

### 3. AMBIENT IMPACTS AND IMPLICATIONS

#### Introduction

A lot of people believe that building something, which allows decreasing the freight traffic on the motorway corresponds to a reduction of the pollution. This is a very questionable statement as in reality the matter is complex, trucks and vehicles pollute because of their number but also because the engines, specially those built outside Europe, do not fulfil regulation for combustion, gas and particulate emissions.

|                         | CO    | NOx   | HC   | Particolato |
|-------------------------|-------|-------|------|-------------|
| Euro 0                  | 11,20 | 14,40 | 2,40 | 0,60        |
| Euro 1                  | 4,50  | 8,00  | 1,10 | 0,36        |
| Euro 2                  | 4,00  | 7,00  | 1,10 | 0,15        |
| Euro 3                  | 2,10  | 5,00  | 0,66 | 0,10        |
| Euro 4                  | 1,50  | 3,50  | 0,46 | 0,02        |
| Euro 5                  | 1,50  | 2,00  | 0,46 | 0,02        |
| Δ% (da Euro 0 a Euro 5) | -87%  | -86%  | -81% | -97%        |

Tab 3-1 – Truck Emissions versus engine energy [g/kWh]

Too often vehicles spreading suffocating gases and particles, circulates on our highways, some of them are coming from the European east, but in many case they are simply old and out of maintenance. Forbidding the transit of such trucks to some of the alpine passes does not correspond to a solution as if they are allowed to enter into a state then some place has to let them go out. The local block of access to polluting vehicles does not resolves the problem of the pollution, simply transfers it elsewhere.

Tab 3-1, defining the emission of truck engines as function of the European regulation, allows to simply compute that 7 trucks of Euro 5 class give the same quantity of polluting elements than 1 class 0 truck. Obviously this is not an excuse to allow any quantity of traffic because the regulation takes care of pollution. It is a disillusion means for whoever promise or believes that with the implementation of mastodontic projects as the AV/AC, the pollution can be drastically reduced because of the significant (30-50%) freight traffic reduction, which by the way for the Turin-Lyon will be only 0.8%, so the pollution reduction will be negligible. In a 10 years period most of the circulating trucks will be renewed and a pollution reduction obtained anyhow.

The ferroutage is as well a local, not very efficient compromise, because a train of 1185t, absorbing 11MW is needed for transporting 18 trucks with a total of 288t of freight. The efficiency is 25% against a 53% by road.

To correctly compare the environment pollution in the case of railway and road transportation a complex thermo-energetic analysis has to be performed. Such analysis, performed by the University of Siena for the Milan-Naples TAV line starts as follows:

*The TAV has environmental impacts comparable to the individual transportation in car and absolutely superior to the freight transportation by road. The **emission impact is not better** and the **quality of the ambient is worse because of the presence of the infrastructure**.....Even the comparison between global level emissions are not comfortable: With respect to cars, the TAV emits more SO<sub>x</sub> (Sulphur oxides), more particulate and comparable quantity of CO<sub>2</sub> (Carbon dioxide)*

*The above is because the energy is not just needed for moving trains (up to 8.8 MW for each ETR and up to 9.6 MW for the France TGV) but also for supplying the entire infrastructure, for the safety equipments, services, illumination, ventilation and so on including the energy lost in the iron rails and aerial copper wires. Particles, gases, and oxides are released where the energy is produced, including radioactive waste whenever the energy is produced by thermo-nuclear power plants.*

*The advantage of the train to concentrate the pollution at the power plants, so in principle in a more controllable way, is acknowledged but in addition there is all pollutions generated during the infrastructure construction as, particles, powders, chemical elements, gases, liquids and so on, for 10-15 years.*

**Cleaner transportation means are necessary for the future, however this will not be sufficient without adoption of a suitable policy for containing the transportation increase, avoiding mastodontic and economically unmanageable infrastructure, just because the industry found more profitable buying materials and freight elsewhere instead of procuring or producing them locally.**

An example comes from Stefanie Böge of the German institute Wuppertal, who has conducted and documented a study concerning a strawberry yoghurt produced entirely in Germany, considering all its constituents, the plastic can, the aluminium foil of the cover, inks...and of course milk and strawberries. The result is that the components are travelling by 9,115 Km and 4g of gasoline are necessary for transporting all components of 150g yoghurt pot and the pot itself till the shops. About 40 g of gasoline for a 1Kg yoghurt and package.

