High Speed Transport Infrastructure (TAV) in Italy[1]

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ABSTRACT

The Susa Valley, situated between Maurienne, France and Turin, Italy, has been urbanised by the economic development of the region. The area is scarred by infrastructure like the Frejus highway, an international railway, and numerous dams, tunnels and industries. This “development” has had significant environmental and social impacts. The high speed train line (Treno Alta Velocita in Italian, or TAV) between Turin and Lyon is planned at the intersection of 2 main European axes to complement the European railway network by increasing the transport of passengers as well as goods. The train will pass through the Susa Valley, via various tunnels, the longest one extending over 50km, to connect St. Jean-de-Maurienne (France) to Venaus (Italy), making it the main tunnel to cross the Alps. The “No TAV” movement, spontaneously born in the 1990s, is the grass-roots movement of the Susa Valley population against the construction of the tunnel. Composed mainly of civil society committees and organisations and local institutions, their struggle is motivated by the need to protect the environment but it is also a political and cultural struggle against the development logic of globalisation all over the world. In contrast, supporters of the project are mainly found in European, national, and provincial governments and in companies and corporations driven by private interests in infrastructure and trade development. They argue that the TAV would improve passenger and goods transport, providing a more ecologically sound transport alternative that would also create employment and contribute to economic development. This case study explores the motives and rationale of the main actors, highlighting the role of power relations and an underlying clash of ideologies, and suggesting how tools and concepts of ecological economics might be applied to support alternative proposals from civil society.

KEYWORDS

Transport and energy, Material Flows, Participatory democracy, Cost Benefit Analysis, Multi Criteria Evaluation, High speed, NIMBY (Not In My Back Yard), activist knowledge

INTRODUCTION

The early 1990s saw the development of high speed train lines (Treno Alta Velocita, or TAV) across Italy as massive sums of public money were invested in order to provide the country with a railway network that could compete at the European level. Not only is it part of a national railway development plan, it is also one of the priority infrastructure projects of the European Union (EU), as the Turin–Lyon segment will form the intersection of two main axes connecting northern Europe to the south, west and east of the region. It is a key element of "Corridor n°5" on the west-east axis that will link Lisbon to Budapest initially and to Kiev eventually, completing the European railway network by developing passenger and goods transport.

Figure 1: Location of the crossing of the TAV Turin-Lyon between France and Italy

The Susa Valley, between the French area of Maurienne and Turin in Italy, is a highly urbanized area. Divided between the Lower and Upper Valleys, the Lower Valley has 66 162 inhabitants with a population density of 468 per km^2 (ISTAT, 2001). Since World War II its economy has shifted from agriculture to industry, mainly steel, services and trade. The Upper Valley has 12 909 inhabitants with 579 persons per km^2 (ISTAT, 2001). Its economy is based on tourism, as well as on more traditional activities such as dairy production and livestock grazing. (Leonardi, 2007)

The development of transport infrastructure in the beginning of the 1990s coincided with the decline of industry, particularly in the Lower Valley. To boost the local economy, Susa Valley officials began to invest not only in industry and transport, but also in the development of the local territory, especially mountain tourism and skiing activities, as the area has a rich historical and cultural legacy of popular celebrations and a scenic protected area. These **local development plans** based on traditional activities (handicrafts, agriculture) and nature tourism were highly

incompatible with the development of industrial and transport infrastructure that threatened to transform the Valley into a transit corridor. It is not surprising then that a conflict between national and local development plans rapidly erupted, dividing the country into Pro TAV, and No TAV groups.

The community of the Susa Valley is a historically united population, renowned for its anti-fascist resistance and struggles dating from the 1980s against big infrastructure projects (Leonardi, 2007). The first local committee, "Habitat" was born in 1991 and the first coordinated group of civil society and local institutions was created in 1994. The decades-long struggle of the Susa Valley people is very complex and cannot be reduced to a **NIMBY** (Not in My Backyard, see text box below). The No TAV movement against high speed grew to become one of the strongest in the country, successfully blocking the implementation of the project for nearly two decades by presenting obstacles for Pro TAV advocates. The struggle against the Treno Alta Velocita (TAV) Turin-Lyon has become one of the most important social movements in Italy in the last 20 years.

The NIMBY Syndrome (*Not In My Back Yard)* is a label often applied to discredit valid local opposition to projects that could have negative externalities on the environment in a territory. Such projects could be for example incinerators, quarries, and industrial, mobility, or energy infrastructures. The use of the concept implies the necessity of such projects' regardless of citizens' opposition to their implementation in their own territory, or "backyard".

This case study looks at the TAV conflict through the lenses of ecological economics and political ecology, drawing on both scientific sources and "**activist knowledge**". As background to the TAV project, this paper presents a brief description of the infrastructure plan and its evolution through the years. The roles of various actors and their arguments are then examined to better understand the context and dynamics of the conflict, and to identify the influence of values regarding health, environment and ecology, safety, speed, cost, territory, transport, economy and quality of life.

THE INFRASTRUCTURE PROJECT

The high-speed line is divided into 3 segments (Figure 2): The French one managed by Réseau Ferré de France (RFF) would go from Lyon to St Jean de Maurienne. The international section, with Lyon Turin Ferroviaire (LTF), an Italo-French company in charge, would connect St Jean de Maurienne, France, with San Didero, Italy (Figure 3) through two main tunnels of 52 and 12 km in length (Figure 4). The Italian section, under the control of the Italian railway network company Rete Ferroviaria Italiana (RFI) will be 43 km long passing through the Garvio – Musinè tunnels, respectively 12 and 21km long, with service access points at Condove, Caprie and Almese. The TAV will then reach Turin via trenches and viaducts (Allasio, 2006).

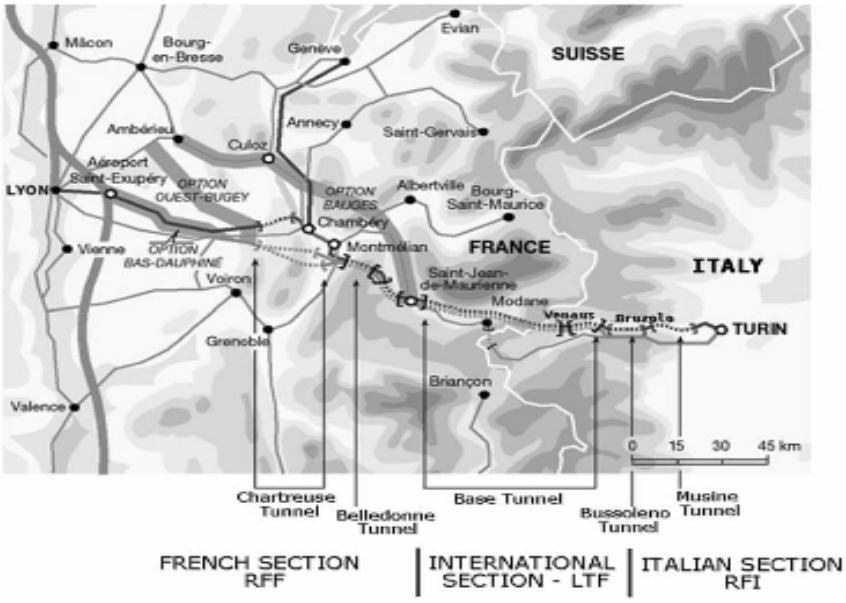

Figure 2: the 3 sections of the main project for TAV Turin-Lyon, (Appiotti, Marcincioni, 2009)

