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## Appraising territorial effects of tram- based systems

Cyprien Richer

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## SINTROPHER WP2

# Appraising territorial effects of tram-based systems

1<sup>st</sup> PHASE – State of the art

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## Introduction

This report takes place through the frameworks of the European project “*Sintropher*”, acronym of “*Sustainable Integrated Tram-based Transport Options for Peripheral European Regions*”. The focus of *Sintropher* is to promote development of new or improved tram services in regions of Northwest Europe “which are disadvantaged by reason of being geographically peripheral”. The four work axes (the “work packages”) relate to technical and legal challenges (WP1), to economic feasibility of tram systems<sup>2</sup> (WP2), to interoperability of transport hubs (WP3) and to innovative marketing initiatives (WP4). It puts the emphasis on sustainable and economic railway systems which optimize the use of existing railway infrastructures, by applying innovating technologies. These research axes, coordinated by the *University College of London (UCL)*, are about thoughts of concepts of “*Metropolis Transit*” (Cervero, 1998) or “*Transit Oriented Development*” (Calthorpe, 1993) within “New Urbanism”. However, these concepts, by seeking better connections between public transport services and the various configurations of urban planning, become established as new paradigms of public actions in favour of sustainable urban development<sup>3</sup>. This European cooperation project “Northwest INTERREG IVB” is both an extension and a further analysis of other contributions on this topic, such as TranSURban (Development of Transport Systems for Urban Regeneration), SusStation, BahnVille...

Five regions of Northwest Europe participate to Sintropher project : The Fylde Coast / Blackpool (United Kingdom), Valenciennes (France), West Flanders (Belgium), North Hesse/Kassel(Germany) and Nijmegen - Kleve (Netherlands). In France, the partner is the authority in charge of urban public transport, the SITURV. The SITURV, who leads the work package 2 about socio-economic and territorial effects appraisals of tram-based systems, joined the CETE Nord-Picardie to carry out a research in two phases :

- the first phase carried out a state of the art about the different appraising methods used in Europe in order to assess the potential effects between tram based systems and urban, economic, social or environmental dynamics. It deals with a comparative approach in order to highlight the effects of investment choices of tram-based systems on the town planning.
- the objective of the second phase is to provide a feedback on the issue of the modern tram systems through the analysis of various case studies. This fieldwork aims to observe more precisely the regulatory mechanisms as well as the expectations regarding to the commissioning of a modern tramway system throughout various territorial contexts.

This report presents the results of the first phase of investigation aimed to deepen the way appraisals are done through organization and governance in the field of public transport policies in Europe. The analysis of decision-making process and evaluation methods which are often perceived as a tool of good governance, is also based on the investigation of expected benefits which can be direct or indirect, and on a look at opportunities effects as regards to employment, urban renewal, cohesion, socio-economic and sustainable development. Thus, through the example of tram networks, how can we couple governance organization with the optimization of transport infrastructures role in Europe? Up to what

<sup>1</sup> Further information : see on <http://sintropher.eu/>

<sup>2</sup> It concerns tram-based systems that is to say light rail system which connect urban areas to suburbs.

point, appraisal, planning, and governance, can build together conditions for synergy of development projects between tram networks projects and urban development policies? These are all structuring questions to which we provide some answers in this report through a structuring into four main parts :

- Backing up with a literature review, the first part outlines our position about the issue of transport infrastructures effects, and gives the framework for the different terms of transport systems, as well as the assessment stakes.
- The second part focuses on the French practical appraisal experience of modern trams. After recalling the legislative context, it highlights the governance tools and public interventions which favor a tramway conception as a tool for urban planning. This section reflects the contrast that exists in France between enthusiasm for modern tramways and a still discrete practice of evaluation.
- The third part puts into perspective three European decision-making models as regards to tramway projects (United Kingdom, France, Germany). Large logics underlying the tram lines development, are highlighted. The goal is to suggest assumptions through the crossing of public intervention models and the objectives assigned to tramways.
- The final section presents the methodological choices for the case studies of the second phase of the work program. The cases have been selected through a list of criteria to allow a relative homogeneity of the situations in contrasted territorial contexts. The construction of an original method aims at targeting the expected or observed opportunities of tramway projects without producing too rigid quantitative measures and involving causality relations unsuitable for scientific approach.

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<sup>3</sup> “A New Train network is the most effective way to curb sprawl, and goes hand in hand with smart growth, creating livable communities, economic sustainability, environmental protection, human rights, and sustainable community design. When planned together with compact, walkable forms of development, trains solve many serious problems facing society.” -[NewUrbanism.org](http://NewUrbanism.org)

# I. Appraising territorial effects of tramway systems : positioning

*This first part seeks to establish a state of general knowledge about the potential interactions between infrastructures and territories which they cross and serve. Using a literature review, we clarify several terms in order to successively present our position :*

- *regarding to the issues of transports impact ;*
- *regarding to the classification of the intermediate railway transports ;*
- *and, more precisely, regarding to the assessment of tram networks.*

## ***1.1 Relationships between infrastructures and territories***

### **1.1.1 The scientific literature is skeptical about transport impacts**

The idea that a transport infrastructure leads to development is well anchored in political circles. However the scientific literature puts in debate the belief in “automatic impacts” or “structural effects” of transport infrastructures on the territories. The determinism of the role of transport networks is highly criticized by many researchers who especially point out the lack of methodological rigorous analysis. According to Offner (1993), searching the influence of the equipment commissioning on the territorial economy asks formidable methodological problems. It is generally difficult to give a solid estimate of the infrastructure rate of return.

For example, a guide proposed by the “Departments of the Environment and Transport” (1994) intended for the local planners in Great Britain assumes the existence of transport impacts on territorial development, by arguing that rail services with their fixed railway can provide the greatest certainty for promoters as well as a support for economical regeneration and growth, thanks to their fixed infrastructure. However, no proof that such effects really occur is advanced. The mechanism which links the new public transport system to the generation of economic development is not clear (Mackett, Edwards 1998).

Rigorous empirical studies conclude that there is at best only an amplification and an acceleration of the preexisting trends. Several observatories of “effects” of the new highway and railway infrastructures (Berion, Joignaux, Langumier, 2007) converge to underline :

- the modest effects in terms of spatial organization ;
- the lack of automatic effect; the changes observed result more of a mutual adaptation which results in most cases in a strengthening of preexisting dynamics;
- difficulties to understand the effects because of the complexity of the interrelationships between networks and territories.

Indeed, railway transports such as tramways would be a necessary condition but not a sufficient condition to produce its effects on different urban environments. “The



infrastructure releases potentialities, but it is not a *sine qua non condition* of development” (Bavoux, Beaucire, Chapelon, Zembri, 2005). The noticed effects do not fit in causal relationships, but in complex interactions between different systems with different logics. However, these interactions depend on economic and social conditions at a given time, on the dynamism of the various local actors (accompanying policies) and on opportunities they will be able to seize [OFFNER 1993]. We can not pick out the tram effect.

Methodologies which try to isolate transport effects all have weaknesses and some of them are quite simply not applicable in an empirical context (Hass-Klau, Crampton, 2005). They are generally based on data which show the independent variation of various influences, such as combined time series or the comparison of various comparable areas in the same city in some of which are served by the infrastructure<sup>4</sup>. The dynamism of the infrastructures depends on a number of factors that are still misunderstood by the economists. The inability to isolate the project's role is more a pitfall for the discipline than a proof of the non-existence of such effects. The difficult to measure them is not a reason to mean that they do not exist! (Co.-Marie, Bélanger, 2010).

For all that, the subject of infrastructures effects is still relevant today. If the myth of structural effects persists, it is because it is used by politicians in decision-making processes and also in *ex ante* assessment procedures of major projects (Offner, 1993). Economic pipe dream or not, the structural effect is indeed a political problem (Bavoux, Beaucire, Chapelon, Zembri, 2005), which is increased by the pursuit of balance between the desire to reduce territorial inequalities (cohesion policy) and the temptation to enhance the accessibility of the most dynamic areas, so as to play a part in the international competition (competitiveness policy). The subject remains fascinating and the scientific interest is real if we set aside temptations of a deterministic demonstration of transport impacts. Thus, our position will be based on the comprehension of interrelationships between transport networks, in this case tram lines, and its territory by a focus on the local public action.

*A tramway project in the electoral program in Montreal*



<sup>4</sup> Methodologies to isolate the effects will normally rely on data that show sufficient independent variation of various influence, such as combined time-series/cross-section data in many areas over a long period of time, or use of control cities and areas which are alike in every respect except the investment considered. All of these methodologies have their weaknesses and some of them are simply not practical in an empirical context.

## I.1.2 A vocabulary to be adapted : impact or congruence?

Care must be taken to the "rhetoric of the transport impact", "of the transport effect brought out" on urbanization and urban planning" (Offner, 1993). Understanding the complex interrelationships between the city and its networks suggests the use of a suitable vocabulary : so we're going to use the terms of "territorial effects" or "opportunity" instead of the noun "impact" which refers to automatic relations.

Beyond, the concept of "congruence", popularized by Offner, refers specifically to the idea of mutual adaptation of transports and town planning by taking into account preexisting structural trends. For example, it is not a question any more of proving if tramways add value or not to town centers, but we have to show how they insert into an urban centrality model and how they are adapted and taken into account in the structuring urban city. So, we analyze the relationship between the tram systems and their environment through the way public policies consider the "tram" subject in their territory projects. We can also notice the "degree of congruence" "between the shape of the city and the transport model [HALL 1983].

### *Caricatural opposition in the vocabulary used : Impact, effect and congruence*

Vocabulary	Link	Dynamic	Approach	Method
<b>Impact; Structural Effects</b>	<b>Causality</b> : cause and effect relation	<b>Synchronic</b> : state at a given time	<b>Cartesian</b> : compartmental approach, isolation of the "transport" variable	<b>Evaluation</b> by comparison with a reference scenario
<b>Territorial Effects ; Congruence</b>	<b>Reciprocity</b> : a phenomenon interacts with its environment	<b>Diachronic</b> : taking into account the changes in the time and also the preexisting dynamics	<b>Systemic</b> : complex approach of synergies, interdependencies	<b>Observatory system</b> : time analysis of interactions

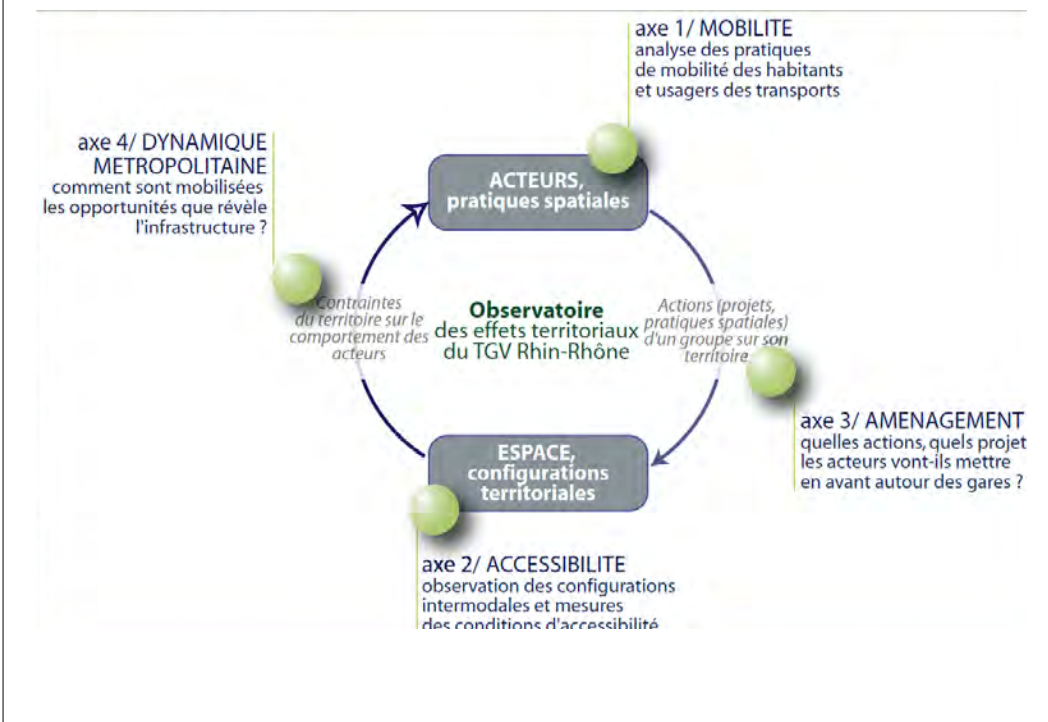
If the terms of territorial effects, opportunities or congruence are preferred, that also suggests an adaptation of the evaluation range : the reciprocity replaces causality within the framework of a systemic approach. Understanding the complex interactions between the network and the territory can not be satisfied with a static comparison between a reference situation, often rebuilt, and a modified situation (by opening a tram line for example). Consequently, one may wonder about the quality of assessment tools to interpret territorial dynamics resulting from the implementation of a railway transport line.

The example of the methodology of an "observatory system": the observatory of the Rhine-Rhone TGV stations : a systemic approach (Richer, Berion, Manonne-Facchinetti, 2009)

Understanding the territorial effects of new transport infrastructures requires a systemic approach of territorial changes in order to comprehend the consequences of infrastructures in terms of process; changes resulting from a convergence of factors. The set up of an observatory system is a relevant approach to analyze territorial effects of large transport facilities. Thus, the four themes relating to mobilities, accessibility, installation and metropolitan dynamics are part of a systemic approach that enables a comprehensive approach of territorial mutations.

We study at the same time, the spatial practices including mobilities knowledge mobilities (subsystem actor), their configurations by measuring accessibility (subsystem territory), as well as the interactions between these two aspects. These interrelationships are about two elements : the actors' action on the territorial structuring approached through the projects and the strategy of enhancing infrastructure, and the constraints of spatial configurations on actors' behavior by wondering how the opportunities revealed by the infrastructure are mobilized.