*Many other examples can be found along such industrial policy of increasing revenues by finding always the lowest price of the products and raw materials, regardless the distance, increasing energy needs and creating as a consequence the need of huge transportation infrastructures, paid by the entire population. Also Marco Polo project, launched by the UE for sponsoring ideas and implementation of transportation methods alternate to road transportation, has a positive appearance but it does not contribute to decrease the future energy demand. Incentives should be given to who produces everything locally or at least to the best extent, minimising energy request, transportations and pollution.*

### 3.1. *Is there asbestos or not ?*

- The asbestos, in the Lanzo and Susa Valleys is present in form of Serpentinized Peridotite (commonly called Serpentine) and in Tremolite, white or grey minerals of the amphibole group, that is a silicate of calcium and magnesium, in form of friable or compact matrix, generally as filling of cracks.
- The presence of such ores, in Susa Valley and the side valleys of Lanzo and Chisone, is traced in the Italian Mineralogical Maps. The Asbestos quarries are well visible and the Balangero one was the most productive in Europe, located in the same mountain group of the Mont Musinè, subjected to the Gravio- Musinè tunnel.
- The documentation of Italferr preliminary design, estimates about 1,15 million cubic meters of serpentine in the sole Gravio-Musinè tunnel (23 Km long) equivalent to approximately 15% of all the extracted material from such tunnel. Italferr had commissioned the study to the university of Siena, which has taken and analysed 39 ground and rocks samples in 29 points of the zone. The result is that 34 cutting fractures have been traced, and about 20 of them were mineralised to asbestos (8 with a good asbestos quality), but the study clearly advises that sensitive variations could occur under work course.
- Two recent Susa Valley events bring in mind that forgiving the asbestos aspects, treatments and its disposal could have been intentional to keep down the initial project cost estimate.
  1. The Frejus tunnel is currently subjected to works for enlarging the profile (gabarit) of the Frejus tunnel so to allow the ferroustage to board also taller trucks. The removed material rich of asbestos is temporary disposed at Salbertrand, treated with gluing liquids and then transported to Germany.
  2. During the works for the preparation of the free style site for the 2006 winter Olympic games, Dr. Guariniello, has open a procedure for the presence of the asbestos, measured by ARPA (Agency of Piedmont Region for the Ambient) in percentage 16 times higher then the law allowance. The result is that the construction of the site has been moved in a different place.
- Last event is the ovation of politicians and promoters because no asbestos was found at the Seghino soundings. The truth is that LTF design documentation defines the objective of that sounding (identified as S42) for hydrologic research and not for searching asbestos, which absence was expected. Unfortunately politicians and mass media didn't say that to Italians.

### 3.2. *About uranium*

- The presence of uranium pitchblende in the zone of the basic tunnel was pointed out in the years 60 by spectrographic analysis executed by the French Minatome and the Italian Agip companies. Superficial rocks with radioactive emission have been localised in 16 points of the geographic trapezium connecting Novalesa, Chiomonte, Oulx, Bardonecchia, as well as in the French territory neighbour.
- The LTF denies the presence of Uranium and its preliminary project, thanks to the permission given by the "Objective law" neither contemplates the radiation monitoring during excavation works for determining the presence of radioactive material, nor plans for handling and disposing such material, if found.

In absence of such plan, rocks and debris containing radioactive material would be transported in open trucks without knowledge of workers and inhabitants, disposed in open dumps, spread by winds, rains and ultimately entering into the human feeding cycle, through the water, the meats, the vegetables, etc. The specialists of the Polytechnic of Turin have defined a real nightmare.
- Being the presence of uranium documented, the fact of not having identified such risk, estimating the eventual cost for the handling and disposal, constitutes again a trick to keep down the initial project costs.
- Prof Zucchetti of the Polytechnic of Turin, made a clear point concerning the severity of the Italian legislation, in particular the law 241/2000 which is today very restrictive about radon, gas derived by decay of radioactive material, toxic for inhalation and potential source of the pulmonary cancer. In case the excavation works fall into area with dangerous concentration of uranium or radon, then the workers of the tunnel would become immediately professionally exposed to radiations, with all health and cost implication.
- ARPA has documented in 1998 the presence of Radon into the water sources of the area between Salbertand and Giaglione, where in 12 sources over 27 shown a value between 11 e 40 Bq/l (Bequerel/liter). The limit established by US for drinking water is 11 Bq/l, while in Europe such a limit does not exist and only a recommendation is made for not drinking water with Radon concentration higher than 100Bq/l.

Also the 30 min work shifts implemented and observed during the excavation of the tunnel of the Pont Ventoux power plant, are signs of presence of dangerous material, for which the Italian regulation prescribes work in short working shifts. The concentration of Radon in excess to normal values is a sign of the radioactive activities and composition of the ground and it is a clear message to tunnel constructors.
- LTF mentions the monitoring of the Radon and the Grisou, sadly known to coal miners, but does not identify any plan and counter measurements.