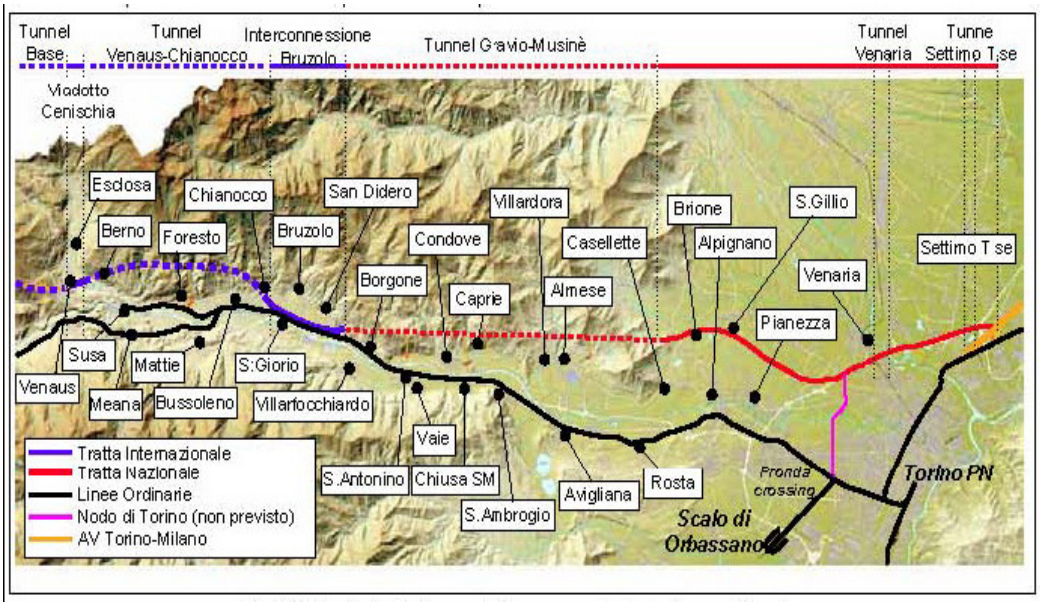

Figure 3: TAV line from Venaus to Turin, the Italian part in red; the international part in blue, the existing line in black, and the Susa valley municipalities (Leonardi, 2007).

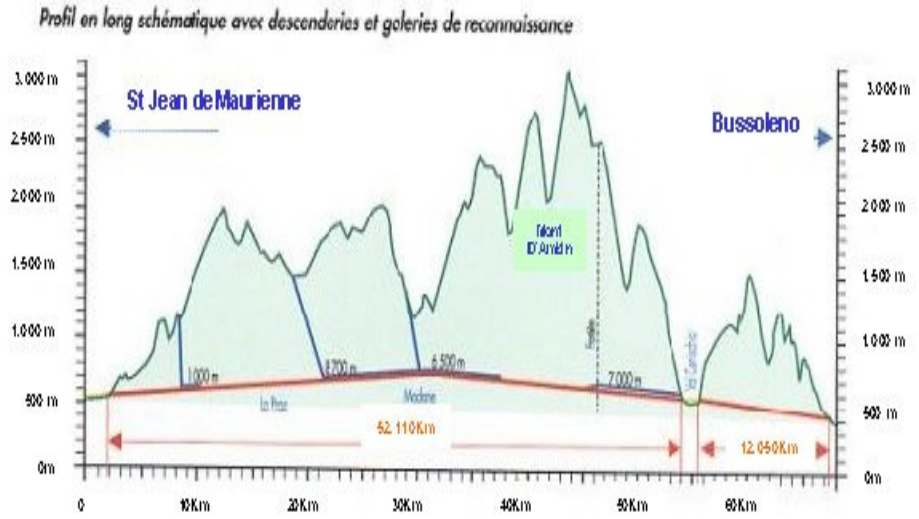

Figure 4: The two main tunnels of the project: in red the base tunnel and the Bussoleno tunnel (www.notavtorino.org)

The TAV project proposals have evolved and expanded for almost two decades. Over the years, emphasis has shifted away from passenger comfort and convenience toward increased transport of goods across Italy and Europe, which is now the main driver of the construction of the TAV Turin-Lyon. On February 29th, 2001 France and Italy ratified an international agreement for the construction of the Lyon-Turin railway connection. On May 5th, 2004, another agreement was made regarding equal investment (to be supported by EU funding) in the international project by these two countries. In December 2008, new funding from the European Commission was allocated for feasibility studies and construction. Although numerous changes and proposals have been made, plans for the line have remained basically the same (Figure 3).

The TAV Turin-Lyon Observatory, created in 2005 to assess feasibility and evaluate alternative proposals, met numerous times in 2007 and 2008 to discuss the potential of the existing line, and the exploration of possible alternatives to the TAV Turin-Lyon project. The planning agreement it presented, recommended a slight reduction of land use for the construction of the line and changed the entrance and exit of the international tunnel, enlarging it by some kilometres to end up with a 57 km tunnel. The new path would go from Lyon to Settimo and then join the existing TAV Milan-Turin. Mainly, the document draws “orientation indications” for improved use of the existing line, for the “united “ management of the implementation of the new line, and for the organisation of the project design and construction, highlighting the necessity to draw project guidelines and ”respect the commitment taken towards the community and its participation” (Accordo di Pracatinat, 2008, Verbale Palazzo Chigi, 2008).

Later, on July 29th, 2008 the Ministers’ Council resolved to: create a working group within the Observatory representing the Ministry of Infrastructure and Transport, the Piemonte region and the Agency for Mobility to define the intervention and improve local transport; plan a similar process (for October 2008) for goods transportation on railways; update the so-called “Dossier de Bruxelles” for the European Union on the basis of the ”Pracatinat document”; begin planning for the new Lyon-Settimo-Turin line; and define responsibility in the Observatory for monitoring the project and its united governance according to guidelines for resource coordination.

At the moment the Tav Turin-Lyon remains in the “project design phase”, with geological soundings for the first construction works set to commence at the beginning of 2010. (Trabucco, 2009)

Image from Legambiente

HISTORY AND DYNAMICS OF THE CONFLICT

Periods of the conflict

Following the analysis of Leonardi (2007), four distinct periods can be identified in the TAV conflict. The first from **1990-1995** marks the **beginning of the conflict when** the TAV Turin-Lyon project was developed along with other High Speed Train projects in Italy. Both promoters and opponents from local and regional levels gathered in groups to express their views. The first national march against High Speed happened in 1995.