Moreover, an observatory system is not a static analysis of territorial issues; it considers their progression in time on both sides of the "t" time corresponding to the commissioning of the infrastructure. The previous phase can set a reference situation, observe the actors' mobilization and anticipate some phenomena : sticking point, changes in demand... We can note that some effects (or lack of effects besides) of the infrastructure can be grasped before the start of its operation, such as land prices which undergo anticipation mechanisms. The step t+1 relates to the observation of effects over time (more or less long time) of the infrastructure on the topics. Depending on the needs, different temporalities have to be preferred : we may need a comparison just after the commissioning of a new supply (for example for the analysis of mobilities changes) or, need a long stand back to assess the evolution of some territorial dynamics (for example the location of economic activities).



## 1.2 The case of trams and light railway systems

### 1.2.1 Definition of tram railway systems

The work published by the CERTU on “the urban public transport modes : Elements of choice by a comprehensive approach of the systems » gives both an account of the presupposed variation of public transport effects according to their appearances, and of the increased diversity of urban public transport modes, each of which can have a specific effect on the surrounding area of the transport lines. Thus, this research gives several types of guided transports including tramways, light rails and tram-trains. If the mentioned cases of trams are French (Strasbourg, Montpellier, Lyon, etc), the CERTU gives German cases for the light rails which would be comparable to a tram whose a part of its tracks would be in fully own site, and finally tram-trains, « designed to operate on the railway space holds » and generally aimed to extension of the tramway network beyond the urban area : a little revenge of former tram networks which crossed some countries until the middle of the twentieth century? These overlapping definitions, their use sometimes more dependent on *branding* than on technical realities, and their random translations – going from the very generic *light rail* (including tram, tram-train and light subway) to the subtle *S-Bahn: Stadtbahn* (tram) and *Strassenbahn* (RER) – even further make the reading of existing situations difficult.

The term “Light Rail” refers to railway transport systems organized on intermediate distances from 10 to 40 kilometers, connecting a central city and the area under its influence or a more rural area (Dutch Ministry of transport 1997)<sup>5</sup>. the light railway rolling stock is suitable for hybrid services : both “urban service” with short interstations and an proper acceleration/braking capacity; and “interurban service” with a higher speed. There are different types of “light-rail” as the type of Priemus and Konings (2001) distinguishes :

- the first model is about a railway transport in an urban area which combines a new railway and the shared use of existing infrastructures. This system allows to connect directly urban peripheries to the city centers with a high frequency (A.Randstad Rail model).
- The model of Karlsruhe (C) is quite similar because it relies on the use of the regional and urban railway network. The light rail system is mixed with other traffic in the two networks : conventional trains in the suburbs and tramway in urban area. A lower frequency (quarter of an hour) and a regional service of medium-sized cities are the main differences with the Randstad Rail model. The Karlsruhe model is the *Tram-Train type*.
- The third type of light rail system is characterized by the exclusive use of existing tracks that are shared with other traffics. This allows direct connections from the suburbs to the central station with average frequencies (4-6 services per hour).

5 « Light rail is a rail-associated public transport concept related to journey distances of 10 to 40 km between a central city and its direct area of influence, or exclusively directed to the more rural region. The system technologies applied for vehicles and infrastructure are tuned to that market. The vehicles have ample pick up and set down points, rapid acceleration and short stopping times, adequate top speed and are often so adaptable that they are also capable of running on the infrastructure for existing train, express tram and metro networks. One-man operation and the relatively light weight of the carriages lead to lower operating costs and more simple rail maintenance than would be the case with train operation » (Ministry of Transport, Public Work and Water Management 1997)

- The specificity of the last model is the use of connections with the conventional railway network in rural areas. This light rail model contributes to save regional railway lines by increasing the service (1-4 service(s) per hour).

*Diagram of the different "light rail" systems (Priemus, Konings, 2001 according to Ministry of Transport, Public Work and Water Management 1997) : four sorts of light rail*

	Combination of own infrastructure and shared uses of railway Net	(Pratically) exclusive of the railway Net uses
Urban regional main connections	A. Randstad Rail model	B. Randstadspoor model (mixing with other trains)
Regional connections around medium big cities	C. Karlsruhe model	D. Dürener model (No mixing)

"From this typology, it can be derived that the spatial urban structure will be highly relevant for the suitability of a particular type of light rail system" (Priemus, Konings, 2001). According to the authors, the most promising systems are those using successively regional and urban lines (Randstad Rail and Karlsruhe models) because they reduce modes changes and the investment costs by optimizing the existing network (Schaffer, 1999; Jefferson, Kühn, 1996).

The Sintropher project uses the term of "tram-based system". It refers to intermediate rail modes because they are set between the performances of an urban tram and those of a regional train. In a context of urban and suburban expansion, the tram-based systems meet the needs to serve surrounding areas which are further away from the city-center and less dense.

#### *Situation of the railway systems between urban tram and regional train*

Type of railway system	Approximate length of a line	Insertion of the rail track	Interstation distance	Commercial speed	Frequency	Attendance
Tramway (in urban area)	About 10 km	Permeability <sup>6</sup>	400-500 meters	20 km/h	Every 5 to 10 minutes	4000 pass/km
<i>Intermediate railway System: "tram-based system"</i>						
Train (regional)	More than 40 km	Segregation	Generally between 5 and 15 km	50 to 70 km/h	Variable: 1-4 services per hour	Very variable

6 By abuse of language, trams are traditionally called "public transport in own way of circulation" while they run on a guided track with a less or more high degree of mixing with other traffic. This is criticized by some people for too much separation between tram and its environment, tram is designed "as a true surface metro" (Frenay, 2005) and other people, on the contrary, consider in contrast to their low impermeability with the urban environment (Carmona, 2001). The "cleanliness" of the site is mainly due to a compromise (that fits with the local context and the urban environment) between the need to reserve a lane to public transport traffic to ensure network performances (speed, regularity ...) and the importance of maintaining a high permeability of the urban area by avoiding to add new cuts. For Frenay, it's better to convert the own site to a "virtual site" (as in Switzerland) to provide continuity of pedestrian and bicycle path quality.

The term “Tram-based system” is thought by comparison to the tram model but also getting closer to the definition of “light rail system” in English, the “regional tram” or the “tram-train” in France, and the “Regionalstadtbahn” or “Regiotram” in Germany.

Terminology	English	French	Deutsch	Italiano	Espanol	Nederlands
Ground urban railway System	Tram (type of “Light rail”)	Tramway	Straßenbahn	Tram (Vehicle)/Tran via (infrastructure )	Tranvia	Tram
Intermediate railway System	Tram-Train (type of “Light rail”)	Tramway Regional, tram-train, train-tram <sup>7</sup>	Regionalstadt bahn, Tram-Train-Systeme (Karlsruhe Model)	Tram-treno/Tram interurbano	Tren ligero/tren-tram, tren-tranvia	Tramtrein
Regional railway System	Regional rail	Transport Express Regional (TER)	Regionalbahn	Treno Regionale /servizio ferroviario suburbano	Tren suburbano	Stoptrein/ Sprinter
Alternative for big conurbations	Rapid Transit System	Réseau Express Regional (RER in Ile-de-France)	S-Bahn (12 cities)	servizio ferroviario metropolitano	Cercanías (12 cities)	Randstad Rai Modell

*The different transportation systems in the urban area of Mulhouse (Inauguration of Mulhouse Tram-Train, dec.2010)*



## I.2.2 Evolution of tram networks in Europe

The horse-drawn trams appeared in the second half of the 19th century. This means of transport became very popular with the advent of electricity. And nearly each city in the western world (and some in the colonies) had expanded its tram network. The British advance at that time (time of the Industrial Revolution) was also noted through the early

<sup>7</sup> The current concept of train-tram means, on the contrary of a tram-train which can run on rail conventional tracks, a rolling stock which has rail characteristics and is able to run on urban platforms when it gets into the city.

development of tram networks in the main cities of the United Kingdom. Whereas in 1870, France and Germany do not count more than ten cities equipped, the United Kingdom has more than double.

At the beginning of the 20th century, in each country, all cities with more than 200,000 inhabitants have one or more tram lines (French urban areas, German municipalities and British urban areas). This golden age continued until the First World War which constitutes a “turning point in the history of the tram”, in particular in France: “The five years of war followed by the damaged economic situation prevailing after the conflict will be fatal to less economic justified networks, while the others, destroyed by war would not be rebuilt” (Paris, 2011).

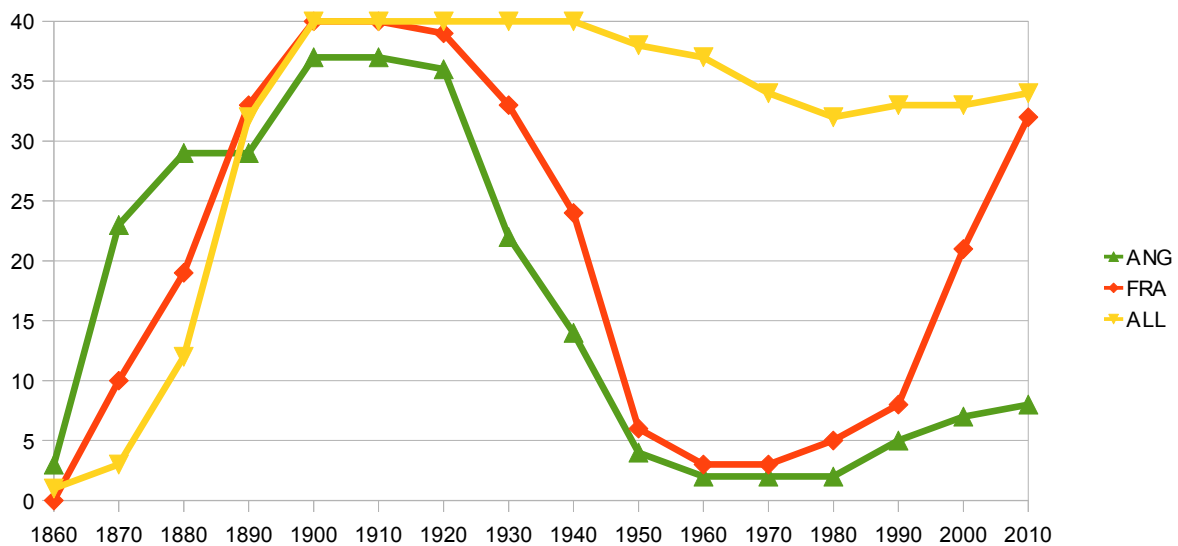
In the 1920s, dismantlings of tram lines thus is quickening in France and also in the United Kingdom. So that at the end of the Second World War, the tram remains in less than ten British big cities. The trend is the same in France with an interval of a few years. This is the time when trams give way to cars in the after war town-planning. In France as in the United Kingdom and Spain, the tram networks removing was so massive that in 1975, only a few residual lines remained in all these countries (Emangard, 2011) with a specific reason not to be dismantled : for instance, the single British network remaining in Blackpool “relates to a seaside resort where the tourist traffic played a main function in its survival” (Emangard, 2011); another example, in Marseille, one of the three French retained lines (with Lille-Roubaix-Tourcoing and Saint-Etienne), could not be converted to a road infrastructure due to a narrow tunnel (Paris, 2011). Italy and Portugal followed the same path even if the few preserved networks are dense and important (Rome, Milan, Turin, Naples, Lisbon...).

*First page of a local newspaper in valenciennes  
in the seventies (Escaut Magazine quoted by A.Plard, 2010)*



In Central and Eastern Europe, the trend is quite different : in Germany, tram is largely maintained even if several lines have been closed. Less than about ten cities of more than 200,000 inhabitants split up with their tram networks (such as Aachen or Hamburg). An important debate in the years 1960-1970 focused on the question of the opportunity of replacing tram networks by underground networks, by outright substitution or by progressive evolution into underground tram (Emangard, 2011). Contrary to Hamburg, most urban areas realize they will not afford to substitute their tram by a subway system (U-Bahn). They decided to keep and modernize their trams, sometimes by creating underground sections. The principle they sought by modernizing light rail systems was “to get 80% of the performance attributes of metro for 20% of its costs” (UITP). Germanic cities have also succeeded in maintaining old tram lines and to improve the service quality and the system image.