### 3.3. Powders, particulate, other polluting elements and their transportation

The meteorologist did comments the inadequacy of the Italferr project of the Italian segment because it was not including any environmental analysis for assessing the dissemination of the particles, mainly asbestos. In particular, the weaknesses of not considering the Val Susa peculiar climate and the risk of spreading asbestos in a wider town area were pointed out. The small asbestos fibres with a diameter of some microns, present in the zones of excavation, over the trucks loading and in the open dumps, will be then carried toward Turin and surroundings by the breeze that in morning flows from the valley towards the city, or by strong western wind blowing again toward the city. Vice-versa, in the sunny afternoons the large air masses, warmed by the mountains slopes exposed to the sun, will such cold air through the valley entrance dragging asbestos fibres upwards, toward the tip of the mountains, at altitude much higher than the working sites.

Gliders flying into the Susa valley know and use such large ascending air columns for gaining altitude up to 3000-4000 meters by spiralling inside them.

Same journey will occur to all particles, smoke and harmful gases generated during the construction, risen by the trucks and operating machines at the construction sites, generated by smashing the extracted rocks and by distributing the resulted gravel, by handling cement and other powders as well as by the thousand daily truck travels. All of them will deposit particles and chemicals over a large area, from the grasslands in high mountains to city of Turin, day by day, for 10 – 15 years.

The promoters have computed that the pollution effect would be equivalent of having 1000 -1100 daily heavy vehicles in addition to the traffic already circulating in the A32 highway, which correspond to a 35% daily increase, for the whole duration of the works. A study made by Habitat is showing that the pollution concentration could be double and the computation is totally credible.

The design data of Italferr mentions a 3% increase of the particulate, which would make the atmosphere of the valley equivalent to the one of a big town. The question of the people is how it will become the atmosphere in 10-15 years if today it is already close to the limits. A whole generation of infants will born and grow until the adolescence in such environment.

### 3.4. The acoustic noise

For 15 years the noise coming from the construction yards, the transportation vehicles, the augers, the mines, the equipment running days and nights, will propagate along the valley and in the Turin northern surroundings.

LTF states that during the construction phase, absorbing provisions will be taken if necessary to limit the noise to the population, such to bring the noise lever under the law (L447 26/10/95) prescription. The noise estimated by the designers for the sites of the Italian segment, ranges between 100 and 123 dBA (acoustic decibel-see Tab 3.4-1). The construction sites of the Turin surrounding are plan to work from 6 AM to 10 PM, while in the Susa valley all sites will work 24 hours around the clock.

| Level  | Qualitative ambient  |
|--------|--|
| 0 dBA  | Reference level = human hear sensitivity = pressure wave of 20 microPascal                           |
| 20 dBA | Very silent ambient: bed rooms at night, windows with double glass and closed                        |
| 30 dBA | Silent ambient: some fable background noise in a room during the day, closed windows.                |
| 40 dBA | Some noise distant noise can be perceived: a room during the day with open windows, in a quite area. |
| 50 dBA | External noise in quite areas during the day   |
| 60 dBA | External noise in areas with some traffic.   |
| 70 dBA | Crowd road   |
| 75 dBA | Threshold for the working areas  |

Tab 3.4-1 Qualitative noise levels

| Max admissible external noise<br>Vs area typology<br>Law 447 of 26/10/95 | Level dBA LEq         |                         |
|--|-----------------------|-------------------------|
|  | Daytime<br>6:00-22:00 | Night time<br>22:00-6:0 |
| Residential areas  | 55                    | 45                      |
| Mixed areas  | 60                    | 50                      |
| Area with intense human activity   | 65                    | 55                      |
| Areas mainly industrial  | 70                    | 60                      |
| Areas exclusively industrial   | 70                    | 70                      |

Tab 3.4-2. Regulation for external noise - Italy

The risk is that the provisions mentioned by LTF remains just good proposition and in case of problems during the works the people has to proceed legally, hoping that in the meantime the legislation shortens the times when remedy must be set.

Once the line will be operative fleeting and freight trains will produce noise. LTF and RFI declare that barriers made of aluminium, PMMA and wood, as well as ground dunes will be arranged to meet the noise requirements imposed by the law, but the difficult of the problem is evident as RFI is planning to implement 6 meter tall barriers in all railway opening and country side segments.

The objectives of LTF, respectively 58 dBAs at night (10 PM to 7 AM) and 63 dBAs in the daytime 63 dBAs, are not in line with Italian law because exceeding both levels and the night time duration (see Tab 3.4-2).

The RFI objective is not to exceed 50dBA LEaq wherever, which is good but very optimistic as measures taken around operating lines give noise figures much higher than RFI expectation. The dimension of the bands of respect around the line will play a certain role for noise reduction.

Even if the European normative has imposed design limits to railcars and locomotives emitted noise, the first results are just coming and the way to get silent trains is still long, as the noise produced by a TGV passing is around 93 dBAs at 100 meters. This implies the necessity of planning and building protections, absorbent barriers, large bands of respect around the line, so to get the noise level within the applicable regulations. Just to make an example, the attenuation required to reduce the noise from 93dBA at 100 meters to 50 dBAs to 150 m, is of around 40dB, which are equivalent to reduce the wave pressure wave by a factor 100.