The second period **between 1996 and 1999** was characterised by the development and reinforcement of the No TAV movement. The Institutional Committee was founded in 1996 to put into practice the theory of **participative democracy**. Composed of local administrators and organisations' delegates, it was designed for the exchange of information and for decision-making, especially in crisis moments. (Leonardo, 2007). **The Provincial and the Regional** Government reiterated their will to i**mplement the project** in the face of the No TAV protests and the **uncertainties of the National Government**, as reflected in an announcement in 1999 by the Minister of Environment that there would not be a TAV Turin Lyon.

The third period, **2000-2003** was characterised by **advances made by promoters** for the TAV Turin Lyon: preliminary projects were proposed, changed and passed, and the EU added the TAV Turin-Lyon as a priority infrastructure project. Strong protests resulted and the No TAV movement grew. The main contested issue was the **assessment of impacts and the externalities** of a new line.

The fourth period**, 2004-2008** corresponds to the escalation of the conflict, in which promoters reinforced their position and unity while the **No TAV movement** mobilised in response to the initiation of geological soundings without local consultation. In 2005 around 50 000 inhabitants of the valley occupied the excavation site and set up permanent pickets, paralyzing all work until the demonstration was repressed by the army. As a result of the mobilisation, the Observatory was established to undertake environmental impact assessment to examine possible health and environmental risks. However, beyond the perception of risks, the two sides continued to disagree fundamentally on what kind of development they envisioned. Despite **a financial scandal** in 2005 within the TAV S.p.A, the EU granted 671 million € in funding for the TAV Turin-Lyon for 2007-2013.

Actors

Over the years the debate between the project's proponents and opponents has grown more radicalised. Taking the Pro TAV side were the province and city of Turin, the Piemonte Region, the National government, the Ministry of Environment and the Ministry of Transport and Infrastructure, Banks, Firms, the Italian and French Railway Companies, the Province and City of Turin, and the majority of the national mass-media.

The No TAV movement was initially comprised of: the Comunità Montana Bassa Valsusa (The Mountain Communities of the Val de Susa), other local municipalities; residents associations, the local Green Party, and the Italian Communist Party. No TAV movement members now count among them environmentalists, administrators from all political parties, youth from self-managed social centres and from the Scouts, religious delegates, researchers, and other men and women of all ages and backgrounds. It has a horizontal structure characterised by the diversity of its foci.

The TAV Turin-Lyon Observatory was founded in 2005 at the height of the conflict by the Italian government, to research project externalities and the development of project alternatives with civil society participation. Its members come from the Ministries of Environment, Infrastructure, Internal Affairs, and Health, the CIG, the Piemonte Region, the Turin Provinces, the Susa Valley Mountain Communities, the RFI, and the LTF. Officially, it aims to encourage dialogue between members, address and resolve conflict, and provide technical assessment of the environmental, social and economic impacts of the international and Italian segments of TAV Turin-Lyon, and the outputs of the Observatory have focused on improvement of existing rail infrastructure and on the planning of a new line. As such this body is rejected by the No TAV movement, which suspects that emphasis was only placed on the improvement of the existing line to distract attention from its implicit support for TAV construction. The work of the Observatory has in fact fuelled protest and reinforced the mistrust of organised civil society.

Discontent with the Observatory has not been limited to its civil society detractors. Shortly after the establishment of the Observatory, some Mayors and the President of the Susa Valley Mountain Communities began to express discontent with its work. In addition, the Director of the Observatory in December 2008 was forced to resign over a disagreement with some technicians of the Lower Susa Valley, who had refused to vote for a revision of project plans believing that this was not their mandate. Despite these internal conflicts, the Observatory presented a "united" image, to convince the European Union of the legitimacy of its representation, its capacity for monitoring the project and to develop public support for the TAV.

Motives and Rationale

While Pro TAV arguments are generally based on the benefits of increased competitiveness in European markets and on economic and ecological advantages of rail transport, No TAV arguments are founded on politics, environment and health, transport needs and infrastructure costs, territory and quality of life. The Pro and No TAV positions can be seen as representative of a much larger debate on substitutability between the economy and environment, a debate captured in terms of "weak" versus "strong" sustainability. According to Neumayer (2003) **weak sustainability** (WS) can be interpreted as the view that what matters for future generations is only the total aggregate stock of 'man made' and 'natural capital (and possibly other forms of capital as well) but not natural capital as such. WS implicitly assumes that investments in manufactured capital or human capital are perfectly adequate substitutions for natural capital, so that countries with a history of resource depletion and ecosystem damage may actually appear "sustainable" (Ayres, van den Bergh and Gowdy, 1998). WS also addresses the role of environmental indicators in relation to GDP, viewing an overall reduction in carbon emissions per unit of GDP as "sustainable". From the Pro TAV point of view then, the environmental destruction anticipated in implementing the TAV will be justified by the creation of modern, large-scale infrastructure that will bring jobs and prosperity to the region, particularly since it is anticipated that each tonne

transported will have a lower environmental impact through reduced CO_2 emissions.

In contrast, the essence of **strong sustainability** (SS) is that natural capital is regarded as non-substitutable, both in the production of consumption goods and as a direct provider of utility. The SS paradigm aims to maintain life opportunities through conservation of the stock of human capital, technological capability, natural resources and environmental quality. This requires the independent maintenance of minimum amounts of a number of different types of capital (economic, ecological, social) in real physical/biological terms, as natural resources are seen as essential inputs in economic production, consumption and welfare that cannot be substituted for by physical or human capital. Acknowledgment of environmental integrity and the `rights' of nature is another driver of the SS approach, but key is the understanding that some environmental components are unique and that some environmental processes may be irreversible (Ayres, van den Bergh and Gowdy, 1998). A SS perspective is advocated by No TAV supporters, evident in their arguments based on foreseen (and unforeseen) impacts on environmental and human health and security, preservation of ecosystems and quality of life. . In other words the Pro TAV vision of sustainability is one of carbon and energy efficiency; while the No TAV vision argues for an **absolute dematerialization of the economy**.

Pro TAV Arguments

Infrastructure Modernisation

Initially, the TAV project was presented as a technological advance to promote **faster** and **safer travel** and the modernisation of the **national network** (Figure 5). Over the last decade however, promoters have put more emphasis on goods transport rather than passengers, using the terminology of **high capacity** instead of high speed. One of its main objectives is to improve the accessibility of the Turin area (see Figure 5) so the region and the country can compete more effectively in the **European economy** (Torino Internazionale, 2004).

Reduced Emissions and Road Congestion

TAV project supporters have also proclaimed the **ecological advantages** of reduced noxious emissions compared to air and road transport. The Turin–Lyon line would reduce CO_2 emissions (AA. VV., 2002) they argue, as road and air transport is reduced with the shift to high speed rail, powered by electricity instead of fuel. However, the main argument of the Pro TAV supporters is the potential benefits from solving the **road transport** bottleneck assuming increased demand (Figure 6). Of the 38 million tonnes (t) of goods transiting between Italy and France, only 9 million are currently transported by train. In 2015, they estimate the projected goods transport will be about **60 million t** (AA. VV., 2002).