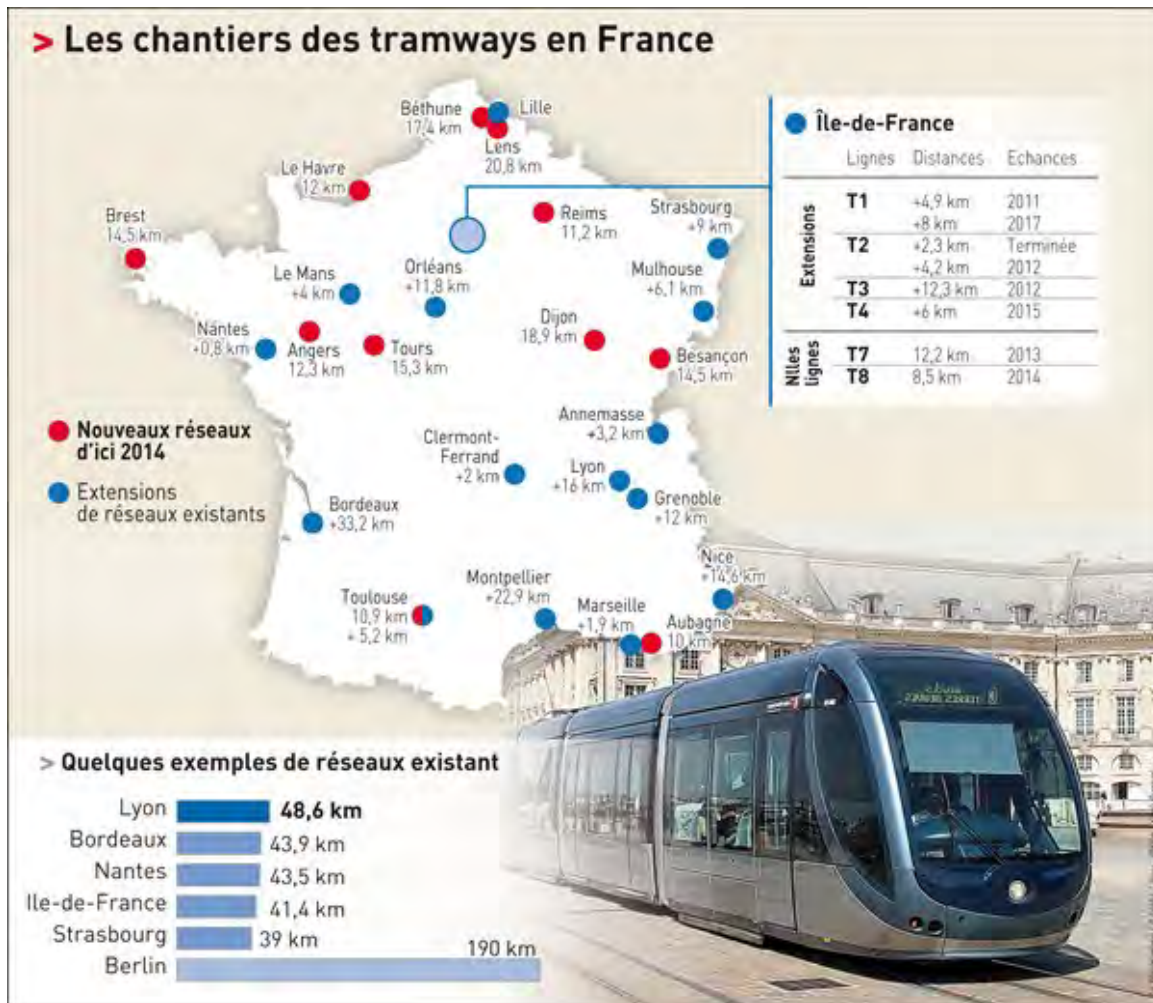
*Number of cities with a tramway in France, Germany and the United Kingdom between 1860 and 2010 (over 40 cities with more than 200,000 inhabitants (French urban areas, German municipalities and urban areas of the United Kingdom))*



In France, the beginnings of a shift appeared in the early seventies. Faced with the deadlock of the “all automobile”, actors started to come back with the idea of public transport but mainly through futuristic modes or underground, which avoids the issue of road sharing (Paris, 2011). The competitive process “Cavaillé” in 1975 did not lead directly to the return of tram but the idea starts to make its way. The renewal of French trams takes its origin in Nantes in 1985, and also in Grenoble in 1987 with the first «low floor » tram manufactured by Alstom. In about thirty years, « France has almost managed to reconstruct the tram implementation in the major cities, but with reduced consistencies” (Paris, 2011). The extent of the renewal of modern trams in France has no equivalent in the United Kingdom : except Sheffield and Nottingham, the restoration of modern trams only affects very large urban areas (London, Birmingham and Manchester). The Anglo-Saxon urban policies are particularly fond of these `flagships' projects , i.e. emblematic projects which mark the city. However, the trams role for the image of the city seems less perceptible than in France.



*French trams in service and in projects in 2010 (Valenciennes is lacking)*



How to explain such contrasts in the path in life of British cities (suppression and then shy comeback), German cities (upkeep and modernization) and French cities (suppression and resurgence) for trams? Beyond the historical approach, the recent decision-making process should be observed in order to draw up the broad outlines of the national contexts partly explaining the different approaches about trams.

### I.2.3 Debate about the relevance of modes

Mackett and Edwards (1998) explain that there is a rift in the literature between those who seem to promote new urban systems based on rail tracks, and those who argue that substantial amounts were wasted because the light railway system does not achieve the expected goals. Whereas the first think that, in most cases, the most efficient alternative to the car is the rail system, the economic arguments do not contest the need to provide an attractive alternative to the car. They argue that the expenditure on a limited number of prestigious projects is not the best : in some cases, it is better to invest in bus lanes with their own infrastructure (Mackett, Edwards 1998).

In the transport community, the technical rationality justifies the relationship between the choice of a new means of transport and the size of a city. According to different authors, transport networks would have a field of relevance; “heavy” modes should be reserved for the cities while the intermediate cities should content themselves with intermediate modes : “there are cities where the tram is really the most suitable means of transport, those where an underground or a VAL would be better, and those which should solve their traffic problems in the most effective way and to lower costs by having recourse to buses and trolley buses well used on well conceived and implemented paths” (Carmona, 2001). Moreover, as Pierre Merlin (1991, p. 382) already noted, “the different public transport systems have (...) costs which are almost proportional to the available capacity”, in other words, it means to connect the potential of service to the choice of transport system.

In the early nineties, technicians defined feasibility limits around a minimum of one million inhabitants to implement an underground and about 500,000 inhabitants for a tram. The assumption of Laisney and Grillet-Aubert (2006) is that, among the many reasons which prevail to the idea of a tram project, the size of the urban area is a very relevant criterion. When we consider the demographic size of the urban areas that have already trams or will soon have a tram, the threshold of 200,000 inhabitants appears to be a rule. In France, the conurbation of Le Mans with its 195,000 inhabitants comes very close to this limit. On the 32 existing urban areas of more than 200,000 inhabitants, 26 have one or more tram lines. Less than 10 years ago, all speeches about urban planning set the threshold below which the tram was not viable at 300,000 inhabitants. In the four millionaire conurbations (Paris, Marseille, Lyon and Lille), among which we can add Toulouse with mostly 800,000 inhabitants, the tram system complements a subway system. Next, the dominant fact is that 21 other urban areas made the choice (or are about to do it) of a tram system as a central structure of their public transport system”. The counterexample in France is Rennes which is labelled as « the smallest town of the world with a subway » (Laisney, Grillet-Aubert, 2006).

According to the CERTU, “the question of the tramway relevance in the average urban areas (less than 300,000 inhabitants) is asked, in particular in the relationship between cost and demand”. Thus, the idea of “intermediate systems” between buses and trams has led to the concept of BHNS (Buses with High Levels of Services). Without going into a numbers battle, it appears that the technical advantage of a tramway is not “so obvious” compared to the BHNS, which is less expensive (PREDIT, 2004; CERTU, 2009). The “field of relevance of the BHNS” is thus able to take market shares to the tram. However, even if the number of BHNS spreads, the tram system is plebiscited and especially in increasingly small urban areas.

#### *Evolution of the minimal size of french cities with a tram*

times	Minimum population of urban areas (urban unit) with a tram	The smallest urban area with a tram
Before 2000	400,000	Saint-Etienne
2000	270,000	Orleans
2006	240,000	Mulhouse
2007	210,000	Le Mans
2012	200,000	Brest
2015	135,000	Besancon

*The Commissioning of the first line of the light tram of Besançon  
(town of 117,000 hab.) is planned for 2015*



Indeed, the thresholds of the modes' relevance still remain porous and cyclical. From a minimum of 500,000 inhabitants to 300,000 and finally 200,000 inhabitants, it even seems that this last barrier will soon fall in Europe where some urban areas of less than 150,000 inhabitants in France (Besançon 135,000 inhabitants), in Spain (Velez-Malaga 80,000 inhabit.) or in Italy (Sassari 130,000 inhabit.) chose the “tram-based system”. According to Schaffer (1999), light railway systems can even be economically attractive for urban areas whose centers have less than 100,000 inhabitants<sup>8</sup>. Besides, some researches indicate that urban public transport based on railway systems are more propitious to economic development than a bus system (Hass-Klau 2004): “In this respect the light rail versus bus argument is won by light rail” (Hass-Klau, Crampton, 2005).

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<sup>8</sup> Representing real innovations are for instance, dual system vehicles which not only run on urban routes but can also use the infrastructure of the main line railways. These permit the avoidance of changing and through the use of railway infrastructure, reduce investment costs. This renders light rail systems economically attractive also for agglomerations whose centres have less than 100 000 inhabitants

## ***1.3 Practical experience of appraising tramway lines: issues and limits***

### **1.3.1 Appraising : a fervent obligation?**

Over the years, the assessment becomes an unavoidable step for public policies (Richard, Verdier, 2004). It can be explained by a growing questioning of the legitimacy of public action, by a will to control public spendings, by necessity because of the development of contractual procedures or, according to a similar principle, because of decentralization. The role played by public actors has gradually been transformed from actor to “coordinator” (Donzelot, Estèbe, 1992), which, far from reducing it, has multiplied the need for information and coordination. The assessment becomes a key element of good governance, especially in the field of transport where new infrastructures are particularly expensive.

So, the assessment becomes a tool not only to rationalize public action, but also to legitimize public policy, while being an opportunity to explain the choices carried out. However, this last point represents a risk : that the publication of the appraisal's results becomes the subject of negotiations, up to the point they lose their meaning and teaching value.

The assessment requires the actors to take responsibility for the consistency of their actions. However, even with this purpose in mind, a debate about the object of the evaluation remains. What is appraised ? “Policies led by the actor himself? the public action in general? The effects of public action, especially because of a better complementarity of the actions carried out by different public authorities?” (Richard, Verdier, 2004). Political issues obviously make this topic sensitive, and the compromises that can be searched may reduce the scope of the assessment and its teaching value.

On the contrary, the assessment, by forcing public actors (the evaluator - or the ordering party of the evaluation - and the evaluated) to work together, is likely to bring them closer and makes it possible to legitimate the actor in charge of the coordination by sharing his diagnosis. Nevertheless, as « the evaluated » does not always well accept his statute, there may be a lack of dialogue between the ordering party and him. However, conversely, the actor whose project is appraised may also seek to strengthen his expertise in order to defend his point of view during assessments. In the case of urban transport, it is consequently necessary that all the implied parts ensure that the evaluation is comprehensive and objective.

Legrain, Awers and Ulens (2004) list the elements they consider essential for having any effectiveness assessment : it must be understandable, the results must be correlated with the objectives, and information must be reliable (and so credible). However, due to a double complex of assessment – one refers to superiority (because of its omniscience and because it's generally imposed from above) and the other to inferiority (because of the absence of direct effects - the added value does usually not lie where its partisans and the theorists of public policies management expect it (Thoenig, 2002)). Moreover, structural problems of evaluation approach can be linked to its weak legitimacy when it is too dependent on the political schedule, when its organization way is unsuited, or when it is only mimetic. This last point allows Chanut to say that appraisal initiatives are seldom “laboratory tools and innovation” and the emphasis is often more placed on foregoing assessment than on the consequences that have to be taken afterwards (Chanut, 2002).

Furthermore, the assessment straddles two different worlds but complementary : the first one is about the production of knowledge, and the second one the action's world. This necessarily affects the selected options in terms of organization, production, and temporality. The organization is in fact constrained by (without being completely dependent) the supply of expertise domain, the legal procedures which govern the process, the allocated resources, the deadlines, and finally, the administration's organization in itself. The context is particularly important when one considers that « no assessment would be possible when institutions do not maintain separate skills » (Thoenig, 2002), following the example of some co-financed projects for which partnerships and institutional entanglement annihilate logical accountability. For instance, tram projects are generally co-financed by different institutional actors but the contractor tends to make it a symbol of his action; it allows him to reap the project's benefits in exchange of his responsibility to lead the assessment. Behind the reluctance of assessment practices, some preoccupations of local politicians can be hidden to assume directly the success or the failure of their projects. At the same time, it also happens that institutional blockages reduce the evaluations scope” (Offner, 1998).

We have to keep in mind that assessment is a tool and not an end in itself, and it is more specifically a management tool of public action. To this end, to be effectively implemented, assessments are supposed - according to a study by OECD (Thoenig, 2002) - to be pragmatic, that is to say be rested on concerns, be adapted to the contexts and turned to actions (including the way they are planned). Finally, it seems that assessment have to overcome the barriers imposed by a hostile environment. Thus, the widespread doubts about the effectiveness (ie the effects) of public institutions' action also reach public policies of transport and town planning. This leads some administrations to doubt about themselves and consequently fear the evaluative judgment. Next, the public authority who willingly submits to the evaluative process should theoretically be prepared to start from a concrete problem to achieve cross-cutting and inter-sectoral issues, involving consequently a number of external actors and multiplying the topics approached, which makes more complex the public action and makes its keyline fuzzier.

According to Offner (1998), public action's assessment is maieutics, mirror and change's attendant. It reveals both the issues of the analyzed situation and the positionings of the actors regarding to these issues, in a learning process : hence the used expression of “endoformative” evaluation, tool of “definite and carefully thought out co-production of public action [...], in which different interpretation models of decision-making and action are negotiated” (Monnier and Spenehauer, 1992). In that, appraisal processes are clearly part of the new model of the local public action (Offner, 1996).

### **1.3.2 The territorial expected effects of trams : what sort of expectations needed to be assessed?**

The appraisal practice is complex to implement but relatively unavoidable in the public action model. We are going to seek to deepen the ways of assessment organization and governance structures of public rail transport policies in Europe.

Through the example of tram networks, how can we correlate the governance organization with the implementation of a synergy between transport and urban development policies ? To what extent assessment, planning and governance can be tools for transport policies and for tram networks projects in Europe?

Like any major public project, the implementation of a tram line is subjected to a appraisal process of ex-ante expectations and ex-post effects. It is therefore necessary to review the scope of expectations and expected effects.

