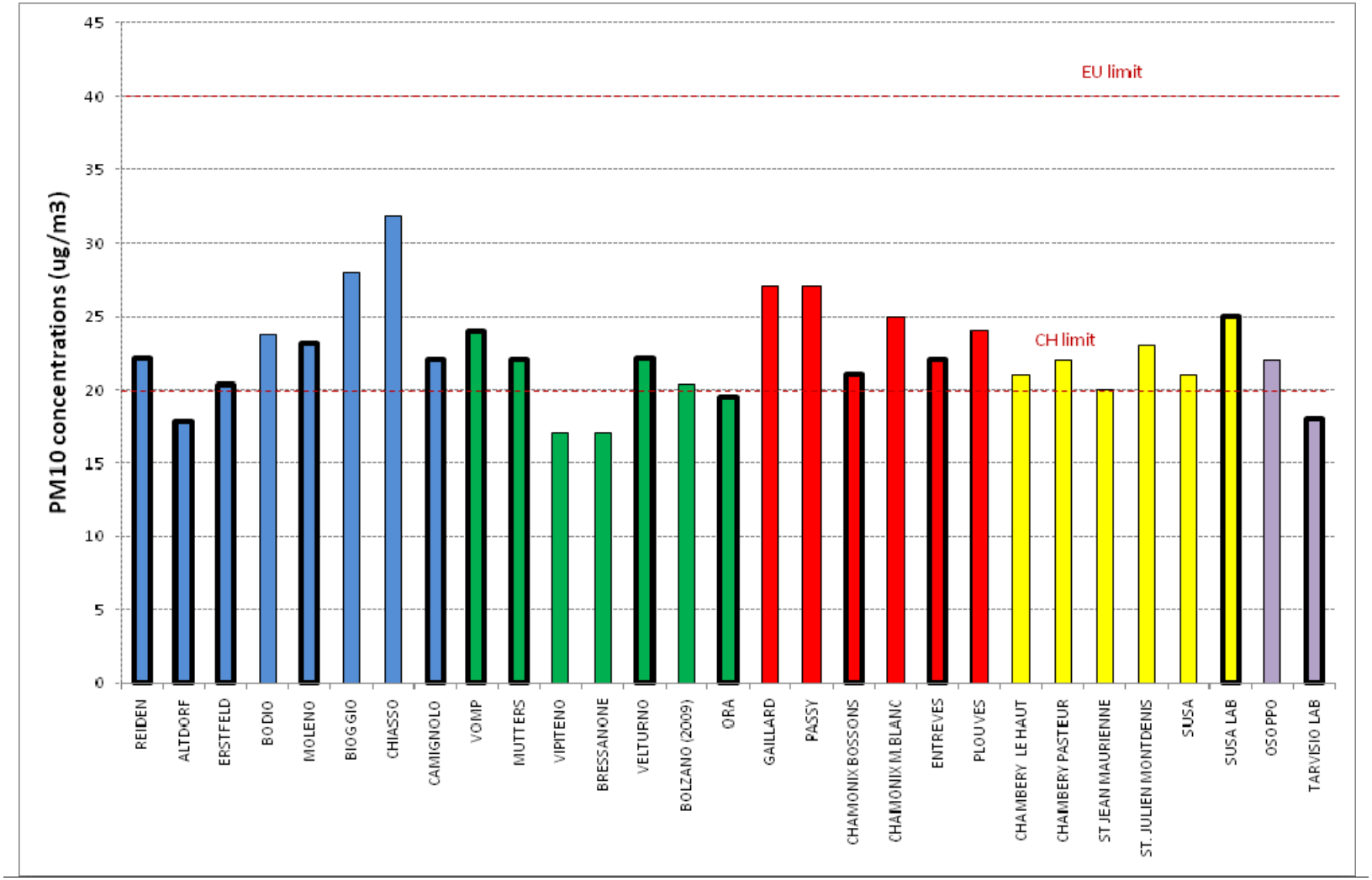
DATA ELABORATIONS

The bars marked in the next charts with a black border are referring to traffic air quality stations data. The data marked “Susa LAB” and “Tarvisio LAB” are provided by monitoring campaign with mobile laboratory.

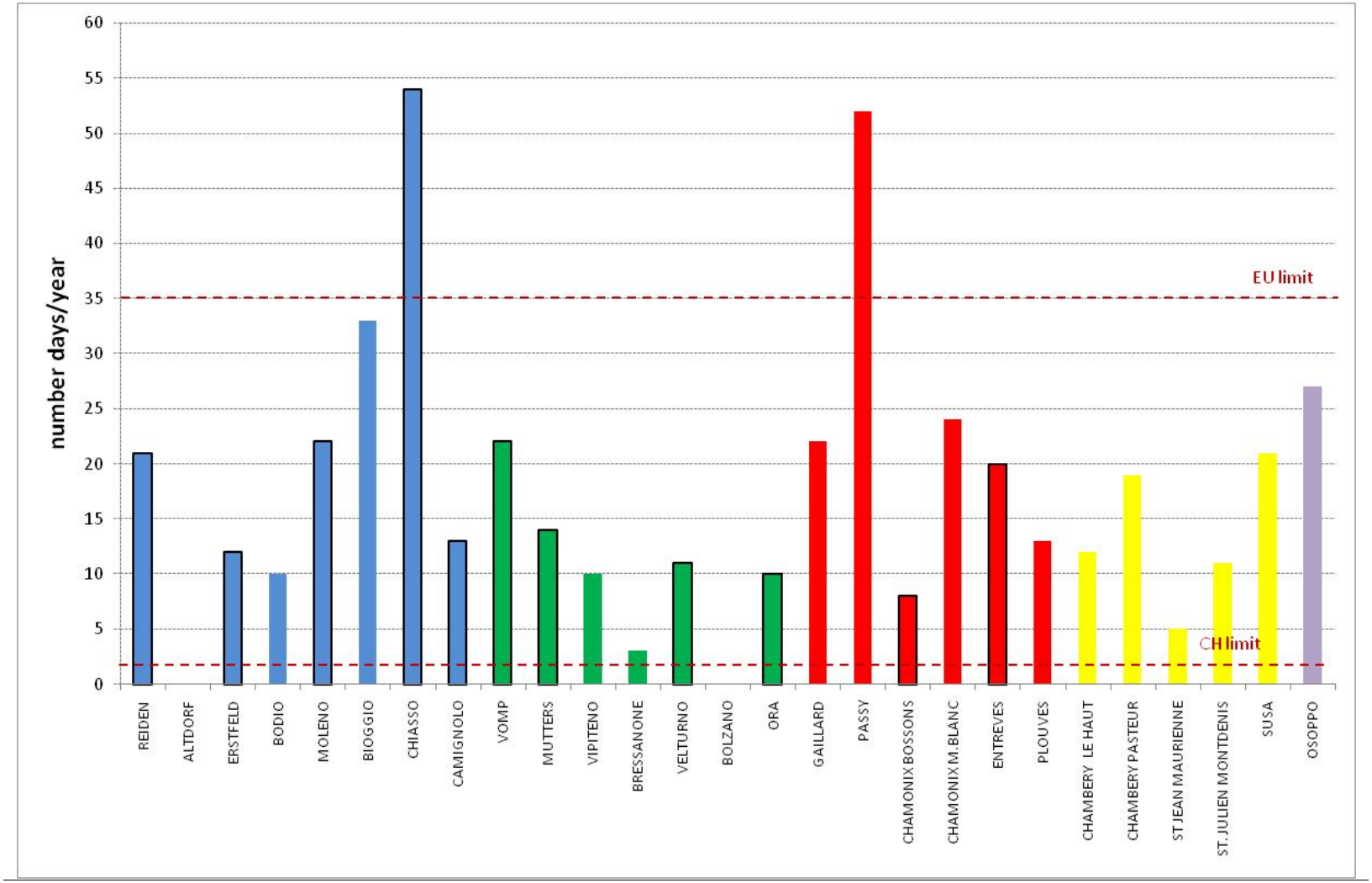
NO2 CONCENTRATIONS: YEARLY AVERAGE VALUES (2010 DATA)



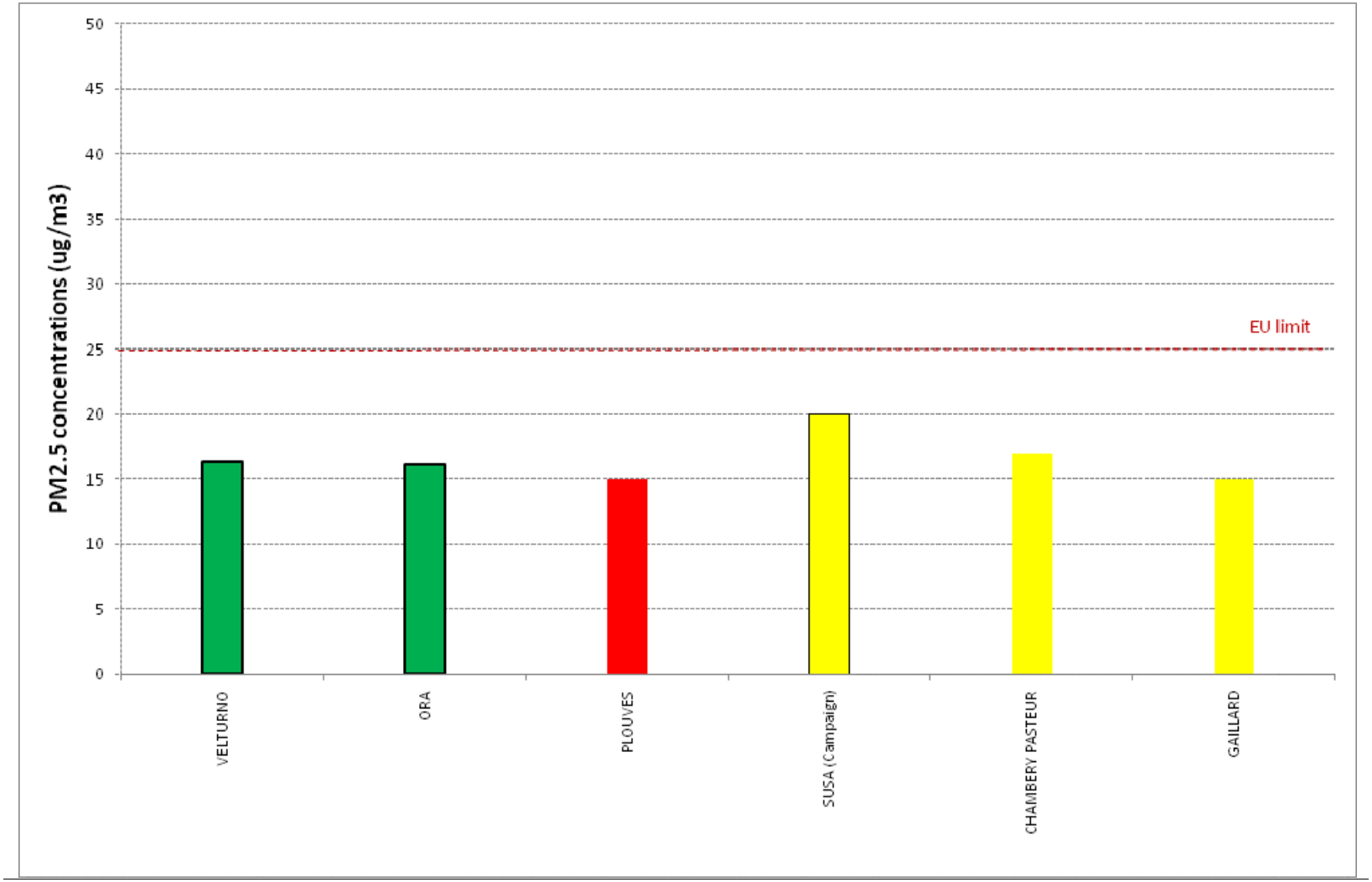
PM10 CONCENTRATIONS: YEARLY AVERAGE VALUES (2010 DATA)



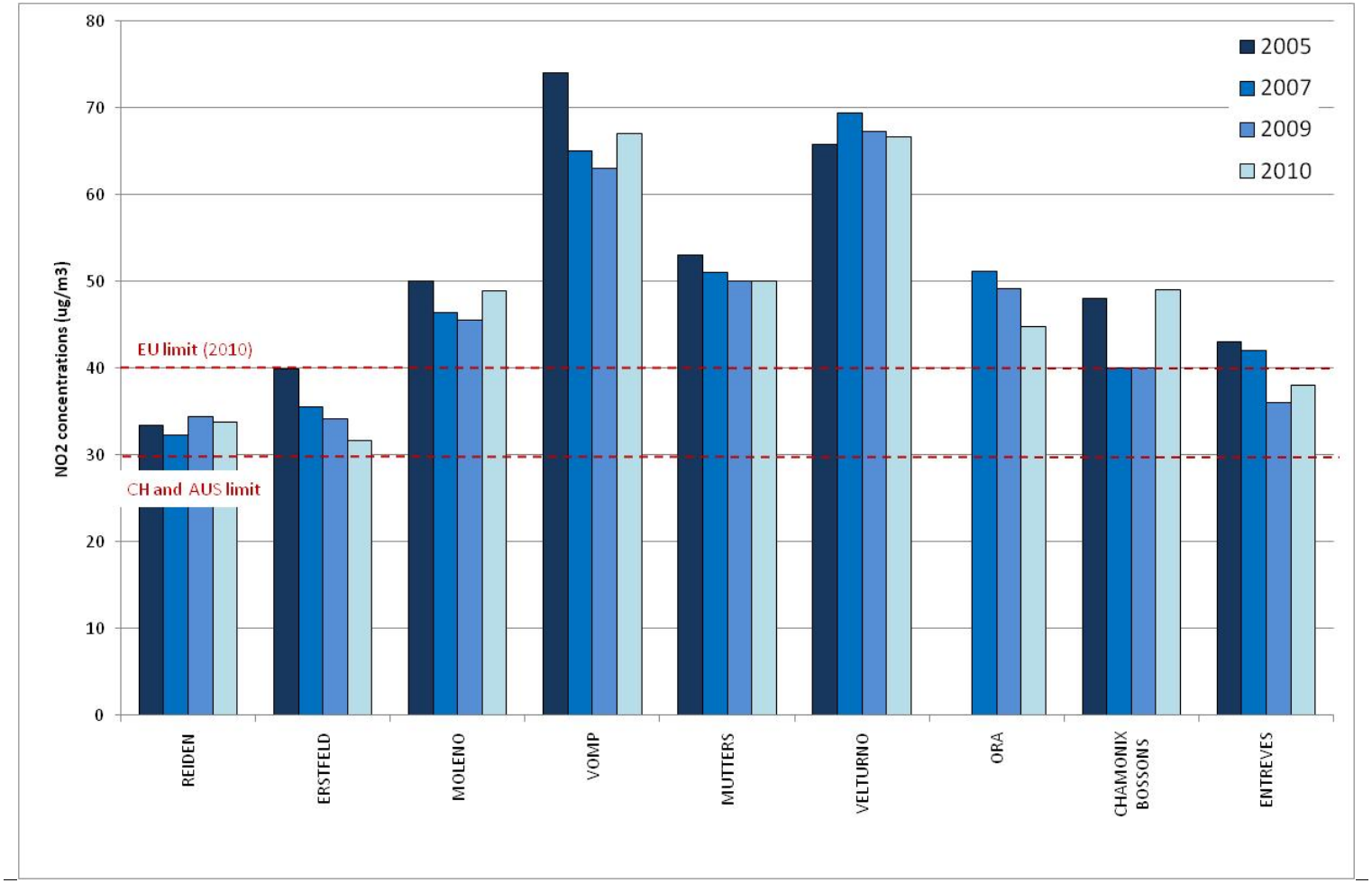
PM10 CONCENTRATIONS: DAILY NUMBER OF LIMIT OVER (2010 DATA)



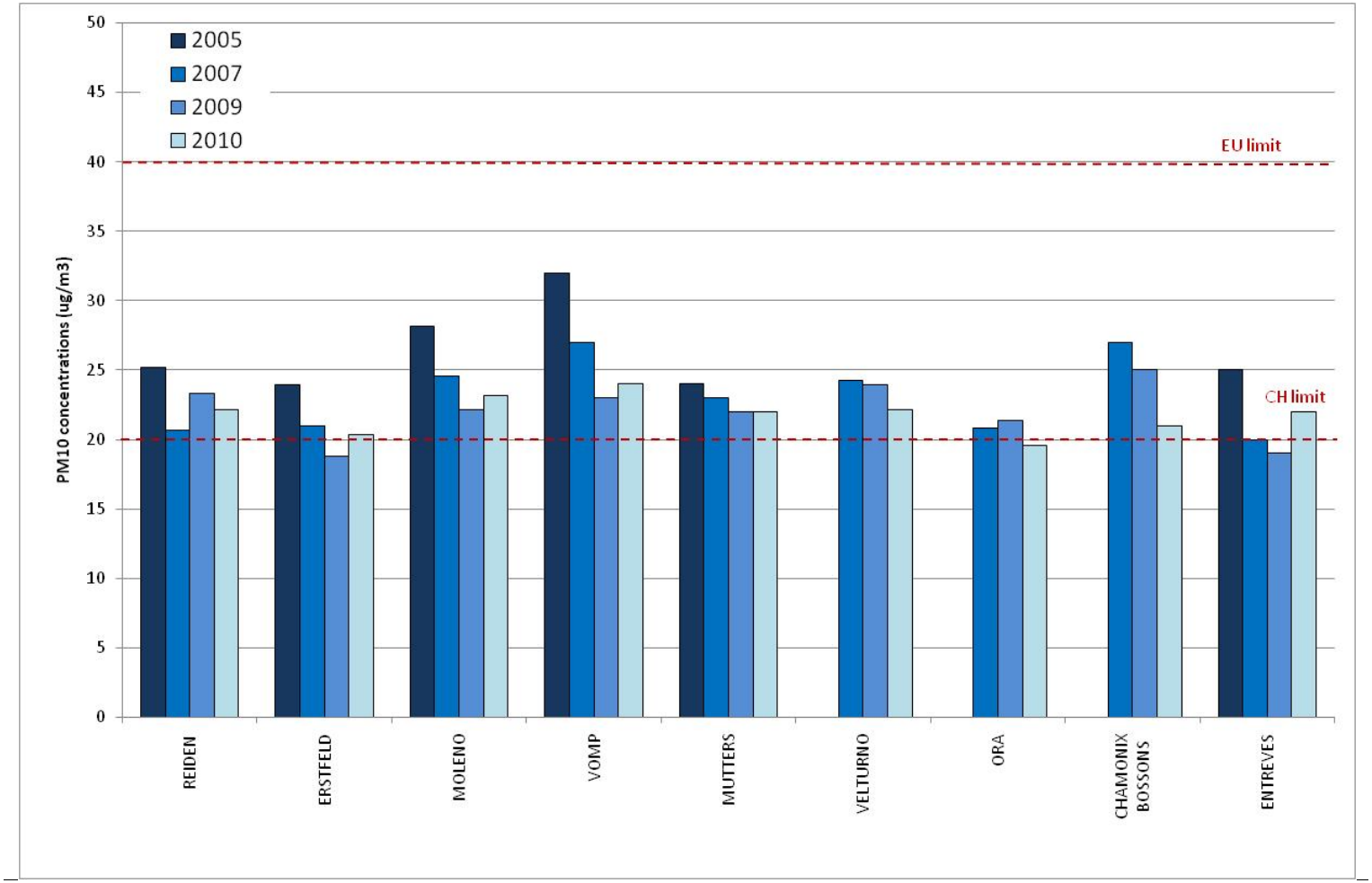
PM2.5 CONCENTRATIONS: YEARLY AVERAGE VALUES (2009-2010 DATA)



NO_2 CONCENTRATIONS: YEARLY AVERAGE TREND (2005-2010 DATA, ONLY TRAFFIC STATIONS)



PM10 CONCENTRATIONS: YEARLY AVERAGE TREND (2005-2010 DATA, ONLY TRAFFIC STATIONS)



Key figures:

Concentrations European limits observance for 2010:

NO_2: 7 on 11 Air quality traffic stations over the European limit

PM10: 0 on 11 Air quality traffic stations over the European limit

PM2.5: 0 on 2 Air quality traffic stations over the European limit

Evaluation restrictions:

In the Fréjus and Tarvisio corridors there are no air quality monitoring stations side of the motorway, but only stations in neighboring towns. From autumn 2010 Piedmont and Friuli partners are started with an air quality IMONITRAF! campaign near the highways.

A. General reading and data analysis

NO_2 yearly average concentrations

- → It is noted that the stations which are above the European limit are all on the roadside, this pollutant is indeed mainly related to transport.
- → All the stations of the Fréjus and Tarvisio corridors, including the monitoring campaign points close to the highways, not register overcoming of the European limit.

PM10 yearly average concentrations

- → No station exceeds the European limit of 40 $\mu g/m^3$, but the Swiss limit of 20 $\mu g/m^3$ is exceeded by almost all stations considered.
- → Not always the stations with higher values are those of the roadside given that this pollutant is also influenced by sources other than road traffic (heating plants, industries,…).
- → In the five corridors the range of measured values don't differ much.

PM10 daily number of limit over concentrations

- → Only two stations exceed the European limit and not all are close to road, but they show urban situations.
- → All stations considered exceed the low Swiss limit.

PM2.5 yearly average concentrations

- → The European limit is respected everywhere, even on the roadside.

B. Reading of trends

There is a general decrease in the concentrations of nitrogen oxides and dust measured from 2005 to 2009, the last year, post economical crisis, the most stations give a little increase due to the recovery of the traffic fluxes.

C. Analysis with Monitraf and general objectives

NO_2: European and Swiss limits are exceeded in most of the stations at the roadside, particularly important are the values measured along the Brenner corridor (Vomp and Ora stations).

PM10: The situation is less problematic for dust, while Switzerland's most restrictive limit is exceeded by every traffic station.

D. Use for the definition of the scenarios

This indicator is used to define the objectives for scenarios on air quality; related to the indicator 4, it may be used to correlate the traffic flow with the pollution measured.

Evaluation of environmental sustainability (2010 state):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
Air quality	3*	3	4	5	2*

1to **5** = good to bad

***** = campaign, not fixed stations

Evaluation of environmental sustainability (trend 2005-2010):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
Air quality	not applied	↓	↓	↓	not applied

↓ = decrease of concentrations

2.6 INDICATOR 6 – Noise assessment

METADATA

Metadata Indicator:	***Noise assessment***					
	Noise	6	**Name:**	Noise assessment		
	MONITRAF indicator	11	**Main category:**	Environment	**Unit:**	dBA
	Level:	Stations				
	Objective:	Noise assessment				
	Definition of indicator:	Lden (noise indicator for overall annoyance) and Lnight (noise indicator for annoyance during the night period). Refer to the annex 1 of EU directive 2002/49/EC for detailed definition				
	Calculation:	Based on EU directive 2002/49/EC. The values of Lden and Lnight can be determined either by computation or by measurement (at the assessment position). Refer to the European Commission Reccomandation 2003/613/EC for further details				
Data:						
	Name:	Lden	**Unit:**	dBA	**Periodicity:**	annual
	Period:	2006-2010	**Reference period:**	2000 and 2005		
	Definition of data to be collected:	Lden (noise indicator for overall annoyance)				
	Data source (citation basis):					
	Other Comments:	Every regions collects the available data				
	Name:	Lnight	**Unit:**	dBA	**Periodicity:**	annual
	Period:	2006-2010	**Reference period:**	2000 and 2005		
	Definition of data to be collected:	Lnight (noise indicator for annoyance during the night period)				
	Data source (citation basis):					
	Other Comments:	Every regions collects the available data				
	Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request					

	Piemonte	Valle d'Aosta	Switzerland Central Cantons	Canton Ticino	Friuli Venezia Giulia
Data source (citation basis):	ARPA Piemonte	ARPA Valle d'Aosta	Monitoring of Supporting Measures-Environment (MSM-E), Federal Office for the Environment FOEN, Switzerland.	Monitoring of Supporting Measures-Environment (MSM-E), Federal Office for the Environment FOEN, Switzerland.	ARPA Friuli Venezia Giulia

DATA TABLES

L_{den} in the iMONITRAF! Years of activity and reference years

		2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
CSC	Reiden	*78,5*	78,7	79,2	79,2	79,6	79,6	79,6
Ticino	Camignolo	*78,5*	78,7	78,9	79,1	79,6	79,5	79,8
VdA	Courmayeur	*x*	x	73,8	74,1	74,8	72,6	70,7
	Chatillon	75,4	x	x	x	x	77,5	74,6
Piemonte	Bardonecchia	*x*	x	x	x	x	72,8	71,4
	Borgone	*x*	x	x	x	x	74,9	73,3
FVG	Tarvisio	*76,9*	x	x	x	x	71,2	71,3

L_{night} in the iMONITRAF! Years of activity and reference years

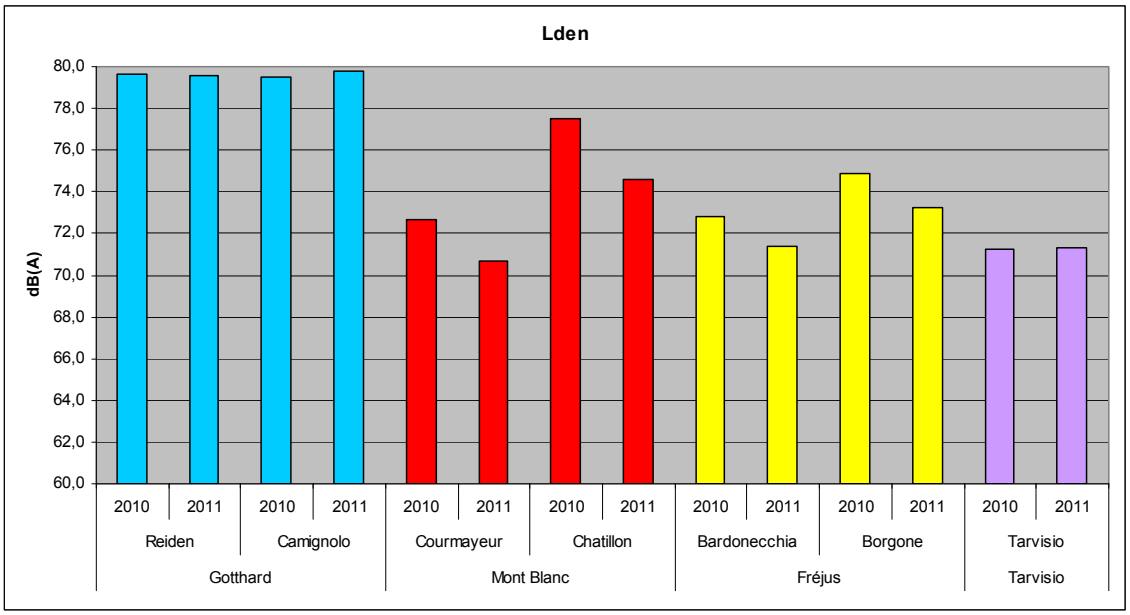
		2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
CSC	Reiden	*70,5*	70,9	71,4	71,5	71,9	72,0	71,9
Ticino	Camignolo	*70,3*	70,6	70,8	71,0	71,5	71,4	71,7
VdA	Courmayeur	*x*	x	66,5	x	x	65,3	63,4
	Chatillon	67,1	x	x	x	x	69,3	66,6
Piemonte	Bardonecchia	*x*	x	x	x	x	66,0	64,1
	Borgone	*x*	x	x	x	x	67,5	65,2
FVG	Tarvisio	*69,7*	x	x	x	x	64,9	64,3