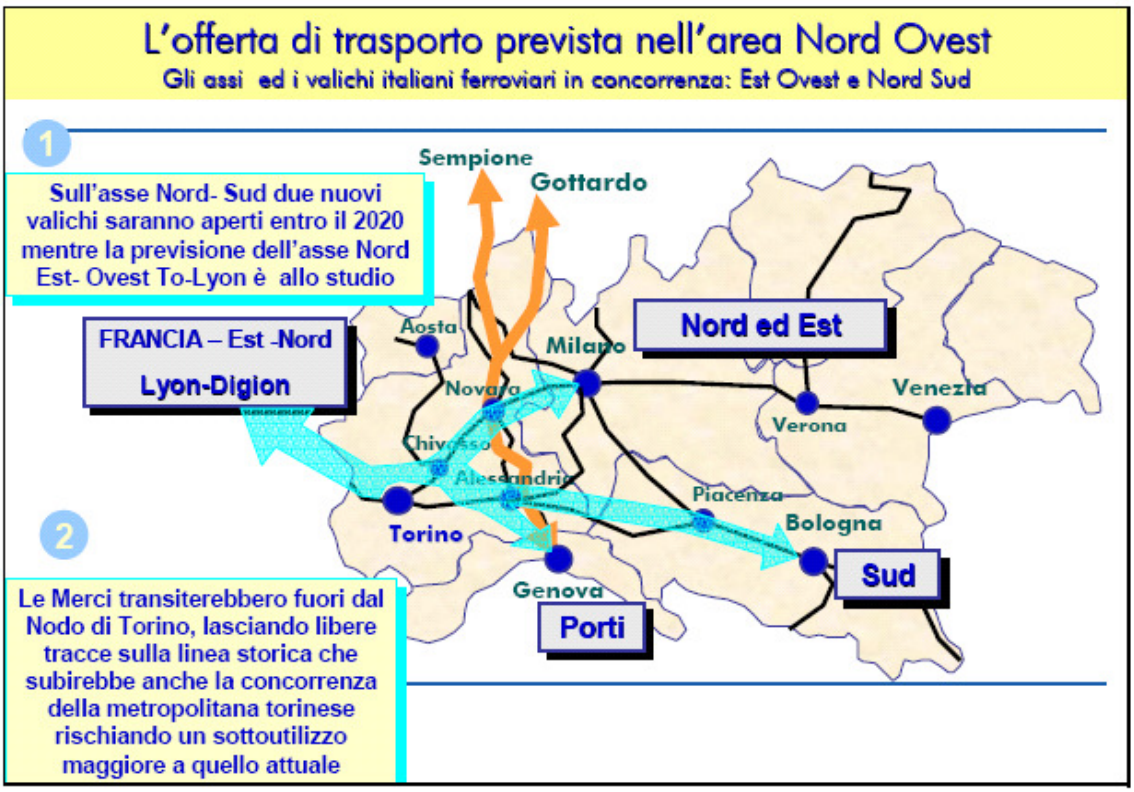

Figure 5: Map by RFI called "The transport offer planned in the North West, Italian railway axes and passes in confrontation: East-West and North-South" (Legambiente,2003)

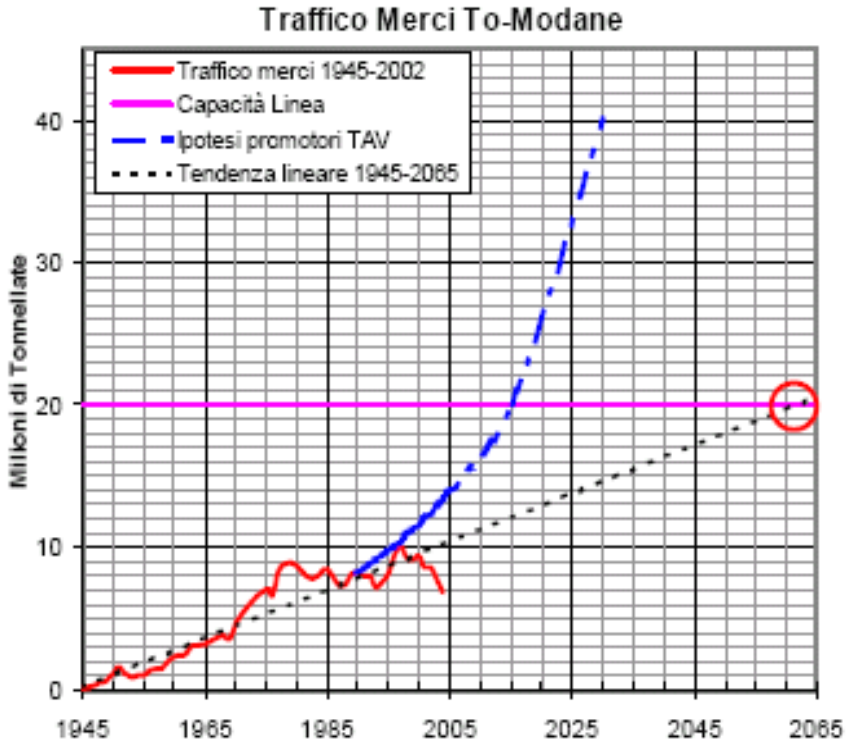

Figure 6: Good traffic through Modane by train per year in millions of tonnes between 1945 and 2002 (in red), present line capacity : 20Mt (in purple), TAV promoter hypothesis (in blue), and linear tendency for 1945-2065 (in black) (source: Allasio, 2006)

Economic Advantages

With unemployment increasing in Italy, TAV proponents also have a convincing argument in terms of the **economic advantages** the project will offer vis a vis increased tourism and employment. It has been estimated that the project would employ about 500 workers in the first year growing to 3 000 workers in the fourth year, and 250 workers in the sixth year of construction (AA.VV., 2002).

No TAV Arguments

Hydro-geological issues

The construction of such a massive infrastructure in this area of complex geological composition raises a variety of hydro-geological issues. For No TAV, the highly technical level of digging required due to the length of tunnels, and the type and quantity of rocks to be extracted that will require transport and treatment are highly problematic. It has been estimated that the main tunnel alone (between France and Italy) will create about 7.5 m^3 of material for extraction, which corresponds to a tower 750 m high with a base of 100m^2. (AA.VV., 2002, p. 11). These processes imply **indirect material flows,** which in the case of rocks containing dangerous substances such as asbestos will require transport treatment locally and beyond.