The first merit generally attributed to the tramway is that it a priori allows the users to have better conditions to travel around the town. It often constitutes a key element of Urban Transport Plans (PDU). As a public transport with its own track, it runs on a specific space reserved for him : the passenger is ensured of a fixed travel time from one point to another and avoids traffic jams. This major objective, which refers to the original function of tram is never presented alone in the speeches. It is added with considerations on urban mobility : it is not so much to move faster, but better. We can read on the tramway project's website of the town of Angers "move differently for a better life". Meanwhile, the tram is presented as an easily accessible means of transport for all kinds of public (in particular elderly or disabled people through a low-floor system) and thereby acquires a social dimension.

This tramway objective on mobility is crucial because the challenge is to encourage modal shift. It is even a main objective of tram or "Light Rail" systems as noted Mackett and Edwards (1998). It should be reflected in appraisal process by the reduction of car use, the restriction of congestion and environmental pollution due to transport. In a context of growing issues about sustainable development, project holders put the emphasis on the ecological dimension of a tram. On the one hand, the electric tram contributes to protect the environment by using clean energy which does not reject gas into the atmosphere. On the other hand, it would reduce car use, contributing to the reduction of pollution : indeed, its implementation leads to a reduction of the "usable" space for cars and causes delays for cars. The aims are definite on the website of the tram project of the "Boulevards des Maréchaux" in Paris: "the width of the lanes is reduced, leading motorists to drive more slowly. With the introduction of the tramway, a 25% drop in car traffic is expected". So, the tramway should answer the objectives of the LAURE (1996) and SRU (2000) laws: reduction of car traffic, development of "soft" transport modes (cycle paths, TSCP), improvement of air quality... In summary, the tramways seems to be an ideal mode of transport at a time when the model of "sustainable development" is unanimously (Stambouli, 2007). The tramway is a great media object, serving the images of the city and the international competition, it is also a consensus that relates to a mode of transport showing the concept of sustainable development (Grillet-Aubert, 2006). However, Mackett and Edwards (1998) noted very limited impacts on modal shift and therefore on the environmental gain.

Another recurrent theme is the technical performances of the rolling stock "tramway". Datas on the frequency, speed, trains capacity are put forward in order to convince. Indeed, the latest generations of trams use the latest technologies, definitively moving away from the pre-war "old trams" : low floors, air-conditioning, ground power supply (in Bordeaux), anti-vibration systems, trams trains, trams on tires. In Lyon, voice announcements and electronic display warn passengers of the train crossing. In short, it is a question of showing that the city is able to innovate, that it is modern.

The merits of the tramway are also praised as compared with other modes of public transport : three to four times cheaper than the subway, faster to build, given a new sight on the city. Quieter, cleaner... Finally, some discourses put the economic argument forward : jobs created by the construction, particularly in the building and civil engineering sector, boosting trade through increased visits in the city center... In short, arguments combine technical references with current subjects (performance/ecology, solidarity) in order to legitimize the trams as vectors of urbanity taking part in the quality of life of the inhabitants.

Potential urban effects of modern trams occur in extremely different fields : effects on transport demand, on services offered to users, on real estate values along the line, on trade business, on employment; but also on public spaces, on security, on the image of the city; and also on noise, air pollution, energy consumption (Stambouli 2007). The revival of tramways in France is associated with “the rehabilitation of public spaces, of roadway system and of the mobility system” (Grillet-Aubert, 2006). In France, the tram is even shown as a new paradigm of urbanity (Cartier, 2005). According to official discourses, the tram combines all the qualities. Positive adjectives used to talk about it are numerous : efficient, comfortable, ecological, aesthetic, quiet, accessible, fast, safe... A series of arguments is put forward to justify new projects but it should be likely difficult to prove them in the context of appraisal process.

Urban Effects: interactions between tramway and... (according to Stambouli, 2007)	
<b>... the economic system of transport</b>	General increase in the supply of public transports; Development of intermodal practices using car and public transport; Change in modal shift in favor of public transports; Improvement of accessibility to or from the city center [...]
<b>... the general economic system</b>	Rise in building plots prices, rise in rents in the tramway corridor; Job creation in the urban area due to the works of the tram; Polarization of some economic activities in the corridor; specialisation of the trade along the line [...]
<b>... the social system</b>	A new share of public spaces in favor of alternative modes, Security improvement; Influence on urban restructuring operations in the tram corridor; Demographic Changes [residential and professional] in the corridor [...]
<b>... the natural environment</b>	Plantation of trees and increase in green spaces in the tram corridor; Noise reduction along the line by reducing traffic; Reduction of air pollution of proximity; Saving energy due to modal shift from car to public transport [...]

In a specific study about economic impacts of “light rail” investments, Hass-Klau and Crampton (2005) distinguish direct indicators (land and property values around stations) indirect indicators (pedestrians flow, reduction of the car's space and other types of economic gains in the city center), and non economic urban dynamics (changing the image of the city...).

The authors consider that economic development from the rail network is not as important as it could be. One of the reasons suggested is the low knowledge from transport authorities face to the activation of development levers (Hass-Klau, Crampton, 2005). One of the key lessons from the comparison of 15 urban areas is that when land use and transport planning are combined, high densities can be foreseen. It is an objective which is wished by all cities, even if initiatives in this direction remain modest or fragmented (Hass-

Klau, Crampton, 2005). Thus, it seems that the first ingredient of success of these transportation projects is the political will (Babalik-Sutcliffe (2002), Hass-Klau and coll (2000, 2003,2004), Crampton (2003). This will shall be accompanied by measures to promote the project (subsidies, incentive parking, integrated service) and by measures disadvantaging cars (taxes, toll, pedestrianization of streets or city centers, access control of parking in some areas). The other factors favoring a successful implementation are quality, frequency and reliability of the service. The advertisement of the means of transport would also play a significant role. Finally, the route of the service is to be considered (Co.-Marie, Bélanger, 2010).

*Urban project around the tram of Valenciennes (in Anzin region) : Plard A. "Valenciennes: First tramway line, a tool for the urban regeneration of the city", Sintropher Workshop*



### I.3.3 Many expectations for modest gains: a risky assessment?

The researches led by Mackett and Babalik about success factors of urban rail networks are based on different goals that transport projects should reach (Mackett, Babalik, 2003). Besides the items of attendance and profitability of the system, the public integrated transport systems should reduce car traffic (sub objectives : reduce congestion and atmospheric pollution), optimize land use and urban growth models (sub objectives : stimulate economic growth of tertiary centers, ensure the development of urban forms compatible with public transport)<sup>9</sup>.

<sup>9</sup> « The first is to have high patronage: the higher the patronage, the greater the likelihood of achieving the other objectives. The second is to build and operate the system cost-effectively (...) For this study, five objectives were defined: the two implicit ones of having high patronage and being cost-effective, plus three others which incorporate the other ones cited above. One is to increase public transport usage, the second is to reduce car traffic, and the third is to improve the land-use and urban growth patterns. The last two have sub-objectives. The objective related to reducing car traffic usually includes the sub-objectives of reducing growth in car usage, preventing or relieving traffic congestion, and reducing air pollution, while the land-use related objective refers to sub-objectives, such as helping to stimulate development in central business districts (CBDs) and in declining areas, and helping to change urban growth patterns from car-oriented to public-transport-friendly forms ».



*Table of criteria to measure success of trams (Mackett, Babalik, 2003)<sup>10</sup>*

Objective	Criteria for the attainment of objective
To cuts high patronage	Patronage per road measures in kilometres is higher than the national but continental average
	Vehicle load is higher than the box study average
	Patronage is not lower than the forecast
To build and operate the system cost-effectively	Capital cost per passenger is continental less than the national but average
	Operating cost per passenger is less than the box study average
	Farebox recovery ratio is higher than the box study average
To increase public use transport	Modal share for public increased transport
	Bus patronage did not declines due to the new system
	The patronage one the new system is increasing
To reduce traffic congestion and environmental problems	Reduction in growth in because use
	Reduction in Improvement congestion in air quality
To improve the Land-uses and urban growth patterns	Improvement and development At the city center
	Improvement and development in declining areas
	Improvement in the pattern of urban growth

Expectations of tram projects are particularly numerous and ambitious. However, the scientific observations insist to be very careful with the measures' method of effects and besides with the interpretation of results.

Works on new railway infrastructures effects consider that the new network can be a support for guiding the urban development in some particular areas and also can have a role in the residential attractiveness. However, Mackett and Edwards (1998) give two warnings : first, urban or economic development is not produced or generated, it is simply relocated; and "secondly, light rail systems are expensive, and if the objective is to promote development in a particular area, more direct methods of stimulating growth can be more cost-effective".<sup>11</sup>

Beyond expectations, the real benefits of a tram implementation are difficult to define. The scientific demonstration of impacts, in particular on economic development, is delicate. The works led by Hall and Hass-Klau (1985) found few evidence of the role of regional rail transport in Germany on stimulating economic activity. Another research made by Dunphy (1995) related that the influence of new light railway systems on regional development prospects in 9 cities in the United States could not be demonstrated with rigor<sup>12</sup>. Faced with

<sup>10</sup> Criteria analysed for measuring the success of systems in attaining their objectives

<sup>11</sup> "A new light rail or metro system can, however, be used to steer development to particular areas, and act as a focus of marketing initiatives to attract newly-locating companies. Two caveats should be added: firstly, development is not being generated, merely relocated; secondly, light rail systems are expensive, and if the objective is to encourage development in a particular area, more direct methods of stimulating it may be much more cost-effective"

<sup>12</sup> There is rather limited evidence of the other impacts of new systems. The evidence on indirect effects, such as on development, is even thinner than that on the more direct effects. Hall and Hass-Klau (1985) looked at the impact of light rail schemes in German cities and found little evidence of economic activity being stimulated. Dunphy (1995) looked at regional development trends in nine cities in the United States in which light rail systems have been constructed in recent years and also found little evidence of the

this difficulty, or even, the inability to measure the structuring effect, several studies have preferred to study the effect of the proximity service on the location of households and firms (Co.-Marie, Bélanger, 2010). However, if a link seems to exist, it is rather weak and varies greatly from one area to another (Lane, 2006).

Moreover, the assumptions underlying social-economic measures of assessment are particularly fragile. The scenarios are generally based on a modal shift of the road users to the new transport line; which will cause beneficial effects on reducing congestion, accidents and pollution. Feitelson (1994) proved that a new railway system is not likely to have a high impact on the environment because it involves a very limited number of travels. Furthermore, the assumption that there will be fewer cars on the road depends on the modeling approach. In practice, models do not take into account the latent demand for cars use. That means that, in context of road congestion, the space freed on the road by the modal shift to rail, will be re-used by other automobile travels (Mackett, Edwards 1998).

Finally, if the assessment process is now an instrument of good governance, it still remains a difficult and risky exercise, especially in the case of tram projects. The mechanisms to be observed are complex and some hasty interpretations should not be considered as definitive. Thus, the implementation of an objective assessment includes a risk, a risk to limit at least the enthusiasm of the decision makers, and to reappraise at peak the project.

*This first part shows that there is overall a strong concern for appraising public policies and new infrastructures, such as tram lines, in particular. This interest in assessment contrasts with the skepticism of the scientific literature about the demonstration of a direct link between infrastructure and territory. The inherent complexity of territorial systems proscribes the research for structuring effects but strengthens the interest of an observation of congruences between transport and territories. In order to perform this observation, we will first carry out a detailed investigation on the French case where the tram is seen more as a planning tool. We will then adopt a comparative approach between the major European models of assessment process of territorial tram effects (the United Kingdom, Germany and France).*

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development trends being influenced by the new systems. In their study of the impacts of light rail in France, the United States and Canada, Walmsley and Perrett (1992) concluded that light rail could not create development but could influence the location of development under favourable circumstances, particularly when there are suitable mechanisms to harness the benefits.

## II The French case : a collective enthusiasm for modern tramway but a discrete practice of ex post assessment

### II.1 The “French” tram : a combine tool of transport and town planning policies

Faced with a growing urban traffic congestion due to an excessive presence of cars, national and local actors have reshaped their policies since the late 1980's by promoting the development of alternative modes, including public transport.

That is particularly reflected in a revival of tramways after deletion of the rails in the 1950's. Since the tram return in 1985 in the urban area of Nantes, its appearance or reappearance in the urban areas has increased steadily. In 2011, we can count no less than eighteen French cities served by at least a tram line. This is equivalent to a little more than 400km of tram lines with 92% located in provincial cities. This number will continue to grow by 2015 with nearly ten new cities that will be equipped with an urban railway service.

This marked return of public transport in cities designed for cars is a strong change of political vision. This section will analyze how the tramway has become essential in the eyes of local actors as a tool for organizing urban mobility but also as a support for town planning policies and image.