L_{den} and L_{night} in the iMONITRAF! Years of activity and reference years

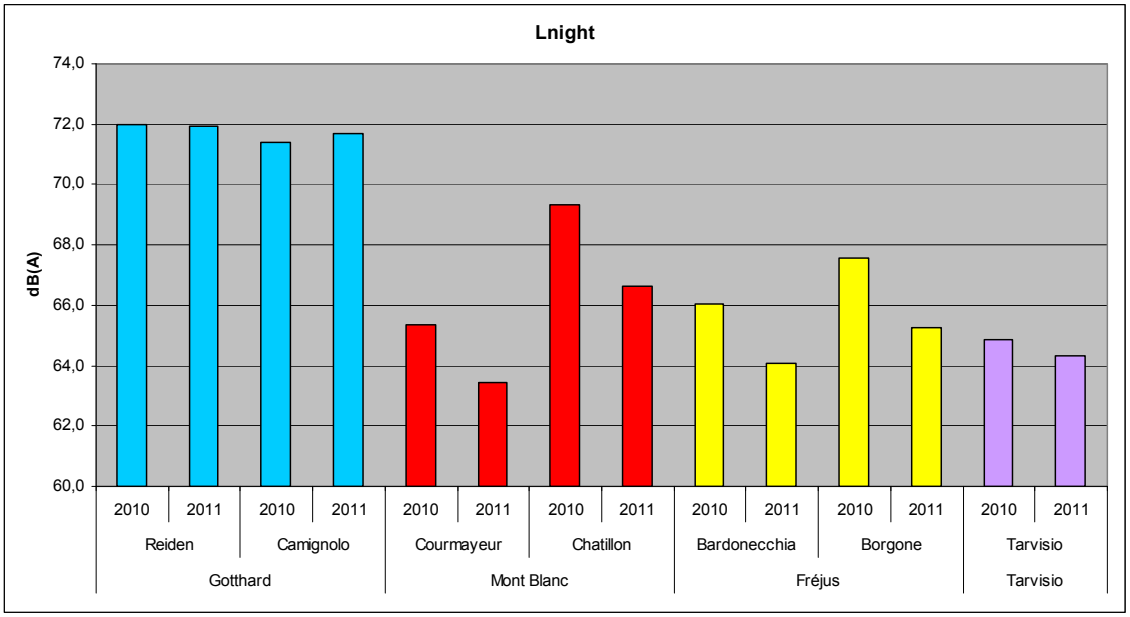
PP	Sito	Anno	Lnight	Lden
CSC	Reiden	2010	72,0	79,6
		2011	71,9	79,6
Ticino	Camignolo	2010	71,4	79,5
		2011	71,7	79,8
VdA	Courmayeur	2010	65,3	72,6
		2011	63,4	70,7
	Chatillon	2010	69,3	77,5
		2011	66,6	74,6
Piemonte	Bardonecchia	2010	66,0	72,8
		2011	64,1	71,4
	Borgone	2010	67,5	74,9
		2011	65,2	73,3
FVG	Tarvisio	2010	64,9	71,2
		2011	64,3	71,3

DATA ELABORATIONS

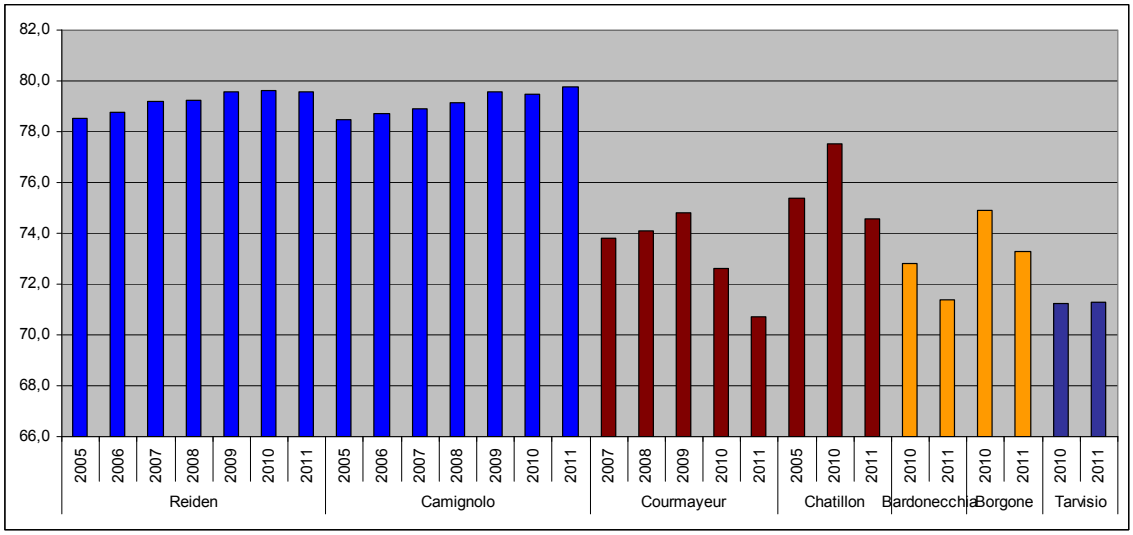
L_{DEN} IN THE IMONITRAF! YEARS OF ACTIVITY



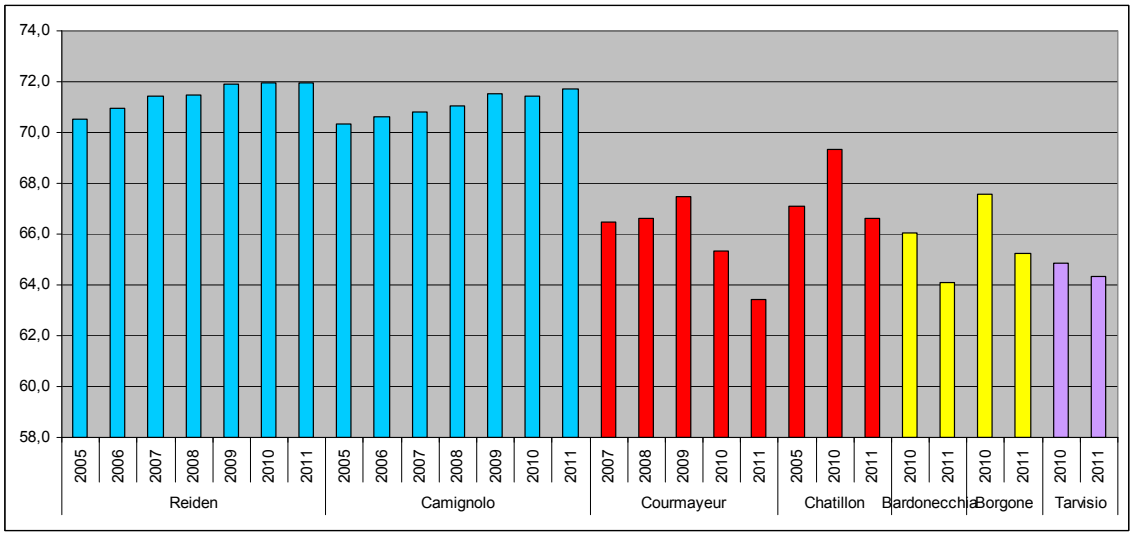
L_{NIGHT} IN THE IMONITRAF! YEARS OF ACTIVITY



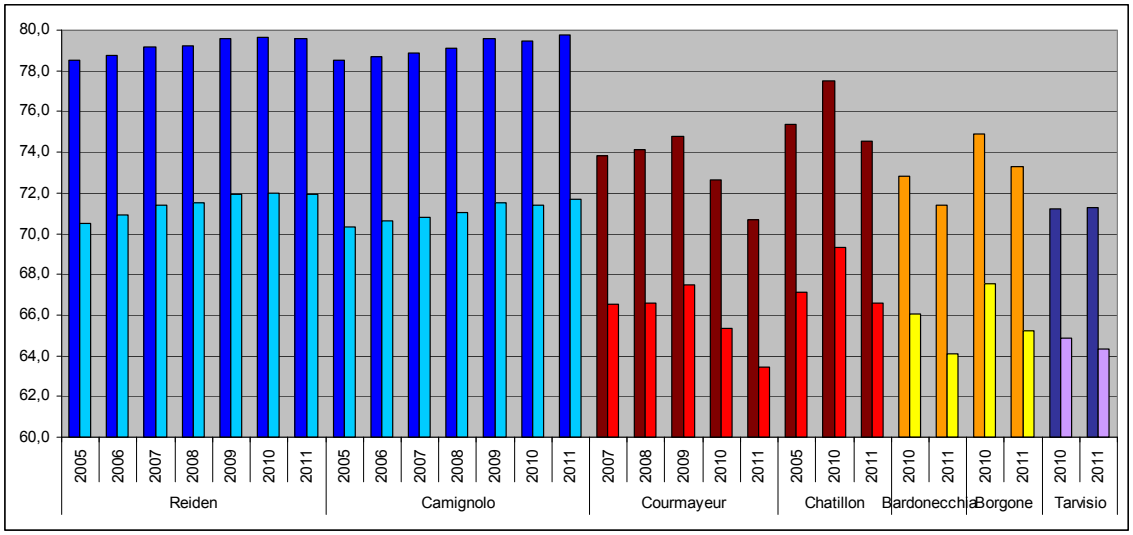
L_{DEN} IN THE IMONITRAF! PROJECT AND REFERENCE VALUES



L_{NIGHT} IN THE IMONITRAF! PROJECT AND REFERENCE VALUES



L_{DEN} AND L_{NIGHT} IN THE IMONITRAF! AND REFERENCE VALUES



Key figures:

The values measured in Reiden and Camignolo are higher than the ones of the other corridors due to the large number of light vehicles that travel on those roads. In these two measurement points there is a quite large local traffic.

Evaluation restrictions:

All the measures have been conducted in accordance to guidelines written and approved by all the project partners to ensure measures are comparable between different corridors. Every measured level is standardized at a fixed distance (10 meters from infrastructure) and height (4 meters).

Note that the reference values (obtained in the years prior to 2005) displayed for this indicator were measured before the creation of the guidelines and those measured in Piemonte and Friuli Venezia Giulia were obtained using a different measurement procedure.

The Project Partners agreed to conduct at least one measurement per season, in order to have the same minimum amount of data for each corridor.

It should be noted at Courmayeur there is a two lanes road and that the inclination of that road is very high, while all the others are four lanes highways with about flat terrain.

For these reason the shown values are good indicators of the real emission levels of the infrastructures.

Unfortunately it has not been possible to retrieve noise monitoring data for the Brenner corridor.

A. General reading and data analysis

In the last year it is possible to observe a reduction of the noise levels of about 2 dB in the Piemonte and Valle d'Aosta corridors. The levels measured in Switzerland and Tarvisio did not change significantly from the previous years.

B. Reading of trends

The measured noise levels in Fréjus, Gotthard and Tarvisio in the recent years are significantly lower than those measured in 2005. This is due to a general decrease of traffic fluxes that occurred because of the economic crisis of 2008 and some soft measures implemented in the corridors such as installation of noise barriers.

C. Analysis with Monitraf and general objectives

The noise measurements were conducted in open fields in order to evaluate the emission of the corridors and not in places where inhabitants reside. For this reasons there are no limits to be confronted with the actual measured values.

D. Use for the definition of the scenarios

This indicator is used to define the objectives for scenarios on noise pollution. It is well known that the noise levels are correlated to the number of vehicles or trains that travels on the infrastructure.

Evaluation of environmental sustainability (2010 state):

	Fréjus	Mont Blanc	Gotthard	Tarvisio
Noise level	3	2	4	2

1 to 5 = good to bad

Evaluation of environmental sustainability (trend 2005-2011):

	Fréjus	Mont Blanc	Gotthard	Tarvisio
Noise level	↑	↑	--	↑

2.7 INDICATOR 7 – Toll prices

METADATA

Indicator:						***Toll prices***
	Number:	7	**Name:**	Toll prices		
	MONITRAF indicator	17	**Main category:**	Prices and regulation	**Unit:**	€/km
	Level:	Corridor (motorway and tunnel)				
	Objective:	Basis for assessment of MONITRAF scenarios				
	Definition of indicator:	Travel cost based on toll prices (highways and tunnels) per km for Euro 2 and Euro 5 Heavy duty vehicle (40 t, 5 axes) and a passenger car.				
	Calculation:					
Data:						
	Name:	Travel cost for Euro 2 Heavy duty vehicle (40 t, 5 axes)		**Unit:** €	**Periodicity:**	annual
	Period:	2005-2011	**Reference period:**	2005		
	Definition of data to be collected:	Toll prices sum for Euro 2 Heavy duty vehicle (40 t, 5 axes) on the motorway and on the tunnel in the project corridor in € or in CHF, VAT excluded				
	Currency conversion:	Data has to be defined for currency conversion. Suggestion for conversion date: 31.12. of the respective year				
	Name:	Travel cost for Euro 5 Heavy duty vehicle (40 t, 5 axes)		**Unit:** €	**Periodicity:**	annual
	Period:	2005-2011	**Reference period:**	2005		
	Definition of data to be collected:	Toll prices sum for Euro 5 Heavy duty vehicle (40 t, 5 axes) on the motorway and on the tunnel in the project corridor in € or in CHF, VAT excluded				
	Currency conversion:	Data has to be defined for currency conversion. Suggestion for conversion date: 31.12. of the respective year				
	Name:	Travel cost for a passenger car		**Unit:** €	**Periodicity:**	annual
	Period:	2005-2011	**Reference period:**	2005		
	Definition of data to be collected:	Toll prices sum for a passenger car on the motorway and on the tunnel in the project corridor in € or in CHF, VAT excluded				
	Currency conversion:	Data has to be defined for currency conversion. Suggestion for conversion date: 31.12. of the respective year				
	Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request					

Travel cost for Heavy duty vehicle	Rhones-Alpes	Piemonte	Valle d'Aosta	Switzerland Central Cantons	Canton Ticino	Tyrol	South Tyrol	Friuli Venezia Giulia
Data source (citation basis):	GEIE TMB, ATMB autoroutes, SFTRF and AREA autoroutes	SITAF - www.sitaf.it	Data providers: SAV Autostrade, RAV Autostrade, GEIE Mont Blanc	Federal Office for Customs: http://www.ezv.admin.ch/zollinfo_firmen/steuern_abgaben/00379/index.html?lang=de		Tyr - ASFINAG, Amt der Tiroler Landesregierung, Abt. Verkehrsplanung	Autonome Provinz Bozen-Südtirol, Abteilung Mobilität, Amt für Planung und Gütertransport	Autostrade per l'Italia S.p.A.
Other Comments:		In Tunnel tool prices With "Heavy duty vehicle (40 t, 5 axes)" we mean Vehicle with three or more axes whose total height exceeds 3 m.		The distance-related fee is applied on all the swiss roads ad not only on highways; the min/max costs calculation base on minimal an maximal weight (min: 3.5 t, max: 40 t); all values without 20% VAT		road pricing was introduced 2004, all values without 20% VAT		

Travel cost for a passenger car	Rhones-Alpes	Piemonte	Valle d'Aosta	Switzerland Central Cantons	Canton Ticino	Tyrol	South Tyrol	Friuli Venezia Giulia
Data source (citation basis):	GEIE TMB, ATMB autoroutes, SFTRF and AREA	SITAF - www.sitaf.it	Data providers: SAV Autostrade, RAV Autostrade, GEIE Mont Blanc	Federal Office for Customs: http://www.ezv.admin.ch/zollinfo_firmen/steuern_abgaben/00379/index.html?lang=det		ÖAMTC		Autostrade per l'Italia S.p.A.
Other Comments:				The vignette, which is a sticker applied to inside of the windscreen, costs a flat-rate price and is mandatory for motor vehicles and trailers up to a total weight of 3.5 t each		introduction of vignette for all light vehicles <3,5t in 1997 (since than only one price incfrease in 2000)		

DATA TABLES

Toll prices: values in Euros, VAT excluded.

Corridor: Fréjus Piemonte **km: 76** from Fréjus to Avigliana

HIGHWAY TOOL PRICES

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car	7,70	7,80	8,00	8,10	8,30	8,75	
Euro 2 Heavy duty vehicle (40 t, 5 axes)	22,00	22,50	22,95	23,40	24,00	25,25	
Euro 5 Heavy duty vehicle (40 t, 5 axes)	22,00	22,50	22,95	23,40	24,00	25,25	

TUNNEL TOOL PRICES

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car	30,25	31,55	32,10	32,75	33,20	35,10	
Euro 2 Heavy duty vehicle (40 t, 5 axes)	217,25	230,45	234,35	239,35	242,70	256,20	
Euro 5 Heavy duty vehicle (40 t, 5 axes)	217,25	230,45	234,35	239,35	242,70	256,20	

Corridor: Fréjus Rhone-Alpes **km: 78** from Aiton to Fréjus

HIGHWAY TOOL PRICES

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car	5,936	6,020	6,104	6,187	6,35	6,35	6,52
Euro 2 Heavy duty vehicle (40 t, 5 axes)	23,829	24,247	24,415	24,833	25,50	25,59	26,25
Euro 5 Heavy duty vehicle (40 t, 5 axes)	23,829	24,247	24,415	24,833	25,50	25,59	26,25

TUNNEL TOOL PRICES

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car	25,502	26,087	27,007	27,007	27,76	29,35	30,77
Euro 2 Heavy duty vehicle (40 t, 5 axes)	182,692	190,134	196,656	196,656	202,26	213,46	237,12
Euro 5 Heavy duty vehicle (40 t, 5 axes)	182,692	190,134	196,656	196,656	202,26	213,46	224,58

Corridor: Mont Blanc VdA **km: 97** from Mont-Blanc to Pont-St-Martin

HIGHWAY TOOL PRICES

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car	9,24	9,27	9,89	9,94	10,14	10,27	
Euro 2 Heavy duty vehicle (40 t, 5 axes)	23,99	24,12	25,52	25,61	26,03	26,38	
Euro 5 Heavy duty vehicle (40 t, 5 axes)	23,99	24,12	25,52	25,61	26,03	26,38	

TUNNEL TOOL PRICES

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car	30,00	31,20	32,30	33,20	33,20	35,10	36,80
Euro 2 Heavy duty vehicle (40 t, 5 axes)	215,30	228,20	236,00	242,70	242,70	256,20	284,50
Euro 5 Heavy duty vehicle (40 t, 5 axes)	215,30	228,20	236,00	242,70	242,70	256,20	268,90

Corridor: Mont Blanc Rhone-Alpes **km: 129,8** Le Fayet --> entrée du tunnel

HIGHWAY TOOL PRICES

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car	7,61	7,78	7,86	8,03	8,28	8,28	8,36
Euro 2 Heavy duty vehicle (40 t, 5 axes)	24,75	25,67	26,17	26,84	27,76	28,26	29,10
Euro 5 Heavy duty vehicle (40 t, 5 axes)	24,75	25,67	26,17	26,84	27,76	28,26	29,10

TUNNEL TOOL PRICES

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car	25,08	26,09	26,67	27,01	27,76	29,35	30,77
Euro 2 Heavy duty vehicle (40 t, 5 axes)	179,35	190,13	193,90	196,66	202,26	213,46	237,12
Euro 5 Heavy duty vehicle (40 t, 5 axes)	179,35	190,13	193,90	196,66	202,26	213,46	224,08

Corridor: Gotthard (side: CS) **km: 68** from Luzern to Gotthard

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car (vignette fee)	40,00	40,00	40,00	40,00	40,00	40,00	40,00
Euro 2 Heavy duty vehicle (40 t, 5 axes)	68,54	68,54	68,54	83,50	83,50	83,50	
Euro 5 Heavy duty vehicle (40 t, 5 axes)	58,48	58,48	58,48	61,47	61,47	61,47	

Corridor: Gotthard (side: TICINO) **km: 108** from Gotthard to Chiasso

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car (vignette fee)	40,00	40,00	40,00	40,00	40,00	40,00	40,00
Euro 2 Heavy duty vehicle (40 t, 5 axes)	108,86	108,86	108,86	132,62	132,62	132,62	
Euro 5 Heavy duty vehicle (40 t, 5 axes)	92,88	92,88	92,88	97,63	97,63	97,63	

Corridor:Brenner - TYR (motorway A12 and A13 - special toll road) **km: 108** from Kufstein to Brenner

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car (vignette fee)	12,48	12,48	12,48	12,56	12,56	12,72	12,72
	87,680	87,680	87,680	88,640	88,64	90,56	90,80
Euro 2 Heavy duty vehicle (40 t, 5 axes) - daytime	78,884	78,884	84,554	85,695	86,26	96,16	96,16
Euro 5 Heavy duty vehicle (40 t, 5 axes) - daytime	78,884	78,884	84,554	85,695	86,26	84,06	84,06
Euro 2 Heavy duty vehicle (40 t, 5 axes) - nighttime	128,284	128,284	133,954	135,782	136,69	152,40	152,40
Euro 5 Heavy duty vehicle (40 t, 5 axes) - nighttime	128,284	128,284	133,954	135,782	136,69	133,19	133,19

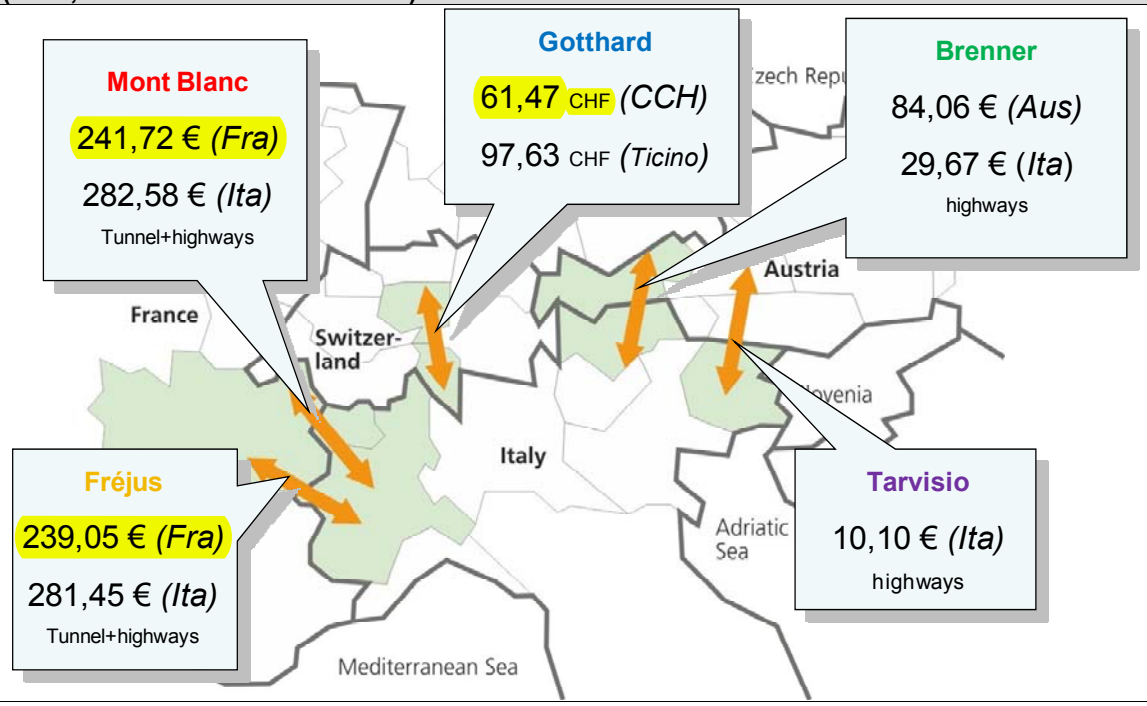
Corridor: Brenner/Brennero S_TYR **km: 207** from Brenner to Affi

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car (vignette fee)							12,25
Euro 2 Heavy duty vehicle (40 t, 5 axes)							29,67
Euro 5 Heavy duty vehicle (40 t, 5 axes)							29,67

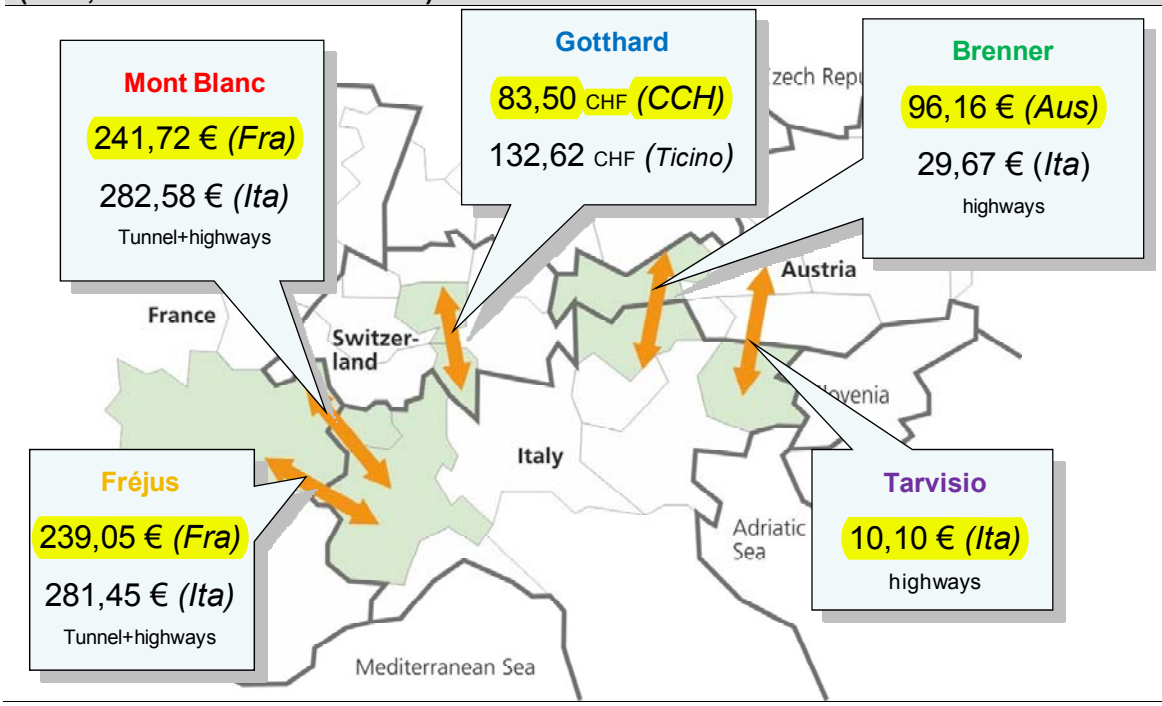
Corridor: Tarvisio - IT (A23) **km: 60** from Gemona to Tarvisio

Category for toll price	2005	2006	2007	2008	2009	2010	2011
Passenger car	3,60	3,70	3,80	3,90	4,00	4,20	
Euro 2 Heavy duty vehicle (40 t, 5 axes)	8,50	8,80	8,90	9,30	9,60	10,10	
Euro 5 Heavy duty vehicle (40 t, 5 axes)	8,50	8,80	8,90	9,30	9,60	10,10	