The construction of TAV Turin-Lyon is also seen as a threat to watercourses and the natural water cycle in the Valley. The use of mines and more generally the activity of digging could dangerously modify underground **watercourses** vital for feeding springs, and could **dry** out entire mountain areas, as experienced during the construction of highway tunnels and the hydro-electric power station in the Upper Susa Valley. Moreover, TAV opponents argue that the laying of cement for the deviation of underground and superficial watercourses could divert water more rapidly to the plains, increasing the risk of **floods** in the lower part of the Valley. (Pavia, 2006; ARPA, 2005, pp.22-23)

These geo-hydrological and contamination issues exemplify the problem of **risk and uncertainty** in decision making. Normal science usually reduces uncertainty to a probable risk. In this case, however, the potential impacts on human health from the extraction of materials, flooding and other damage to the environment, have been dismissed by the Pro TAV position, who are not concerned with the application of the **precautionary principle** in the face of clearly identifiable risk and uncertainty.

Threats to Health and Ecosystems

No TAV also argues that uranium and asbestos would be released into the atmosphere during the works. The extraction of **uranium** from the Ambin mountain range could expose workers and the local population to radiation and therefore to tumours and leukaemia (Pavia, 2006). Other studies by Sienna University's Geo-technological Centre have shown that over one million cubic meters of materials containing **asbestos** would be extracted from the tunnel passing under Mount Musiné (Maccheri M., Monaci Naldini D., Antompaoli M. L., 2003). It is possible to safely treat asbestos but such procedures would increase the cost and the duration of the project and would still not completely rule out all danger.

In addition No TAV also bases its opposition to the Turin-Lyon line on grounds that it would pass through a highly valuable environmental area that offers a vast and interesting variety of ecosystems. In Turin Province, 24 out of 69 Sites of Communitarian Interest (SIC), proposed by the Piemonte Region during the development of the European Natura 2000 Network (UE Dir. 43/92

CEE "Habitat") (Arpa Piemonte quotation) are situated on Val di Susa territory, as are two special **Nature Reserves** and one **Provincial Park**.

Initially, the main project foresees the construction of the tunnel between the two nature reserves of Foresto and Chianocco and the Orsiera-Rocciavrè park, jeopardising the connecting zone between the protected areas crossed by terrestrial and aquatic fauna. Local **wildlife** will also be affected by the extensive fences that will block its movements, as was the case with previous highway construction (ARPA, 2005, p. 23). Not only will animal species be disturbed, the flora (this part of the Alps alone is home to 47 of the 120 species of orchids present in Italy) will suffer intense noise and vibration, and be at risk of spring and groundwater aquifer pollution. The tunnel would ultimately compromise the monitoring and conservation of the protected areas. In recognition of these risks, the management office of the park and reserves in 2005 voted in favour of a motion stating their disagreement on the implementation of the TAV Turin-Lyon.

Territory and Quality Of Life

TAV opponents point to evidence that the construction of the TAV Turin-Lyon will lead to environmental changes that will modify the morphology and appearance of the landscape. The space needed for the construction yards and the storage of extracted materials will necessitate a **loss of cultivable lands, prairies and woods** (AA.VV., 2002, ARPA, 2005, p. 23). This threat highlights the issue of **landscape valuation** in addition to those of valuation of environmental or health damage. **Non-economic values** not directly related to human health or environmental contamination are usually absent from decision making processes but valuation of landscape and natural beauty in money terms or in other “units” could become the basis of a strong argument for TAV opponents.

The quality of life of the local population would furthermore be seriously affected as **construction yards** would produce dust, dirt and an increase in traffic and noise. The vibrations alone from mining activities could cause cracks in houses (AA.VV., 2002). Research also shows that a high-speed train produces the same level of **noise** as a landing plane, and that such sudden and repeated noise can generate panic attacks, discomfort or aggression, altered behaviours, stress and insomnia (Saponetta, 2001). Avoidance of such impacts requires living at a minimum distance of 500m from the source, but for an area like the Susa Valley already crossed by numerous railways and highways, this would mean the forsaking of numerous villages and much farmland. Moreover, as the Valley is surrounded by high, narrow mountain chains, the echo would amplify the noise, dispersing it across nearby mountainside villages (Chiocchia G., Cancelli C., Clerico M., 2002).

Additional concerns of No TAV relate to **security** issues. The first regards the potential for negligence in following safety measures and concerns over workers’ security. The second relates to passengers security and the likelihood of accidents along a 57 km long tunnel, the avoidance of which would require very high standards of safety measures (AA. VV. 2002). The security argument is particularly relevant following accidents in the Mont Blanc tunnel in 1999 and in 2005.

Scientific Studies used by No TAV

In contrast to Pro TAV assertions that the ecological impacts of increased transport through the Alps would be addressed with the construction of High Capacity lines, the No TAV movement has responded with a body of research showing a new line is in fact unnecessary, since the project’s objectives could be achieved simply through modernisation of the existing line (Debernardi, 2004, Boitani, Ponti and Ramella, 2007).

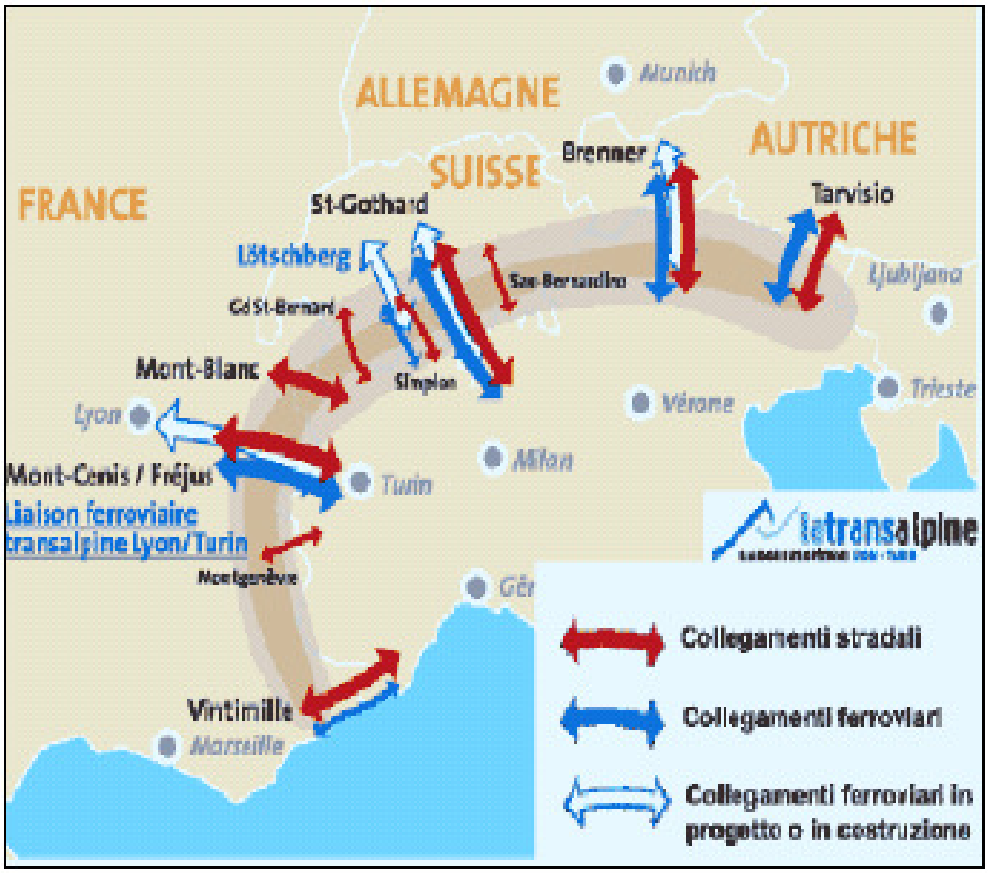

Figure 7: Estimation of the goods transiting through the Alps for 2030 (with a total 40MT by rail) red: road connections, blue: railway connections, transparent: rail projects or connections under construction. The larger the arrow, the more goods are transported (Allasio, 2006)