The Department of Aeronautical and Space Engineering of the Polytechnic of Turin has conducted specific studies confirming that the propagation of the sound in an alpine valley is very different from the propagation in a flatland. This is due to the reflections of the mountains and of the slopes, creating by diffraction zones where noise results amplified and others in which it is attenuated. Then considerations have to be made to the effects of the wind, the breeze and in general to the dis-homogeneity of the atmosphere of a valley.

- The designers have not taken these effects into account and noise estimation has been performed with flatland models. This means that most of the absorbing or protecting provisions defined into the project will not be enough to meet the regulation requirements, leading to further population protests, legal actions and finally additional cost to be withstood by the government.
- Under request of the commons and environmentalist association, several legal procedures have been opened against RFI-Trenitalia because of exceeding the noise limits. Unfortunately the Italian law prescribes that remedy to noise issues is put in place within 15 years, meanwhile population waits.

In the Dec 13<sup>th</sup> 2005 meeting, the technical commission of the Turin-Lyon has approved a series of studies over different design and environmental aspects relevant to the noise [8], but unknown are the planning of the activities and the timescale for getting the results. The approach of the promoters is clearly stated by the document [8] which reads *"further mitigation actions should be foreseen and adopted in the event that non conformities with limits established by the law are found"*.

The statement is emblematic of the general approach of the entire project, wherever promoters and designers are unable to produce demonstrations and solid solutions against opposition technical comments.

### 3.5. The effects on the human health

Some month after of the presentation of the preliminary projects, physicians and oncologists begun to denounce the human risks associated to the accomplishment of the TAV, particularly to the tunnel and to dangerous materials like the asbestos and uranium, which could be extracted during the works. In May 2004, more than 100 physician operating in Susa valley denounced the worry for the TAV construction works and the risks of severe damages to the public health. The envisaged health problems are the following:

- **Asbestosis.** It is a respiratory chronic illness awkward to the property of the asbestos fibres to provoke a cicatrization (fibrosis) of the woven pulmonary with the consequent stiffening and loss of the functional capacity. The illness rises up after a long period of latency and begins in gradual manner, 10–15 years after the exposition to the asbestos. It is a typical professional illness occurring at mid-high expositions.
- **Pulmonary Carcinoma.** The pulmonary carcinoma is in general the most frequent malicious tumour. As for the asbestosis also for the pulmonary carcinomas a tight connection with the total quantity of inhaled asbestos was verified and with the habit of smocking tobacco. The risk to contract this tumour in presence of asbestos is about 1 over 2000 people (not smokers) and 1 over 200 people (smokers). It is characterized from a progressive deterioration of the health conditions and worsened at the end by troubles due to metastasis formation in other organs. For some smaller tumours at the initial phase a surgical removal can be attempted, but the results are often unsatisfying.
- **Pleura Mesothelioma.** The mesothelioma is a malignant tumour of the pleura; it is for sure the most serious consequence of the exposure to the asbestos, also for modest levels of exposure. It manifest after 15-20, also 40, years from the asbestos particle inhalation, but it has 100% mortality and the death come usually within nine months from the diagnosis.
- **Lymphomas.** The lymphomas can generate following contamination due to inhalation of uranium. The Superior Institute of Health recently emphasized a development (+236%) of lymphomas of Hodgkin in the soldiers employed in peace mission in the Balkans, because the exposition to the impoverished uranium. To equality of volume, the uranium present in the pitchblende is considerable more radioactive.

It is emerging with increasing obviousness the importance of the ultra fine particulate; 5 causes of death in exceeded to the average are due to tumours of the breathing apparatus. To strengthen this observation there are consideration related to the presence into the urban environment particulate of a lot carcinogenic targeting the pulmonary: the isopropyl alcohol and various nitrite developed during combustion processes, but also the heavy metals, chrome, arsenic, nickel, etc.

Meanwhile an epidemiological study lead from ARPA emphasized that 12 cases of Mesothelioma have been found in the last years in upward Susa valley, one of highest level of the Piedmont.

Then there are all the effects due to the noise if this is not reduced to suitable levels, that are: troubles of the sleep, hypertension, effects on the mental health, besides the annoyance which is more or less known by everybody. However there is an extra series of auditory effects which might become important: changes in the electroencephalogram (EGG), pot-seemed arterial, increase intercranial pressure, headache, cronassia reduction, aggressiveness, depression, conflicting syndromes, activation of the encephalic-hypofisis system, increase thyroidism and of adrenal activity.

In addition there will be as well the risk of tumours and childlike leukaemia because of the presence of the new high voltage 380KV and 132KV electrical power lines for supplying the 25 KV aerial of the railway.