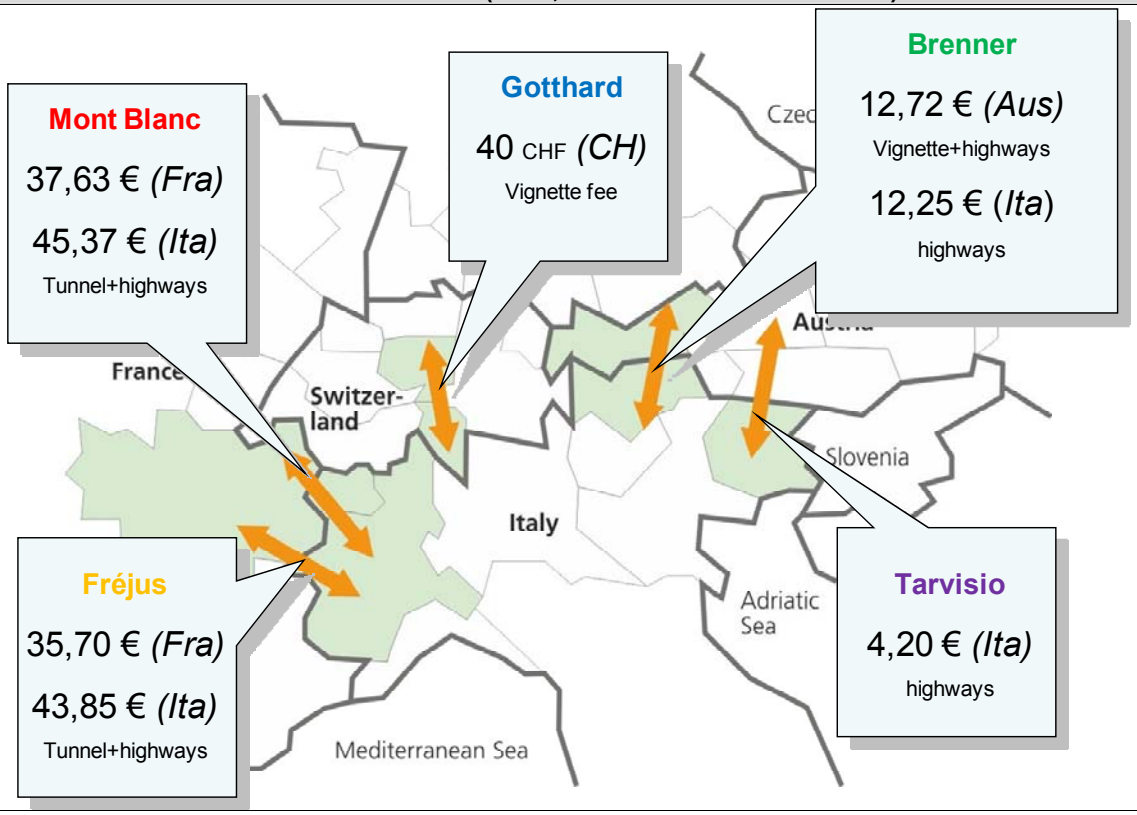
TOLL PRICES FOR EURO 5 HEAVY DUTY VEHICLE, 40 T, 5 AXES
(2010, 2011 FOR SOUTH TYROL)



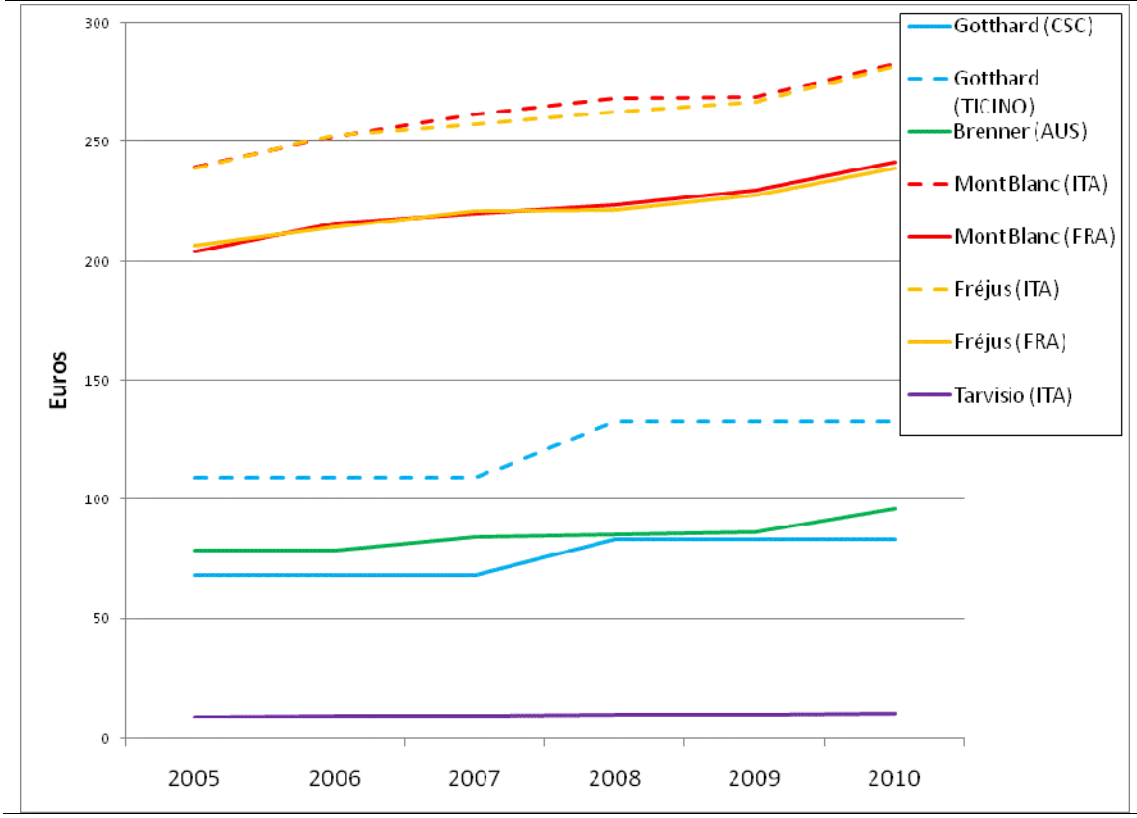
TOLL PRICES FOR EURO 2 HEAVY DUTY VEHICLE, 40 T, 5 AXES
(2010, 2011 FOR SOUTH TYROL)



TOLL PRICES FOR PASSENGER CAR (2010, 2011 FOR SOUTH TYROL)



TOLL PRICES FOR EURO 2 HEAVY DUTY VEHICLE, 40 T, 5 AXES (TREND 2005 - 2010)



Key figures:

The travel price for an HDV Euro 2, 40 t, 5 axes in the last years is more than 200 € for Fréjus and Mont Blanc, around 100 € for Gotthard and Brenner and around 10 € for Tarvisio.

Evaluation restrictions:

Problem to evaluate the vignette fee for the passenger cars of Gotthard and Brenner corridors.

Only Gotthard and Brenner corridors apply a different toll prices related to Euro classes for the heavy duty vehicles with a lower spending for the newest ones. For the Mont Blanc tunnel there is a lower tolls for the euro 3-4-5 classes starting from January 2011.

A. General reading and data analysis

Heavy duty vehicles:

We notice three different situations: Fréjus and Mont Blanc tunnels with high prices, Gotthard and Brenner with intermediate prices and Tarvisio with the lowest costs.

The toll reduction for the newest Euro class is applied for Gotthard (-26%) and Brenner (-13%) corridors.

Passenger cars:

The higher prices are applied in the western corridors of Fréjus, Mont Blanc and Gotthard, the other eastern corridors of Brenner and Tarvisio have less economic costs.

In general we can see that the travel costs are inversely proportional to the vehicle fluxes: Fréjus and Mont Blanc tunnels have the highest prices and the minor fluxes among the five IMONITRAF! corridors.

B. Reading of trends

The trend from 2005 to 2010 of the travel prices is in increase for every corridor. For the economic crisis period 2008-2010 only in the Gotthard corridor the prices didn't increase.

C. Analysis with Monitraf and general objectives

The travel price data allow us to analyze the effect of the cost faced by the transalpine travelers on the distribution of the vehicles fluxes among the IMONITRAF! corridors.

D. Use for the definition of the scenarios

This indicator can be useful to study the effect of the toll prices measures on the future transalpine vehicles fluxes.

Evaluation of environmental sustainability:

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
Toll prices	**2**	**2**	**3**	**3**	**5**

1to **5** = high to low prices

Evaluation of environmental sustainability (trend 2005-2010):

	Fréjus	Mont Blanc	Gotthard	Brenner	Tarvisio
Toll prices	↑	↑	↑	↑	↔

↑ = tolls increase

-- = stability

2.8 INDICATOR 8 – Fuel prices

The indicator 8 fuel prices has been chosen as basis for the assessment of the iMONITRAF!-scenarios. The development of the fuel process in the past might serve as an indicator for the future development of the internal costs of transalpine transport.

METADATA

Indicator:								***Fuel prices***
	Number:	8	**Name:**	Fuel prices				
	MONITRAF indicator	17		**Main category:**	Prices and regulation	**Unit:**	€/l	
	Level:	NUTS 2 level, state level						
	Objective:	Basis for assessment of MONITRAF scenarios						
	Definition of indicator:	Yearly average of fuel prices (what the final consumer pays) on regional level (NUTS 2) and for the state distinguished between diesel and petrol						
	Calculation:	Yearly average of the fuel prices (what the final consumer pays) per season (one day per season: 15.1., 15.5., 15.7., 15.10) on regional level (NUTS 2) and for the state distinguished between diesel and petrol						
Data:								
	Name:	Fuel price			**Unit:**	EURO	**Periodicity:**	annual
	Period:	2006-2008		**Reference period:**	2000 and 2005			
	Definition of data to be collected:	Fuel prices (yearly average) for every season on regional level (NUTS 2) and for the state distinguished between diesel and petrol in € or in CHF						
	Data source (citation basis):	**Gottard:** Data provided by the Institute of economic research (Università della Svizzera Italiana: IRE, Istituto di Ricerche Economiche, Via Maderno 24, CP 4361, CH-6904 Lugano, Tel. +41 (0)58 666 4661, http://www.ire.eco.unisi.ch/)						
	Other Comments:							
	Currency conversion:	Data has to be defined for currency conversion. Suggestion for conversion date: 31.12. of the respective year						
	Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request							

The collection and elaboration focuses on the yearly average of the fuel prices for the years beginning with the 2006, in order to continue the indicator analysis already performed during the MONITRAF-project. As value it is assumed the price the final consumer pays. The collection distinguishes between cost for Diesel and unleaded petrol.

To examine the annual divergence of fuel prices the prices are examined one exemplary day per season of each year:

- Winter: 15.01.
- Spring: 15.05.
- Summer: 15.07.
- Autumn: 15.10.

At the beginning of the project it had been planned to collect fuel prices for each NUTS 2 region of the project area. This has been proven as an ambitious aim, since data on this regional level was difficult to obtain for each single region. Therefore the collection was restricted to the collection of data on the national level for the countries

participating (Austria, France, Italy and Switzerland) in the project. Values present in Swiss Francs have been converted using the database of the European Central Bank corresponding to the date of the analysis.

The data is derived from the following sources:

- **Austria:** Österreichischer Automobil und Touring Club (ÖAMTC): Pumpenpreise und Steueranteile ab 1998.
- **France:** Data provided from project partner Region Rhône-Alpes,
- **Italy:** Istituto nazionale per la statistica (ISTAT).
- **Switzerland:** Swiss federal office for statistics: Treibstoff-Durchschnittspreise pro Liter in Franken / Carburants - Prix moyens par litre en francs.

DATA TABLES

SWITZERLAND

Region (NUTS 2): Switzerland (NUTS 0)

Diesel

year	15.01.	15.05.	15.07.	15.10.	annual average
2000	0,879	0,879	0,905	0,976	0,910
2001	0,967	0,920	0,947	0,927	0,940
2002	0,900	0,913	0,907	0,920	0,910
2003	0,894	0,914	0,868	0,894	0,893
2004	0,881	0,900	0,920	0,998	0,925
2005	0,988	1,008	1,059	1,137	1,048
2006	1,103	1,141	1,134	1,079	1,114
2007	1,060	1,054	1,061	1,072	1,062
2008	1,202	1,285	1,419	1,316	1,306
2009	1,066	1,025	1,061	1,071	1,056
2010	1,132	1,270	1,282	1,281	1,241
2011	1,389	1,531	1,572	1,495	1,497
2012	1,590				

AUSTRIA

Region (NUTS 2): TYROL

Diesel

year	15.01.	15.05.	15.07.	15.10.	annual average
2000	0,715	0,737	0,761	0,846	0,765
2001	0,759	0,770	0,759	0,733	0,755
2002	0,722	0,751	0,694	0,717	0,721
2003	0,747	0,714	0,704	0,709	0,719
2004	0,731	0,802	0,803	0,863	0,800
2005	0,861	0,895	0,982	1,035	0,943
2006	0,976	1,042	1,051	0,987	1,014
2007	0,926	0,980	1,059	1,132	1,024
2008	1,176	1,335	1,397	1,177	1,271
2009	0,962	0,992	1,026	1,022	1,001
2010	1,079				1,079
2011	1,271	1,359		1,399	1,343
2012					

ITALY

Region (NUTS 2): S-TYR, VdA, PIEDMONT

Diesel

year	15.01.	15.05.	15.07.	15.10.	annual average
2000	0,847	0,865	0,891	0,971	0,893
2001	0,914	0,883	0,888	0,862	0,887
2002	0,850	0,880	0,858	0,889	0,869
2003	0,909	0,867	0,864	0,872	0,878
2004	0,890	0,944	0,950	1,022	0,952
2005	1,020	1,079	1,148	1,233	1,120
2006	1,173	1,225	1,223	1,133	1,189
2007	1,118	1,150	1,184	1,224	1,169
2008	1,287	1,467	1,528	1,298	1,395
2009	1,052	1,071	1,075	1,087	1,071
2010	1,153	1,246	1,212	1,224	1,209
2011	1,318	1,425	1,449		1,397
2012					

FRANCE

Region (NUTS 2): SAVOIE, HAUTE SAVOIE

Diesel

year	15.01.	15.05.	15.07.	15.10.	annual average
2000	0,806	0,802	0,829	0,905	0,836
2001	0,804	0,819	0,806	0,790	0,805
2002	0,741	0,773	0,751	0,809	0,769
2003	0,820	0,761	0,759	0,779	0,780
2004	0,804	0,880	0,875	0,972	0,883
2005	0,915	0,984	1,067	1,118	1,021
2006	1,054	1,118	1,117	1,037	1,082
2007	1,011	1,066	1,100	1,115	1,073
2008	1,187	1,411	1,438	1,187	1,306
2009	0,996	0,979	0,985	1,027	0,997
2010	1,087	1,174	1,137	1,169	1,142
2011					
2012					

National fuel prices for Diesel (in EURO)

SWITZERLAND					
Region (NUTS 2): Switzerland (NUTS 0)					
non leaded S-plb98					
year	15.01.	15.05.	15.07.	15.10.	annual average
2000	0,860	0,905	0,969	0,956	0,923
2001	0,933	0,960	0,960	0,920	0,943
2002	0,893	0,920	0,934	0,941	0,922
2003	0,901	0,907	0,874	0,894	0,894
2004	0,868	0,913	0,959	0,972	0,928
2005	0,924	0,969	1,014	1,111	1,004
2006	1,051	1,128	1,140	1,017	1,084
2007	0,986	1,072	1,092	1,042	1,048
2008	1,135	1,169	1,264	1,206	1,194
2009	0,944	1,012	1,067	1,057	1,020
2010	1,118	1,256	1,252	1,229	1,214
2011	1,343	1,483	1,529	1,438	1,448
2012	1,474				

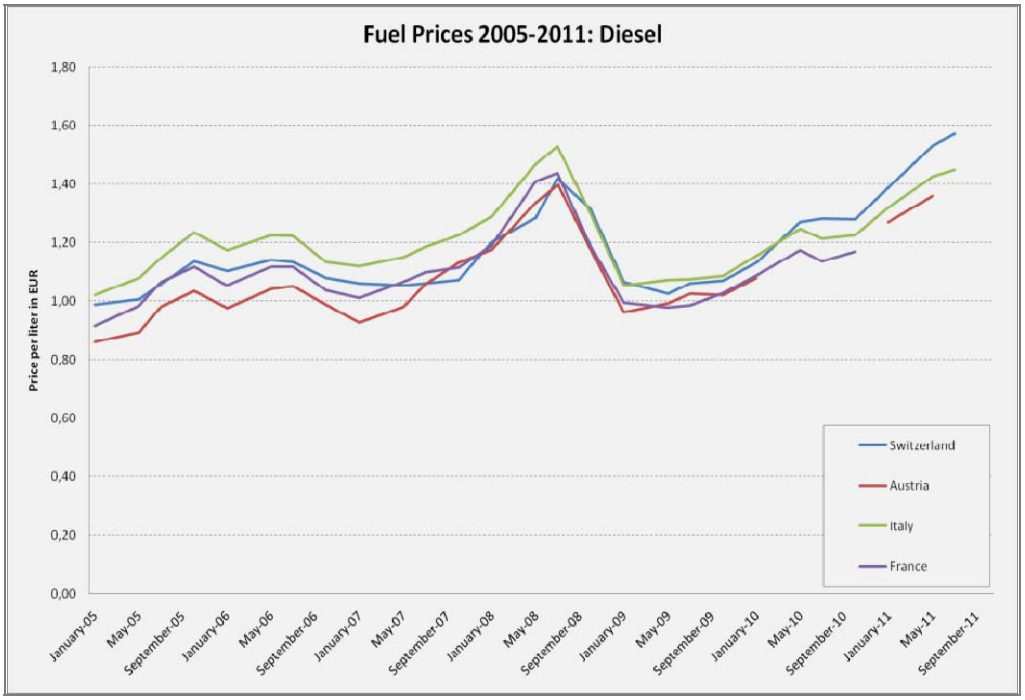
AUSTRIA					
Region (NUTS 2): Austria (NUTS 0)					
petrol (91 octane)					
year	15.01.	15.05.	15.07.	15.10.	annual average
2000	0,841	0,916	0,953	0,908	0,905
2001	0,851	0,943	0,892	0,840	0,882
2002	0,824	0,864	0,824	0,809	0,830
2003	0,849	0,839	0,834	0,837	0,840
2004	0,830	0,939	0,937	0,974	0,920
2005	0,890	0,948	1,037	1,119	0,999
2006	1,024	1,132	1,119	1,034	1,077
2007	0,977	1,069	1,142	1,162	1,088
2008	1,197	1,295	1,331	1,145	1,242
2009	0,938	1,073	1,120	1,114	1,061
2010	1,191		1,221	1,218	1,210
2011	1,281				1,281
2012					

ITALY					
Region (NUTS 2): S-TYR, VdA, PIEDMONT					
Petrol (without Pb)					
year	15.01.	15.05.	15.07.	15.10.	annual average
2000	1,007	1,074	1,131	1,121	1,083
2001	1,048	1,128	1,069	1,035	1,070
2002	1,005	1,082	1,064	1,080	1,058
2003	1,082	1,048	1,055	1,055	1,060
2004	1,059	1,153	1,159	1,188	1,140
2005	1,101	1,218	1,259	1,349	1,232
2006	1,271	1,359	1,399	1,233	1,316
2007	1,223	1,335	1,374	1,329	1,315
2008	1,372	1,473	1,532	1,352	1,432
2009	1,113	1,229	1,260	1,251	1,213
2010	1,311	1,400	1,372	1,355	1,360
2011	1,445	1,556	1,577		1,526
2012					

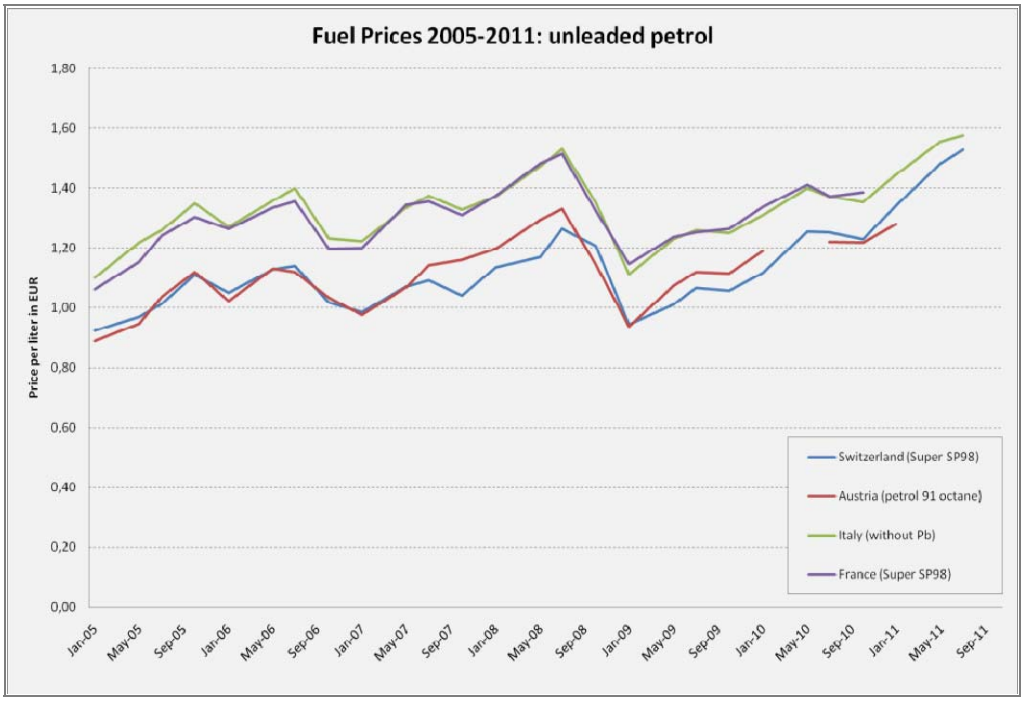
FRANCE					
Region (NUTS 2): SAVOIE, HAUTE SAVOIE					
Petrol (Super SP98)					
year	15.01.	15.05.	15.07.	15.10.	annual average
2000	1,043	1,098	1,157	1,110	1,102
2001	1,034	1,151	1,061	1,018	1,066
2002	0,985	1,050	1,027	1,069	1,033
2003	1,066	1,017	1,016	1,015	1,029
2004	1,023	1,131	1,103	1,130	1,097
2005	1,061	1,153	1,240	1,302	1,189
2006	1,265	1,336	1,355	1,197	1,288
2007	1,199	1,346	1,356	1,309	1,302
2008	1,375	1,484	1,515	1,323	1,424
2009	1,146	1,237	1,252	1,265	1,225
2010	1,339	1,412	1,372	1,387	1,377
2011					
2012					

National fuel prices for unleaded petrol (in EURO)

DATA ELABORATIONS



Development of national fuel prices: trend 2005-2011 per country for Diesel



Development of national fuel prices: trend 2005-2011 per country for unleaded petrol

Key figures:

The status as by end of 2011 illustrates a noticeable variety in national fuel prices between the countries examined during the project.

For **Diesel** the currently highest values (by 2011) have been registered in Switzerland (1,572 €/liter) and Italy (1,449 €/liter), both as of 15.07.2011). Medium range values in 2011 have been registered in Austria (1,399€/liter as of 15.10.), while France has the lowest prices for Diesel (1,169 €/liter as of 15.10.2010 – data for 2011 could not be retrieved).

The **development of Diesel prices** since 2005, as illustrated in **Error! Reference source not found.** demonstrates an overall steady increase of annual averages. A significant peak has been registered in mid-2008, followed by a fall in prices from mid-2008 until early 2009. Until then a new increase until today could be derived from the collected values. For the year 2011 the highest prices since 2005 for some countries (Switzerland, Italy) have been registered. Austrian fuel prices rose by 55%, diesel prices in Switzerland have been subject to an increase of 51% in 2011, compared to 2005. A more moderate growth can be registered for Italy (+37%) and France (+25%).

For **unleaded petrol** the currently highest values (by 2011) have been registered in Italy (1,577 €/liter as of 15.07.2011) and Switzerland (1,529 €/liter as of 15.07.2011). The values for France for the year 2011 could not be retrieved; however already by the end of 2010 the values were close to the values registered in Italy and Switzerland. Austria however has the lowest values for unleaded petrol (1,281 €/liter as of 15.01.2011).

The **development of prices for unleaded petrol** since 2005 demonstrates an overall steady increase of annual averages, similar to the prices analyzed for diesel. During the last years, French and Italian prices for unleaded fuel have been the top-runners. The trend during the last year shows an approximation of Swiss values to Italy and France, which might however be due to the development of the exchange rate between the Swiss franc and the Euro.

A significant peak for the years between 2005 and 2011has been registered in mid-2008. This peak has been followed by a fall in prices until early 2009. Until then a slow but steady increase could be derived from the collected values between 2009 and 2011. For Italy and Switzerland the prices of 2011 are at the same time the highest values since 2005. Especially Swiss fuel prices rose by 57%, compared to 2005. At the same period, prices in Austria rose by 44%, in Italy by 39% and in France by 31%.

2.9 INDICATOR 9 – GDP per inhabitant

The assessment of the Gross Domestic Product (GDP) has been chosen as basis to analyze the regional economic background of the regions involved in the project. It is to describe the background situation as well as to estimate the economic development, both for the single region as well as to compare the regions. Therefore it represents the value of the economic performance resulting from productive activities in a period of reference for both NUTS 2 and NUTS 3 level.

METADATA

Indicator:								***GDP per inhabitant***
	Number:	9	**Name:**	GDP per inhabitant				
	MONITRAF indicator	18	**Main category:**	Economy	**Unit:**	€/inhabitant		
	Level:	NUTS 3 and NUTS 2						
	Objective:	Description of the background situation, estimation of economic development and comparison of the regional development						
	Definition of indicator:	Value of the economic performance resulting from productive activities in a period of reference, calculated for NUTS 3 level and NUTS 2 level						
	Calculation:	GDP (NUTS 3 level) / inhabitants (NUTS 3 level) (indicator n° 10) GDP (NUTS 2 level) / inhabitants (NUTS 2 level) (indicator n° 10)						
Data:								
	Name:	GDP		**Unit:**	number	**Periodicity:**	annual	
	Period:	2006-2008	**Reference period:**	2000 and 2005				
	Definition of data to be collected:	GDP in Euro or CHF at current market prices for NUTS 3 level and NUTS 2 level. According to ESA95 definitions GDP at market prices includes VAT and excludes subsidies on products. GDP is equivalent to the market value of all final products and services (without double counting products used in other output) produced within a certain country or region over a specific time period, usually one year.						
	Data source (citation basis):	**Gotthard:** CS - EUROSTAT, Swiss Federal Statistical Office; Ticino - IRE, Istituto di Ricerche Economiche, Via Maderno 24, CP 4361, CH-6904 Lugano, Tel. +41 (0)58 666 4661, http://www.ire.eco.unisi.ch/. **Brenner:** Tyrol - STATISTICS AUSTRIA, Regional Accounts. S-TYR - EUROSTAT. **Mont Blanc**: EUROSTAT; VdA - EUROSTAT. **Mont Blanc/Fréjus**: EUROSTAT.						
	Other Comments:	In Switzerland the national income (CHF) instead of the GDP could be used on NUTS 3 level						
	Currency conversion:	Data has to be defined for currency conversion. Suggestion for conversion date: 31.12. of the respective year						
	Name:	inhabitants		**Unit:**	number	**Periodicity:**	annual	
	Period:	2006-2008	**Reference period:**	2000 and 2005				
	Definition of data to be collected:	inhabitants for NUTS 3 level and NUTS 2 level (see indicator n° 19)						
	Data source (citation basis):	(see indicator n° 19)						
	Other Comments:	**Gotthard:** CS - Data for years 2004 and 2005 were not available und were estimated (see note)						
		Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request						
	NOTE							
Gotthard: CS	The 2004 and 2005 GDP percentages were not available. They were estimated as a mean of the years 1990-2003 (approximation). These estimated percentages were used to calculate the BIP per Canton, based on the national BIP. GDP perctentages up to 2006 are available. Values for 2007 and 2008 are provisional values.							
Mont Blanc/ Fréjus - France	GDP data for the years 1990-2003 are definitive, 2004 semi-definitive and 2005 provisional							

The database continues the work and methodology begun in the framework of the first MONITRAF project in order to obtain a continuous analysis of data.