First of all, if current flows across the Alps (see Figure 7) were to carry on for the next two decades, about **270 million t** of merchandise would transit the Alps per year **from 2020-2025**, 80% (or 216 million t / yr) of which would continue to be transported by truck due to the low cost of road transport for stocks, semi-manufactured and finished products. Second, even if railway traffic were to expand, demand could be met by existing railway lines crossing the Susa Valley as they are only used at 38% of their capacity (trends show this traffic is actually decreasing). This is without accounting for improvements that would come from modernisation (Debernardi, 2004). In this context, the No TAVs believe that modernisation of existing lines is the best means for meeting future transport demands

Estimation of traffic between Italy and France

The work of French economist Prud'homme, provides a useful illustration of the value of passenger and goods transit between France and Italy, France's largest trading partner. He calculated that transit between Italy and France in 2007 amounted to about 2.5 million passengers and **37 million t** of goods per year. The latter figure corresponds to both rail and road, but most of this was moved by truck. In the last decade, road traffic has remained constant but railway traffic has actually decreased by 25%. He shows the new line would initially be used by half of the passengers from the existing line, and another 30% would be new clients, totalling 2 million persons per year. He estimates the traffic of goods on the new train line as equal to a quarter of the goods currently transported (rail and road) plus new traffic from 10% of existing traffic, equalling about **13 million t** per year. Calculating an increase of 2% per year he estimates that in **2037** the new line would transport **3.3 million passengers** and **21.3 million t of goods** (Prud'homme, 2007). This projection does not take into account the impact of a future axis through Switzerland.

Flows of import-export in Italy and through the Alps

The two main trans-alpine trade partners for goods transiting through the western Alps are France and Germany (Tables 1 and 2). From 2006-2008, the majority of products exchanged between Italy, France and Germany were: electrical appliances; automotive products; fashion; iron and steel; plastics; food products (including milk, eggs and honey); furniture (exported from Italy to France); medicines, medical and optical goods; electronics (imported to Italy from France); fruits (exported from Italy to Germany); and paper (exported from Germany to Italy)[2]. Debernardi however underlines some important characteristics of international Alpine rail traffic: first, its rate of increase is below average; second, there is a structural imbalance between the amount of traffic entering Italy (30 million t in 1997) and the amount leaving the country (15 million t in 1997); and third, transit exchanges are concentrated on France and central and northern Europe and very limited with the British Isles and the Iberian Peninsula (Debernardi, 2004).

ROAD + RAIL														
	000 t													
O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	**Tot**
1 France		19.517						7	5	79	43	126		**19.777**
2 Italy	11.981		4.788	2.267	3.385	1.561	4.081	2.124					672	**30.859**
3 Spain and Portugal		4.150					2	10	46	73	21	19	3	**4.324**
4 United Kingdoms		2.168								2		47		**2.217**
5 Belgium and Luxemburg		5.349								1	2	19		**5.370**
6 Netherland		2.282												**2.282**
7 Germany		7.777	2											**7.779**
8 Switzerland	4	3.193	7											**3.204**
9 Austria			59											**59**
10 ex Yugoslavia	81		15	3										**98**
11 Europe Eastern countries	1		19											**20**
12 Greece and Turkey	55		19	17	9									**100**
13 The rest of Europe		997	1											**998**
Total	**12.121**	**45.432**	**4.910**	**2.287**	**2.955**	**1.561**	**4.083**	**2.141**	**51**	**155**	**66**	**210**	**675**	**77087**

Table 1: Goods transported by road and rail through the Western Alps by country in 1997 (Debernardi, 2001)

RAIL														
	000 t													
O \ D	1	2	3	4	5	6	7	8	9	10	11	12	13	**Tot**
1 France		6.036												**6.036**
2 Italy	1.463		285	748	1.916	825	2.655	778					473	**9.142**
3 Spain and Portugal		428												**428**
4 United Kingdoms		779												**779**
5 Belgium and Luxemburg		2.995												**2.995**
6 Netherland		1.001												**1.001**
7 Germany		6.112												**6.112**
8 Switzerland		2.037												**2.037**
9 Austria														**0**
10 ex Yugoslavia														**0**
11 Europe Eastern countries														**0**
12 Greece and Turkey														**0**
13 The rest of Europe		867												**867**
Total	**1.463**	**20.255**	**285**	**748**	**1.478**	**825**	**2.655**	**778**	**0**	**0**	**0**	**0**	**473**	**29.397**

Table 2: Goods transported by rail through the Western Alps by country for 1997 (Debernardi, 2001)

2 (from http://www.gtis.com, Global Trade Information Services, http://www.ice.it, Italian Institute for External Trade)

Costs and Corruption: The Financial Management Issue

No TAV argues that the cost of the Turin-Lyon high-speed line project is very high. This is because it is a huge and technically complex infrastructure project but also because a great deal of debt has already been accumulated by the project. The construction costs of high-speed rail lines in Italy are much higher than the equivalent infrastructure in France or Spain (Table 3) as they are linked to the nature of **Italian contracts and financial architecture**.

TABLE 3

	France		Spain		Italy	
	Length (km)	**Average Cost / km (M €/km)**	**Length (km)**	**Average Cost / km (M €/km)**	**Length (km)**	**Average Cost / km (M €/km)**
Operational Lines	1548	10	1030	9	564	32
	South East Atlantic Rhone-Alps North Europe Paris Interconnections Mediterranean		Madrid-Barcelona Madrid - Seville		Florence-Rome Rome-Naples Torino-Navara	
Lines in Development or in Construction	990	13	1490	15	647	45
	East Europe Perpignan-Figueras Rhine-Rhone Nimez-Montpellier South Atlantic		Toledo-Madrid-Seville Connection Madrid-French Border Malaga-Costa del Sol Valladelid-Madrid Madrid-Alicante-Murcia		Navara-Milan Milan-Bologna Terzo-Valico Milan-Venice	

Table 3: Construction costs in Italy, Spain and France, by M. Moretti (FS Spa.) in 2007, showing the length of rail lines and the average cost per km for France, Spain and Italy. Data in blue denotes existing lines, while data in red represents lines in development or under construction.(Cicconi, 2008)

The financial scandal surrounding TAV S.p.A illustrates how the **project operation financial model** promoted for the TAV implementation in Italy contributed to the public deficit and was unsustainable. In 1991, the national railway company released funding to TAV S.p.A. in the form of an "allowance for projecting, constructing and for the economic exploitation of the high-speed line" in Italy. The State Council ordered TAV SpA (40% of which was held by FS S.p.A, and the remainder held by privately owned companies) to raise private funds for investing in the undertaking of the project. TAV S.p.A. had mismanaged the TAV Turin-Lyon project however and could not come up with the necessary private funds. Instead public money from European funding was diverted through FS S.p.A. until 2005 when the European Union discovered the fraud through aTAV-related infraction procedure. The Italian State was forced to reimburse the money, a sum of about 13 million € accumulated from 1994- 2005, assuming it as a public debt. Opponents to the TAV Turin-Lyon continue to protest the fact that although the Italian State eventually took responsibility for the debt, and its citizens paid for it, TAV S.p.A is still promoting the same financial model under the authority of the RFI (Cicconi, 2008, p. 1, Venosi, 2005).