### 3.6. Hydrological risks

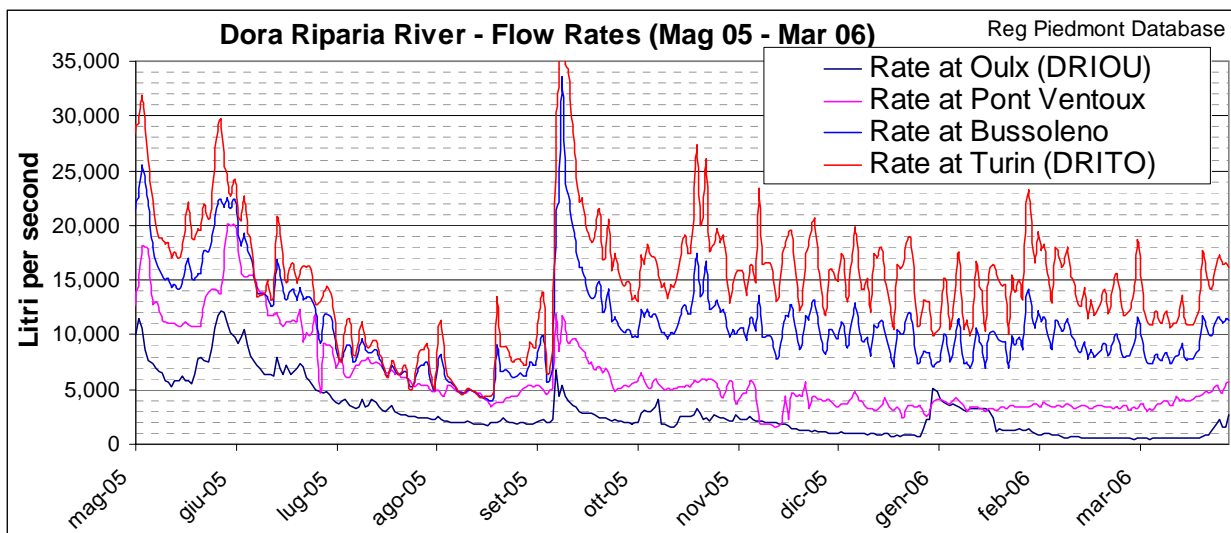
About 30 superficial water springs have been identified by RFI along the track of the national segment rail line, in the communes of Borgone di Susa, Caprie, Casellette, Condove, Rubiana, Almese, Val della Torre and Villardora. Same situation appears in the communes impacted by the international segment, Bussoleno, Urbano, Venaus, Giaglione, Moncenisio, Novalesa, where the number of water sources and creeks is quite high and higher of the number considered by LTF and RFI, with the complication that several of them are used for supplying drinkable water to villages. Therefore two kind of problems are risen:

- The intense activities can drain or deviate the springs leaving population without water
- The sources can be polluted, becoming undrinkable and unusable.

The excavation of the Musinè and basic tunnels brings potential impacts to the underground waters, typically interception of high pressure springs, or deviation of the normal flow of the underground waters produced due to obstacles and sections of the line. In presence of such very deep tunnel, the surveys soundings are not so practicable because in many cases the line is even more than 1000 meters under the ground level (see Fig.1.4-2) and because of the difficulty to reach the sounding sites situated upwards in mountain.

During the activities for the construction of the Pont Ventoux hydroelectric power plant, which is in the same zone of the basic tunnel, innumerable high pressure water jets have been found together with an underground lake of hundred thousands cubic meters. The artificial lake of the Mont Cenis, a 333 millions cubic meters water reservoir at 2000 meter of altitude, supplying power plants in France and in Italy, is only 5-6 Km from the basic tunnel. Interception of very high-pressure jets cannot be excluded a priori during excavations.

Fig 3.6-1 Flow of Dora Riparia at Oulx and Torino (Database Piedmont Region)



From the final report prepared for L. de Palacio [49], it is possible understanding for the first time the amount of water drained by the tunnels, in particular:

- 1700 ÷ 3452 l/s for the basic tunnel and the descending accesses.
- 251 ÷ 521 l/s for the Bussoleno tunnel.

Fig 3.6.1 showing the behaviour of the daily flow of the Dora Riparia river taken at Oulx and at Turin in the time span from 1 May 2005 to 30 Apr 2006, the minimum and maximum flows can be derived as follows:

- 500 ÷ 12100 l/s at Oulx, before junction with Dora di Bardonecchia river.
- 4200 ÷ 32000 l/s at Turin, except during the exceptional raining week of Sept 9, 2005

The water drained by tunnel is comparable with minimum and maximum flow rate of the Dora Riparia River but also with the lower flow of the Dora di Bardonecchia River. Some other interesting data mentioned into report are coming from the specific flow rates of a single tunnel tube, without contribution of the descending accesses:

- 30 - 61 l/s/km for the drained sector Modane-Saint Jean de Maurienne:
- 12÷25 l/s/km for the Modane-Venaus sector (up to **50 l/s/km** for both tubes)
- 19÷40 l/s/km for the Bussoleno tunnel, i.e. up to **80 l/s/km** for both tubes.