The analysis refers to the GDP in Euro or CHF at current market prices for the territorial levels NUTS 2 and 3 within the project. GDP is equivalent to the market value of all final products and services (without double counting products used in other output) produced within a certain country or region over a specific time period, usually one year. According to ESA95 definitions, the GDP at market prices includes VAT and excludes subsidies on products.

The values have been collected and analyzed for the years 2006 until today (where possible). The years 1990, 1995 and 2000 through 2005 have been selected as reference period. The data has been available until the year 2008 for all regions, for the year 2009 only Swiss data is available. Newer data could not be retrieved (as of 29.02.2012). For Switzerland the GDP per inhabitant has not been collected for the years between 2000 and 2005. For this period the analysis refers to the national income (CHF).

The spatial extension of the data collection refers to NUTS 3 regions within the alpine convention. This excludes some regions, even though part of the NUTS 2 region – i.e. the western departments of the region Rhône-Alpes.

The data is derived from the following sources:

- **Austria:** Tyrol: Statistics Austria, Regional Accounts and EUROSTAT.
- **France:** EUROSTAT.
- **Italy:** EUROSTAT.
- **Switzerland: Central Switzerland and Ticino:** Swiss Federal Statistical Office, 2006-2008 BAK economics, Wirtschaftsatals BAK Basel[1]; **Ticino** - IRE, Istituto di Ricerche Economiche[2]

Values present in Swiss Francs have been converted, corresponding to the 31.12. of the respective year, using the database of the European Central Bank.

[1] http://www.wirtschaftsatlas.bakbasel.com/wirtschaftsatlas.html
[2] http://www.ire.eco.unisi.ch

DATA TABLES

Corridor: Gotthard (Central Switzerland)															
NUTS 3	**NUTS 3 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
		National income (instead of the GDP) in CHF									**GDP (in CHF)**				
Luzern	CH061	39.623,46	43.095,80	44.568,91	45.246,47	45.930,96	46.297,32	47.278,29	51.130,20	*52.877,00*	55.552,80	57.508,40	56.121,90		
Uri	CH062	36.958,39	44.842,76	42.421,81	43.368,83	43.383,76	43.582,72	46.921,93	47.807,99	*50.297,00*	51.468,20	53.964,60	54.082,90		
Schwyz	CH063	38.842,10	39.544,06	42.533,95	43.693,92	42.864,08	42.576,36	43.007,01	43.335,62	*51.525,60*	53.656,70	55.547,10	54.099,60		
Obwalden	CH064	35.099,82	35.099,24	36.325,74	36.691,11	36.848,95	37.074,84	38.510,17	39.115,65	*43.431,00*	47.837,00	52.200,30	50.844,70		
Nidwalden	CH065	52.397,82	51.579,24	49.668,32	51.703,06	51.604,69	50.969,40	53.523,11	54.120,76	*58.587,00*	59.693,60	61.721,80	60.792,40		
Zug	CH066								95.221,80	*100.488,30*	106.222,60	113.214,60	109.963,70		
exchange rate		---	---	0,642	0,662	0,682	0,657	0,648	0,646	*0,621*	0,604	0,673	0,674		
		in CHF		**National income (instead of the GDP) in EUR**						**GDP (in EUR)**					
Luzern	CH061	39.623	43.096	28.609,08	29.954,27	31.308,90	30.434,72	30.624,18	33.023,84	*32.836,62*	33.553,89	38.703,15	37.826,16		
Uri	CH062	36.958	44.843	27.230,85	28.711,23	29.572,60	28.650,21	30.393,35	30.878,10	*31.234,44*	31.086,79	36.318,18	36.451,87		
Schwyz	CH063	38.842	39.544	27.302,83	28.926,45	29.218,36	27.988,65	27.857,49	27.989,50	*31.997,40*	32.408,65	37.383,20	36.463,13		
Obwalden	CH064	35.100	35.099	23.317,74	24.290,41	25.118,14	24.372,09	24.944,69	25.263,91	*26.970,65*	28.893,55	35.130,80	34.269,33		
Nidwalden	CH065	52.398	51.579	31.882,43	34.228,69	35.176,41	33.506,03	34.669,23	34.955,37	*36.382,53*	36.054,93	41.538,77	40.974,08		
Zug	CH066								61.501,60	*62.403,23*	64.158,45	76.193,43	74.115,53		
NUTS 2	**NUTS 2 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
		National income (instead of the GDP) in CHF									**GDP (in CHF)**				
Central Switzerland	CH06	42.848	45.553								61.125,00				
exchange rate		---	---	0,642	0,662	0,682	0,657	0,648	0,646	*0,621*	0,604	0,673	0,674		
		in CHF		**National income (instead of the GDP) in EUR**						**GDP (in EUR)**					
Central Switzerland	CH061	42.848	45.553	0,00	0,00	0,00	0,00	0,00	0,00	*0,00*	36.919,50	0,00	0,00		

Corridor: Gotthard Ticino															
NUTS 3 and NUTS 2	**NUTS 3 code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Ticino CHF	CH07	52.352	53.551	58.908	nv	nv	nv	nv	61.454		68.264	70.059	68.080		
exchange rate		---	---	0,642	0,662	0,682	0,657	0,648	0,646	0,621	0,604	0,673	0,674		
		in CHF		**National income (instead of the GDP) in EUR**						**GDP (in EUR)**					
Ticino EURO	CH07	52.352	53.551	37.813,55	nv	nv	nv	nv	39.691,74	0,00	41.231,15	47.149,71	45.885,79		

Corridor: Brenner TYR															
NUTS 3	**NUTS 3 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Außerfern	AT331	NA	22.500,00	26.600,00	28.000,00	29.000,00	29.000,00	30.100,00	33.100,00	35.700,00	37.700,00	39.100,00			
Innsbruck	AT332	NA	23.800,00	28.300,00	28.900,00	30.200,00	30.500,00	31.200,00	33.000,00	34.400,00	35.900,00	37.100,00			
Osttirol	AT333	NA	15.300,00	17.500,00	17.700,00	18.600,00	18.900,00	19.600,00	21.400,00	22.600,00	23.200,00	24.300,00			
Tiroler Oberland	AT334	NA	22.300,00	25.700,00	26.200,00	26.300,00	27.500,00	28.900,00	29.800,00	30.800,00	32.200,00	33.600,00			
Tiroler Unterland	AT335	NA	21.600,00	26.200,00	27.200,00	27.400,00	28.100,00	29.100,00	30.800,00	32.800,00	34.500,00	35.500,00			
NUTS 2 Label	**NUTS 2 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Tirol	AT33		22.100,00	26.300,00	27.000,00	27.800,00	28.400,00	29.300,00	30.900,00	32.600,00	34.000,00	35.200,00			

Corridor: Brenner S-TYR															
NUTS 3	**NUTS 3 code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Bolzano-Bozen	ITD10	NA	20.500,00	27.500,00	28.300,00	28.700,00	29.600,00	31.300,00	31.400,00	32.900,00	33.900,00	34.600,00			
Region (NUTS 2)	**NUTS 2 Co**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**		**2008**	**2009**	**2010**	**2011**
Provincia Autonoma Bolza	ITD1	NA	20.500,00	27.500,00	28.300,00	28.700,00	29.600,00	31.300,00	31.400,00	32.900,00	33.900,00	34.600,00			

Corridor: Mont Blanc_VdA															
NUTS 3	**NUTS 3 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Valle d'Aosta Mio Euro	ITC20	17.267,86	20.200,00	24.000,00	25.700,00	26.400,00	27.600,00	28.400,00	28.800,00	29.500,00	30.100,00	30.600,00			
NUTS 2	**NUTS 2 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Valle d'Aosta Mio Euro	ITC2	17.267,86	20.200,00	24.000,00	25.700,00	26.400,00	27.600,00	28.400,00	28.800,00	29.500,00	30.100,00	30.600,00			

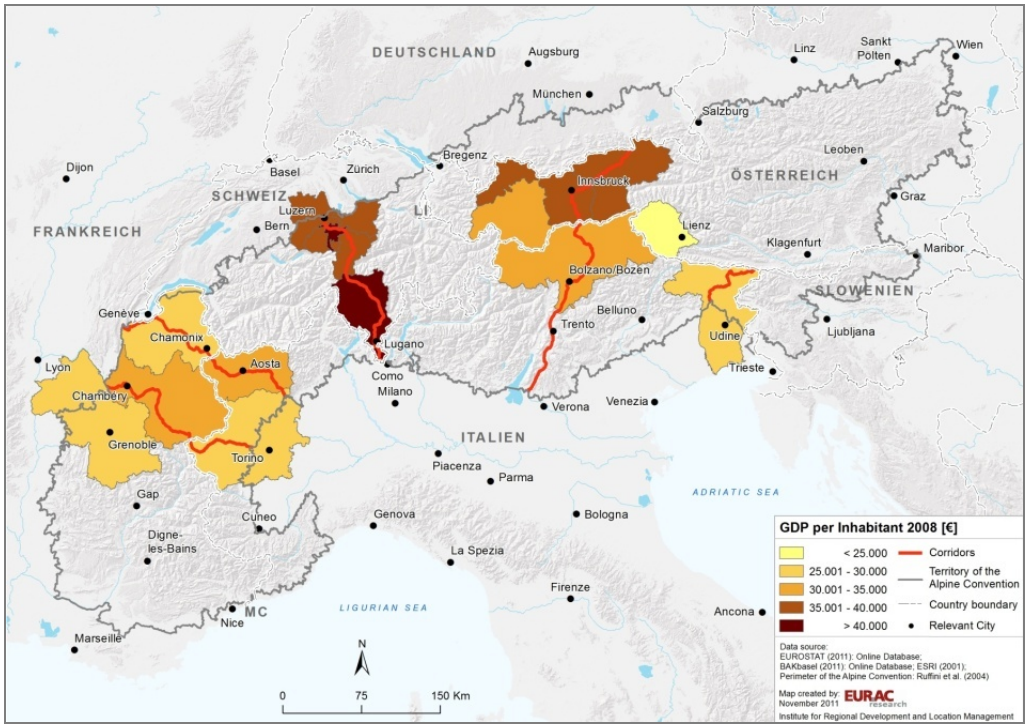
Corridor: Mont Blanc FRANCE															
NUTS 3	**NUTS 3 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Savoie		NA	21.000	24.100,00	25.200,00	26.400,00	27.300,00	28.600,00	29.500,00	31.100,00	32.100,00	32.800,00			
Haute-Savoie		NA	20.700	24.000,00	24.900,00	24.700,00	25.700,00	26.600,00	27.000,00	28.000,00	28.500,00	29.000,00			
NUTS 2	**NUTS 2 Code**	**1990**	**1995**	**2000 (1999 inhab)**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Région Rhones-Alpes		18.132,00	20.317,00	24.100,00	24.800,00	25.100,00	25.800,00	26.800,00	27.600,00	29.000,00	29.900,00	30.500,00			

Corridor: FREJUS FRANCE															
NUTS 3	**NUTS 3 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Isère		NA	20.200	23.500,00	23.900,00	24.100,00	24.800,00	25.700,00	26.400,00	27.700,00	28.500,00	29.000,00			
Savoie		NA	21.000	24.100,00	25.200,00	26.400,00	27.300,00	28.600,00	29.500,00	31.100,00	32.100,00	32.800,00			
NUTS 2	**NUTS 2 Code**	**1990**	**1995**	**2000 (1999 inhab)**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Région Rhones-Alpes		18.132,00	**20.317,00**	**24.100,00**	**24.800,00**	**25.100,00**	**25.800,00**	**26.800,00**	**27.600,00**	**29.000,00**	**29.900,00**	**30.500,00**	**29.420,00**	**29.420,00**	**29.420,00**

Corridor: FREJUS PIEDMONT															
NUTS 3	**NUTS 3 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Torino			17.800,00	24.500,00	25.200,00	26.000,00	26.500,00	27.300,00	27.600,00	28.300,00	28.800,00	28.900,00			
NUTS 2	**NUTS 2 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Regione Piemonte			17.800,00	23.400,00	24.200,00	24.900,00	25.600,00	26.500,00	26.900,00	27.800,00	28.600,00	28.800,00			

Corridor: Tarvisio															
NUTS 3	**NUTS 3 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Udine			16.100,00	22.300,00	23.300,00	24.900,00	24.900,00	25.300,00	26.200,00	27.500,00	29.200,00	29.400,00			
NUTS 2	**NUTS 2 Code**	**1990**	**1995**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Friuli Venezia Giulia	IT-36		16.800,00	23.400,00	24.600,00	25.400,00	25.600,00	26.300,00	27.100,00	28.200,00	29.400,00	29.500,00			

DATA ELABORATIONS



GDP per inhabitant per NUTS 3 project region for 2008 (in Euro).

Key figures:

The following analysis is based on the status of the regional GDP per inhabitant on NUTS 3 level by the year 2008, since this year represents the latest year where data for all regions has been available. The map verifies a variety in the GDP per inhabitant for the respective iMONITRAF! NUTS3 regions.

Generally speaking, the Gross Domestic Product (GDP) is growing in all the considered NUTS3 and absolute values are high. However, the map puts into evidence noticeable varieties when the year 2008 is considered: the highest values are registered for the Swiss regions along the Gotthard corridor. The highest value could be registered for the canton of Zug (Central Switzerland) with a GDP per inhabitant of about 76.000€ in 2008. This top-runner is followed by other Swiss cantons (Ticino, Nidwalden) and parts of Tyrol (Außerfern, Innsbruck, Tiroler Unterland). At the same time, these regions are located along corridors with highest traffic volumes (Gotthard, Brenner). Medium range values (between 25.000 and 40.000€/inhabitant) in the GDP are registered for NUTS3 regions in France, Italy and also parts of Austria. The Austrian region of Osttirol is the lowest in the ranking of the projects NUTS 3 regions for the GDP per inhabitant with a value of 24.300€ per inhabitant in the year 2008.

2.10 INDICATOR 10 – Population living close to the traffic axes

METADATA

Indicator:								***Population living close to the traffic axes***
	Number:	10	**Name:**	Population exposed				
	MONITRAF indicator	19		**Main category:**	Society	**Unit:**	inhabitants	
	Level:	LAU 2 (NUTS 5), NUTS 3 and NUTS 2						
	Objective:	Evaluation of the number of inhabitants living in a zone where the traffic impacts are more important						
	Definition of indicator:	Inhabitants in a buffer of xxxx m along the corridors						
	Calculation:	Calcolo del numero di abitanti per metro quadrato di superficie edificata comunale e valutazione della popolazione presente nel buffer sulla base della superficie edificata rilevata con GIS						
Data:								
	Name:	inhabitants		**Unit:**	number	**Periodicity:**	annual	
	Period:	2007		**Reference period:**	2000 and 2005			
	Definition of data to be collected:	Inhabitants in the selected municipalities along the corridor (NUTS 5) derived from the population register						
	Data source (citation basis):	**Gotthard:** Bilanz der ständigen Wohnbevölkerung nach Bezirken und Gemeinden, Data is available for 2006, 2007, 2008, Swiss Statistics. CS - Population data: Komponenten der Bevölkerungsentwicklung. Bilanz der ständigen Wohnbevökerung. Population forecasts: Swiss Statistics. Population Scenario. See http://www.bfs.admin.ch/bfs/portal/de/index/themen/01.html; Ticino - USTAT-Ufficio di statistica, Viale S. Franscini 32, CH-6501 BELLINZONA, tel. +41 91 814 6411, http://www.ti.ch/DFE/USTAT/DATI_CANTONE/; http://www.ti.ch/DFE/USTAT/DATI/superweb/default.asp. **Brenner:** S-TYR - ISTAT (National Statistical Institute of Italy), Populazione municipale 2006, ASTAT (Statistical institute of the Autonomous province of Bolzano/Alto Adige), figures derived from the population register; for forecast: ASTAT (Statistical institute of the Autonomous province of Bolzano/Alto Adige): Die voraussichtliche Bevölkerungsentwicklung in Südtirol bis zum Jahr 2020 / Previsione sull´andamento demografico in provincia di Bolzano fino al 2020. Issue N° 58, 1998.. TYROL/CARINTHIA: Statistik Austria Wohnbevölkerung zu Jahresbeginn gemäß Bevölkerungsregister 2007 **Mont Blanc**: VdA - ISTAT; **France:** Estimation de population au 1er janvier; Source : Insee - Estimations de population au 1er janvier. Insee: Population municipale 2007 (donées estimées)						
	Other Comments:	**Gotthard:** SC - data for 2007 and 2008 no more provisory, data has been provided for NUTS 5; no population forecasts are available for NUTS 2; the forecast data base on scenario "medium". Also available: scenarios "low" and "high". Ticino - under each data-table is reported the code of the USTAT-table (or tables) used to derive the number of inhabitants. **Brenner:** S-TYR - Resident population at 31.12. of the respective year; Persons registered at the population register. Forecast: A new forecast is in work right now, will be published this year (date information: 07/2007). **Mont Blanc:** VdA - Resident population at 31.12. of the respective year, the forecast data base on scenario "medium"; **France:** Population for 2007 is estimated. **Italy:** Data for inhabitants of municipalities is only available for 2006						
	Name:	municipal building surface		**Unit:**	m2	**Periodicity:**		
	Period:	1999-2005		**Reference period:**				
	Definition of data to be collected:	GIS elaboration, based on blending number of inhabitants per municipality and available settlement area (methodology for available settlement area still has to be defined by EURAC depending on available alpine-wide GIS-data)						
	Data source (citation basis):	**Alpine Space:** DIAMONT Database: Available Settlement Area, Inhabitants in the selected municipalities						
	Other Comments:							
	Name:	traffic proximity buffer		**Unit:**	m2	**Periodicity:**		
	Period:	1999-2007		**Reference period:**				
	Definition of data to be collected:	GIS elaboration						
	Data source (citation basis):	**Alpine Space:** DIAMONT Database: Available Settlement Area, Altitude of Center of Settlement, Inhabitants in the selected municipalities						
	Other Comments:							
	Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request							

To reduce the noise pollution for the residents, the iMONITRAF! project partners are committed to develop a common set of measures for the regions along the five major road and rail corridors across the Alps. To that end, comparable indicators are used to monitor and survey the situation in all corridors. One of these indicators quantifies the number of residents who are exposed to potentially *critical noise levels* from the transalpine road and rail traffic along the main transport routes.

This quantification exercise is aimed to work out a simple and transferable methodology that could fit in the iMONITRAF! system of indicators. On the basis of harmonized principles and with the support of Geographic Information Systems (GIS) an attempt was made to achieve comparable results for the rough quantification of the affected population through readily available data. The elaboration and the results proved to be very critical in terms of really affected people.

The population possibly affected by elevated noise levels is quantified as living in a fixed area left and right of the single iMONITRAF! corridors. The extension of the area follows the traffic volumes for road and rail for the respective year. Therefore this approach calculates the number of persons living close to the iMONITRAF! corridors.

DATA ELABORATIONS

The datasets to be used were selected according to availability and quality criteria, so as to ensure comparability of results across the entire Alpine region.

Raw data come from the five motorway and four railway sections of the above mentioned corridors. Table 1 below provides a detailed overview of the data sources.

Data set	**Source**
Road network – Corridors in the study area (except South Tyrol), railways	Teleatlas, 2009
Road network South Tyrol	Autonomous Province South Tyrol, 2009
Reference data sets for the correction of the Tele Atlas railway sections	Eurogeographics, ERM V4, 2010 Google Maps, Bing Maps
Elevation model	SRTM V4, USGS/NASA, CIAT, 2007
Municipal boundaries	Eurogeographics, EBM V3, 2008
Inhabitants per municipality	National Institute for Statistics, 2007
Settlement areas - EU Member States	CORINE Land Cover (CLC) 2006, EEA, 2010
Settlement areas - Switzerland	CLC-Schweiz 2006, Swiss Federal office for the Environment (BAFU), 2010

Data sets used to elaborate the indicator

Data concerning railway sections are linear and contain no altitude information. The positional accuracy and currency of the road data are very good, since they were collected for the purpose of vehicle navigation systems. Records concerning railway sections actually originated from the same dataset, but are less precise when it comes to position and do not contain information about the location and length of tunnels. Also routes are missing, or are partly out of date. Inaccuracies were corrected and missing information was filled-in manually at an early stage of data preparation. ERM data (see Table 1) serve as reference datasets, while Google Maps and Bing Maps provide visual support.

The elevation model is available at a resolution of about 93 m. The residential areas are in accordance with the Corine Land Cover (CLC) classes 111 (continuous urban fabric) and 112 (discontinuous urban fabric). The CLC land use data generated according to a uniform methodology are available for all Alpine countries in the 1:100,000 scale range.

METHODOLOGY

The following section describes, how the number of residents in an area located along the alpine transit corridors and expected to have high noise levels – with the use of GIS systems – has been calculated.

The administrative units under examination are the municipalities of the Alpine region, while the data set for spatial refinement is provided by the land use classes of the urban areas contained in Corine Land Cover. Weighting according to development classes was not possible because there are no readily available data on the building density for the study areas. It was therefore assumed that the population is evenly distributed in the settlement areas.

Firstly, all settlement areas were matched to the relevant municipalities using a geometric intersection technique. In a second step, all settlement areas in a given municipality were summed up, so as to calculate the total settlement area per municipality.

The geometric intersection of the settlement areas and the area exposed to traffic noise allows calculating the number of square kilometers (km^2) per sub-area falling within and outside the affected area. Subsequently, for each municipality, the noise affected area (internal surface area) can be determined as a percentage of the total area. The individual settlements were then linked to the municipalities. In a last step, the affected population was calculated by multiplying the internal surface area by the number of inhabitants per municipality, divided by 100.

Tunnels longer than 1,000 m have not been considered in the calculation, since they release no significant noise emissions into the environment. However, it has not been possible to include existing noise barriers in the calculation. This is due to the fact that georeferenced data are not available for all corridors.

BASIC ASSUMPTIONS

The methodology includes the elaboration of the area depending on the traffic volume on highway and railway for each of the iMONITRAF! corridors. This variety of the buffer width maintains the comparability of the affected population between the single corridors, taking into consideration also the specific traffic volumes.

All settlement areas were first matched to the relevant municipalities using a geometric intersection technique. In a second step, all settlement areas in a given municipality were summed up, so as to calculate the total settlement area per municipality.

The elaboration and illustration of the possible effects and variations of noise levels on the residential population along the iMONITRAF! corridors served for the elaboration future traffic scenarios. For example, these results served during the elaboration of the impact-indicator of the DPSIR-analysis conducted in work package 6.

CALCULATIONS

The calculations are based on the traffic fluxes measured for the year 2010. The values for the road hail from the collected and calculated in Indicator 1 of the iMONITRAF! indicator system, expressed in average daily traffic. The values for the railway fluxes have been collected in Indicator 3, expressed in trains per day. For each corridor, a specific measuring point as the basis for the calculations, has been defined. At the same time, also the number of inhabitants for the single communities refers to the number as of 01.01.2010.

On this basis, the noise levels for L_{den} have been calculated by the noise experts from WP5. The extension of the considered zone has been defined as the area where the noise emissions amount to 66dB (A) or more. The number of persons inside this area of possibly higher noise levels has been calculated for each municipality by use of Geographical Information Systems (GIS). In order to obtain the specific number of persons living close to the single iMONITRAF! corridors, the results for each municipality have been summed up.

Road traffic has been regarded both separate for Light Vehicles (LV) and Heavy Duty Vehicles (HV), divided for the day, evening and night traffic. The following table shows the assumed traffic volumes in average daily traffic, divided by road traffic categories and the single day, evening and night schedules. The last column lists the affected zones' extensions for the single road corridors, derived from these traffic volumes.

Corridor	day		evening		night		Road buffer extension for 2010 (in m)
	LV	HV	LV	HV	LV	HV	
Fréjus	1.656	1.391	358	300	436	366	**48**
Mont Blanc	2.518	940	500	288	317	381	**46**
Gotthard	10.523	1.992	2.205	281	1.781	311	**98**
Brenner	13.047	5.529	2.587	1.128	2.085	1.447	**212**
Tarvisio	6.497	3.015	1.120	531	618	773	**101**

Volumes of road traffic assumed for each corridor for Light Vehicles (LV) and Heavy Duty Vehicles (HV).

The following table shows the assumed rail traffic categories for passenger trains (PT) and freight trains (FT) per day, assigned to the single day, evening and night schedules. The last column lists the affected zones' extensions for the single rail corridors, derived from these traffic volumes. For the Mont Blanc corridor, no rail buffer has been taken into consideration since it does not dispose of railway lines with importance for transalpine traffic.

Corridor	day		evening		night		Rail buffer extension for 2010 (in m)
	PT	FT	PT		PT	FT	
Fréjus	13	3	1	48	2	5	**31**
Mont Blanc	--	--	--	46	--	--	**--**
Gotthard	102	33	34	98	15	36	**81**
Brenner	57	39	25	212	13	39	**52**
Tarvisio	3	29	5	101	2	18	**17**

Volumes of rail traffic assumed for each corridor for Light Vehicles (LV) and Heavy Duty Vehicles (HV).

The single buffers elaborated for road and rail have then been merged into one single buffer for each of the iMONITRAF! corridors. Thus, the corridors form a single buffer, which still reflects the traffic volumes on road and rail. For this merged buffer, the number of persons living inside has been calculated.

As mentioned before, it is assumed that the population is evenly distributed over the settlement area of each municipality. Therefore the proportion of the considered population is equal to the share of the share of the area intersected in the entire settlement area of the municipality.

The figure below illustrates the calculation at the example of the Gotthard-corridor in Canton of Ticino in Switzerland. Where this buffer intersects settlement areas (grey), the percentage of the exposed settlement area (orange) is calculated. The same share is used to quantify the number of inhabitants inside the area, which is possibly exposed to noise levels of 66 dB (A) or more.