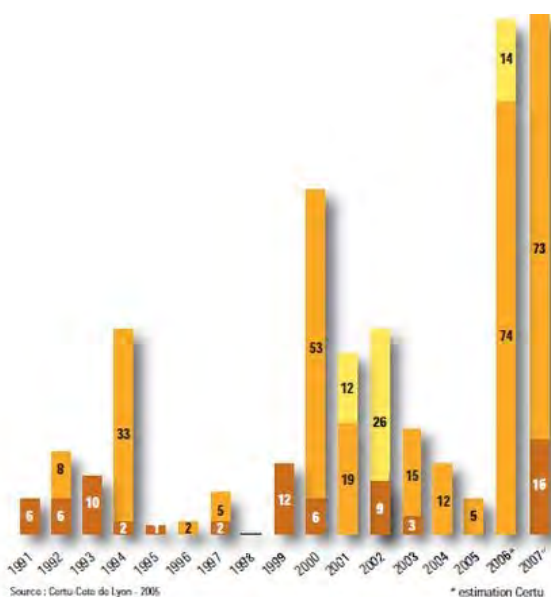


Illustration 1: Length of public transport guided infrastructures since 1991 (per km) - source : CERTU

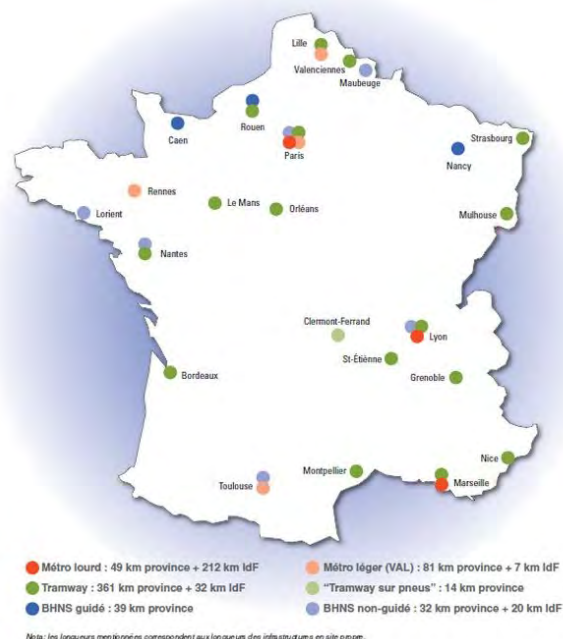


Illustration 2: Cities with urban transport public systems with own space - status 2009 - source : CERTU

#### II.1.1 An obligation of coherence between transport and town planning policies required by local actors

Mobility needs of people result from the spatial organization of the territory, especially the location of housing areas, employment areas, urban centers, amenities. The organization of public transport system is thus highly dependent on development and planning policies.

This strong interdependence was translated in the French regulation by a series of laws since 2000 in order to strengthen the consistency between sectoral policies relating to town planning, housing and transport. Public transports are strongly targeted. This part will analyze how this issue about coherence between transport and town planning is reflected in the texts and in the facts on the French territory.

### ***II.1.1.a A regulatory environment in favor of sustainable travels***

Since the early 1980's, French urban policies are subjected to a legislative and regulatory framework encouraging to seek greater consistency between transport and land use planning.

We find this incentive to broader thinkings about travels in the reference law on the transport organization in 1982, called "LOTI Law"<sup>13</sup> following the example of what was practiced predominantly (mono-modal approach). This law of transport decentralization which has established different levels of competence in transport organization, incites the communities to conduct more comprehensive travel policies. So, a first generation of urban mobility plans, called in French "Plans de déplacements urbains PDU" appeared in 1984.

Faced with increasing environmental concerns, the regulatory package was reinforced, firstly with the promulgation in 1996 of a new law for the conservation of energy<sup>14</sup> which made compulsory the establishment of these mobility plans for urban areas over 100,000 inhabitants. Then, the "Solidarity and Urban Renewal" law (SRU) acted in December 2000 reinforced the french legal framework. It strengthened the role of mobility plans which became the main tool for transport planning, with a specific objective to develop public transport.

The development of these plans in cities with over 100,000 inhabitants then leads to a multiplication of tramway projects considered as the alternative solution to underground for cities under one million inhabitants.

But this legislative measure of the early 2000's marks time in dealing, in the same law, with the issues of transport, town planning and housing policies. This triptych law affirms the necessity for greater coherence between sectoral policies and sets up new planning tools replacing former measures (master plans, land use plans) to achieve this goal :

- the Territorial Coherence plan called the SCOT in France, is a long term strategic tool for planning between local councils, without however being a programming document; it gives a view of the territorial project at the scale of the travels territories<sup>15</sup>;

- the Local town plan called by the acronym PLU in France, is a planning document at the scale of the communal perimeter for the medium term. It has to be coherent with the SCOT and the PDU.

In 2007, the action of the French government in favor of a better coherence of the sectoral policies had been continued with a wide consultation on the theme of ecology, sustainable development and planning called "Grenelle de l'environnement." The transport policy legitimately invites itself within the discussions about energy, employment, health, climate change or building. The spirit of this Grenelle relies on the definition of a mobility policy for a sustainable development. It has to fit into the three mainstays of sustainable development (environmental / economic / social) while being based on a balance of urban development,

13 Acronym of « Loi d'Orientation des Transports Intérieurs » voted on December 1982

14 Law voted in December 1996 and related to air and rational use of energy called law « LAURE »

15 In the facts, the SCOT perimeters correspond to political boundaries, most often at the level of an arrondissement (subdivision of a department which is larger than a canton)

a mix of urban and social functions, and as well as on a reduction of greenhouse gases emissions and preservation of biodiversity. This policy must be able to intervene in the growth of urban mobility.

Within the framework of territorial planning, the challenge is not to approach the travels' issue as an ex-post answer for a development project, but it is to integrate this issue as well as those related to urban development within an overall discussion about a territory project according to its uses.

The translation of the Grenelle commitments in two laws in August 2009 and July 2010<sup>16</sup> led to impose an objectives' framework which should be met for territorial planning by all stakeholders in order to fight against urban sprawl and energy loss.

The law "Grenelle 1" confirmed the priority commitment to develop public transports with the construction of 1.800km of public transport in own space of circulation by 2020. Beyond the development of railway systems, it has focused on the coherence between transport and urban development by laying down the consideration of a criterion of relationship between the level of service of public transport and the density of population in the planning documents<sup>17</sup>. The law "Grenelle 2" introduced the possibility of setting up a flat tax on capital gains of bare lands and built buildings resulting from the implementation of public transport infrastructures.

### ***II.1.1.b Specific tools developed by local actors for a better coordination between transport systems and urban development***

We earlier saw that the legislative arrangements since the early 2000s have offered planning tools in order to reach a coherence between transport and urban planning (SCOT, PLU, PDU). But face with the consequences of french institutional divisions resulting from a splitting up of competences, some actors of transport policy and of urban development policy mobilized to implement new tools, in addition to the traditional tools of urban planning, to ensure coherence between sectoral policies, and in particular between the fields of transport and urban planning.

These relatively recent tools are based on either the formalization of a governance between actors or on a process of mutual thought which is originally technical and that will have to be translated in the planning documents in order to promote a development and an urban planning towards the structuring axes of public transport.

We had no will to discuss exhaustively all the tools. We preferred to focus on two examples of answers provided by French authorities to develop transport and urban planning within a harmonious and sustainable context. These two examples - the axis contract implemented on the tram network of Grenoble and the DIVAT approach deployed in the metropolitan area of Lille - illustrate the possible tools to reach a coherence between policies, and that beyond regulatory tools. Their interest is they show different governance models depending on the competence sharing out between public institutions. In the case of the axis contract, it consists in showing how it is possible to reach the coherence of sectoral policies even though institutional competences are scattered in different structures. The DIVAT approach deals with the issue of policies transversality within an institution gathering different competences.

<sup>16</sup> Law voted in August 2009 related to programmation of the implementation of the Grenelle environment, law « Grenelle 1 »,

Law voted in July 2010 about national commitment to environment, law « Grenelle 2 »

<sup>17</sup> Confered to the article 7 of the law Grenelle 1

Other co-operation actions have been realized in the Paris region (charter for a sustainable territory around the subway extension of line 11), in Toulouse (axis contract) or in Geneva (Switzerland) where the approach is based on the concept of urban coordinated development perimeters (PACA) corresponding to development areas related to the creation of transport corridors.

*Axis Contract : a model of close cooperation between transport actors and urban development actors*

This first example of governance relates to the case where competences of urban planning and transport are divided into different structures. In this case, as the local authority in charge of transport is not a property operator, it can not achieve the urban development around stations of transport public lines.

However, the transport authority considers that there is an interest to reconcile urban development and transport. Indeed, it may directly or indirectly improve the networks attendance by the proximity of the local residents.

On the occasion of a new transport line project, she may take the initiative to set up a partnership with urban planning actors in order to coordinate sectoral policies. This is the approach taken by the transport authority of Grenoble, the “Syndicat Mixte des Transports Collectifs” Transports (SMTC), in 2005, on the occasion of the completion of the fifth tramway line of the city (E line).

Discussions during seminars between these different competences made it possible to highlight the will to formalize in a contract this active collaboration between transport and urban planning actors. This contract is based on two main consensual principles :

- the urban projects planed around the transport public lines must be negotiated with objectives of density, diversity and quality of life,
- the implementation of an anticipated property land action should encourage public control of operations.

Local actors have formalized this collaboration by the signing of a charter “town planning and transport”. This charter translates their wish to fit into a comprehensive approach of urban development by coordinating policies of town planning and transport for each structuring transport public project.



Illustration 3: The partners' commitments through 12 principles of the charter « town planning and transport » - source : SMTC Grenoble

For the operational implementation of this charter's principles, the urban area's actors have chosen a new contractual tool : the axis contract.

This contract meets a dual purpose. On the one hand, it resembles to a process of studies and governance. Its challenge is to open up the phase of transport system conception led by the transport authority (design of the infrastructure and the service that will be available to users) and the urban development strategy around the axis which is defined by the municipalities or the instance in charge of cooperation between municipalities. The challenge is to manage to co-define or co-adapt the transport system route and the potentialities of urban mutation in a corridor around the axis (generally within 500m around the axis).

On the other hand, beyond the interest of a partnership process of studies, this contract has a decision-making scope because it includes the registration of the reciprocal commitments from the transport authority and the municipalities or institution of cooperation.

For the contracting authority of the transport project, these commitments may involve both transport supply and the implementation of the infrastructure, or even the schedule or the financing of the operation. Municipalities or cooperation institutions agree on a strategy of densification around the tramway and on urban accompanied operations such as re-qualification of public spaces or achievements of pathways towards the stations.



Illustration 4: Corridor for urban intensification around the E tram line in Grenoble - source : SMTC

### The axis contract's commitments of the tram line E in Grenoble (source: AURG)

\* to implement an efficient and sustainable mobility supply : SMTC, authority in charge of transport public and contracting authority of the tram line E, promises to set up all the necessary means to the commissioning of the line in 2014. To make tram accessibility easier and to contribute to the global attractiveness of transport public, the other transport authorities and the roadway managers also promise to carry out some works for the pedestrians and cyclists and also some parks and ride. They are also committed to ensure a coordination between networks.

\* to reorganize the car traffic in favor of the reconquest of urban spaces, with a particular emphasis on the function of local service to the detriment of a transit function and by giving tram priority at all crossroads.

\* to create public spaces with quality around the tram corridor and to develop urban polarities

\* to develop the urbanisation around the tram line E:

The actors jointly defined a "corridor of urban intensification" as a preferential place for urban development with quantitative objectives for production of housing, equipment and activities areas.

Extracts - source: AURG

This tool created and signed in June 2011 in Grenoble for the implementation of a new tram line represents one of the governance tools for planners which is based on a project approach aiming to reach a congruence between transportation system and future urban development.

This kind of tool is based on an adjustable mechanism. Indeed, some railway stations contracts are under discussions. It thus marks the beginning of a new period practice of "urban negotiated planning" as pointed out by the planning agency of the Grenoble region.

### The "DIVAT" approach : developments around the structuring axes of public transport

This second example relates to a process initiated by a local authority who has competences in urban transport and planning. Even in the case of an unified structure, reaching a coherence between these policies requires the management of the internal transversality of thoughts and actions.

This issue of coordination between transport public system and regional planning especially arises in the territories which are or will be served by these transport public. Thinking about the challenges of coherence between these policies requires to identify the sectors



concerned and thus the influence areas of tramway lines in order to decline the leanings, to share them between all actors and finally to translate them in operational plans.

The Urban Community of Lille Métropole which is an institution of cooperation between 85 municipalities with competences in town planning and city transport on its perimeter has addressed these issues in 2007 /2008, during the review of its urban mobility plan. This review was part of a political will to implement the principles of a “compact city” in order to save car travels and to promote sustainable mobility.

To decline this principle of “compact city”, the metropolitan institution has developed a new methodological tool to reach coherence between transport policies and urban planning. This tool is called “DIVAT”, acronym for discs of Valorization of transport axes. It is tended to be a help for planners to define, on a given perimeter, the prospective of a possible sustainable development close to the stations of the structuring transport public network.

These DIVAT correspond to discs with a radius of 500m<sup>18</sup> centered around a subway, tram or train station. They represent an area of about 78 hectares around a transport node. Having a network made up of different types of transport public lines, the local authority has chosen to rank the DIVAT in five levels according to the nature of the structuring networks (subway, tram, regional train stations, urban and suburban important lines).

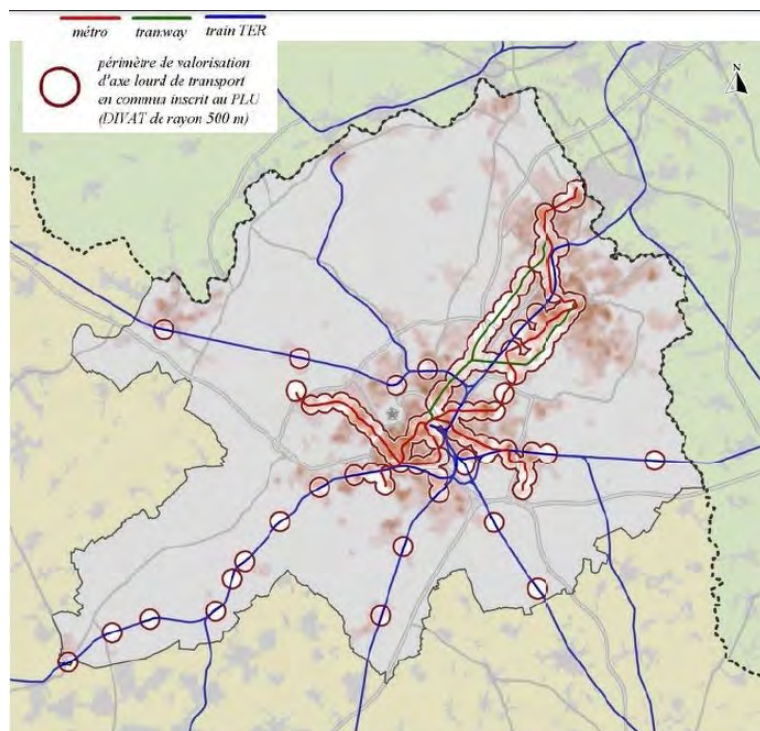


Illustration 5: 120 DIVAT définis sur le réseau actuel de la métropole lilloise - source : LMCU

The challenges in these discs are threefold. It consists in a better connection between the city and its public transport networks by seeking densification of these strategic nodal points, by promoting the use of alternative modes (walking or cycling), as well as by thinking up urban development forms more sustainable in consistency with travels issues.