The report [49] is admitting that the values are much higher than usual and in particular higher than the Pont Ventoux tunnel, which with its 33 l/s/km and an average of 10 l/s/km, was identified as one of the highest.

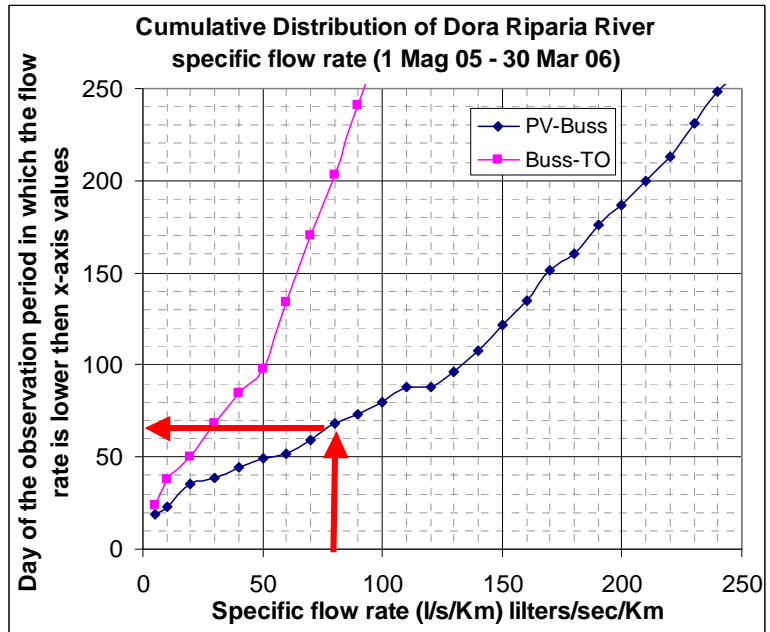


Fig 3.6-2 Specif flow rate of Dora Riparia river (Piedmont Reg. data)

A simple comparison with the Dora Riparia specific flow rates statistics derived from the Piedmont Region database, allows understanding the criticality of the depicted numbers and assessing the necessity of further in depth analyses.

The statistic of the Dora Riparia river is given in fig 3.6-2, known as cumulative distribution of the specific flow rate, representing the days within the observation period (365 days) in which the specific rates is lower then the value on the x-axis. A comparison of the water drained by the tunnels allows to find out that the Dora Riparia specific rates is lower that the draining of the Bussoleno tunnel (80 l/s/Km) for 64 days of the year, and it is for 50 days lower than the Modane-Venaus draining sector of the basics tunnel (50 l/s/Km).

Being the most water quantity of Dora Riparia given by the left creeks, a tunnel draining such water amount at left creeks expenses, turns into an high probability that the river flow downstream of Oulx is decreasing instead of enlarging. Difficult and complex analysis have to be made for understanding the extent of the Dora Riparia river flow reduction and the existence of period and areas where the river goes under the minimum vitality level, however this should have been done by LTF and RFI as part of the general contractor scope of work and submitted to the ambient impact evaluation.

It is reminded that into the Mugello section of the Milan-Rome TAV line, the flow rate reduction under the vital limit has been the major cause of civil legal procedures (Italian law 183/1989) opened against the constructors. It is to be noted that the huge damage made the Mugello's tunnels as total drying of creeks, were produced by draining rates 10 to 15 times lower that those expected in the international segment of the Turin-Lyon tunnels. For example the draining found at Vaglia tunnel (completed to 90%) was only 4.7 l/s/Km.

The situation of the national segment is even more ambiguous, as no water draining data were produced by RFI/Italferr concerning the Gravio-Musinè, 23 Km tunnel.

In addition, Susa Valley has two additional aggravating factors:

- Pont Ventoux power plant is as well draining water from Dora Riparia river and some of its left creeks. AEM, customer of the Pont Ventoux plant is admitting the draining and confirming that 1000 l/s will be granted into Dora Riparia river between Pont Ventoux and Susa. Being this flow very reduced respect to the natural flow of the river, someone should have analysed the compatibility of the two projects but there is no evidence that this was done.
- Tunnels are draining water from the valley left side, which is as well the driest side, being exposed to South.

Proper precautions have to be taken as part of the design to avoid the fall again in a Mugello's like situation, where due the intense activities of the Bologna-Rome TAV, a lot of villages and small cities waterworks remained dried because the underground water flow was deviated or lowered. It is necessary to account in advance for the water decrease, building in advance redundant water provisions, which unfortunately will increase again the cost.