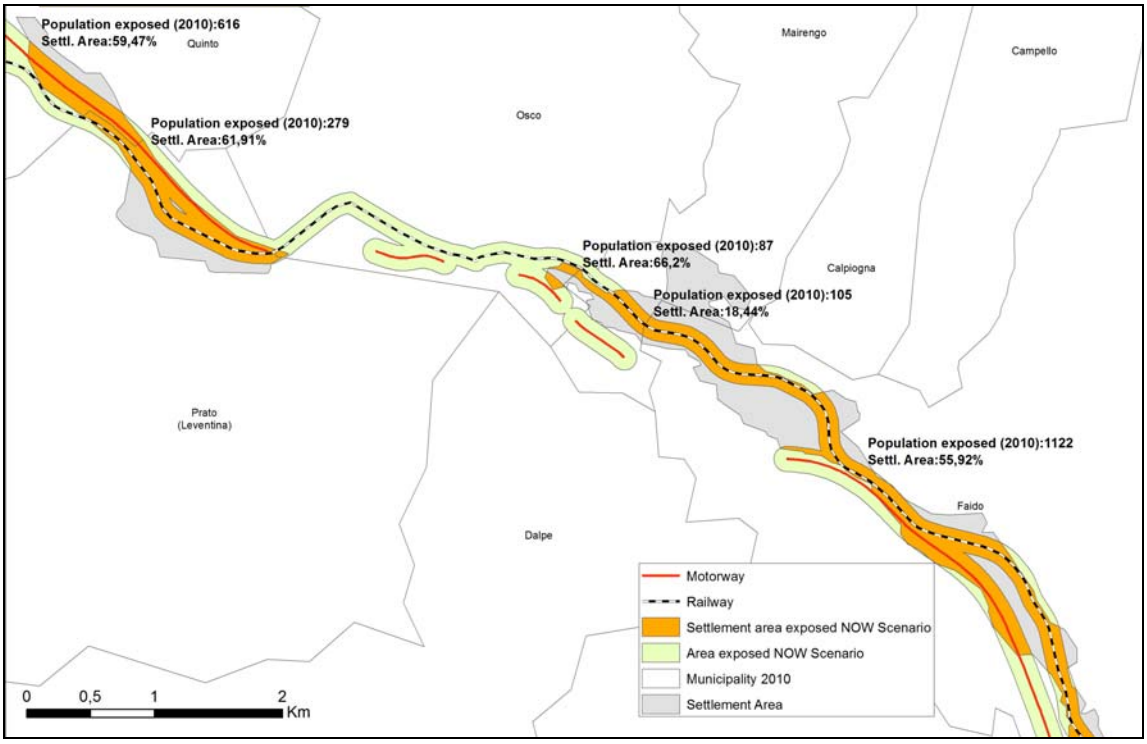


Illustration for the calculation of the fixed buffer (light green) the exposed settlement areas (orange) at the example of the Faido area (Gotthard, Ticino, Switzerland).

For the municipality of Faido for example, a share of 55,92% of the total settlement area is intersected by the zone. Therefore 55,92% of the population of 2010 (i.e. 1.122) persons are considered.

RESULTS

The following paragraph presents an overview of the results obtained through the methodology described in the section before.

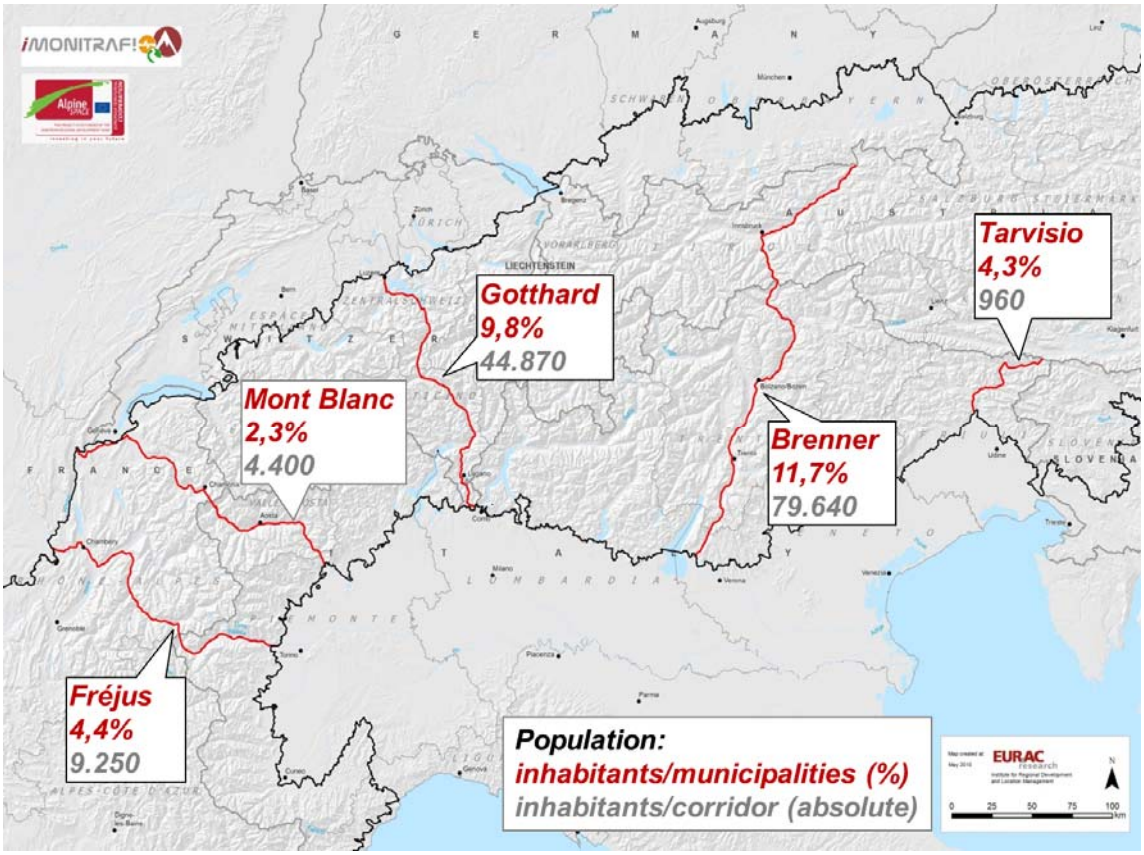
Corridor	Buffer extension for the situation in 2010 in m		Number of persons possibly exposed to higher noise levels from road & rail in 2010
	Road	Rail	
Fréjus	48	31	**9.254**
Mont Blanc	46	--	**4.401**
Gotthard	98	81	**44.871**
Brenner	212	52	**79.635**
Tarvisio	101	17	**964**

Number of persons possibly exposed to higher noise levels from road and rail

The highest number of persons affected is obtained for the Brenner corridor, followed by the Gotthard. The corridors of Fréjus and Mont Blanc follow with a considerable distance. The Tarvisio corridor is the one with the least

population affected in absolute terms. The following table shows the affected zones' extensions for the single road and rail corridors and the number of persons possibly exposed to higher noise levels (sum of road and rail).

The figure below illustrates the calculated number of people affected by noise for each corridor.



Number of inhabitants - absolute number, noise affected percentage of the total population in the relevant municipality calculated

The upper value quantifies the percentage of the population potentially exposed to high noise emissions in comparison to the overall population of the communities intersected by the buffer. The lower value indicates the population considered in absolute numbers.

The calculations reveal that Brenner and Gotthard are the corridors with the greatest number of the population living in a zone where the noise emissions from traffic reach high levels. This comes as no surprise, since both corridors are the longest of the five corridors examined. In addition, the corridors run through densely populated areas, and are both highly frequented on the road and well as on the rail corridor. Overall, it can be stated that the values for the corridors are results of different influencing factors. Apart from the traffic fluxes and the presence of both road and rail corridors, these factors include the alignment of the road or rail line close or distant from the settlement areas, the population density as well as the overall length of the considered corridor.

The following table quantifies the resident population affected by noise levels higher than 66 dB (A) and puts then into relation with the resident population in 2010 of the entire region.

Corridor	affected NUTS 3 total inhabitants 2010	Affected population 2010	% of Total pop 2010 in affected NUTS 3 regions
Fréjus	2.711.347	9.254	0,3
Mont Blanc	862.434	4.401	0,5
Gotthard	1.040.389	44.871	4,3
Brenner	1.552.537	79.635	5,1
Tarvisio	541.036	964	0,2
Sum	6.707.743	139.125	2,1

Overall, about 2% of all the population of the intersected NUTS3 regions is possibly affected by high noise levels. The highest percentages of the population affected with regard to the total regional population are calculated for the Brenner and the Gotthard. On these two, almost every twentieth person lives in a zone where noise emissions from road and rail might reach 66 dB (A) or more. Considerably lower values are recorded for the other corridors. This fact evidences the lower traffic volumes on road and rail on these corridors.

The table below quantifies the resident population of the municipalities intersected by the zone of noise levels possibly higher than 66 dB (A) and puts then into relation with the resident population in 2010 of the entire municipality.

Corridor	municipalities total inhabitants 2010	Affected population 2010	% of total pop 2010 in affected municipalities
Fréjus	209.556	9.254	4,4
Mont Blanc	187.395	4.401	2,3
Gotthard	456.484	44.871	9,8
Brenner	680.427	79.635	11,7
Tarvisio	22.662	964	4,3
Sum	**1.556.524**	**139.125**	**8,9**

Overall, about 9% of all the population of the intersected municipalities of the iMONITRAF! project area is possibly affected by high noise levels. The highest percentages of the population affected with regard to the total population of the communities are calculated for the Brenner and the Gotthard corridor. Here, every tenth inhabitant lives in a zone where noise emissions from road and rail might reach 66 dB (A) or more. Considerably lower values are recorded for the corridors of Fréjus and Tarvisio, which have both a road and a rail corridor considered. Therefore, the absence of a rail corridor is visible from the numbers calculated for the Mont Blanc corridor (having the same buffer extension for the road as the Fréjus-Corridor).

EVALUATION RESTRICTIONS

For a more precise localization of the affected population, higher-resolution data on settlements and development density should be used. Complete geo-referenced data of existing noise barriers along the transport routes have not been fully available. In order to use the same methodology for all corridors, thereby ensuring comparability of results, noise barriers were not included in the investigation. However, integrating the barriers could help determine the number of noise-affected residents in a more accurate way.

2.11 INDICATOR 11 – Transport employment

The assessment of the Number of employed persons in the transport sector has been chosen to describe the background situation of transalpine transport as well as to compare the regional development, both for the single region as well as means of comparing the regions. Therefore it represents the value of the economic performance resulting from productive activities in a period of reference for both NUTS 2 and NUTS 3 level.

METADATA

Indicator:									
	Number:	21	**Name:**	Number of employees in the transport sector					
	WP7 Codification:	724, 725	**Main category:**	Economy	**Unit:**	number			
	Level:	NUTS 3, NUTS 2							
	Objective:	Description of the background situation and comparison of the regional development							
	Definition of indicator:	Number of employed persons in the transport sector (NACE / NOGA) for NUTS 3 level and NUTS 2 level							
	Calculation:	Number of employed persons in the transport sector							
Data:									
	Name:	Number of employed persons in the transport sector	**Unit:**	number	**Periodicity:**	annual			
	Period:	2000-2006			**Reference period:**	1990, 1995			
	Definition of data to be collected:	Number of employed persons in the transport sector (for EU: NACE sections 60, 61, 62 and 63; for Switzerland: NOGA) for NUTS 3 level and NUTS 2 level							
	Data source (citation basis):	**Central Switzerland**: Swiss Statistics. Companies Census, Years 1995, 1998, 2001, 2005 and 2008. (http://www.bfs.admin.ch/bfs/portal/de/index/themen/06.html in German); **Ticino**: UST - Censimento federale delle Aziende 1995-2005, Data Warehouse del mercato del lavoro ticinese Unità delle statistiche economiche, Ufficio cantonale di statistica, 2008: Swiss Statistics. Companies Census, 2008. (http://www.bfs.admin.ch/bfs/portal/de/index/themen/06.html in German) **TYROL**: Amt der Tiroler Landesregierung, Abt. Raumordnung Statistik; **Aosta Valley, Alto Adige/Südtirol, Friuli-Venezia Giulia, Piedmont:** ISTAT, **Rhône-Alpes**: INSEE							
	Other Comments:	**RA**: La population active occupée au sens du recensement de la population comprend les personnes qui déclarent : - exercer une profession (salariée ou non) même à temps partiel ; - aider un membre de la famille dans son travail (même sans rémunération) ; - être apprenti, stagiaire rémunéré ...; - être militaire du contingent (tant que cette situation existait).							
	Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request								

The Number of employed persons in the transport sector has been analyzed based on the specific sections of the European NACE (Nomenclature statistique des activités économiques dans la Communauté européenne – Statistical Classification of Economic Activities in the European Community) and the Swiss NOGA (Nomenclature Générale des Activités économiques – General Classification of Economic Activities) sections. The sections covered by the data collection are the following:

- 60: Land transport, transport via pipelines
- 61: Water transport
- 62: Air transport
- 63: Supporting and auxiliary transport activities; activities of travel agencies

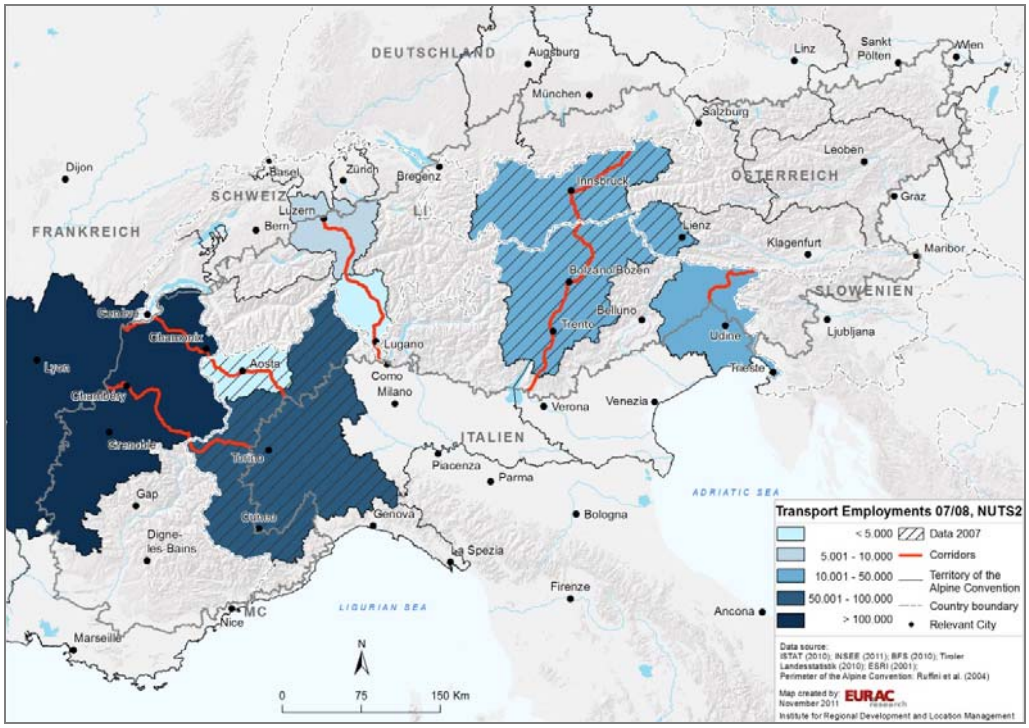
The data collection is to represent both the NUTS 3 and NUTS 2 levels and is derived from the following sources:

- **Austria:** Amt der Tiroler Landesregierung, Abt. Raumordnung Statistik for Tyrol
- **France:** INSEE for Rhône-Alpes
- **Italy:** ISTAT for Aosta Valley, Alto Adige/Südtirol, Friuli-Venezia Giulia, Piedmont.
- **Switzerland: Central Switzerland:** Swiss Statistics. Companies Census, Years 1995, 1998, 2001, 2005 and 2008. (http://www.bfs.admin.ch/bfs/portal/de/index/themen/06.html in German); **Ticino:** UST - Censimento federale delle Aziende 1995-2005, Data Warehouse del mercato del lavoro ticinese Unità delle statistiche economiche, Ufficio cantonale di statistica, 2008: Swiss Statistics. Companies Census, 2008[3].

The inhomogeneity of the available data does not allow a satisfactory elaboration of the indicator. The values were to be collected and analyzed for the years 2006 until today (where possible). The years 1990, 1995 and 2000 through 2005 have been selected as reference period. The data recovered is mostly referring to one single year of the desired period (year 2000 until 2008). In addition, unfortunately no data could be collected representing the regional situation for one single year for all regions together. The goal to retrieve statistical data for more years in order to allow also the analysis of time series was not successful.

[3] http://www.bfs.admin.ch/bfs/portal/de/index/themen/06.html (in German)

DATA ELABORATIONS



Employees in the transport sector per NUTS 2 project region for the years 2007/2008

Key figures:

The comparison between the analyzed NUTS2 regions illustrates striking differences between the regions in terms of the number of employees in the transport sector. While the numbers for some regions exceed values of 50.000 persons, other regions have 10.000 and fewer employees.

The map evidences that highest values for employees in the transport sector are registered for the NUTS 2 regions Rhône-Alpes (over 140.000 employees in 2008) and Piedmont (75.000 in 2007). One explanation of this discrepancy is the presence of cities with more than 1 Million inhabitants in Rhône-Alpes and Piedmont. The major part of the analyzed regions has values between 10.000 and 50.000 persons employed in the transport sector. The lowest values are registered for the Aosta Valley (2.300 persons in 2008) and the canton of Ticino in Switzerland (3.800 persons).

Evaluation restrictions:

As described in the chapter for the database, data allowing a consistent regarding time and geography has been difficult to obtain. Therefore a common year to analyze the data for all regions could not be selected. The analysis thus is been restricted to the level of NUTS 2 for very selected years. The following map confronts the results for the years 2007/2008 (where available).

2.12 INDICATOR 12 – Health impact

METADATA

Indicator:						***Health indicator***
	Number:	12	**Name:**	Annoyance (%HA)		
	MONITRAF indicator	12	**Main category:**	Quality of life	**Unit:**	%
	Level:	na				
	Objective:	The annoyance is used for defining a threshold, inside which the disturb exceeds a limit expressed in function of a critic value of L_{DEN}, on the basis of the Guideline of the WHO, World Health Organization. the limit is fixed at 66dB(A), resulting from a combination of the different recommendations in the different periods of the day (Day-Evening-Night) corresponding to %HA=17,6, for the road traffic and %HA=9,5 for railway traffic. Starting from this limit, the distance to which is reached this value is calculated from the noise source. In this way, fixed this distance constant along the noise sources (highways or railways), a buffer is identified. After that, one can calculate the people potentially exposed to the noise source in reference to the percentage of 17.6%, or 9,5% for railway or both, of the whole population living within the buffer.				
	Definition of indicator:	Annoyance should express the amount of stress, or dissatisfaction, people experience when exposed to noise from traffic source				
	Calculation:	*Road* $\%HA = 9{,}868 \cdot 10^{-4}(L_{DEN}-42)^3 - 1{,}436 \cdot 10^{-2}(L_{DEN}-42)^2 + 0{,}512(L_{DEN}-42)$ *Rail* $\%HA = 7{,}239 \cdot 10^{-4}(L_{DEN}-42)^3 - 7{,}851 \cdot 10^{-3}(L_{DEN}-42)^2 + 0{,}169(L_{DEN}-42)$				
Data:						
	Name:	na		**Unit:** na	**Periodicity:**	na
	Period:	na	**Reference period:**	2005 - 2011		
	Definition of data to be collected:	na				
	Data source (citation basis):	The data are validated on the basis on ***Indicator 6.*** For having homogeneous values of each corridor, the data collected during the monitoring campaign are linked to relative number of vehicles. By means of modulation curves, estimated values of L_{DEN} are calculated, according to number of vehicles crossing the frontier. These values of L_{DEN} are the starting data. After that, a buffer is identified, for estimating only the impact on population in terms of annoyed people of these last ones.				
	Other Comments:	na				
	Please indicate zero and missing values as: 0 = value 0 x = no value existent nv = data existent, but not available for this request na = data not applicable for this request					

DATA TABLES

The table below shows the number of inhabitants referred to the municipalities interested by the passage of transport infrastructures (road and rail). The data are estimations referred to the Year 2010, reported for each side of the different corridors.

Total inhabitants on the whole municipalities and respective percentage of highly annoyed people.

Corridor	Side	Number of inhabitants	High Annoyed People on the whole municipalities [%]
Fréjus	Piemonte	61474	0,47
	Rhône-Alpes	236239	0,35
Montblanc	Valle d'Aosta	71993	0,47
	Rhône-Alpes	115402	0,38
Gotthard	Canton Ticino	325127	1,15
	Zentralschweiz	293172	0,84
Brenner	Trentino	746940	1,04
	Tirol	523683	0,97
Tarvisio	Friuli	28420	0,48
	Kärnten	6912	0,00

DATA ELABORATIONS

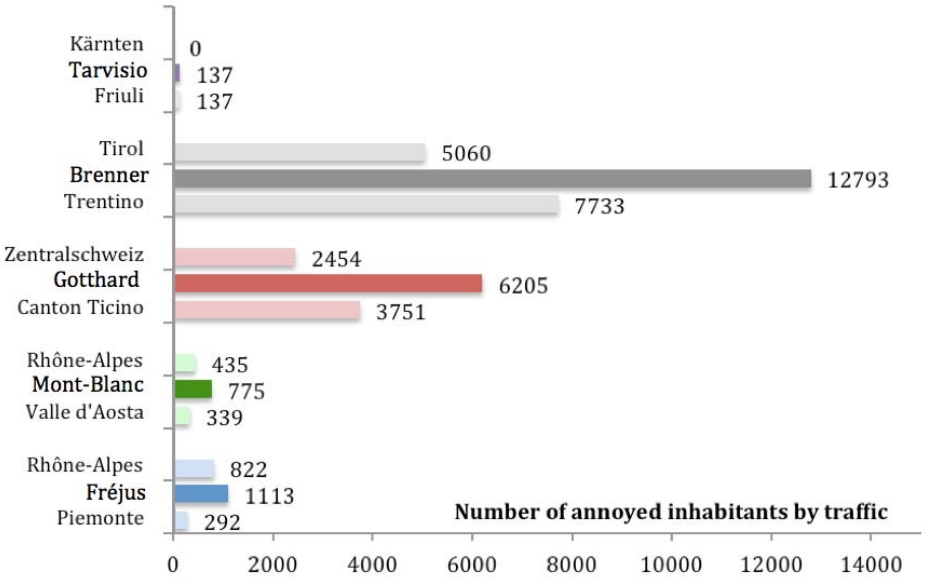
All data of percentage of annoyed people are calculated starting from the LDEN values, those are evaluated using a simplified numerical model based on the number of vehicles of each corridor. For The road and railway traffic the highly annoyed people per side is shown in table below.

Number of highly annoyed people per side by road and rail traffic

Corridor	Side	Road		Rail	
		Number of in-habitants	Highly Annoyed People	Number of in-habitants	Highly Annoyed People
Fréjus	Piemonte	19810	60	41664	231
	Rhône-Alpes	107737	438	128502	384
Montblanc	Valle d'Aosta	71993	339	-	-
	Rhône-Alpes	115402	435	-	-
Gotthard	Canton Ticino	157967	2038	167160	1713
	Zentralschweiz	210084	1678	83088	776
Brenner	Trentino	371329	5886	375611	1847
	Tirol	271761	4007	251922	1054
Tarvisio	Friuli	7669	99	20751	38
	Kärnten	0	0	6912	0

Key figures:

The chart below shows the number of total inhabitants annoyed by noise traffic (rail and road) per side of each corridor.



Total inhabitants highly annoyed by noise traffic (rail and road) per side and corridor

Evaluation restrictions:

The problems in finding data are related to collecting the results of the monitoring campaigns (LD LE LN and LDEN) and the relative numbers of heavy-duty and light vehicles.

The number of vehicles model approach is preferred to that one based on the monitoring campaign because the point of measure gives only a punctual indication about the LDEN level and the respective annoyance value, and because of the lack of data about the Brenner corridor. The values obtained in the monitoring campaign are used for the calibration of the model.

Related to problems about considering heavy-duty vehicles in traffic flow during night in the different countries linked to this study, the procedure doesn't take into account the sleep disturbance (%HSD) on the basis on LN. Note that the procedure for evaluating the buffer is identical as %HA. **General reading and data analysis**

The data are estimated and referred to the 2010 scenario number of vehicles. For each side of pass, the annoyance caused by road traffic and railway is analyzed. In terms of annoyed people, the contribution of railway is smaller than road traffic and then is added to the second one.

A. General reading and data analysis

The data are estimated and referred to the 2010 scenario number of vehicles. For each side of pass, the annoyance caused by road traffic and railway is analyzed.

B. Reading of trends

A comparison between the 2007 and 2010 data is proposed in table below for showing the trend by means of Indicator 12. The trend shows a decrease of highly annoyed people for all the corridors according to the reduction of traffic flow.

Highly annoyed people evaluation of trend

Corridor	Side	2007 %HA	2010 %HA
Fréjus	Piemonte	1,25	0,47
	Rhone-Alpes	0,65	0,35
Montblanc	Valle d'Aosta	0,54	0,47
	Rhone-Alpes	0,42	0,38
Gotthard	Canton Ticino	1,76	1,15
	Zentralschweiz	1,01	0,84
Brenner	Trentino	1,25	1,04
	Tirol	0,83	0,97
Tarvisio	Friuli	0,60	0,48
	Kärnten	0	0

C. Analysis with Monitraf and general objectives

The Indicator 12 is useful for defining area inside which the degree of disturb is out of a fixed threshold. For this reason, the annoyance gives an indication about the quality of life in relation to traffic noise.

D. Use for the definition of the scenarios

The Indicator 12 could be used also to evaluate future scenarios. Changing the number of vehicles, the population affected by noise traffic (rail, road or both) will also change.

Health study Factsheets collected by the Project Partners are presented below.