A diagnosis of the existing property potential in these discs allows the authority to define the stakes of regulatory densities' evolutions in order to tend towards stronger thresholds for each station depending on characteristics and local urban forms. Besides, a diagnosis of the conditions of the accessibility to the station allows to identify the possible levers for bicycle and car parkings in order to promote the use of sustainable modes. And also it can

<sup>18</sup> The choice to take a distance of 500 meters reflects an accessibility to the station within 10 minutes walk away.

help to identify works to be planned to make bike and pedestrian connections more comfortable and direct.

This process initiated by the transport authority of the metropolitan area of Lille which associates elected officials in charge of urban planning, has led to include in the new urban mobility plan votes in May 2011, precise clauses about coherence between transport system and urban development. Indeed, one of the major themes relates to the links between the issue of dense city and mobilities. The PDU recommends to analyze this coherence from each of the four objectives declined in an action program :

- to develop the dense city articulated with all the transport network,
- to systematize micro urban mobility plans,
- to work in terms of pedagogy, exemplary nature and communication about the issue of connection between travels and urban planning,
- and especially to give to guided public transport networks the role of supports of urban development, in order to implement the concept of the "compact city".

***"the guided public transport networks as supports and vectors of urban development"***

1- *To develop public transport axes in exclusive right of way within the DIVAT :*

*\* to treat on a hierarchical basis the DIVAT according to the quality and level of service of the transport public network (levels 1 to 3)*

*\* to give priority to urban development projects near public transport structuring axes, existing or planned, near stations of subway, tram, train station or bus with high level of service*

*\* to propose in the future SCOT and in the PLU urban requirements according to the DIVAT's level (1,2,3) by applying in particular for all new residential and economic constructions differentiated objectives of minimal densities*

*\* to propose specific standards of parking for motorized vehicles within the DIVAT concerning new constructions of offices and tertiary activities*

*\* to formalize a property strategy and an urban development strategy in these DIVAT*

*\* to develop pedestrian and cycling routes to and from transport public stations. They have to be short, accessible for everybody, comfortable and secure.*

2- *To implement axes contracts or DIVAT according to the specific context, or in articulation with the contracts of territory to reach synergies between transport public network and urban intensity*

3- *To exploit the urban development potential and the railway opportunities from rail land areas [...].*

*Extracts of the PDU 2010>2020 - source: LMCU*

Their translation have to be transposed in urban development plans during the discussions about territorial coherence plans (SCOT) and local urban planning plans (PLU). Even if the operational implementation's conditions have to be checked, this approach nevertheless shows a high political will to make otherwise urban development by considering advantages that the structuring transport public system

***Density targets suggested in the urban mobility plan (PDU) 2010>2020***

*In DIVAT of level 1:*

*\* at least 70 housings/hectare for all new housing constructions and a COS higher than 1.5 for office buildings and equal to 1 for other economic activities*

*In DIVAT of levels 2 and 3:*

*\* at least 35 housings/hectare for all new housing constructions and a COS higher than*

may bring to a sustainable territory management.

1 for office buildings and equal to 0.5 for other other economic activities

Extracts of the PDU 2010>2020 – source : LMCU  
NB: COS percentage of building density opportunity of the ground

## II.1.2 Does the tram projects governance have a potential influence on the conception of the tram line?

In France, the public transport organization had been decentralized about thirty years ago. This reform had given to local authorities a significant role based on a principle of virtual autonomy for transport public networks' development.

However, French state remains present in this issue of public transports development.

We will see in this section how the tramway projects governance leads to a specific conception of French tramways.

### II.1.2.a Different structures for the contracting authority of tram projects

The French law of transport organization in December 1982 paved the way for decentralization of transport competences by giving local authorities the role of public transports organization and management in a first time on urban and departmental scales, and in a second time on the regional scale in 2002<sup>19</sup>.

Urban transport authorities can have different legal forms. Since the institutional reform of 1999<sup>20</sup>, the French urban transport authorities' scene is mainly structured by institutions of municipalities cooperation with very different legal forms. However close to 22% of municipalities have transport competence.

They can concern associative structures having only the transport competence (associations of municipalities and other local authorities pooling financial resources and working together on common projects) or with multiple skills. But most of the transport cooperation concern federative structures between institutions (urban communities, metropolitan and communities of communes).

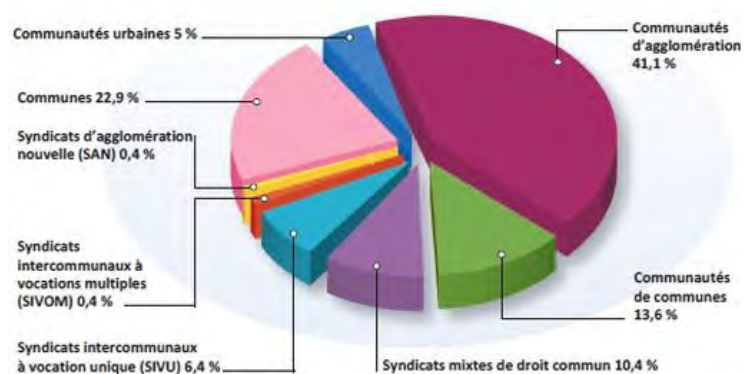


Illustration 6: French urban transport authorities in January 2010 - source : GART

One of the main differences of these legal forms concerns the possession or not of compulsory competences. Thus urban and agglomeration communities must take the urban transport competence while it is optional for communities of communes.

<sup>19</sup> The law called « Solidarity and Urban Renewal » in December 2000 continued the transport decentralization process initiated in 1982 and gave the role of rail regional transport authority to the regional institution.

<sup>20</sup> Law adopted in July 1999 about the strenghtening and simplification of municipalities cooperation. This law has accelerated the process of municipalities regrouping.

This diversity of legal cooperation institutions in charge of transport policy may explain the variability of the technical structures. Indeed we can meet light structures of transport authorities (case of small and average size transport perimeters) or, on the contrary, well structured teams (case of major transport networks).

These different profiles of technical support structures lead to different possible forms of urban transport project management.

The public project management remains largely widespread in France, even if some urban areas have opted for a private project management. This is the case in the urban area of Reims which chose a public/private partnership contract for the implementation and the management of the tramway.

In the case of public project management, the project management may take different forms like a direct control by the public authority such as the case of Grenoble, or like a transfer of powers (mandate). This is the case of the tramway in Orleans, because the urban transport authority had chosen to entrust the project management to a mixed economy company (Semtao) who manages the urban transport network.

Some communities keep their role of contracting authority but decide to surround themselves with a technical assistance on specific points of the project (legal and financial assistance, schedule management,...).

The situation is much more complex for projects which go out of the competence perimeter of the transport authority. From a strict institutional point of view, the emergence of suburban tram or tram train projects in France bumps into the separation of competences and into the different perimeters of transport. These rail projects which stretch beyond the urban transport perimeter, question the positioning of other institutional authorities such as the Department or the Region. They correspond to "interspace" transport projects which are not exclusively urban, nor exclusively regional. They shake up the French institutional architecture by pointing the existence of an institutional vacuum in these "inter-territories". About the French institutional public transport context, Sylvain Barone supposes that "some observable developments from the local public action contribute to overcome this scheme of competence management", inherited from the LOTI law (1982). This transformation is especially striking through the suburban rail projects : these systems "raise questions because of their positioning at the crossroads of different regulatory, technical and professional worlds" (Barone, 2010).

The recent implementation of a tram-train connecting Mulhouse to the Thur valley at the foot of the Vosges mountains highlighted the complexity of French transport institutions' organization which leads to a splitting up of competences. It should be a brake to projects' development. The political will of local actors and the implementation of a new governance without precedent ensured to make the suburban transport system a reality in December 2010 whereas the idea was launched in 1995.



Illustration 7: Le tram-train de Mulhouse en gare de Thann - photo CETE Nord Picardie

### **The tram-train of Mulhouse**

The first tram-train in France was opened in December 2010 in Mulhouse. It connects this center to the city of Thann which is in the Thur Valley. The route of 22km takes some urban rail tracks of the tramway of Mulhouse and some national rail tracks on which regional trains are also running.

This system which runs over the competence perimeter of the urban transport authority required the implementation of a specific governance to reach a partnership between the diversity of implied actors:

- \* two contracting authorities (the Alsace Region is competent for regional rail transports and the urban area authority of Mulhouse is competent for the urban part of the project),
- \* two operators (SNCF company operates on regional rail trains and Soléa company is in charge of the operation of the urban transport network)
- \* the owner of the national rail network (RFF) who is the contracting authority of all infrastructures development,
- \* the towns crossed by the project
- \* and the Department in order to improve the connections with his interurban network (coaches).

### **II.1.2.b A decision-making process based on various phases of participatory consultation**

The French legislation lays down the principle of public participation<sup>21</sup> for all infrastructures projects. So, the contracting authorities of tram projects are subjected to the implementation of several times of participatory consultation during the project's life. The main objective is to collect the observations raised by the project and to take them into account in its conception.

As required by the Town Planning Code for any development project, which "by its importance or its nature, may substantially change quality of life or economic activity of the city" (L300-2 Article), the contracting authority is required to carry out a public consultation upstream, also called prior consultation, based on the preliminary draft studies. This administrative procedure allows a first phase of meeting between the elected officials carrying the project, actors and citizens of the towns concerned. In addition to the public information about the project, this phase invites to do comments on the project (its issues, features, cost,...) and thus to collect any opinion and suggestion.

The spirit of this prior consultation is then to refine the characteristics of the tram project in order to take the best into account the population expectations while respecting the general interest.

Moreover, by applying the strengthened clauses of public participation for major regional planning projects with regard to railway lines introduced by the law of February 2002, tram projects may need to implement a public debate. In fact, the different seizures of jurisdiction

<sup>21</sup> Principle which was known in the 70-80s but officially transcribed in a law in February 1995 related to environment protection. This law is named « Law Barnier » and had been reinforced by another law in February 2012 concerning local democracy.

of the National Commission for Public Debate (CNDP), main public participation organ, often led to conclude that there was no need for a public debate as these projects were considered as local interest. And so this structure recommends the consultation procedures or local debate such as in the case of the two tram projects of the former mining territory in 2009 for example. In those two cases, the national commission invited the transport authority to organize a preliminary debate and to ensure “the public participation, in particular through public meetings which should inform the population and collect the opinion of residents and users about the different aspects of the project, its environmental impact, its phasing and financing as well as the consultation process until the public inquiry and during construction” (SMT, 2009).

The other time of the consultation occurs just before the launch of the operational phase of the project, the start of work. This new phase of public consultation includes the implementation of a public inquiry based on a case which presents the project at the conception stage and includes an analysis of the environment impact. The aim is to assert and justify the public interest of the project. When the results of the public inquiry confirm this interest, it is then translated through administrative decisions transcribing the general interest of the project (project declaration taken by the transport authority or declaration of public utility pronounced by the local representative of the government - the Prefect - in the case of an expropriation procedure). This final phase of consultation makes it possible to legitimate the project.

Consultation procedures appear to be key moments in the maturation of a tram project. It represents an opportunity for the contracting authority to bring out the fact that his project is well legitimate. But above all, the different consultation times introduce a balance of power because they offer the opposition groups to rally against the project and so there is an ambiguity in the representativeness of the public, as already noted by Philippe Subra : “the opponent mobilizes, the partisan remains passive; the degree of mobilization decreases with distance, regardless of the real interest of the project” (Subra, 2007).

This balance of power is however important, because it offers the possibility of negotiation, not for the whole project, but specific changes in the program, or compensations. In most cases, these negotiations are about the project's route and parking. For example, in the city of Valenciennes, the first tram line had been the subject of intense negotiations which led to many redefinitions of the route and to a compromise of the parking policy, causing very limited inconvenience for motorists (Frère, Richer, 2007).

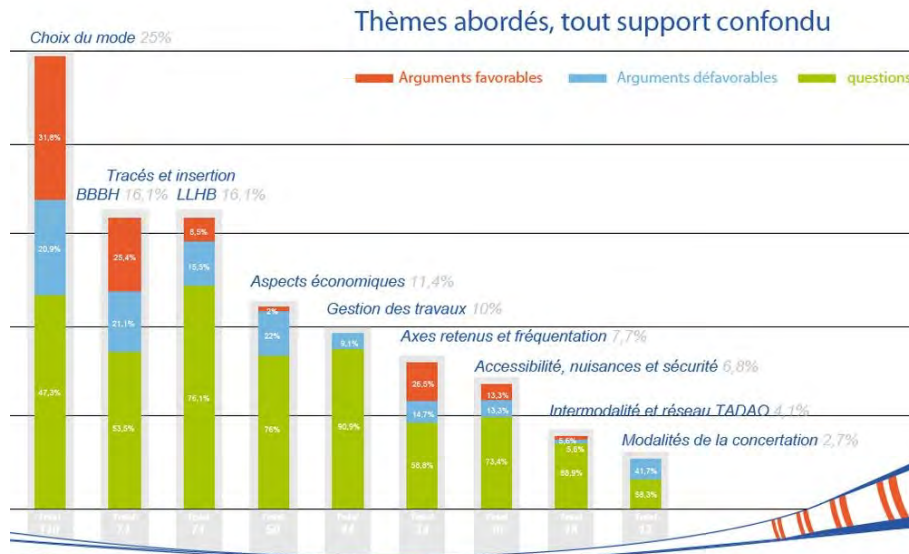


Illustration 8: The main themes discussed during the prior consultation about the two tram projects in the mining territory of the north of France – source : SMT Artois Gohelle 2009

### II.1.2.c The French government action : to strive for a tram model?transport

Since the decentralization of transport competences, the French government still remains very present in the policy of public transport.