In the national segment part surrounding Turin, several risks exist for the crossing of the water course, channels for irrigation and some of these are of serious concern where the lines runs in artificial tunnels under the ground level or in deep trench (from 7 to 12 meters) and in the country around Venaria and Settimo Torinese. It will be necessary to account for the hydraulic works necessary to restore trenches and irrigation channels and for the possible interferences with points of water withdrawal, waterworks and wells.

### 3.7. Impact on residential, industrial and agriculture areas

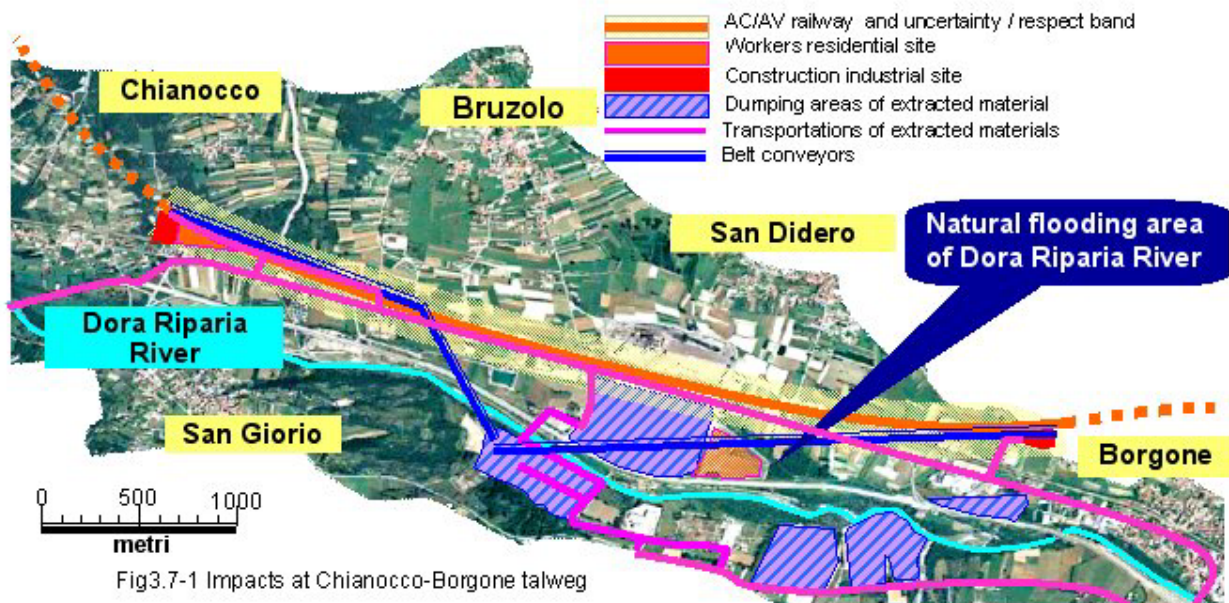
The impacts to the residential, industrial and agricultural areas are substantially due to the presence of a large, visible, shadowing and noisy infrastructure and to the means necessary to build it, as:

- 19 sites that will occupy about 120 hectares of ground for a variable duration between the 7 and 15 years
- 20 depot sites of for about 10 millions of cubes meters of extracted rocks, will occupy not less that 100, without accounting for 4 – 6 millions deposited at the Carriere du Paradis, in France.
- 20 kilometres of external railway over embankment, viaduct and trench, for a total of about 50 hectares.
- The train parking area of Bruzolo with its the intersection, the station, the power transformation plant will occupy more than 30 hectares, all together.
- A 150 meter wide band of respect, along each external track of the line, for a total of about 600 hectares

Neglecting the access roads to the sites, cableways and tape conveyors, the overall occupied area is about 900 hectares, equivalent to an area 200 meters wide and 45 Kilometres long, more or less long as the distance between Bussoleno and Turin. Crucial are the areas at north of Turin, in particular Venaria and San Gillio, but also Venaus and Chianocco-Bruzolo-San Didero-Borgone areas, which will be devastated (Fig 3.7-1).

The effects are obvious in the Italferr technical documentation, justifying fields and lands compulsory purchase as well as destruction of houses and commercial buildings, even if the photographic documentation covers only the part of the line between Settimo Torinese and the entrance of the Musinè tunnel.

The same will be in the Italian part of the international segment where demolition of houses, commercial buildings and a gas station will take place between Chianocco and San Didero, as briefly identified into the LTF design documentation.



The consequence of the above can be synthesized as:

- Occupancy, use and compulsory purchase of wide agriculture fields and mountain lands for the duration of works
- Destruction of a number of houses, cottages and industrial structures.
- People forced to move in other places
- Industrial activities relocation
- Decrease of the terrains economical values around the construction sites and close to the line
- Years and years of trucks running on ordinary roads and the consequent unavoidable accidents
- Recovery of the areas used by construction sites at the completion of the project. Usually late and painful.
- Recovery of the areas designated to temporary disposal. The trend is to transform them as permanent.