Project Partner: ARPA Valle d'Aosta

Title of the study:	Salute ed Ambiente – Santé et Environnement Traffico pesante ed effetti sulla salute. Il caso della Valdigne
Authors:	Regione Autonoma Valle d'Aosta – Assessorato della Sanità, Salute e politiche Sociali Patrizia Vittori, Moreno Demaria, Ennio Cadum, Lorena Charrier, Manuela Zublena, Giovanni Agnesod
Years of print:	2006
Years of analysis:	1997-2004
Regions, Municipalities:	Regione Valle d'Aosta: Comuni della Valdigne e Comuni del fondovalle principale.
Bibliography or web reference:	Quaderni di Epidemiologia Ambientale (n° 0) – Osservatorio Regionale Epidemiologico – Salute ed Ambiente
Summary of the Report (max 500 words):	The study evaluated the sanitary risk for the Valdigne mountain zone and the sanitary impact linked to the Mont Blanc Tunnel closure period (1999 - 2002). The sanitary risk linked to PM10 concentrations levels measured in Valdigne reveals only less than 1 added death for the short term and 1 added death for the long term. Good correlation with the traffic fluxes and NO_2 concentrations only for the respiratory and cardiovascular diseases of the older people. Any correlation was founded with the mortality data. The low demographic density of Aosta Valley is a big obstacle to give an effective evaluation of the health impacts.
Input data:	- Municipalities population - PM10 and NO_2 concentrations measures - Hospital discharges and causes of death databases
Output data:	- Mortality or morbidity local differential and trends
Indicators proposed:	DPSIR method: -Drivers: Population, vehicles fluxes -Pressures: Road traffic emissions -State: PM10 and NO_2 concentrations -Impact: Mortality and morbidity data -Response: Not evaluated
Correlation air quality / morbidity (formulas, coefficients,…):	SHORT TERM: +10 μg/mc of PM10 annual average gives: ▪ +0.3% of deaths for natural causes

	▪ +0.6% of hospitalizations for respiratory diseases ▪ +0.29% of hospitalizations for cardiovascular diseases LONG TERM: +10 μg/mc of PM10 annual average gives: ▪ +4.3% of deaths for natural causes ▪ +1.3% of hospitalizations for respiratory diseases ▪ +1.2% of hospitalizations for cardiovascular diseases ▪ +30% of bronchitis for the young people ▪ +5.1% of asthma for the young people ▪ +0.4% of asthma for the adult people
Correlation noise / morbidity (formulas, coefficients,…) :	Not evaluated in this study.
Population exposed (%):	Population of the municipalities of the Valdigne zone or of the central valley.
Key words:	Air quality, Health impact, Road traffic, Alpine environment

Project Partner: Canton Ticino

Title of the study:	Salute ed Ambiente – Santé et Environnement Analisi dell'impatto dell'inquinamento da polveri sottili sui ricoveri urgenti negli anni 2001-2006
Authors:	Institut für Sozial- und Präventivmedizin, Universität Basel: Leticia Grize, Christian Schindler Amt für Abfall, Wasser, Energie und Luft, Kanton Zürich: Reto Schüpbach, Gian-Marco Alt Swiss Federal Laboratories for Materials Science and Technology: Robert Gehrig
Years of print:	2009
Years of analysis:	2001 - 2006
Regions, Municipalities:	Cantoni: Basel-Landschaft, Basel Stadt, Bern, Genf, Luzern, Nidwalden, Obwalden, Schwyz, Solothurn, St. Gallen, Tessin, Uri, Waadt, Wallis, Zug and Zürich
Bibliography or web reference:	„Untersuchung des Einflusses der Feinstaubbelastung (PM10) auf die notfallmässigen Spitaleinweisungen in den Jahren 2001 bis 2006" or „Analisi dell'impatto dell'inquinamento da polveri sottili sui ricoveri urgenti negli anni 2001- 2006", www.feinstaub.ch/files/Schlussbericht_Untersuchung_DesEinflusses_DerFeinstaubbelastung_02052009.pdf www4.ti.ch/fileadmin/DT/temi/aria/documenti/Rapporto_ISPM_2010.pdf
Summary of the Report (max 500 words):	In der oben genannten Studie wurde zunächst ein statistisch signifikanter Zusammenhang zwischen der täglichen Zahl der Notfalleinweisungen infolge kardiovaskulärer Probleme und der durchschnittlichen PM10-Belastung während des Hospitalisationstags und des Vortages gefunden. Der gefundene Zusammenhang entsprach sehr genau dem Effekt, der in der europäischen Multizenterstudie APHEA-2 für die Notfalleinweisungen infolge kardialer Probleme geschätzt wurde. Zudem lagen alle regionalen Unterschiede in den Resultaten im Bereich des Stichprobenzufalls. Im Unterschied zur APHEA-2 Studie, welche stärkere Effekte der PM10-Belastung auf die Zahl er respiratorischen Notfälle gefunden hatte, war der durchschnittliche Zusammenhang mit M10 für die respiratorischen Notfalleinweisungen bei uns weniger deutlich als für die kardiovaskulären Notfalleinweisungen. Allerdings gab es bei uns beträchtliche regionale Unterschiede bezüglich des geschätzten Effekts von PM10 auf die respiratorischen Notfallhospitalisationen. Die deutlichsten Zusammenhänge wurden in den beiden Tessiner Regionen gefunden.
Input data:	- Municipalities population - PM10, NO_2 and ozone concentrations measures - Hospital discharges and causes of death databases
Output data:	- Mortality or morbidity local differential and trends
Indicators proposed:	DPSIR method: -Drivers: Population, traffic, industry, heating systems, construction sites -Pressures: air pollution, meteorology -State: PM10, NO_2 and ozone concentrations -Impact: Mortality and morbidity data -Response: Not evaluated

Correlation air quality / morbidity (formulas, coefficients,…):	
Correlation noise / morbidity (formulas,	Not evaluated in this study.

		Medizinische Ursachen pro Tag	Kardiovaskuläre Ursachen pro Tag	Respiratorische Ursachen po Tag
Altersgruppe	PM10 Expositionsmass	Veränderung der Fallzahl in %	Veränderung der Fallzahl in %	Veränderung der Fallzahl in %
Alle Altersgruppen	Zweitagesdurchschnitt	0.9	2.8*	1.3
	Viertagesdurchschnitt	2.0**	2.3*	2.6
	Siebentagesdurchschnitt	1.4	0.2	2.2
>= 65 Jahre	Zweitagesdurchschnitt	1.6*	3.1**	3.2
	Viertagesdurchschnitt	2.7**	2.2	7.9*
	Siebentagesdurchschnitt	1.9*	–0.6	9.8*
>= 75 Jahre	Zweitagesdurchschnitt	1.4	4.0**	3.7
	Viertagesdurchschnitt	2.7**	3.5**	9.7**
	Siebentagesdurchschnitt	1.8	–0.2	12.8*

* p-Wert <0.10

** p-Wert <0.05

Tabelle 1. Geschätzte durchschnittliche Prozentveränderung der Zahl der Notfallhospitalisierungen auf Grund medizinischer, kardiovaskulärer und respiratorischer Ursachen, bezogen auf eine Zunahme des jeweiligen PM10-Durchschnittswerts um 50µg/m3.

Erklärung: Angenommen, bei einem Zweitagesdurchschnitt der PM10-Belastung von 30 µg/m3 wäre die Zahl aller kardiovaskulären Spitaleinweisungen im Durchschnitt gleich 100. Dann wäre die Zahl der Einweisungen bei einem um 50 µg/m3 erhöhten Zweitagesdurchschnitt (d. h. bei 80 µg/m3) im Durchschnitt gleich 102.8, bzw. um 2.8% höher (oberster Wert in der mittleren Kolonne).

coefficients,…) :	
Population exposed (%):	Population of the municipalities of the cantons of Basel-Landschaft, Basel Stadt, Bern, Genf, Luzern, Nidwalden, Obwalden, Schwyz, Solothurn, St. Gallen, Tessin, Uri, Waadt, Wallis, Zug and Zürich who lives under 900 m (m s/m) (thermal inversion)
Key words:	Air quality, Health impact

3 Indicators evaluation system

In order to compare the summary tables for the environmental evaluation of previous indicators in the next global table, we can identify the following observations:

- The Brenner and the Tarvisio (global score over 3 points) are the most critical corridors for traffic flow and consequent air quality values;
- The Gotthard (score of 3 points) reveals a situation still critical, in particular it is determined by the light vehicles flows and by the resulting air quality situation, but there are positive elements related to heavy vehicles (modal shift and the success of technological change);
- The two corridors of the Western Alps (score under 3 points) display the lowest values for all indicators, showing a not so critical condition.

2010 situation	HV fluxes (ind. 1)	LV fluxes (ind. 1)	Vehicle fleet (ind. 2)	Rail traffic fluxes (ind. 3)	Road emissions (ind. 4)	Concentrations measured (ind. 5)	Noise level (ind. 6)	Toll prices (ind. 7)	Score (average value)
FREJUS	*2*	*2*	*2*	*4*	*2*	*3*	*3*	*2*	2,5
MONT BLANC	*2*	*2*	*2*		*2*	*3*	*3*	*2*	2,3
GOTTHARD	*3*	*4*	*1*	*1*	*3*	*4*	*4*	*3*	2,9
BRENNER	*5*	*5*	*1*	*2*	*5*	*5*	*N.A.*	*3*	3,7
TARVISIO	*3*	*3*	*4*	*3*	*4*	*2*	*4*	*5*	3,5

About the 2005-2010 trends analysis, we marked with green arrows the trends positives for the environment impacts reduction and with red arrows the trends with opposite effects. The best trends are referred to the indicators 2, 4, 5 and 7.

2005-2010 trends	HV fluxes (ind. 1)	LV fluxes (ind. 1)	Vehicle fleet (ind. 2)	Rail traffic fluxes (ind. 3)	Road emissions (ind. 4)	Concentrations measured (ind. 5)	Noise level (ind. 6)	Toll prices (ind. 7)
FREJUS	↑	↔	↑	↓	↓	*not applied*	↔	↑
MONT BLANC	↔	↔	↑	*not applied*	↓	↓	↔	↑
GOTTHARD	↑	↑	↑	↓	↓	↓	↔	↑
BRENNER	↔	↑	↑	↑	↓	↓	*not applied*	↑
TARVISIO	↓	↓	↔	↑	↓	*not applied*	↔	↔

REFERENCIES

National statistical Offices:

EUROSTAT, ec.europa.eu/eurostat

Swiss Federal Statistical Office; www.bfs.admin.ch/bfs/portal/en/index.html

ISTAT - Istituto nazionale di statistica, www.istat.it

INSEE - Institut National de la Statistique et des Études, www.insee.fr/

ARE Bundesamt für Raumentwicklung, http://www.are.admin.ch/index.html

ALPINFO - Traffico merci su strada e per ferrovia attraverso le Alpi [Dipartimento federale dell'ambiente, dei trasporti, dell'energia e delle comunicazioni della Confederazione Svizzera DATEC - Ufficio federale dei trasporti UFT Divisione Finanziamento]

Handbook Emission Factors for Road Transport. Swiss Agency for the Environment, Forests and Landscape / INFRAS, CD ROM, Bern.

ANNEX : Indicators detailed data

INDICATOR 1 – VEHICLES FLUXES

	2000						2005					
	VL/Y	PL/Y	TOT/Y	TGM VL	TGM PL	TGM tot	VL/Y	PL/Y	TOT/Y	TGM VL	TGM PL	TGM tot
Fréjus												
Planaise	5.621.621	2.721.550	8.343.170	15.402	7.456	22.858	6.501.672	2.014.873	8.516.545	17.813	5.520	23.333
Aiton	2.094.188	1.902.928	3.997.115	5.738	5.214	10.951	2.221.664	1.240.080	3.461.744	6.087	3.397	9.484
Hermillon	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV
SFTRF Tunnel FRA	1.223.596	1.495.506	2.719.102	3.352	4.097	7.450	651.960	796.839	1.448.799	1.786	2.183	3.969
SFTRF Tunnel ITA	1.220.213	1.491.372	2.711.585	3.343	4.086	7.429	652.073	796.978	1.449.050	1.787	2.184	3.970
Bardonecchia	1.165.850	1.553.252	2.719.102	3.194	4.255	7.450	647.344	801.455	1.448.799	1.774	2.196	3.969
Salbertrand	2.796.531	1.530.751	4.327.282	7.662	4.194	11.856	2.842.517	1.298.393	4.140.910	7.788	3.557	11.345
Avigliana	3.436.875	1.569.432	5.006.307	9.416	4.300	13.716	2.577.458	872.687	3.450.145	7.062	2.391	9.452
M. Bianco												
Eloise	4.702.018	1.102.942	5.804.960	12.882	3.022	15.904	5.877.818	1.378.747	7.256.565	16.104	3.777	19.881
Entrebières	4.301.215	642.710	4.943.925	11.784	1.761	13.545	5.650.167	844.278	6.494.445	15.480	2.313	17.793
Bonneville	6.618.253	1.167.927	7.786.180	18.132	3.200	21.332	8.992.907	1.586.984	10.579.890	24.638	4.348	28.986
Cluses	3.136.095	833.645	3.969.740	8.592	2.284	10.876	4.695.203	1.248.092	5.943.295	12.864	3.419	16.283
Passy	3.297.381	1.158.539	4.455.920	9.034	3.174	12.208	4.858.829	1.707.156	6.565.985	13.312	4.677	17.989
ATMB Tunnel FRA	X	X	X	X	X	X	1.046.299	697.532	1.743.831	2.867	1.911	4.778
ATMB Tunnel ITA	X	X	X	X	X	X	1.046.299	697.532	1.743.831	2.867	1.911	4.778
Aosta-ovest	1.076.299	130.887	1.207.186	2.949	359	3.307	1.806.526	782.042	2.588.568	4.949	2.143	7.092
Aosta-est	4.195.548	653.758	4.849.306	11.495	1.791	13.286	4.937.924	1.318.865	6.256.789	13.529	3.613	17.142
Pont St. Martin	5.988.528	822.857	6.811.385	16.407	2.254	18.661	6.643.858	1.507.890	8.151.748	18.202	4.131	22.334
Ticino												
Camignolo							14.062.554	3.072.344	17.134.898	38.528	8.417	46.945
Biasca S (AS)					X	X	7.841.551	2.013.486	9.855.037	21.484	5.516	27.000
Gotthard**												
San Bernardino (Tunnel)	2.242.913	98.803	2.341.716	6.145	271	6.416	1.861.043	381.177	2.242.220	5.099	1.044	6.143
Gotthardtunnel	5.898.775	916.735	6.815.510	16.161	2.512	18.673	4.612.136	1.253.216	5.865.352	12.636	3.433	16.069
Seelisbergtunnel (AB)	6.552.623	900.698	7.453.321	17.952	2.468	20.420	5.810.529	1.578.845	7.389.374	15.919	4.326	20.245
Erstfeld S (AB)					X	X	6.003.530	1.631.287	7.634.818	16.448	4.469	20.917
Reiden S (AB)					X	X	11.938.514	3.851.037	15.789.550	32.708	10.551	43.259
Erstfeld N (AB)					X	X	na	na	na	na	na	na
Brenner												
Matrei am Brenner	8.008.830	2.042.905	10.051.735	21.942	5.597	27.539	7.532.272	3.830.543	11.362.815	20.636	10.495	31.131
Vomp	14.754.760	3.210.540	17.965.300	40.424	8.796	49.220	14.593.036	4.420.909	19.013.945	39.981	12.112	52.093
Kundl	12.404.525	2.178.685	14.583.210	33.985	5.969	39.954	12.182.149	4.060.716	16.242.865	33.376	11.125	44.501
Brennero-Vipiteno	5.252.364	2.666.894	7.919.258	14.390	7.307	21.697	5.876.747	2.988.625	8.865.372	16.101	8.188	24.289
Vipiteno-Bressanone	5.848.262	2.796.011	8.644.273	16.023	7.660	23.683	6.540.209	3.146.874	9.687.083	17.918	8.622	26.540
Bressanone-Chiusa	6.710.402	3.136.012	9.846.414	18.385	8.592	26.976	7.482.714	3.541.737	11.024.451	20.501	9.703	30.204
Chiusa-Bznord	7.511.704	3.301.154	10.812.858	20.580	9.044	29.624	8.332.740	3.697.133	12.029.873	22.829	10.129	32.959
Bznord-Bzsud	7.035.713	3.321.673	10.357.386	19.276	9.100	28.376	7.600.298	3.640.272	11.240.570	20.823	9.973	30.796
Bzsud-Ora	9.246.653	3.882.839	13.129.492	25.333	10.638	35.971	10.311.101	4.353.370	14.664.471	28.250	11.927	40.177
Ora-Salorno	9.149.306	3.847.536	12.996.842	25.067	10.541	35.608	10.090.860	4.308.796	14.399.656	27.646	11.805	39.451
Tarvisio												
Barriera di Ugovizza - A23	2.993.000	1.821.715	4.815.080	8.200	4.991	13.192	3.360.190	2.119.555	5.479.380	9.206	5.807	15.012
Gemona Osoppo	1.690.680	434.715	2.125.395	4.632	1.191	5.823	1.971.365	576.335	2.547.335	5.401	1.579	6.979
Carnia	2.349.140	421.940	2.770.715	6.436	1.156	7.591	2.713.775	509.905	3.223.680	7.435	1.397	8.832
Pontebba	268.640	299.665	568.305	736	821	1.557	300.030	222.285	522.315	822	609	1.431

	2006						2007					
	VL/Y	PL/Y	TOT/Y	TGM VL	TGM PL	TGM tot	VL/Y	PL/Y	TOT/Y	TGM VL	TGM PL	TGM tot
Fréjus												
Planaise	6.672.492	2.095.903	8.768.395	18.281	5.742	24.023	6.906.384	2.164.596	9.070.980	18.922	5.930	24.852
Aiton	2.387.368	1.266.793	3.654.161	6.541	3.471	10.011	2.436.734	1.323.542	3.760.276	6.676	3.626	10.302
Hermillon	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV
SFTRF Tunnel FRA	771.249	942.637	1.713.886	2.113	2.583	4.696	797.869	975.174	1.773.043	2.186	2.672	4.858
SFTRF Tunnel ITA	771.249	942.637	1.713.886	2.113	2.583	4.696	797.914	975.229	1.773.143	2.186	2.672	4.858
Bardonecchia	0	0	0	0	0	0	0	0	0	0	0	0
Salbertrand	2.842.517	1.298.393	4.140.910	7.788	3.557	11.345	2.752.701	1.291.479	4.044.180	7.542	3.538	11.080
Avigliana	3.672.327	1.447.916	5.120.243	10.061	3.967	14.028	3.702.105	1.459.124	5.161.229	10.143	3.998	14.140
M. Bianco												
Eloise	NV	NV	NV	NV	NV	NV	5.964.739	1.399.136	7.363.875	16.342	3.833	20.175
Entrebières	NV	NV	NV	NV	NV	NV	12.978.586	1.939.329	14.917.915	35.558	5.313	40.871
Bonneville	NV	NV	NV	NV	NV	NV	8.449.969	1.491.171	9.941.140	23.151	4.085	27.236
Cluses	NV	NV	NV	NV	NV	NV	4.886.956	1.299.064	6.186.020	13.389	3.559	16.948
Passy	NV	NV	NV	NV	NV	NV	3.180.968	1.117.637	4.298.605	8.715	3.062	11.777
ATMB Tunnel FRA	1.083.224	722.149	1.805.373	2.968	1.978	4.946	1.064.263	709.509	1.773.772	2.916	1.944	4.860
ATMB Tunnel ITA	1.083.224	722.149	1.805.373	2.968	1.978	4.946	1.064.263	709.509	1.773.772	2.916	1.944	4.860
Aosta-ovest	1.860.733	814.880	2.675.613	5.098	2.233	7.330	1.865.883	804.536	2.670.419	5.112	2.204	7.316
Aosta-est	4.995.067	1.370.311	6.365.378	13.685	3.754	17.439	4.951.731	1.351.586	6.303.317	13.566	3.703	17.269
Pont St. Martin	6.645.233	1.539.588	8.184.821	18.206	4.218	22.424	6.660.345	1.529.888	8.190.233	18.248	4.191	22.439
Ticino												
Camignolo	14.024.760	3.147.468	17.172.228	38.424	8.623	47.047	14.521.364	3.167.879	17.689.243	39.785	8.679	48.464
Biasca S (AS)	7.564.285	1.942.705	9.506.990	20.724	5.322	26.047	8.022.342	2.158.114	10.180.456	21.979	5.913	27.892
Gotthard**												
San Bernardino (Tunnel)	1.983.603	406.280	2.389.883	5.435	1.113	6.548	1.853.844	379.703	2.233.547	5.079	1.040	6.119
Gotthardtunnel	4.305.019	1.155.609	5.460.628	11.795	3.166	14.961	4.772.201	1.295.416	6.067.617	13.075	3.549	16.624
Seelisbergtunnel (AB)	5.526.472	1.483.486	7.009.958	15.141	4.064	19.205	5.913.168	1.605.133	7.518.301	16.200	4.398	20.598
Erstfeld S (AB)	5.224.355	1.402.388	6.626.743	14.313	3.842	18.155	5.803.952	1.575.486	7.379.438	15.901	4.316	20.218
Reiden S (AB)	12.045.592	3.790.191	15.835.783	33.002	10.384	43.386	12.760.002	4.103.731	16.863.733	34.959	11.243	46.202
Erstfeld N (AB)	na	na	na	na	na	na	na	na	na	na	na	na
Brenner												
Matrei am Brenner	7.621.296	3.983.149	11.604.445	20.880	10.913	31.793	x	x	x	x		x
Vomp	14.530.723	4.493.442	19.024.165	39.810	12.311	52.121	14.603.913	4.620.637	19.224.550	40.011	12.659	52.670
Kundl	12.278.509	4.092.836	16.371.345	33.640	11.213	44.853	12.482.453	4.160.818	16.643.270	34.199	11.400	45.598
Brennero-Vipiteno	5.981.214	3.125.986	9.107.200	16.387	8.564	24.951	6.167.455	3.281.037	9.448.492	16.897	8.989	25.886
Vipiteno-Bressanone	6.690.355	3.281.296	9.971.651	18.330	8.990	27.320	6.887.328	3.441.219	10.328.547	18.869	9.428	28.297
Bressanone-Chiusa	7.667.641	3.666.214	11.333.855	21.007	10.044	31.052	7.706.903	3.774.126	11.481.029	21.115	10.340	31.455
Chiusa-Bznord	8.467.394	3.807.639	12.275.033	23.198	10.432	33.630	8.603.024	3.955.268	12.558.292	23.570	10.836	34.406
Bznord-Bzsud	7.804.464	3.766.860	11.571.324	21.382	10.320	31.702	7.947.034	3.913.864	11.860.898	21.773	10.723	32.496
Bzsud-Ora	10.589.087	4.482.134	15.071.221	29.011	12.280	41.291	10.734.106	4.595.443	15.329.549	29.409	12.590	41.999
Ora-Salorno	10.388.539	4.444.228	14.832.767	28.462	12.176	40.638	10.614.440	4.568.674	15.183.114	29.081	12.517	41.598
Tarvisio												
Barriera di Ugovizza - A23	3.438.665	2.218.105	5.656.770	9.421	6.077	15.498	3.554.370	2.290.010	5.844.380	9.738	6.274	16.012
Gemona Osoppo	2.044.730	594.220	2.638.950	5.602	1.628	7.230	2.121.380	630.720	2.752.100	5.812	1.728	7.540
Carnia	2.783.490	516.840	3.300.330	7.626	1.416	9.042	2.884.960	549.325	3.434.285	7.904	1.505	9.409
Pontebba	305.505	228.855	534.725	837	627	1.465	305.140	221.920	527.425	836	608	1.445

	2008						2009					
	VL/Y	PL/Y	TOT/Y	TGM VL	TGM PL	TGM tot	VL/Y	PL/Y	TOT/Y	TGM VL	TGM PL	TGM tot
Fréjus												
Planaise	7.135.677	2.058.673	9.194.350	19.496	5.625	25.121	7.439.540	1.714.661	9.154.200	20.382	4.698	25.080
Aiton	2.406.506	1.270.391	3.676.897	6.575	3.471	10.046	2.485.533	1.128.424	3.613.957	6.810	3.092	9.901
Hermillon	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV
SFTRF Tunnel FRA	768.725	939.552	1.708.277	2.100	2.567	4.667	696.425	851.186	1.547.610	1.908	2.332	4.240
SFTRF Tunnel ITA	768.725	939.552	1.708.277	2.100	2.567	4.667	696.425	851.186	1.547.610	1.908	2.332	4.240
Bardonecchia	0	0	0	0	0	0	0	0	0	0	0	0
Salbertrand	2.802.120	1.221.549	4.023.669	7.677	3.347	11.024	2.794.758	1.049.721	3.844.479	7.657	2.876	10.533
Avigliana	3.758.532	1.381.628	5.140.160	10.297	3.785	14.083	3.726.470	1.174.127	4.900.597	10.210	3.217	13.426
M. Bianco												
Eloise	5.845.887	1.371.258	7.217.145	15.972	3.747	19.719	5.882.844	1.379.926	7.262.770	16.117	3.781	19.898
Entrebières	12.516.868	1.870.337	14.387.205	34.199	5.110	39.309	13.023.678	1.946.067	14.969.745	35.681	5.332	41.013
Bonneville	8.535.598	1.506.282	10.041.880	23.321	4.116	27.437	8.587.100	1.515.371	10.102.470	23.526	4.152	27.678
Cluses	4.864.176	1.293.009	6.157.185	13.290	3.533	16.823	4.872.250	1.295.155	6.167.405	13.349	3.548	16.897
Passy	3.100.748	1.089.452	4.190.200	8.472	2.977	11.449	3.362.745	1.181.505	4.544.250	9.213	3.237	12.450
ATMB Tunnel FRA	1.089.382	696.490	1.785.872	2.976	1.903	4.879	1.108.828	623.715	1.732.543	3.038	1.709	4.747
ATMB Tunnel ITA	1.089.382	696.490	1.785.872	2.976	1.903	4.879	1.108.828	623.715	1.732.543	3.038	1.709	4.747
Aosta-ovest	1.867.683	805.285	2.672.968	5.117	2.206	7.323	1.922.118	733.979	2.656.097	5.266	2.011	7.277
Aosta-est	4.881.966	1.340.530	6.222.496	13.375	3.673	17.048	4.959.295	1.240.425	6.199.720	13.587	3.398	16.986
Pont St. Martin	6.457.255	1.488.791	7.946.046	17.691	4.079	21.770	6.622.787	1.384.912	8.007.699	18.145	3.794	21.939
Ticino												
Camignolo	14.418.434	2.951.507	17.369.941	39.503	8.086	47.589	14.921.959	2.922.336	17.844.295	40.882	8.006	48.888
Biasca S (AS)	7.850.566	2.276.899	10.127.465	21.508	6.238	27.746	7.941.633	2.393.933	10.335.566	21.758	6.559	28.317
Gotthard**												
San Bernardino (Tunnel)	1.786.970	366.006	2.158.875	4.896	1.003	5.899	1.978.289	405.192	2.383.481	5.420	1.110	6.530
Gotthardtunnel	4.614.597	1.438.270	6.069.450	12.643	3.940	16.583	4.836.276	1.308.577	6.144.853	13.250	3.585	16.835
Seelisbergtunnel (AB)	5.707.044	1.778.762	7.506.315	15.636	4.873	20.509	5.906.045	1.598.030	7.504.075	16.181	4.378	20.559
Erstfeld S (AB)	6.148.947	1.916.493	8.065.440	16.800	5.236	22.037	6.467.645	1.749.985	8.217.630	17.720	4.794	22.514
Reiden S (AB)	12.971.201	4.216.086	17.187.287	35.440	11.519	46.960	13.219.163	4.152.611	17.371.775	36.217	11.377	47.594
Erstfeld N (AB)	na	na	na	na	na	na	na	na	na	na	na	na
Brenner												
Matrei am Brenner	7.487.299	3.902.891	11.390.190	20.457	10.749	31.206	7.775.442	3.451.593	11.227.035	21.303	9.456	30.759
Vomp	14.633.705	4.636.718	19.270.423	39.983	12.813	52.796	14.739.985	4.402.075	19.142.060	40.384	12.060	52.444
Kundl	12.440.889	4.101.641	16.542.530	33.992	11.331	45.322	12.352.969	4.117.656	16.470.625	33.844	11.281	45.125
Brennero-Vipiteno	6.076.862	3.193.002	9.269.864	16.603	8.724	25.327	6.362.934	2.828.671	9.191.605	17.433	7.750	25.182
Vipiteno-Bressanone	6.799.795	3.358.726	10.158.521	18.579	9.177	27.756	7.085.134	2.995.697	10.080.831	19.411	8.207	27.619
Bressanone-Chiusa	7.600.650	3.683.157	11.283.807	20.767	10.063	30.830	7.867.985	3.324.384	11.186.894	21.556	9.108	30.664
Chiusa-Bznord	8.487.622	3.870.668	12.358.290	23.190	10.576	33.766	8.686.545	3.473.738	12.160.283	23.799	9.517	33.316
Bznord-Bzsud	7.820.964	3.829.379	11.650.343	21.369	10.463	31.832	8.136.796	3.460.470	11.597.266	22.293	9.481	31.773
Bzsud-Ora	10.455.078	4.475.309	14.930.387	28.566	12.228	40.793	10.807.885	4.080.572	14.882.617	29.611	11.180	40.790
Ora-Salorno	10.349.136	4.443.233	14.792.369	28.276	12.140	40.416	10.710.372	4.048.843	14.759.215	29.343	11.093	40.436
Tarvisio												
Barriera di Ugovizza - A23	3.451.380	1.967.616	5.418.996	9.430	5.376	14.806	3.307.630	1.531.175	4.838.805	9.062	4.195	13.257
Gemona Osoppo	2.051.430	590.358	2.641.788	5.605	1.613	7.218	2.102.035	502.240	2.604.275	5.759	1.376	7.135
Carnia	2.763.666	554.124	3.317.790	7.551	1.514	9.065	2.836.780	494.575	3.331.355	7.772	1.355	9.127
Pontebba	283.284	204.960	488.610	774	560	1.335	279.590	165.345	444.935	766	453	1.219