Other Critiques of the Pro TAV Rationale

One of Pro TAV's arguments in favour of the project is the potential for alleviating pressures on road infrastructure for goods transport in the face of predicted increases in demand. TAV

proponents claim that the project would be ecologically advantageous through reducing emissions of CO_2, but It could also be argued according to the **Rebound Effect** or **Jevons's Paradox**, that these environmental benefits could be cancelled out as implementation of the TAV would actually lead to increased material flows. The rebound effect warns that improvements in efficiency might in fact lead to increased resource use. For example, improving the fuel efficiency of cars could contribute to increased car use as the cost of driving goes down per km. The increased capacity available on the TAV could actually lower transport prices, thereby increasing international trade with negative environmental impacts.

In addition, while high-tech new trains are promoted as sleek and eco-friendly, a **life cycle analysis** would reveal the true environmental impacts of retiring old trains and their infrastructure to build new lines and trains. Contrary to expectations, extending the use of an old car for example, can generate less emissions than buying a new fuel-efficient car due to the energy used in the manufacture of the latter, which can account for up to a quarter of emissions over the car's lifetime.

Civil Society Organisations and Research in the TAV Conflict: Cost Benefit Analysis and Multi Criteria Evaluation

Cost/benefit analysis for Turin-Lyon TAV

Cost Benefit Analysis (CBA) was developed by promoters of large dam construction projects in the United States seventy years ago and later expanded around the world by the World Bank in order to support their projects by demonstrating how losses from dam construction were lower than the benefits they produced. Different from a purely financial analysis, a CBA takes into account (in monetary terms) all facets of the project. For instance, benefits from dams include hydroelectricity and irrigation water and possibly also flood control. Costs include building costs, indemnities to displaced people, and also the loss of fisheries and beautiful landscapes (all valued in monetary terms).

Benefits and costs are given in "present values", applying a **discount rate** to future benefits and costs. Which discount rate to apply is as much an ethical as a technical question. This is because the higher the discount rate, the less we are valuing future generations and privileging present welfare. For example, a cost or benefit of 100 euros occurring 50 years from now, with a 5% discount rate per year would have a present value of only about 10 euros. While applying a 5% discount rate to economic profit from a business perspective makes sense since money invested today can bring returns tomorrow, this logic does not necessarily hold when applying the same discount rate to an environmental good which offers sustained social benefits in time. We cannot assume that in the future the financial capital gained will be able to replace lost natural capital, or that the following generations will be richer than the present one.

CBA is frequently used in support of infrastructure construction, mining or industrial projects, Nevertheless, CSOs have begun using CBA to demonstrate the inappropriateness of projects and to argue against them. The application of CBA in the context of ecological economics can be relevant to environmental conflicts, as it takes into account estimates of environmental externalities (positive or negative), while at the same time pointing out conceptual difficulties in assigning money values to non-market goods and services, and in choosing one particular discount rate.

Be that as it may, the fact of the matter is that for a long time the No TAV movement asked promoters to undertake a study on the costs/benefits of the project. A pertinent cost/benefit study "scientifically" illustrating the argument of the No TAV movement was finally carried out in 2007 by Rémy Prud'homme (see Text Box below). His research on the main tunnel demonstrated that the TAV would not be an advantageous alternative. He acknowledged that railway transport capacity would obviously be improved but that this did not imply that road transport would diminish. His research calls into question whether the TAV would really provide an efficient alternative to road

transport, even though trains are safer and have less ecological impact.

Rémy Prud'homme: CBA of theTAV

In formulating his estimations, Prud'homme took into account socio-economic and environmental indicators (time economies, decreased pollution, CO_2 emissions, reduced number of road accidents) to calculate the benefits of the TAV compared to road transport. For example, he calculates that time savings would mean benefits of 88 million € annually, while positive externality of the reduced atmospheric emissions would be worth 4 million € annually and the avoided $C0_2$, at 25€ a tonne, would be worth 10 million €. In total he calculates that all the benefits would account for 136.7 million € per year, with the bulk of this due to economic gains (106,7 million €) due to time savings and with the rest (29 million €) due to avoided environmental externalities and reduced accidents. He calculates these benefits over a period of 45 years with a discount rate of 4% and the assumption that traffic would increase at a rate of 2% a year.

To calculate the project costs, he then calculates the investment and maintenance costs of the line, estimating that the first five years of construction will cost 4.16 billion per year, then 427 million € per year thereafter for running of the line. He arrives at an estimation whereby the costs exceed the benefits by 25 billion € over 45 years. With this calculation, he concludes that the project would not even cover its infrastructure costs and would create debts and deficits for both the Italian and French governments.

It should be noted that Prud'homme does not quantify or take into account any negative externalities caused by the TAV project enumerated above, such as noise pollution or loss of landscape value. A more complete CBA could try to quantify these costs and benefits to get a more realistic view of the social and environmental impacts and benefits.

Bearing in mind the huge costs of the project vis a vis the benefits, No TAV's alternative proposal of improving the existing line appears unarguably as the more sensible option, and a sufficient response to the needs of transport transiting through the Susa Valley. Economic studies produced by the Milan Polytechnic School show that an improved line could transit 48 million t of goods with 200 trains transporting 800 t for 300 days a year. Over a period of five years, this amount (240 million t) covers a significant portion of the 270 million t of trans-alpine demand projected by Debernardi (M.Brambilla, M.Ponti and S.Erba, 2005).

The Prud'homme study is an example of how cost/benefit analysis can be a useful tool for the No TAV movement. Combined with arguments of the likely environmental risks and the weight of debt that would be incurred by the project, the Prud'homme CBA casts serious doubts on the wisdom of TAV and its sustainability. It is true, however, that alternative assumptions about the money value of negative externalities and a different discount rate would produce a CBA with very different results. This highlights the vulnerability to political manipulation that cost-benefit analyses can be subject to, and why social groups often argue in favour of more participatory inclusive decision-making mechanisms such as multi-criteria assessment.