His role can be seen as a partner of local authorities to achieve the objectives of sustainable development.

On the occasion of the “Grenelle of environment” which was encouraged by the French state in 2007, the role of transport (including urban and suburban transports) was reaffirmed for a sustainable territorial development in close synergy with the other sectoral policies, including urban planning. In agreement with all relevant partners, the French government requested that the collective commitments take into account the further development of public transport which has been strongly encouraged since twenty years. The Grenelle 1 law of 2009 was a first step in implementing the commitments and registered the priority of this development with a target of 1.800km of public transport line in exclusive right of way by 2020.

Besides, this law “Grenelle 1”<sup>22</sup> also recalled the obligations of the state to encourage the elaboration of local mobility plans and to think about the possibility for local authorities to introduce a tax on the value of no-built lands and of buildings resulting from a transport public infrastructure's project.

Since the decentralization, in order to promote transport public development, the French government set up campaigns of financial support policies for structuring public projects. The first period ran from the earlier 1980s to 2003 and was the occasion of the publication is marked by the appearance in 1994 of framework documents called “circulars” which officially transcribed the methods of fundings<sup>23</sup>. But in 2004, the budgetary constraints and the context of increased decentralization led the French state to stop these subsidies.

<sup>22</sup> Article 13 of the law

<sup>23</sup> Circulars of the Ministry in charge of Transport No. 94-91 of December 1994 related on governmental fundings for public provincial transport projects called "circular Idrac" and No. 2001-51 of July 2001 about governmental financial aids for implementation of urban transport plans and provincial transport.

The return of financial aids took place during the implementation of the Grenelle commitments in order to achieve the realization of new structuring transport systems. Thus the state set up two procedures of call for proposals in 2008 and 2010 in order to select projects.

This subsidy policy has undoubtedly encouraged local authorities to develop transport public networks. The consequence is a significant increase in the supply of structuring transport lines.

In addition to the financial aspect, it is interesting to analyze the reference texts defining the public fundings in order to determine the potential influence of the criteria on the argumentation carried by tram projects' authorities.

With the intention of transparency, the criteria of financial aids allocations are officially described in a circular of the ministry of Transport in 1994, a period marked by the development of trams projects in many urban areas.

The eligibility requirements to receive French subsidies were based on criteria related to the place of the project in a comprehensive travel policy and also to the idea of a different public space management encouraged by the transport project, including in particular the issue of the public space share in favor of public transport.

The allocation's procedure was based on the principle of a ministerial taking account procedure for transport public projects over 15 M€ on the basis on a document justifying the choice of a network and/or the transport line. This stage was a prerequisite for any decision of subsidy allocation.

Following the enactments of different laws (law about Air Pollution Control in 1996, Law about the Solidarity and Urban Renewal in 2000 and the Kyoto commitments in 2000), the government wanted to change the conditions of subsidies attribution for public transport projects in order to reinforce the consistency between transport and urban planning policies.

Without questioning the circular of 1994, the French state wished to reexamine it in order to reflect his commitment to give financial support for the implementation of Urban Transport Plans. The new circular gives the opportunity to clarify the contents of the application files stating that they should "allow the State to assess the project in its entirety (coherence between mobility policy and urban development policy, socio-economic interests)".

The circular came into effect in July 2001 and defined the new process of subsidies for public transport projects providing significant improvement in service level, promoting the public space sharing but also consistent with other sectoral policies including urban development policy or town policy (serving the priority districts) and accessibility for people with reduced mobility. The analysis of eligibility criteria puts forwards, alongside transport criteria, criteria encouraging authorities to give to their projects a role of integrator elements of urban policies.

	Eligibility Criteria of public transport projects for a public french subsidy
Circular July 2001	<ul style="list-style-type: none"> <li>- comprehensive approach of urban travels : coherence between transport and urban planning policies</li> <li>- development of intermodality with the transport line project (functional and physical intermodality)</li> <li>- restructuring of the network</li> </ul>



	<ul style="list-style-type: none"> <li>- justification of the choice of the mode and the route</li> <li>- priority given to the run of the transport public system TC (new road sharing, parking policy)</li> <li>- integration of the project in its urban environment (effect of urban structuring, local amenities considered)</li> <li>- service of the priority districts under the meaning of the city policy</li> <li>- reduction of energy and environmental impacts</li> <li>- optimal use of public resources (financial feasibility and socio-economic evaluation revealing the internal rate of return)</li> </ul>
1st call for projects October 2008	<ul style="list-style-type: none"> <li>- integration in a global urban strategy, including densification actions of along transport corridors and based on a policy of urbanization of new areas</li> <li>- policy of modal shift from car to public transport system and complementarity with the other modes (bicycle, walk) while taking care to develop the exchanges and to have a real network</li> </ul>
2nd call for projects October 2010	<ul style="list-style-type: none"> <li>- service of the major equipments</li> <li>- opening-up of the priority districts (policy of the city)</li> <li>- long-term financial sustainability</li> </ul>

Further to the Grenelle, the French government decided to use a regulatory frame of calls for projects in order to select the projects to be supported. At the end of 2011, two calls for proposals were launched by the government. The first one from 2008 supported about fifty public transport projects in 36 urban areas representing a state aid of 810 million euros. A second call for proposal at the end of 2010 involved nearly eighty projects including about thirty tram projects.

Reference texts of these two calls for proposals reveal the expected objectives of these public transport projects. Of the five major objectives targeted by the French state, three of them are directly related to the coherence to seek between transport project and urban policies : integration of the transport project in an urban strategy aiming to develop these structuring transport axes, open-up the priority districts and serve the major equipments.

Even if the preamble of these texts insists on projects allowing a “good-quality transport conditions” to a maximum of individuals to have “good quality transport conditions”, it should be noted the heightening in this circular compared to the one of 2001, to confer to the transport public project a role of an urban project.

This framing by the French State of the trends to be sought for the public transport projects including trams is not without impact on the way they are designed and implemented in the country.

#### ***II.1.2.d Impact of the financial package on the project design***

Further to the first oil crisis in the early 1970s and faced with the observation of the negative effects of the “nothing but the car” culture (pollution, congestion), the French State set up a new tax in order to contribute to give a boost to public transport systems. This new tax named “Versement Transport” (VT) intended to finance these transports. It concerns public and private employers that employ more than nine employees in the competence perimeter of the urban transport authority.

The conditions for determining the rate of this deduction on the payroll are specified in the general code of territorial authorities<sup>24</sup>. The principle of an adjustment of this rate fixed by the transport authority is based on the legal form of the authority, the population threshold, the existence of a city which attracts tourists within the perimeter, but also on the decision to implement a project of public transport in exclusive right of way.

		Taux plafond	+ majoration intercommunalité <sup>1</sup>	+ majoration commune touristique <sup>2</sup>
Agglomération de plus de 100 000 habitants	TCSP	1,75 %	1,80 %	2,00 %
	sans TCSP	1,00 %	1,05 %	1,25 %
Agglomération de 50 à 100 000 habitants	TCSP	0,85 %	0,90 %	1,10 %
	sans TCSP	0,55 %	0,60 %	0,80 %
Agglomération de 10 à 50 000 habitants		0,55 %	0,60 %	0,80 %
Agglomération de moins de 10 000 habitants				? <sup>3</sup>

1 - Bonus de 0,05 % accordé aux communautés d'agglomération, urbaines, de communes et aux syndicats mixtes de droit commun.

2 - Bonus de 0,2 % accordé aux agglomérations dont le PTU comprend au moins une commune touristique.

3 - Possibilité de création du VT pour ces agglomérations votée dans la loi Grenelle II mais pas de taux fixé, ce qui rend la disposition inapplicable pour le moment.

Illustration 9: The maximum rate of the tax « versement transport » (excluding Paris Region) in 2011 – source : GART

By 1988, the corrective finance law allowed to increase the rate of the “Versement transport” in the case of a transport authority who has received a financial state funding for her transport project. The highest rate reaches 1.75 % of the wage bill for authorities of more than 100,000 inhabitants who have decided to achieve a public transport infrastructure and obtained a financial state aid.

This clause is further relaxed by the finance law in 1997. It is adapted also to transport authorities who have received “a commitment in principle on a financial support of the corresponding investment” from the State (this commitment corresponds to the procedure of “taking into account” that we mentioned earlier). This clause allows authorities, by increasing the transport tax rate during the preliminary studies, to get a more substantial amount of resources at the beginning of the project's work.

A second relaxing is given by the finance law in 2004, allowing the Urban Transport Authority to raise the VT rate within the limit of the ceiling if she has decided to implement a road or guided public transport infrastructure. However the French government introduced a clause which makes compulsory the beginning of infrastructure work within a period of five years from the decision date of increasing the transport tax. In the absence of beginning of work, the authority would be subjected to lower the rate to 1 %.

24 Definition in the Article L2333-67 of the general code of local authorities which brings together all the laws and regulations relating to the right of them.

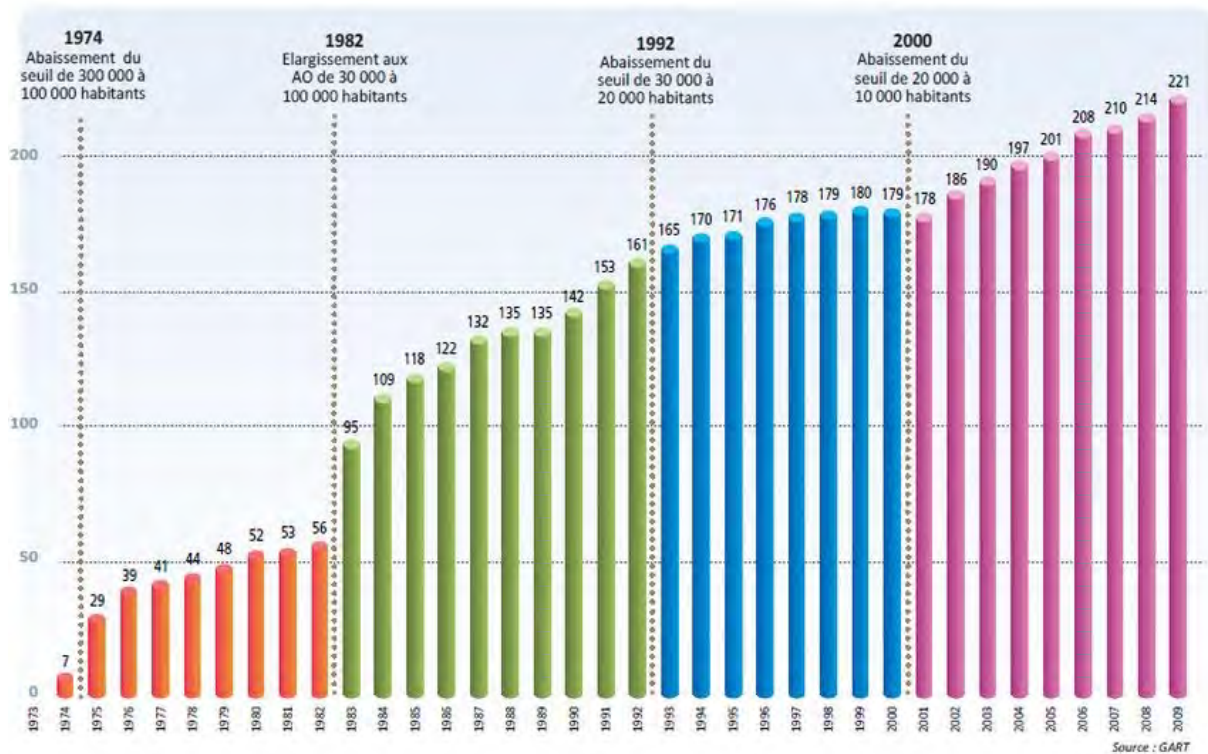


Illustration 10: Evolution of the number of urban transport authorities who have set up the transport tax since 1973- source : GART

The introduction of this specific tax allocated to public transports and the different reforms on the adjustment of its rate have enabled authorities to help them in the financial arrangement of their public transport projects.

In the table below, we propose an analysis of the impact of these clauses for an urban transport authority competent on a territory of 300,000 inhabitants and including a conurbation with a financial base (wage bill) of 3.000M€.