	2010					
	VL/Y	PL/Y	TOT/Y	TGM VL	TGM PL	TGM tot
Fréjus						
Planaise	7.619.886	2.067.214	9.687.100	20.876	5.664	26.540
Aiton	2.569.294	1.194.222	3.763.516	7.039	3.272	10.311
Hermillon	NV	NV	NV	NV	NV	NV
SFTRF Tunnel FRA	740.252	904.753	1.645.005	2.028	2.479	4.507
SFTRF Tunnel ITA	740.252	904.753	1.645.005	2.028	2.479	4.507
Bardonecchia	0	0	0	0	0	0
Salbertrand	2.751.582	1.090.036	3.841.618	7.539	2.986	10.525
Avigliana	3.728.946	1.216.779	4.945.725	10.216	3.334	13.550
M. Bianco						
Eloise	5.996.965	1.406.695	7.403.660	16.430	3.854	20.284
Entrebières	13.548.906	2.024.549	15.573.455	37.120	5.547	42.667
Bonneville	9.103.356	1.606.475	10.709.830	24.941	4.401	29.342
Cluses	5.012.388	1.332.407	6.344.795	13.733	3.650	17.383
Passy	4.153.328	1.459.277	5.612.605	11.379	3.998	15.377
ATMB Tunnel FRA	1.119.096	685.897	1.804.993	3.066	1.879	4.945
ATMB Tunnel ITA	1.119.096	685.897	1.804.993	3.066	1.879	4.945
Aosta-ovest	1.906.449	787.886	2.694.335	5.223	2.159	7.382
Aosta-est	3.811.417	898.488	4.709.905	10.442	2.462	12.904
Pont St. Martin	6.501.563	1.460.123	7.961.686	17.813	4.000	21.813
Ticino						
Camignolo	15.028.043	3.061.270	18.089.312	41.173	8.387	49.560
Biasca S (AS)	8.086.928	2.509.127	10.596.055	22.156	6.874	29.030
Gotthard**						
San Bernardino (Tunnel)	2.006.576	410.986	2.417.562	5.497	1.126	6.623
Gotthardtunnel	4.877.431	1.361.339	6.238.770	13.363	3.730	17.093
Seelisbergtunnel (AB)	no data available for 2010 due to contruction work (jan-jun and dec)					
Erstfeld S (AB)	6.470.122	1.805.874	8.275.996	17.726	4.948	22.674
Reiden S (AB)	12.992.970	4.219.780	17.212.749	35.597	11.561	47.158
Erstfeld N (AB)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Brenner						
Matrei am Brenner	n.a	n.a	n.a	n.a	n.a	n.a
Vomp	15.154.639	4.542.586	19.697.225	41.520	12.445	53.965
Kundl	12.735.945	4.245.315	16.981.260	34.893	11.631	46.524
Brennero-Vipiteno	6.467.542	2.958.311	9.425.853	17.719	8.105	25.824
Vipiteno-Bressanone	7.197.448	3.129.188	10.326.636	19.719	8.573	28.292
Bressanone-Chiusa	7.995.941	3.467.115	11.463.056	21.907	9.499	31.406
Chiusa-Bznord	8.862.075	3.623.727	12.485.802	24.280	9.928	34.208
Bznord-Bzsud	8.241.867	3.601.254	11.843.121	22.580	9.866	32.447
Bzsud-Ora	10.823.262	4.213.594	15.036.856	29.653	11.544	41.197
Ora-Salorno	10.723.573	4.191.810	14.915.383	29.380	11.484	40.864
Tarvisio						
Barriera di Ugovizza - A23	3.005.677	1.576.467	4.582.144	8.235	4.319	12.554
Gemona Osoppo	2.033.768	511.957	2.545.725	5.572	1.403	6.975
Carnia	2.780.263	510.895	3.291.158	7.617	1.400	9.017
Pontebba	256.790	167.973	424.763	704	460	1.164

INDICATOR 2 – DETAILED DATA

Ind 2a										
	Gotthard -SWISS		Brenner - TYROL		Brenner - TYROL		Brenner - S-TYROL		Mont-Blanc -FRANCE	
Counting station	Gotthardtunnel		Radfeld A12	direction Kufstein	Vomp A12				MBTunnel	
Vehicle class	nb heavy duty veh/ y	% EURO class	nb heavy duty veh/ y	% EURO class	nb heavy duty veh/ y	% EURO class	nb heavy duty veh/ y	% EURO class	nb heavy duty veh/ y	% EURO class
Year 2000										
Total	**1187000**								0	
EURO 0	x	no data							x	
EURO 1	x	no data							x	
EURO 2	x	no data							x	
EURO 3	x	no data							x	
EURO 4	x	no data							x	
EURO 5	x	no data							x	
Year 2005					**VOMP A12**					
Total	**925000**	100,0%	1.751.270	100%	**3.329.530**				601062	
EURO 0	12950	3,8%	47.284	2,70%	0	0,00%			0	0,00%
EURO 1	14800	3,7%	31.523	1,80%	166.477	5,00%			7583	1,26%
EURO 2	230325	27,8%	250.432	14,30%	532.725	16,00%			169238	28,16%
EURO 3	663225	62,0%	1.225.889	70%	2.497.148	75,00%			424241	70,58%
EURO 4	3700	1,9%	182.132	10,40%	133.181	4,00%			0	0,00%
EURO 5	925	0,8%	14.010	0,80%	0	0,00%			0	0,00%
Year 2006					**VOMP A12**					
Total	**856000**				**2.988.620**				621896	
EURO 0	x	1,1%	x	x	0	0,00%			0	0,00%
EURO 1	x	1,0%	x	x	89.659	3,00%			4101	0,66%
EURO 2	x	15,9%	x	x	328.748	11,00%			73831	11,87%
EURO 3	x	78,1%	x	x	1.823.058	61,00%			543964	87,47%
EURO 4	x	1,7%	x	x	358.634	12,00%			0	0,00%
EURO 5	x	2,1%	x	x	388.521	13,00%			0	0,00%
Year 2007					**VOMP A12**					
Total	**963000**				**3.087.900**				605391	
EURO 0	x	0,9%	x	x	0	0,00%			0	0,00%
EURO 1	x	0,6%	x	x	92.637	3,00%			3535	0,58%
EURO 2	x	10,3%	x	x	247.032	8,00%			48978	8,09%
EURO 3	x	69,3%	x	x	1.420.434	46,00%			510917	84,39%
EURO 4	x	6,9%	x	x	524.943	17,00%			41961	6,93%
EURO 5	x	12,0%	x	x	802.854	26,00%			0	0,00%
Year 2008					**VOMP A12**					
Total	**973000**		1.639.945	100%					604102	
EURO 0	6974	0,7%	14.760	0,90%	no data				0	0,00%
EURO 1	3689	0,4%	1.640	0,10%					2589	0,43%
EURO 2	56419	5,8%	59.038	3,60%					30643	5,07%
EURO 3	516098	53,0%	564.141	34,40%					444696	73,61%
EURO 4	139558	14,3%	298.470	18,20%					57782	9,56%
EURO 5	250262	25,7%	701.896	42,80%					68392	11,32%
Year 2009					**VOMP A12**					
Total	**900000**				**2.418.490**				**533547**	
EURO 0	4017	0,4%			0	0,00%			0	0,00%
EURO 1	1916	0,2%			26.603	1,10%			1031	0,19%
EURO 2	26759	3,0%			87.066	3,60%			18379	3,44%
EURO 3	353047	39,2%			851.308	35,20%			321545	60,27%
EURO 4	155687	17,3%			350.681	14,50%			73074	13,70%
EURO 5	358574	39,8%			1.102.831	45,60%			119518	22,40%
Year 2010					**VOMP A12**					
Total	**943230**				**2.866.710**				**587445**	
EURO 0	2850	0,3%			0	0,00%			0	0,00%
EURO 1	1639	0,2%			20.984	0,73%			682	0,12%
EURO 2	18256	1,9%			77.401	2,70%			15022	2,56%
EURO 3	294678	31,2%			790.123	27,56%			236262	40,22%
EURO 4	156359	16,6%			325.228	11,35%			119353	20,32%
EURO 5	469447	49,8%			1.652.974	57,66%			216126	36,79%

Ind 2a

	Mont-Blanc - V. AOSTA		Fréjus -FRANCE		Fréjus -PIEDMONT		Tarvisio -FRIULI VG	
Counting station	MBTunnel		ATMB Tunnel					
Vehicle class	nb heavy duty veh/ y	% EURO class	nb heavy duty veh/ y	% EURO class	nb heavy duty veh/ y	% EURO class	nb heavy duty veh/ y	% EURO class
Year 2000								
Total	0						x	
EURO 0	x		x				x	
EURO 1	x		x				x	
EURO 2	x		x				x	
EURO 3	x		x				x	
EURO 4	x		x				x	
EURO 5	x		x				x	
Year 2005								
Total	**584836**		800941				2119553	
EURO 0	0	0,00%	381	0,05%	32		851748	40,19%
EURO 1	6564	1,12%	28342	3,54%	26507		191033	9,01%
EURO 2	161703	27,65%	351103	43,84%	339021		575736	27,16%
EURO 3	416569	71,23%	421115	52,58%	418956		501036	23,64%
EURO 4	0	0,00%	0	0,00%	X		0	0,00%
EURO 5	0	0,00%	0	0,00%	X		0	0,00%
Year 2006								
Total			863710				x	
EURO 0	0	0,00%	240	0,03%			x	
EURO 1	3726	0,61%	16604	1,92%			x	
EURO 2	69566	11,48%	203094	23,51%			x	
EURO 3	532884	87,91%	643772	74,54%			x	
EURO 4	0	0,00%	0	0,00%			x	
EURO 5	0	0,00%	0	0,00%			x	
Year 2007								
Total			894903				2288584	
EURO 0	0	0,00%	129	0,01%			844144	36,88%
EURO 1	3184	0,54%	10875	1,22%			211819	9,26%
EURO 2	45784	7,76%	147259	16,46%			522003	22,81%
EURO 3	500256	84,80%	705159	78,80%			608980	26,61%
EURO 4	40680	6,90%	31481	3,52%			97083	4,24%
EURO 5	0	0,00%	0	0,00%			4555	0,20%
Year 2008								
Total			842340					
EURO 0	0	0,00%	47	0,01%				
EURO 1	2364	0,40%	11054	1,31%				
EURO 2	27712	4,71%	102363	12,15%				
EURO 3	435435	74,00%	549824	65,27%				
EURO 4	55342	9,40%	135862	16,13%				
EURO 5	67585	11,49%	43190	5,13%				
Year 2009								
Total	**533550**		**699706**				973527	
EURO 0	0	0,00%	31	0,00%			149064	15,31%
EURO 1	1031	0,19%	6046	0,86%			86091	8,84%
EURO 2	18379	3,44%	51974	7,43%			230058	23,63%
EURO 3	321548	60,27%	345073	49,32%			223991	23,01%
EURO 4	73074	13,70%	193309	27,63%			276019	28,35%
EURO 5	119518	22,40%	103273	14,76%			8304	0,85%
Year 2010								
Total	**587445**		**747996**					
EURO 0	0	0,00%	32	0,00%				
EURO 1	682	0,12%	3955	0,67%				
EURO 2	15022	2,56%	26347	4,49%				
EURO 3	236262	40,22%	294129	50,07%				
EURO 4	119353	20,32%	230887	39,30%				
EURO 5	216126	36,79%	192646	32,79%				

Ind. 2b - Data registrations - Nb of heavy duty vehicles registrations

	CSW	TICINO	TYROL	S-TYROL	VDA
Year 2000					
EURO 0	x				8398
EURO 1	x				9117
EURO 2	x				11677
EURO 3	x				0
EURO 4	x				0
EURO 5	x				0
Tot	**5418**			**1117**	**29192**
Year 2005					
EURO 0	1310		3627		5422
EURO 1	598		1533		2013
EURO 2	1527		641		2781
EURO 3	2668		1179		16950
EURO 4	75		X		1118
EURO 5	51		X		0
Tot	**6229**			**785**	**28284**
Year 2006					
EURO 0	988				5800
EURO 1	438				2121
EURO 2	1396				3041
EURO 3	2774				15803
EURO 4	208				4905
EURO 5	269				0
Tot	**6073**			**747**	**31670**
Year 2007					
EURO 0	870	1014			4172
EURO 1	385	361			2226
EURO 2	1237	557			4345
EURO 3	2734	772			11073
EURO 4	379	52			10739
EURO 5	707	55			28
Tot	**6312**				**32583**
Year 2008					
EURO 0	616				3914
EURO 1	281				2031
EURO 2	895				4159
EURO 3	2570				8361
EURO 4	488				16709
EURO 5	1229				92
Tot	**6079**				**35266**
Year 2009					
EURO 0					3691
EURO 1					1847
EURO 2					3890
EURO 3					6647
EURO 4					18912
EURO 5					170
Tot					**35157**
Year 2010					
EURO 0					
EURO 1					
EURO 2					
EURO 3					
EURO 4					
EURO 5					
Tot					

Ind. 2b - Data registrations - Nb of heavy duty vehicles registrations

	FR Isère	FR-Haute-Savoie	FR_Savoie	PIEDMONT	FRIULI VG
Year 2000					
EURO 0	X	X	X		
EURO 1	X	X	X		
EURO 2	X	X	X		
EURO 3	X	X	X		
EURO 4	X	X	X		
EURO 5	X	X	X		
Tot	**X**	**X**	**X**		
Year 2005					
EURO 0	X	X	X		851748
EURO 1	X	X	X		191033
EURO 2	X	X	X		575736
EURO 3	X	X	X		501036
EURO 4	X	X	X		0
EURO 5	X	X	X		0
Tot	**8145**	**6012**	**6509**		**2119553**
Year 2006					
EURO 0	X	X	X		16051
EURO 1	X	X	X		9584
EURO 2	X	X	X		20100
EURO 3	X	X	X		22883
EURO 4	X	X	X		2395
EURO 5	X	X	X		6
Tot	**8491**	**6221**	**6640**		**71019**
Year 2007					
EURO 0	X	X	X	11368	844144
EURO 1	X	X	X	2203	211819
EURO 2	X	X	X	4338	522003
EURO 3	X	X	X	4713	608980
EURO 4	X	X	X	748	97083
EURO 5	X	X	X	66	4555
Tot	**8761**	**6379**	**6915**	**23436**	**2288584**
Year 2008					
EURO 0	X	X	X	10663	
EURO 1	X	X	X	2115	
EURO 2	X	X	X	4230	
EURO 3	X	X	X	4723	
EURO 4	X	X	X	1585	
EURO 5	X	X	X	330	
Tot	**9167**	**6564**	**7109**	**23646**	
Year 2009					
EURO 0	X	X	X		
EURO 1	X	X	X		
EURO 2	X	X	X		
EURO 3	X	X	X		
EURO 4	X	X	X		
EURO 5	X	X	X		
Tot	**8667**	**6178**	**6525**		
Year 2010					
EURO 0	X	X	X		
EURO 1	X	X	X		
EURO 2	X	X	X		
EURO 3	X	X	X		
EURO 4	X	X	X		
EURO 5	X	X	X		
Tot	**8744**	**6250**	**6504**		

INDICATOR 4 – DETAILED DATA

2005 [tonn/km]	CARS				HDVs				TOTAL			
	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10
Fréjus												
Planaise	9,07	4,87	1333,38	0,63	0,94	7,21	787,12	0,23	10,01	12,08	2120,49	0,86
Aiton	no fluxes data											
Hermillon	no fluxes data											
SFTRF Tunnel	0,81	0,44	119,51	0,06	0,58	4,47	488,14	0,14	1,40	4,91	607,65	0,20
Salbertrand	3,57	1,92	524,65	0,25	0,94	7,24	790,73	0,23	4,51	9,16	1315,38	0,48
Avigliana	3,24	1,74	475,73	0,23	0,63	4,87	531,47	0,15	3,87	6,60	1007,20	0,38
M. Bianco												
Eloise	no fluxes data											
Entrebières	no fluxes data											
Bonneville	no fluxes data											
Cluses	no fluxes data											
Passy	no fluxes data											
ATMB Tunnel	1,43	0,77	210,92	0,10	0,44	3,15	367,63	0,10	1,88	3,92	578,56	0,20
Aosta-ovest	2,54	1,36	372,99	0,18	0,42	2,98	347,26	0,10	2,95	4,34	720,25	0,28
Aosta-est	6,92	3,72	1017,46	0,48	0,55	3,90	455,26	0,13	7,47	7,62	1472,72	0,61
Pont St. Martin	9,21	4,95	1354,45	0,64	0,60	4,26	497,56	0,14	9,81	9,21	1852,01	0,78
Gotthard												
Seelisbergtunnel (AB)	8,06	4,33	1184,64	0,56	0,74	5,29	597,10	0,18	8,80	9,61	1781,74	0,74
Gotthardtunnel	6,12	3,29	899,76	0,43	0,75	5,39	609,05	0,18	6,87	8,68	1508,81	0,61
Biasca S (AS)	11,03	5,92	1621,24	0,77	0,82	5,83	658,72	0,19	11,84	11,76	2279,96	0,96
Moleno	11,11	5,97	1632,96	0,78	0,76	5,42	611,91	0,18	11,86	11,38	2244,87	0,96
Camignolo	17,62	9,47	2590,41	1,23	0,83	5,92	668,17	0,20	18,45	15,38	3258,57	1,43
Brenner												
Kundl	16,44	8,83	2417,22	1,15	2,23	15,14	1937,89	0,52	18,67	23,97	4355,11	1,67
Vomp	19,69	10,58	2894,94	1,38	2,36	16,02	2050,51	0,55	22,05	26,59	4945,45	1,92
Matrei am Brenner	11,16	6,00	1640,99	0,78	1,75	11,89	1522,49	0,41	12,91	17,89	3163,47	1,19
Brennero-Vipiteno	7,38	3,96	1084,69	0,52	2,12	14,38	1840,56	0,49	9,50	18,34	2925,26	1,01
Bressanone-Chiusa	9,39	5,05	1381,11	0,66	2,51	17,04	2181,20	0,58	11,90	22,08	3562,32	1,24
Bznord-Bzsud	9,54	5,13	1402,82	0,67	2,58	17,51	2241,88	0,60	12,12	22,64	3644,70	1,26
Ora-Salorno	12,67	6,81	1862,51	0,88	3,05	20,73	2653,60	0,71	15,72	27,53	4516,11	1,59
Tarvisio												
Ugovizza	4,22	2,27	620,20	0,29	2,23	15,97	1365,22	0,55	6,45	18,24	1985,43	0,84
Pontebba	0,38	0,20	55,38	0,03	0,23	1,68	143,18	0,06	0,61	1,88	198,55	0,08
Carnia	3,41	1,83	500,89	0,24	0,54	3,84	328,43	0,13	3,94	5,67	829,33	0,37
Gemona	2,47	1,33	363,86	0,17	0,61	4,34	371,22	0,15	3,08	5,67	735,08	0,32

2006 [tonn/km]	CARS				HDVs				TOTAL			
	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10
Fréjus												
Planaise	9,31	5,00	1368,41	0,65	5,49	38,43	4539,20	1,29	14,79	43,43	5907,61	1,94
Aiton	no fluxes data											
Hermillon	no fluxes data											
SFTRF Tunnel	1,09	0,59	160,52	0,08	0,62	4,38	516,88	0,15	1,72	4,96	677,40	0,22
Salbertrand	3,57	1,92	524,65	0,25	0,96	6,73	794,95	0,23	4,53	8,65	1319,60	0,48
Avigliana	4,61	2,48	677,82	0,32	1,07	7,51	886,50	0,25	5,68	9,98	1564,31	0,57
M. Bianco												
Eloise	no fluxes data											
Entrebières	no fluxes data											
Bonneville	no fluxes data											
Cluses	no fluxes data											
Passy	no fluxes data											
ATMB Tunnel	1,49	0,80	218,45	0,10	0,46	3,07	381,96	0,11	1,95	3,87	600,41	0,21
Aosta-ovest	2,62	1,41	384,54	0,18	0,44	2,93	363,74	0,10	3,06	4,33	748,28	0,29
Aosta-est	7,02	3,77	1031,64	0,49	0,58	3,84	476,66	0,13	7,60	7,61	1508,30	0,62
Pont St. Martin	9,23	4,96	1356,54	0,64	0,62	4,13	513,02	0,14	9,85	9,09	1869,56	0,79
Gotthard												
Seelisbergtunnel (AB)	7,68	4,12	1128,65	0,54	0,66	4,48	550,32	0,15	8,34	8,61	1678,97	0,69
Gotthardtunnel	5,71	3,07	839,06	0,40	0,68	4,58	562,39	0,16	6,39	7,65	1401,45	0,56
Biasca S (AS)	10,68	5,74	1569,56	0,75	0,74	5,03	617,28	0,17	11,42	10,76	2186,84	0,92
Moleno	10,57	5,68	1553,94	0,74	0,68	4,60	564,09	0,16	11,25	10,27	2118,03	0,90
Camignolo	19,45	10,45	2860,12	1,36	0,88	5,94	729,13	0,21	20,33	16,39	3589,25	1,56
Brenner												
Kundl	17,04	9,16	2505,94	1,19	1,98	13,44	1720,97	0,46	19,03	22,60	4226,92	1,65
Vomp	20,13	10,81	2959,75	1,41	2,12	14,38	1840,56	0,49	22,25	25,19	4800,31	1,90
Matrei am Brenner	11,71	6,29	1722,17	0,82	1,61	10,94	1400,43	0,37	13,33	17,23	3122,59	1,19
Brennero-Vipiteno	7,51	4,03	1103,98	0,52	2,22	15,04	1925,16	0,51	9,72	19,07	3029,13	1,04
Bressanone-Chiusa	9,63	5,17	1415,25	0,67	2,60	17,64	2257,86	0,60	12,23	22,81	3673,11	1,27
Bznord-Bzsud	9,80	5,26	1440,50	0,68	2,67	18,12	2319,84	0,62	12,47	23,38	3760,35	1,30
Ora-Salorno	13,04	7,01	1917,45	0,91	3,15	21,38	2737,01	0,73	16,19	28,38	4654,46	1,64
Tarvisio												
Ugovizza	4,32	2,32	634,69	0,30	2,33	16,72	1428,70	0,57	6,65	19,04	2063,39	0,87
Pontebba	0,38	0,21	56,39	0,03	0,24	1,72	147,41	0,06	0,62	1,93	203,80	0,09
Carnia	3,49	1,88	513,76	0,24	0,54	3,90	332,90	0,13	4,04	5,77	846,66	0,38
Gemona	2,57	1,38	377,40	0,18	0,63	4,48	382,74	0,15	3,19	5,86	760,15	0,33

2007 [tonn/km]	CARS				HDVs				TOTAL			
	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10
Fréjus												
Planaise	9,63	5,18	1416,38	0,67	1,03	6,98	857,51	0,24	10,66	12,15	2273,89	0,91
Aiton	no fluxes data											
Hermillon	no fluxes data											
SFTRF Tunnel	1,13	0,60	165,52	0,08	0,64	4,38	537,84	0,15	1,77	4,98	703,37	0,23
Salbertrand	3,46	1,86	508,08	0,24	0,95	6,45	792,62	0,22	4,40	8,30	1300,69	0,46
Avigliana	4,65	2,50	683,31	0,32	1,07	7,28	895,50	0,25	5,72	9,78	1578,82	0,57
M. Bianco												
Eloise	7,75	4,16	1139,62	0,54	0,87	5,68	732,31	0,20	8,62	9,85	1871,93	0,74
Entrebières	17,49	9,40	2571,83	1,22	0,72	4,70	605,84	0,17	18,21	14,10	3177,67	1,39
Bonneville	11,30	6,07	1661,87	0,79	0,68	4,48	576,86	0,16	11,99	10,55	2238,73	0,95
Cluses	6,83	3,67	1004,68	0,48	0,54	3,55	457,13	0,13	7,38	7,22	1461,81	0,60
Passy	4,52	2,43	664,67	0,32	0,51	3,33	429,28	0,12	5,03	5,76	1093,94	0,43
ATMB Tunnel	1,47	0,79	215,65	0,10	0,44	2,89	372,58	0,10	1,91	3,68	588,23	0,20
Aosta-ovest	2,63	1,41	386,37	0,18	0,42	2,76	355,17	0,10	3,05	4,17	741,54	0,28
Aosta-est	6,97	3,74	1024,28	0,49	0,55	3,60	463,98	0,13	7,52	7,34	1488,26	0,61
Pont St. Martin	9,25	4,97	1360,30	0,65	0,60	3,92	504,82	0,14	9,85	8,89	1865,13	0,78
Gotthard												
Seelisbergtunnel (AB)	8,17	4,39	1200,69	0,57	0,71	4,59	625,37	0,16	8,88	8,98	1826,06	0,73
Gotthardtunnel	6,33	3,40	930,03	0,44	0,72	4,66	635,08	0,17	7,05	8,06	1565,11	0,61
Biasca S (AS)	11,37	6,11	1672,12	0,79	0,79	5,08	692,05	0,18	12,16	11,19	2364,17	0,97
Moleno	11,44	6,15	1682,28	0,80	0,72	4,68	636,95	0,17	12,17	10,82	2319,23	0,97
Camignolo	20,55	11,04	3021,99	1,44	0,91	5,89	801,65	0,21	21,47	16,93	3823,64	1,64
Brenner												
Kundl	17,23	9,25	2532,76	1,20	2,07	14,05	1798,97	0,48	19,30	23,31	4331,73	1,68
Vomp	20,26	10,88	2978,41	1,42	2,19	14,85	1901,70	0,51	22,45	25,74	4880,11	1,92
Matrei am Brenner	no fluxes data											
Brennero-Vipiteno	7,74	4,16	1138,35	0,54	2,33	15,78	2020,65	0,54	10,07	19,94	3159,00	1,08
Bressanone-Chiusa	9,68	5,20	1422,49	0,68	2,68	18,15	2324,32	0,62	12,35	23,35	3746,81	1,30
Bznord-Bzsud	9,98	5,36	1466,82	0,70	2,77	18,83	2410,38	0,64	12,75	24,19	3877,19	1,34
Ora-Salorno	13,33	7,16	1959,15	0,93	3,24	21,98	2813,65	0,75	16,56	29,14	4772,80	1,68
Tarvisio												
Ugovizza	4,46	2,40	656,04	0,31	2,33	16,53	1471,34	0,57	6,80	18,92	2127,38	0,88
Pontebba	0,38	0,21	56,32	0,03	0,23	1,60	142,58	0,06	0,61	1,81	198,90	0,08
Carnia	3,62	1,95	532,49	0,25	0,56	3,96	352,94	0,14	4,18	5,91	885,43	0,39
Gemona	2,66	1,43	391,55	0,19	0,64	4,55	405,24	0,16	3,31	5,98	796,79	0,34