Moreover the external part of the line, with its trench and embankment acts as a cut in the territory and constitutes a discouraging element for the small farmers who are assuring today the maintenance of the areas, limiting the brutal propagation of urban and industrial establishments.

The aspect of the band of respect on the side of the line is curious. In France such band has been agreed as 150 meters on both sides of the railway, which makes the overall line areas 320 wider. For the TGV

Mediterraneo such band is increased to 200 meters. The preliminary design of the Turin-Lyon foresaw only 30 meters on both side. Piedmont Region administration answered to the comment raised by CMBVS, saying that the French band size was just an agreement with the people (i.e not a law) and it was a people penalty.

To the formal enquire made by the CMBVS concerning different treatment of European people, the European Union answered 12/02/2004: "*no hypothesis of violation of the directive 85/337/CEE has been identified concerning the project of the Turin-Lyon railway line, in which relation no authorisation to the construction of the line has been given. Such project appears still in the feasibility study phase. (and so far unchanged)*"

In spite of the above, in Italy the compensation of the damages could only be obtained for houses, building and properties within 30 meters from the lines while the Italian law 459 of November 18<sup>th</sup> 1998, defines the pertinence of the line as a 250 meters band on both side.

France citizen having properties within the bands of respect are protected by an agreement allowing them to eventually sold out the property at the market price of before the construction, within 3 years from the completion of the works. They can decide to sell properties before the construction or wait and checking for the impacts of the lines once it operates.

The TAV promoters has sponsored an advertisement inside Turin Porta Nuova railway station, in which it is possible to see posters, prints and a video showing the train running along trees and grassland of the valley. Houses, industrial and agriculture structures have been removed with the modern techniques of digital images processing, almost to prove that a mouse click is enough for cancelling culture, tradition, effort and history of a population.

The crossing of the Val Cenischia, already impacted by the long viaduct of the A32 motorway, is particularly critic because of the historical and scenic values of the site, in which the huge 900 m long, 70 meters wide and 12 meters thick viaduct, constitute an enormous impact together with the 3 construction sites and a worker residential site, all in 1Km area from Venaus.

Critical is as well the east entrance of Bussoleno tunnel as the initial part of the tunnel is within the Prebec creek dejection area, few tens of meters under a populated residential area. The tunnel excavation within the rounded stones deposited by river in the millennia will produce the same kind of problems and damages to the houses already occurred on the other site of the Valley, during the construction of A32 Prapuntin tunnel.

The entire infrastructure within the Bruzolo-San Didero area will have particular visual impact due to complex insertion of the railway works within a dense mixed residential and industrial area. The intersection of the new line should be at the same level of the historical line instead of jumping on it from a side viaduct, which implies complex and tall merging structures, right in the middle of the valley. As shown in Fig 3.7-1, such area will be totally compromised by the construction works, the intersection, the new asset of the national road 25, the dumping sites, power station and so on. All this will be largely visible from the mountains and villages around.

An important point concerns the dumping sites, the construction and basic sites positioned in the natural flooding relief areas along the Dora Riparia River and other minor creeks, as the Pissaglio creek, right at the east entrance of Bussoleno tunnel. The LTF design includes in the same flooding area also the power station for supplying the new railway. For such natural areas of flooding expansion without endangering the villages on the border, there is so far no evidence that the utilisation permission has been provided by the Po river authority, who has territorial jurisdiction.

Other valuable places exist also in the Turin northern surroundings, particularly the countryside between San Gillio and Brione, between Venaria tunnel entrance and Pianezza, including a residential area with several cottages.

### **3.8. Archaeological impacts**

All of the area of the line, where there are the sites, windows and the dumps of extracted material is rich of archaeological items, rocky engravings, restive of prehistoric installations, carved bowls, bas-reliefs, walls that can be temporally placed from the prehistory to the high medieval age. In the design documents Italferr cites the inquiries and archaeological searches carried out in the Piedmont's files, carrying out a classification of archaeological series of sites potentially at risk during the intense activities of the Turin – Lyons.

151 archaeological sites are identified and 146 of them are defined as under high risk, due to interference with the works of the line.

RFI does not state it, but there are two envisaged risk categories:

- Destruction, damage or alteration of existing archaeological sites
- Concealment of archaeological items eventually discovered during the excavations, this to not block the continuation of the works.

The second risk is without any doubt the more likely due the considerable archaeological density of sites along the route of the railway and in the places designated to construction sites, openings, service tunnels, windows etc, etc. Unfortunately this risk is also the less controllable.

Despite the project documentation of RFI is identifying all the above risks, it does not address the any solution for minimizing risk occurrence or for managing the cases of archaeological discoveries.



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