Multicriteria Assessment

A **social multicriteria evaluation** (SMCE or MCA) of various indicators or criteria could also be used to demonstrate the plausibility of alternatives to current plans for the development of the TAV. Using methods of participatory deliberation, several alternatives including 1) Use of the existing line only 2) TAV Turin-Lyon main project, 3) alteration of the existing TAV path following recommendations of the Observatory, and 4) improvement of the existing line, can be ranked according to how well (or how badly) they score with respect to the various criteria, for example: economic indicators; environmental externalities; health and security risks; landscape effects; and

cultural values. The draft matrix below suggests how an MCA might be structured in order to capture dimensions of reality that cannot be reduced to money values.

MULTICRITERIA EVALUATION MATRIX

	C1. **Economy**					C2. **Environmental externalities**				C3.	C4.	C5.
	C1.1 **Construction costs**	C1.2 **Employ-ment**	C1.3 **Impacts on local activities**	C1.4 **Price /km and speed ***	C1.5. **Cost /benefit analysis**	C2.1 **Impacts on CO_2 emissions (passengers and goods, air and road transit)**	C2.2 **Contamination risks (uranium and □sbestos)**	C2.3 **Impacts on flora and fauna**	C2.4 **Hydro-geological impacts**	**Impacts on health (disease , noise)**	**Security and risks (roads, construction works, tunnel security requirements**)	**Landscape damage impacts**
A1. **No TAV existing line project**												
A2. **Main TAV**												
A3. **Alternative TAV path**												
A4. **Modern-isation of existing line**												

* Criteria C1.4: (Relation between speed, price and kilometre) On a scale of speed (300km/hour=0.08 high speed, 70km/hour 0.01 very slow) we have calculated that the TAV travels at a rate of 83.3km /hr (0.02) and the existing line moves at a rate of 70km/hr (0.01). Since the price of TAV travel is 0.3€/km (or for example 75€/250km) and that of the existing line 0.16€/km (or 45€/250km), the cost to travel at only a slightly faster speed is double.

DISCUSSION

Power and Decision Making

It is clear from the description of this conflict that there is, as is generally the case in environmental conflicts, an imbalance in the weight of power between the TAV proponents and opponents. The Pro TAV side has from the beginning had superior economic and political power and the ability to effectively influence decision making. It has also benefited from prejudices developed in the course of the conflict that portrayed the No TAV group as a merely a NIMBY movement, and criminalised it by launching military interventions against peaceful demonstrations. The Pro TAV side is furthermore bolstered by support from mainstream politicians and public opinion who argue in favour of developing green transport and increasing Italian integration within the European Community and economy. While the Pro TAV argument was to an extent destabilised by the financial scandal surrounding TAV S.p.A., the overall impact was negligible, and apart from causing some hesitation of the French government and the European Commissiondid not influence allies' support for the project.

Meanwhile, No TAV has tried to draw attention to the lack of environmental impact assessment, lack of consultation with local communities and poor project planning. Their criticisms have been based on solid argumentation and scientific research, embodying a **Post Normal Science** approach through which organised citizens assimilated expert knowledge complemented by scientific research to support the development of concrete alternatives. The strength of the movement stems from its capacities for network organisation, multi-sectoral collaboration and research which enabled credible alternative proposals.

As for the Observatory, created to facilitate civil society participation and its proposals, it has ultimately prevented public participation and excluded it from the decision making process. This happens in many environmental conflicts whereby those who hold procedural power can choose to exclude or allow concrete arguments and values into decision-making processes. This becomes obvious in the case of TAV if one looks at the opposition between Pro and No TAVs' ideological perspectives.

Clash of Ideologies: Economic Growth and High Speed vs. Degrowth and Participative democracy

If the TAV conflict is characterised as one of power imbalance it can also be seen as one of conflicting ideologies. The weak sustainability approach of Pro TAV is grounded in neo-classical economics and the primacy it places on **economic growth** as the means for achieving human welfare. The High Speed and/or High Capacity concept in fact embodies a central tenet of the global market system, calling for the circulation of material and energy flows, labour and profit at maximum speed in order to facilitate the expansion of economic growth.

In contrast the No TAV position, favouring a strong sustainability paradigm, directly questions the need to exponentially increase the movement of goods, preferring instead more localised forms of consumption and decision making. Their struggle aims to defend the environment and the health of the Susa Valley people but it is also part of a greater struggle against economic strategies of globalisation and in support of the promotion of self-governance. As such the No TAV position is closely aligned with the concept of **economic degrowth,** which evolved out of realization of the failures of the dominant growth-based economic model and its disregard for sustainability. Degrowth theorists reject the use of GDP and consumption indicators as measures of human development and happiness, and propose the development of an economic framework that takes into account the limits of natural resources and understands that the increased production of goods

does not imply an improved quality of life. The Pro/No TAV conflict can be seen as a struggle between these two contradictory economic ideologies

A Matter of Self Governance

No-one disagrees with the proposition that rail is a greener option than road transport, but it does not automatically follow that rail projects should be developed with no respect for the environment or the rights of local populations to take part in local development decisions. Rooted in a vision of development on a human scale through **participatory democracy,** the No TAV movement has not merely been a critic of Pro TAV arguments. It has based its critiques and proposals on scientific research and technical expertise to increase public understanding of the issues and potential impacts at stake, developing and proposing sustainable and efficient alternatives. In doing so, No TAV has put into practice of a true form of democracy where people, through information sharing and participation have endeavoured to make decisions for themselves and their territories using science to inform self-governance.

The No TAV mobilisation has stimulated much independent research and the development of alternatives that have constructively criticised and effectively challenged thinking behind the TAV project. These accomplishments provide a perfect example of constructive cooperation between science and social movements for the common good. Unfortunately this conflict is also driven by the continuing will and influence of economic and political institutions to increase the flows of materials in the economy and increase profits, without regard for costs to the environment and human health, or grassroots participation and self-determination.

Remaining Questions

Seen in this light, this study raises important questions: Why was the project first publicly promoted as a high speed line for passengers and then later as a high capacity line for goods transport, when these two uses imply significantly different needs? How will its proponents be able to develop a socially and environmentally friendly project that is economically feasible when so much incompetence was obvious in the project planning phase? Why should citizens trust TAV proponents who have proven themselves unable to manage the project, wasted money on corruption, and produced inadequate environmental assessments and project plans? Why should the public trust those who want to transform their valley into a transit corridor, forsaking the opportunity to implement the development they want for their own territory?

Perhaps more importantly, the main point of interrogation of the TAV conflict remains, “Why should plans for the high capacity line, with high environmental risks and at enormous expense go ahead when the improvement of the existing line would result in achieve the same results at less environmental /social cost? It is in pursuit of the answer to this question that the application of cost benefit analysis and multicriteria evaluation could be of use, sustaining and legitimizing civil society proposals to improve existing rail transport. More generally, deliberative processes could go a long way to improve consultation processes and support the sustainable development of the Turin-Lyon axis.

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