2008 [tonn/km]	CARS				HDVs				TOTAL			
	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10
Fréjus												
Planaise	9,95	5,35	1463,40	0,70	0,87	5,81	780,04	0,20	10,82	11,15	2243,44	0,90
Aiton	no fluxes data											
Hermillon	no fluxes data											
SFTRF Tunnel	1,11	0,60	163,29	0,08	0,57	3,78	507,54	0,13	1,68	4,38	670,82	0,21
Salbertrand	3,52	1,89	517,20	0,25	0,84	5,60	752,76	0,19	4,36	7,49	1269,96	0,44
Avigliana	4,72	2,53	693,73	0,33	0,95	6,34	851,41	0,22	5,67	8,87	1545,14	0,55
M. Bianco												
Eloise	7,60	4,08	1117,80	0,53	0,81	5,06	717,08	0,18	8,41	9,15	1834,88	0,71
Entrebières	16,82	9,03	2472,66	1,17	0,69	4,32	611,58	0,16	17,51	13,35	3084,25	1,33
Bonneville	11,44	6,14	1681,41	0,80	0,65	4,06	575,74	0,15	12,08	10,21	2257,15	0,95
Cluses	6,80	3,65	999,36	0,47	0,52	3,24	458,52	0,12	7,31	6,89	1457,88	0,59
Passy	4,41	2,37	648,23	0,31	0,47	2,96	419,07	0,11	4,88	5,33	1067,30	0,42
ATMB Tunnel	1,49	0,80	219,14	0,10	0,42	2,63	373,10	0,10	1,91	3,43	592,24	0,20
Aosta-ovest	2,63	1,41	386,23	0,18	0,40	2,53	358,48	0,09	3,03	3,94	744,71	0,28
Aosta-est	6,86	3,69	1008,58	0,48	0,53	3,31	468,24	0,12	7,39	6,99	1476,82	0,60
Pont St. Martin	8,95	4,81	1316,36	0,63	0,57	3,55	502,85	0,13	9,52	8,36	1819,20	0,75
Gotthard												
Seelisbergtunnel (AB)	8,17	4,39	1201,30	0,57	0,64	3,94	618,95	0,14	8,82	8,33	1820,25	0,72
Gotthardtunnel	6,32	3,40	929,31	0,44	0,67	4,08	641,73	0,15	6,99	7,48	1571,04	0,59
Biasca S (AS)	11,30	6,07	1661,11	0,79	0,75	4,58	720,23	0,17	12,05	10,65	2381,34	0,96
Moleno	11,39	6,12	1674,60	0,80	0,68	4,15	652,28	0,15	12,07	10,27	2326,88	0,95
Camignolo	20,42	10,97	3001,65	1,43	0,83	5,09	799,67	0,19	21,25	16,06	3801,31	1,61
Brenner												
Kundl	17,19	9,23	2526,63	1,20	1,69	9,62	1777,42	0,37	18,87	18,85	4304,05	1,57
Vomp	20,26	10,88	2978,41	1,42	1,83	10,41	1923,38	0,40	22,09	21,29	4901,79	1,82
Matrei am Brenner	11,54	6,20	1696,84	0,81	1,30	7,40	1368,42	0,28	12,84	13,60	3065,25	1,09
Brennero-Vipiteno	7,63	4,10	1121,63	0,53	1,89	10,76	1988,84	0,41	9,52	14,86	3110,47	0,95
Bressanone-Chiusa	9,54	5,13	1402,88	0,67	2,18	12,41	2294,15	0,48	11,72	17,54	3697,03	1,14
Bznord-Bzsud	9,82	5,27	1443,55	0,69	2,27	12,91	2385,23	0,50	12,09	18,18	3828,77	1,18
Ora-Salorno	12,99	6,98	1910,18	0,91	2,63	14,97	2767,58	0,58	15,62	21,95	4677,76	1,48
Tarvisio												
Ugovizza	4,32	2,32	635,29	0,30	2,00	14,16	1260,74	0,49	6,32	16,48	1896,04	0,79
Pontebba	0,35	0,19	52,14	0,02	0,21	1,48	131,33	0,05	0,56	1,67	183,47	0,08
Carnia	3,46	1,86	508,71	0,24	0,56	3,99	355,05	0,14	4,02	5,85	863,76	0,38
Gemona	2,57	1,38	377,61	0,18	0,60	4,25	378,27	0,15	3,17	5,63	755,88	0,33

2009 [tonn/km]	CARS				HDVs				TOTAL			
	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10
Fréjus												
Planaise	10,38	5,57	1525,72	0,72	0,73	4,70	717,25	0,16	11,11	10,27	2242,97	0,89
Aiton	no fluxes data											
Hermillon	no fluxes data											
SFTRF Tunnel	1,06	0,57	156,17	0,07	0,44	2,85	434,43	0,10	1,51	3,42	590,61	0,17
Salbertrand	3,51	1,88	515,84	0,25	0,66	4,26	650,10	0,15	4,17	6,14	1165,94	0,39
Avigliana	4,68	2,51	687,81	0,33	0,74	4,76	727,15	0,17	5,42	7,28	1414,96	0,49
M. Bianco												
Eloise	7,81	4,20	1148,79	0,55	0,68	4,12	643,41	0,15	8,49	8,32	1792,20	0,70
Entrebières	17,68	9,50	2598,78	1,23	0,58	3,53	551,37	0,13	18,26	13,02	3150,14	1,36
Bonneville	11,64	6,26	1711,93	0,81	0,54	3,28	512,69	0,12	12,18	9,54	2224,62	0,93
Cluses	6,91	3,71	1016,13	0,48	0,43	2,63	410,47	0,10	7,34	6,34	1426,61	0,58
Passy	4,93	2,65	724,63	0,34	0,40	2,45	383,11	0,09	5,33	5,10	1107,73	0,43
ATMB Tunnel	1,51	0,81	221,30	0,11	0,35	2,12	330,59	0,08	1,85	2,92	551,89	0,18
Aosta-ovest	2,68	1,44	394,58	0,19	0,34	2,06	321,15	0,08	3,02	3,50	715,73	0,26
Aosta-est	6,94	3,73	1020,12	0,48	0,44	2,67	416,88	0,10	7,38	6,40	1437,00	0,58
Pont St. Martin	9,13	4,91	1343,02	0,64	0,48	2,90	453,16	0,11	9,61	7,81	1796,18	0,74
Gotthard												
Seelisbergtunnel (AB)	8,30	4,46	1220,60	0,58	0,53	3,07	554,71	0,12	8,84	7,53	1775,32	0,70
Gotthardtunnel	6,51	3,50	957,45	0,45	0,57	3,30	596,11	0,13	7,09	6,79	1553,57	0,58
Biasca S (AS)	11,73	6,30	1725,16	0,82	0,65	3,73	674,50	0,14	12,38	10,03	2399,66	0,96
Moleno	11,91	6,40	1751,59	0,83	0,00	0,00	0,00	0,00	11,91	6,40	1751,59	0,83
Camignolo	21,11	11,34	3104,10	1,47	0,60	3,43	621,05	0,13	21,71	14,78	3725,15	1,61
Brenner												
Kundl	11,81	6,34	1736,11	0,82	1,08	6,14	1134,25	0,24	12,89	12,48	2870,36	1,06
Vomp	20,99	11,28	3086,74	1,47	1,43	8,15	1506,42	0,31	22,43	19,43	4593,16	1,78
Matrei am Brenner	17,72	9,52	2605,04	1,24	1,40	7,94	1468,00	0,31	19,11	17,46	4073,04	1,54
Brennero-Vipiteno	7,99	4,29	1174,43	0,56	1,67	9,52	1759,35	0,37	9,66	13,81	2933,79	0,92
Bressanone-Chiusa	9,87	5,30	1451,22	0,69	1,97	11,20	2070,68	0,43	11,84	16,51	3521,89	1,12
Bznord-Bzsud	10,21	5,49	1501,84	0,71	2,05	11,65	2152,30	0,45	12,26	17,13	3654,14	1,16
Ora-Salorno	13,45	7,22	1976,86	0,94	2,39	13,63	2518,42	0,52	15,84	20,85	4495,28	1,46
Tarvisio												
Ugovizza	4,15	2,23	610,50	0,29	1,20	8,71	960,25	0,29	5,36	10,94	1570,75	0,58
Pontebba	0,35	0,19	51,61	0,02	0,13	0,94	103,69	0,03	0,48	1,13	155,30	0,06
Carnia	3,56	1,91	523,60	0,25	0,39	2,81	310,16	0,09	3,95	4,73	833,76	0,34
Gemona	2,64	1,42	387,98	0,18	0,40	2,86	314,97	0,10	3,03	4,27	702,95	0,28

2010 [tonn/km]	CARS				HDVs				TOTAL			
	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10	CO	Nox	CO2	PM10
Fréjus												
Planaise	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Aiton	no fluxes data											
Hermillon	no fluxes data											
SFTRF Tunnel	1,12	0,60	164,99	0,08	0,48	3,05	465,16	0,11	1,60	3,65	630,15	0,18
Salbertrand	3,45	1,86	507,87	0,24	0,69	4,42	675,07	0,15	4,14	6,28	1182,94	0,40
Avigliana	4,68	2,51	688,27	0,33	0,77	4,94	753,57	0,17	5,45	7,45	1441,83	0,50
M. Bianco												
Eloise	7,91	4,25	1162,73	0,55	0,66	3,81	686,98	0,14	8,57	8,06	1849,71	0,70
Entrebières	18,33	9,85	2695,25	1,28	0,58	3,35	604,08	0,13	18,91	13,20	3299,34	1,41
Bonneville	12,29	6,60	1806,78	0,86	0,55	3,18	572,97	0,12	12,84	9,78	2379,76	0,98
Cluses	7,07	3,80	1039,98	0,49	0,42	2,45	441,94	0,09	7,50	6,25	1481,92	0,59
Passy	6,18	3,32	908,68	0,43	0,41	2,38	428,99	0,09	6,59	5,70	1337,67	0,52
ATMB Tunnel	1,53	0,82	224,73	0,11	0,35	2,03	365,50	0,08	1,88	2,85	590,23	0,18
Aosta-ovest	2,67	1,44	393,26	0,19	0,34	1,94	350,71	0,07	3,01	3,38	743,98	0,26
Aosta-est	5,36	2,88	788,00	0,37	0,26	1,52	274,15	0,06	5,62	4,40	1062,15	0,43
Pont St. Martin	9,01	4,84	1324,48	0,63	0,47	2,71	488,94	0,10	9,48	7,55	1813,42	0,73
Gotthard												
Seelisbergtunnel (AB)	no fluxes data											
Gotthardtunnel	6,57	3,53	965,68	0,46	0,58	3,17	628,06	0,12	7,15	6,70	1593,74	0,58
Biasca S (AS)	11,88	6,38	1746,29	0,83	0,65	3,58	709,59	0,14	12,53	9,96	2455,89	0,97
Moleno	11,95	6,42	1756,67	0,83	0,65	3,54	701,88	0,14	12,59	9,96	2458,56	0,97
Camignolo	21,25	11,42	3124,99	1,48	0,83	4,58	906,75	0,18	22,09	15,99	4031,74	1,66
Brenner												
Kundl	17,63	9,47	2592,65	1,23	1,74	9,89	1827,89	0,38	19,37	19,36	4420,54	1,61
Vomp	21,13	11,35	3106,48	1,48	1,70	9,66	1785,60	0,37	22,83	21,01	4892,08	1,85
Matrei am Brenner	no fluxes data											
Brennero-Vipiteno	8,12	4,36	1193,74	0,57	1,75	9,97	1842,66	0,38	9,87	14,33	3036,40	0,95
Bressanone-Chiusa	10,04	5,39	1475,84	0,70	2,05	11,69	2159,58	0,45	12,09	17,08	3635,43	1,15
Bznord-Bzsud	10,35	5,56	1521,23	0,72	2,13	12,14	2243,13	0,47	12,48	17,70	3764,37	1,19
Ora-Salorno	13,46	7,23	1979,29	0,94	2,48	14,13	2610,98	0,54	15,94	21,36	4590,27	1,48
Tarvisio												
Ugovizza	3,77	2,03	554,77	0,26	1,24	8,96	988,65	0,30	5,01	10,99	1543,42	0,56
Pontebba	0,32	0,17	47,40	0,02	0,13	0,96	105,34	0,03	0,45	1,13	152,74	0,05
Carnia	3,49	1,88	513,16	0,24	0,40	2,91	320,40	0,10	3,89	4,78	833,56	0,34
Gemona	2,55	1,37	375,38	0,18	0,40	2,91	321,06	0,10	2,96	4,28	696,45	0,28

INDICATOR 5 – DETAILED DATA

NO_2 hourly average

NAME	PP	STATION	SITE	2000	2005	2006	2007	2008	2009	2010
REIDEN	CSC	T	S	x	33	34	32	34	34	34
ERSTFELD	CSC	T	R	x	40	38	35	33	34	32
ALTDORF	CSC	T	R	30	28	27	26	26	25	24
BIOGGIO	TICINO		S	36	39	37	36	36	37	35
BODIO	TICINO		S	37	40	31	30	31	29	30
CHIASSO	TICINO		U	52	53	48	45	42	40	41
MOLENO	TICINO		S	x	50	45	46	46	46	49
VOMP	TIROLO	T	R	60	74	76	65	66	63	67
MUTTERS	TIROLO	T	R	41	53	53	51	49	50	50
BRESSANONE	SUD TIRO	T	U	31	35	32	32	30	29	28
VIPITENO	SUD TIRO	B	S	34	35	37	34	32	32	34
BOLZANO	SUD TIRO	T	U	51	43	48	43	42	41	x
ORA	SUD TIRO	T	S	x	x	x	51	47	49	45
VELTURNO	SUD TIRO	T	S	x	66	73	69	66	67	67
PLOUVES	VDA	T	U	42	39	38	29	36	34	31
LA THUILE	VDA	B	R	9	7	3	2	3	4	4
CHATILLON	VDA	T	S	x	x	x	x	x	x	
ENTREVES	VDA	T	S	x	43	42	42	41	36	38
SUSA	PIEMONTE	T	S	x	25	29	24	21	22	24
CHAMBERY LE HAUT	FRA	B	S	31	25	22	23	24	24	23
ST JEAN MAURIENNE	FRA	B	S	27	19	19	19	16	16	15
CHAMONIX BOSSONS	FRA	T	R	X	48	42	40	33	40	49
CHAMONIX M.BLANC	FRA	B	U	34	33	33	32	31	31	29
PASSY	FRA	B	U	X	X	X	23	22	26	34
ANNEMASSE	FRA	B	U	30	25	26	26	24	25	25
GAILLARD	FRA	B	U	32	24	25	25	25	24	25
ST. JULIEN MONTDENIS	FRA	T	S	X	28	26	25	22	22	33
CHAMBERY PASTEUR	FRA	B	U	33	28	28	31	28	27	27
OSOPPO	ITA	S	T		18	20	23	24	19	18
TOLMEZZO	ITA	I	U		19	20	17	18	21	20

Number of days per year with a NO2 concentration daily average of more than 80 µg/m³

NAME	PP	STATION	SITE	2000	2005	2006	2007	2008	2009	2010
REIDEN	CSC	T	S	x	4	0	0	1	1	1
ERSTFELD	CSC	T	R	x	x	x	x	0	2	1
ALTDORF	CSC	T	R	0	0	0	0	0	0	1
BIOGGIO	TICINO		S	2	2	8	3	3	2	2
BODIO	TICINO		S	2	15	0	0	0	0	1
CHIASSO	TICINO		U	50	56	29	9	6	9	6
MOLENO	TICINO		S	x	24	13	9	21	3	15
VOMP	TIROLO	T	R	43	116	115	68	74	67	79
MUTTERS	TIROLO	T	R	0	23	17	1	1	5	4
BRESSANONE (BX1)	SUD TIRO	T	U	1	2	0	0	0	0	0
VIPITENO (ST1)	SUD TIRO	B	S	5	5	15	3	5	7	3
BOLZANO 5	SUD TIRO	T	U	5	9	12	4	3	6	x
ORA	SUD TIRO	T	S	x	x	x	25	15	63	65
VELTURNO	SUD TIRO	T	S	x	69	118	77	55	23	5
PLOUVES	VDA	T	U	20	33	22	1	17	17	5
LA THUILE	VDA	B	R	0	0	0	0	0	0	0
CHATILLON	VDA	T	S	x	x	x	x	x	x	
ENTREVES	VDA	T	S	x	12	0	2	4	1	11
SUSA	PIEMONTE	T	S	x	0	0	1	0	0	2
CHAMBERY LE HAUT	FRA	B	S	2	0	0	0	0	4	0
ST JEAN MAURIENNE	FRA	B	S	0	0	0	0	0	0	0
CHAMONIX BOSSONS	FRA	T	R	X	14	26	9	6	11	29
CHAMONIX M.BLANC	FRA	B	U	3	20	17	12	12	11	2
PASSY	FRA	B	U	X	X	X	0	1	5	2
ANNEMASSE	FRA	B	U	0	0	0	0	0	0	1
GAILLARD	FRA	B	U	2	0	2	0	0	0	1
ST. JULIEN MONTDENIS	FRA	T	S	X	2	0	0	0	0	0
CHAMBERY PASTEUR	FRA	B	U	2	0	0	0	0	0	1
OSOPPO	ITA	S	T		0	0	0	0	0	0
TOLMEZZO	ITA	I	U		0	0	0	0	0	0

Number of hours with a NO2 concentration of more than 200 µg/m³ as hourly average

NAME	PP	STATION	SITE	2000	2005	2006	2007	2008	2009	2010
REIDEN	CSC	T	S	x	0	0	0	0	0	0
ERSTFELD	CSC	T	R	x	x	x	x	0	0	0
ALTDORF	CSC	T	R	0	0	0	0	0	0	0
BIOGGIO	TICINO		S	0	0	0	0	0	0	0
BODIO	TICINO		S	0	0	0	0	0	0	0
CHIASSO	TICINO		U	30	0	12	0	0	0	0
MOLENO	TICINO		S	x	0	0	1	0	0	0
VOMP	TIROLO	T	R	0	8	79	0	0	5	6
MUTTERS	TIROLO	T	R	0	0	0	0	0	0	0
BRESSANONE (BX1)	SUD TIRO	T	U	0	0	0	0	0	0	0
VIPITENO (ST1)	SUD TIRO	B	S	2	0	0	0	0	0	0
BOLZANO 5	SUD TIRO	T	U	0	0	0	0	0	0	0
ORA	SUD TIRO	T	S	x	0	9	0	0	0	0
VELTURNO	SUD TIRO	T	S	x	0	2	0	1	0	0
PLOUVES	VDA	T	U	23	42	5	0	54	48	0
LA THUILE	VDA	B	R	0	0	0	0	0	0	0
CHATILLON	VDA	T	S	x	x	x	x	x	x	
ENTREVES	VDA	T	S	x	12	0	0	1	0	0
SUSA	PIEMONTE	T	S	x	0	0	0	0	0	0
CHAMBERY LE HAUT	FRA	B	S	0	0	0	0	0	0	0
ST JEAN MAURIENNE	FRA	B	S	0	0	0	0	0	0	0
CHAMONIX BOSSONS	FRA	T	R	X	0	0	0	0	0	0
CHAMONIX M.BLANC	FRA	B	U	0	0	3	8	0	0	0
PASSY	FRA	B	U	X	X	X	0	0	0	0
ANNEMASSE	FRA	B	U	0	0	0	0	0	0	0
GAILLARD	FRA	B	U	0	0	0	0	0	0	0
ST. JULIEN MONTDENIS	FRA	T	S	X	0	0	0	0	0	0
CHAMBERY PASTEUR	FRA	B	U	0	0	0	0	0	0	0
OSOPPO	ITA	S	T		0	0	0	0	0	0
TOLMEZZO	ITA	I	U		0	0	0	0	0	0

PM10 daily average

NAME	PP	STATION	SITE	INSTRUM.	2000	2005	2006	2007	2008	2009	2010
REIDEN	CSC	T	S	G	x	25	24	21	22	23	22
ERSTFELD	CSC	T	R	G	x	24	26	21	17	19	20
ALTDORF	CSC	T	R	G	x	20	20	18	17	18	18
BIOGGIO	TICINO		S	ND	x	36	36	35	31	29	28
BODIO	TICINO		S	ND	28	31	31	26	23	23	24
CHIASSO	TICINO		U	ND	33	46	46	40	35	34	32
MOLENO	TICINO		S	ND	x	28	29	25	24	22	23
VOMP	TIROLO	T	R	ND	x	32	33	27	23	23	24
MUTTERS	TIROLO	T	R	ND	x	24	23	23	22	22	22
BRESSANONE	SUD TIROLO	T	U	B	x	27	23	19	18	18	17
VIPITENO	SUD TIROLO	B	S	B	x	21	22	16	16	18	17
BOLZANO	SUD TIROLO	T	U	B	x	30	26	20	21	20	x
ORA	SUD TIROLO	T	S	B	x	x	29	21	21	21	20
VELTURNO	SUD TIROLO	T	S	B	x	x	29	24	23	24	22
PLOUVES	VDA	T	U	M	40	33	33	25	25	25	24
ENTREVES	VDA	T	S	M	x	25	21	20	18	19	22
SUSA	PIEMONTE	T	S	G	x	29	30	22	25	21	21
CHAMBERY LE HAUT	FRA	B	S	M	19	29	28	25	25	27	21
ST JEAN MAURIENNE	FRA	B	S	M	20	25	25	24	23	27	20
CHAMONIX BOSSONS	FRA	T	R	M	X	X	X	27	21	25	21
CHAMONIX M.BLANC	FRA	B	U	M	25	32	29	29	25	26	25
PASSY	FRA	B	U	M	X	X	X	31	29	31	27
GAILLARD	FRA	B	U	M	21	25	26	24	24	27	27
ST. JULIEN MONTDEN	FRA	T	S	M	X	31	32	28	27	29	23
CHAMBERY PASTEUR	FRA	B	U	M	22	27	27	24	26	26	22
OSOPPO	ITA	T	S	B		18	22	26	27	22	22

Number of days with a PM10 concentration of more than 50 µg/m³ as daily average

NAME	PP	STATION	SITE	INSTRUM.	2000	2005	2006	2007	2008	2009	2010
REIDEN	CSC	T	S	G	x	24	34	7	15	17	21
ERSTFELD	CSC	T	R	G	x	8	37	7	3	6	12
ALTDORF	TICINO		S	ND	6	3	21	4	9	7	
BIOGGIO	TICINO		S	ND	x	84	73	79	42	43	33
BODIO	TICINO		U	ND	25	48	39	23	13	3	10
CHIASSO	TICINO		S	ND	63	139	112	97	63	69	54
MOLENO	TIROLO	T	R	ND	x	52	50	27	30	15	22
VOMP (A)	TIROLO	T	R	ND	x	40	55	13	4	13	22
MUTTERS (A)	TIROLO	T	R	ND	x	10	8	6	7	10	14
BRESSANONE (I)	SUD TIROLO	T	U	B	x	34	22	2	8	3	3
VIPITENO (I)	SUD TIROLO	B	S	B	x	22	26	8	4	7	10
BOLZANO (I)	SUD TIROLO	T	U	B	x	38	33	9	16	7	x
ORA (I)	SUD TIROLO	T	S	B	x	x	34	5	18	6	10
VELTURNO (I)	SUD TIROLO	T	S	B	x	x	38	10	14	5	11
PLOUVES (I)	VDA	T	U	M	82	54	48	14	15	9	13
ENTREVES (I)	VDA	T	S	M	x	12	7	12	11	7	20
SUSA (I)	PIEMONTE	T	S	G	x	43	40	27	39	16	21
CHAMBERY LE HAUT	FRA	B	S	M	32	31	36	33	26	30	12
ST JEAN MAURIENNE	FRA	B	S	M	14	7	15	16	9	12	5
CHAMONIX BOSSONS	FRA	T	R	M	X	X	X	28	19	11	8
CHAMONIX M.BLANC	FRA	B	U	M	57	38	40	43	28	30	24
PASSY	FRA	B	U	M	X	X	X	54	51	39	52
GAILLARD	FRA	B	U	M	52	10	33	38	28	30	22
ST. JULIEN MONTDEN	FRA	T	S	M	X	30	46	22	19	20	11
CHAMBERY PASTEUR	FRA	B	U	M	53	21	36	36	31	31	19
OSOPPO	ITA	T	S	B		3	13	24	22	9	27

PM2,5 daily average

NAME	PP	STATION	SITE	INSTRUM.	2000	2005	2006	2007	2008	2009	2010
REIDEN	CSC	T	S	G	x	x	x	x	x	x	x
ERSTFELD	CSC	T	R	G	x	x	x	x	x	x	x
ALTDORF	CSC	T	R	G	x	x	x	x	x	x	x
BIOGGIO	TICINO		S	ND	x	36	x	x	x	x	x
BODIO	TICINO		S	ND	x	x	x	x	x	x	x
CHIASSO	TICINO		U	ND	33	46	x	x	x	x	x
MOLENO	TICINO		S	ND	x	x	x	x	x	x	x
VOMP	TIROLO	T	R	ND	na	na	na	na	na	na	na
MUTTERS	TIROLO	T	R	ND	na	na	na	na	na	na	na
BRESSANONE	SUD TIROLO	T	U	B	x	x	x	x	x	x	x
VIPITENO	SUD TIROLO	B	S	B	x	x	x	x	x	x	x
BOLZANO	SUD TIROLO	T	U	B	x	x	19	16	16	16	x
ORA	SUD TIROLO	T	S	B	x	x	x	17	15	16	16
VELTURNO	SUD TIROLO	T	S	B	x	x	17	15	14	16	16
PLOUVES	VDA	T	U	M	x	x	19	17	17	15	15
ENTREVES	VDA	T	S	M	x	x	x	x	x	x	x
SUSA	PIEMONTE	T	S	G	x	x	x	x	x	x	x
CHAMBERY LE HAUT	FRA	B	S	M	X	X	13	12	X	X	X
ST JEAN MAURIENNE	FRA	B	S	M	X	X	X	X	X	X	X
CHAMONIX BOSSONS	FRA	T	R	M	X	X	X	X	X	X	X
CHAMONIX M.BLANC	FRA	B	U	M	X	X	X	X	X	X	X
PASSY	FRA	B	U	M	X	X	X	X	X	X	X
GAILLARD	FRA	B	U	M	X	X	X	X	X	X	15
ST. JULIEN MONTDEN	FRA	T	S	M	X	X	X	X	X	X	X
CHAMBERY PASTEUR	FRA	B	U	M	X	X	13	13	X	21	17
OSOPPO	ITA	T	S	B		X	X	X	X	X	X