*The “Versement Transport” tax : an incentive tax for structuring public transport projects.*

Periods	Reforms of tax rates (VT)	Annual Amount of the VT without structuring public transport project	Annual Amount of the VT with structuring public transport project	Annual Amount of the VT obtained before commissioning structuring public transport project	Date of structuring public transport projects which have profited from these reforms
Before 1974	No transport tax	0	0	0	
Starting from 1974	VT at 1%	30 M€	30 M€	0	1974: Lyon (subway) 1977: Marseilles (subway) 1983: Lille (subway) 1985: Nantes (tram) 1987: Grenoble (tram)
Starting from 1988	VT at 1% without structuring public transport projects at 1.75% with	30 M€	52.5 M€	45 M€	1993: Toulouse (subway) 1994: Rouen (tram) 1994: Strasbourg (tram)

	structuring public transport projects having obtained a financial aid of the State (approximately 2 years before commissioning)				
Starting from 1993	Same as above but with an increase of +0.05 for authority including a community	31.5 M€	54 M€	45 M€	
Starting from 1997	Same as above but with a rate of VT with 1.75% (1.80) from the taking into account of the State (approximately 4 years before commissioning)	31.5 M€	54 M€	90 M€	2000: Orleans, Nancy, Montpellier (tram) 2002: Caen (tram), Rennes (subway) 2003: Bordeaux (tram) 2006: Mulhouse, Valenciennes, Clermond-Fd (tram) 2007: Nice, Le Mans (tram)
Starting from 2004	Same as above, VT with 1.75% (1.80) from the decision to carry out a structuring public transport project (5 years maximum before work, that is to say approximately 6 years before commissioning)	31.5 M€	54 M€	135 M€	2011: Reims, Angers (tram) 2012: Le Havre, Brest, Dijon (tram) 2013: Tours (tram) 2015: Besançon (tram) 2016: Lens, Nîmes, Avignon (Tram)

The functioning of the Transport Tax, main financing way for urban public transport in France (on average, 42% of the budget of the urban areas having a structuring public transport system), constitutes a real incentive to build structuring public transport networks. It is also widely used by urban areas authorities which may collect increased rates as soon as they decide to implement a structuring public transport project, within the 5 years limit mentioned above. So, since the 2000s, the pressure on the Transport Tax increases due to the completion of tramway networks : about twenty new urban areas have implemented a tram, started its construction, or decided its implementation.

*“The rise of the rates of transport tax, in particular in urban areas with structuring public transport systems (Besançon, Dijon, Lens, Metz, Perpignan, Tours, etc), explains almost 70% of the growth of the transport tax amount between 2008 and 2009”.*



Illustration 11: Evolution of the transport tax amount in millions of euros 2009 - source : GART

## Extract “year 2009 of urban public transport” - GART

But the only Transport Tax which is the self-financing, and which may be optionally completed by a financial participation of the French state is not sufficient to finance tram projects. Before resorting to loans - an increasingly mobilized procedure- the transport authorities seek public co-financing from other authorities such as the Region and the Department, but also from local institutions (municipalities or other public institutions). The support from these actors requires a stronger negotiation than if they were not co-financers. This negotiation must occur upstream of the project with a validation of the conception principles retained for the road impacted by the project (the “façade à façade” in French terms) and even for induced operations (urban redevelopment of places). This leads to a variability in costs per kilometer of tramway projects according to the territory concerned and the developments selected.

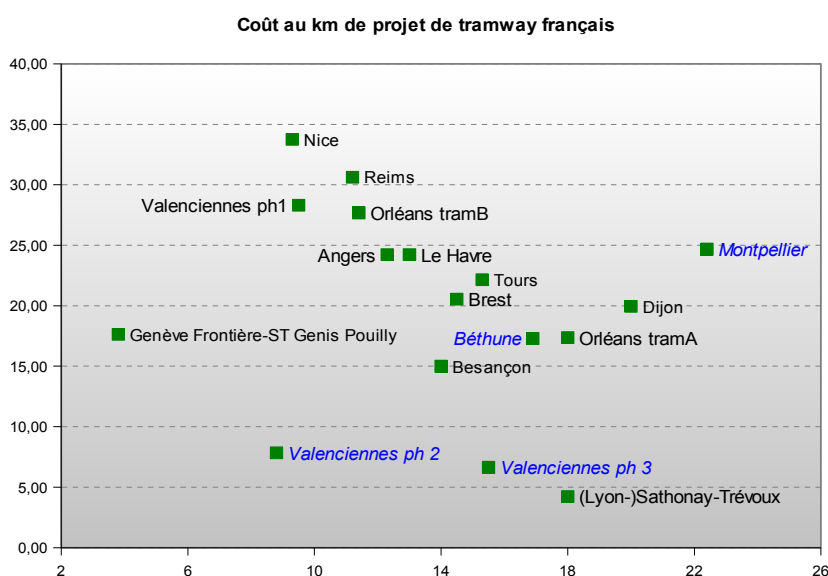


Illustration 12: Variability in costs of French tramway (in M€/km) - conception : CETE Nord Picardie

### II.1.3 Tram projects designed for a dual function: transport and new image of the city

#### II.1.3.a Can we talk about standardized arguments of French tram projects ?

We earlier saw that the participatory consultation that is called for tram projects invites the contracting authorities to present them in all their facets in order to legitimate their choice, both in terms of transport and urban integration.

Moreover, through its various phases of financial accompaniment, the State focused the required directions for structuring public transport projects on a limited number of schemes about transport and urban development. This can be seen as a support for the establishment of arguments in favor of structuring transport, and more precisely in favor of tramway.

As suggested by Hamman (2011), “the implementation and production's process of tramways in urban areas stand out around two principal production ways that one can wonder whether they follow one another, or whether they are opposed or overlap :

- reading the city through a social prism is a first method to build the process. In this case, travels and their accessibility are seen as a tool for urban planning and “social urban policy”.
- the second way is more fitted in an environmental standard - “promoting environmentally friendly public transport face to congestion and urban pollution, or making the city greener.

At the territorial level, the choice argument of a tram system often comes down to the expression of its objectives through short and concise messages combining transport issue with issues about the image and the economic attractiveness of the city. In Tours, the tram project under construction has to meet mobility's needs in good conditions but it has also allow to embellish the city and protect the environment. Beyond these aspects, the local authority has taken major arguments about the contribution to a revitalization of urban spaces, expecting that the tramway will contribute to create business or even “to draw an united urban area”. In Brest, the tram project's argument was built on the basis of the three pillars of sustainable development. On the one hand, the tram is presented as a social project, on the basis of an “united” mode of transport making it possible to reinforce or create connections between districts. It is also shown as an environmental project by giving the idea that it should improve the quality of life and contribute to better regulates of automobile traffic. On the other hand, the elected officials consider the tramway as an economic project and consequently expect feed-back effects!

In the case of the tramway of Saint-Denis-Bobigny in the Paris region, the arguments given by local authorities in favor of the tram are organized in four registers (Offner, 1998) :

- technical rationality (travels from suburbs to suburbs increase and the car could not meet alone the solution to support this mobility);
- social demand, covered by the elected officials (as representatives of the inhabitants, they wish a collective equipment that others populations already obtained elsewhere);
- values of the left wing (promotion of public transport, preservation of a French railway industry);
- the strengthening of local identities (recognition of the employment basin of Bobigny-Saint-Denis, structuring a department with an heterogeneous urban fabric, improvement of the public spaces' quality ).

Through these examples, we can note that the same rhetoric is used to express the tram expected effects on mobility, on ecology, but also on economy, on urban planning and on social aspect. Is it for all that an under control discourse, a turn-key argument for elected officials in order to persuade the interest of their project? According to Carmona (2001), “the “ready to think” nature of the tram is an element that we think fundamental in the seduction of elected officials. [...] It provides ready made answers with mechanical speeches on its overvalued image, on the structuring effects, on its “anti-car” positioning etc...”.

As an “object of public utility”, Laisney (2006) does not consider the tram as a fashion phenomenon. On the contrary, he underlines its durability because “firstly, it contributes to the development of clean public transport which are an alternative to the automobile and its consuming infrastructures. Then, it durably embellishes urban public spaces and finally it is the linchpin of a doctrine about compact city and redeployment of the city on itself, central elements of a real territorial policy of sustainable development”.

### ***II.1.3.b A transport system to rethink the city development***

When we have a look at the tramways developed in France since the 1980s, we can highlight that a tramway which runs on streets, boulevards, roads, emerges to be a opportunity to seized for decision-making actors in order to erase the car hegemony resulting from past policies. That is declined by actions depending on travels policy and relating to refitting of roadway system in a logic of public share between car, public transports, bicycles and pedestrians.

But this renewal of French trams since 1985 goes beyond this issue as the tram provides another way to explore the city or the urban area, as well as to feel the environment,...

Also, actors have taken hold of the tram system to take all opportunities that may be offered on the occasion of its design and implementation. Therefore, they have had recourse to teams with specialists, architects and landscape designers in addition to tram system designers in order to work on the benefit that the tram could provide to the city image.

According to a work led by the urban development agency of Grenoble<sup>25</sup>, the interest to coordinate transport system and urban planning operations led to two generations of trams. The first one dating from the 1980s focused on the operations of public spaces developments : a new public space sharing, creation of small squares, architectural treatment of stations, and landscape integration in a logic of free space and preserved space.

The second generation of modern trams appeared with the implementation of the Grenelle of environment. It is characterized by the will to manage the public space in a sustainable way. It also faces the strong challenge of articulating transport system and urban development with the seek to give priority to the location of future developments in areas well served by public transports. Actors in charge of regional planning thus seize the transport system, whether in service or in project, in order to consider it as a structuring axis, a strategic axis for the urban development. They transcribe their intentions through planning documents such as the Territorial Coherence Plan (long-term planning) and the Local Development Plan which defines the land use. These intentions most often result in thresholds recommended as regards housing density in the corridor of a major transport axis.

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25 Agence d'Urbanisme de la Région de Grenoble, Gabriel Jourdan, " la cohérence urbanisme transports au défi des découpages institutionnels", presentation support, National Seminar-urban travel, December 2009

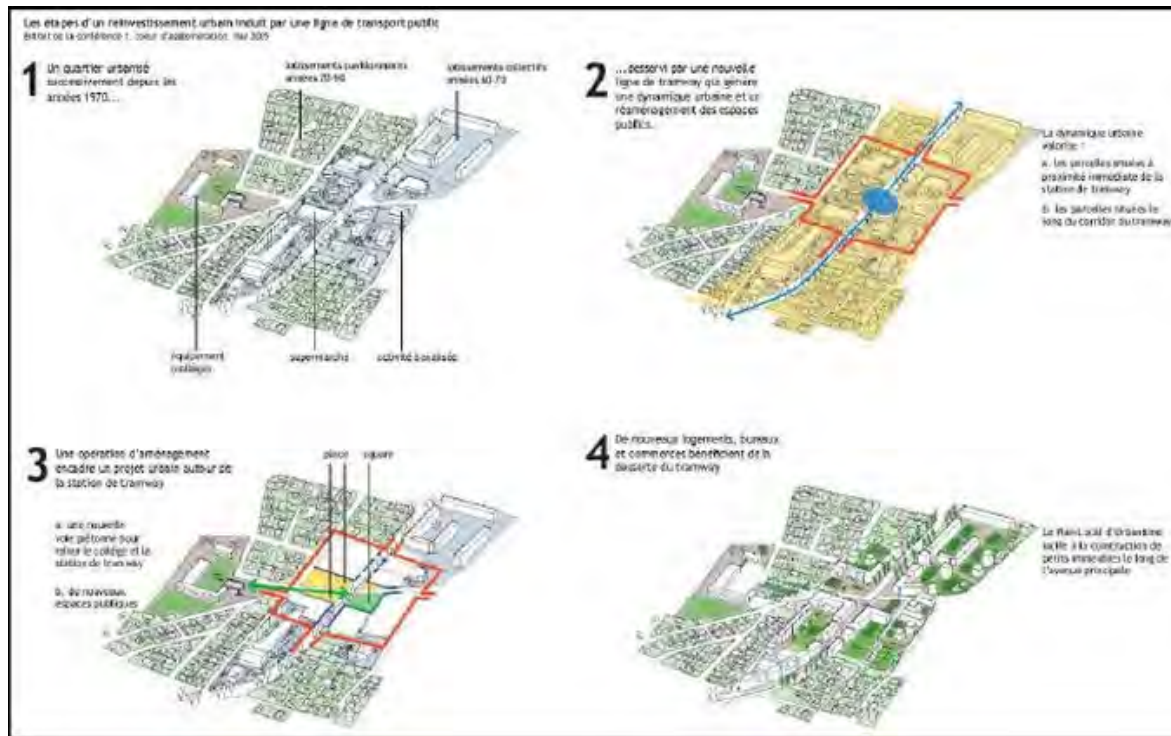


Illustration 13: The different steps of urban reinvestment induced by a public transport line – source SCOT Montpellier extract of the conference number 1, coeur d'agglomération, may 2005

We can hear the term of “town-planning tram” in France. Before even being transport projects, trams are designed as tools to rethink the city development. “The place of the tram in the city make arises not only as a modern means of transport but also as a city model ” (Hamman, Blanc, 2011). New tram lines thus appear as “actors of urban renewal” (Beaucire, 2000). Cartier (2005) points out that “since it is associated with urban policies, the tram transcends its original function of a structuring public transport system. Multifunctional urban project, the tram becomes a vector of the city image : making concrete its identity, showcase project, *media* to explore the city... Whether in a concrete or symbolic way, it contributes to the promotion of the city”. Some actors even identify the tram as a “street furniture which embellishes the crossed districts” (Di Commio, 2005).

All regional planning actors and the research agree that the tram contributes to restore urbanity in the city as underlined by Laisney (2006) : “the implementation of a tram takes in this general trend of enhancement of city centers. In the historic and strengthened city, the tram restores lost urbanity. The tram has a strong physical and symbolic presence. The tram plays the role of a common and efficient reference point of the public transport in the city”. Tram projects are now at the interface between transport and urban planning : more than just a simple means of transport, the tram is often the heart of a wider process of urban transformation. Thierry Paquot (2000) uses the term of “urban planning tram”, “a pacemaker and a multiplier of urbanity”.

Nevertheless, this town-planning function of the tram needs to be moderated. It is important to wonder about the meaning we give to the term of “town planning” when we talk about tramway projects. Is it about a deep transformation of districts or just a cleaning of the facades along the route? Is the same care given throughout the route to the architectural treatment, to the street furniture? (Cartier, 2005). That is why Thierry Paquot says that “the tram could not replace the patient work of town planners”.



French tram is undeniably a tool for regional planning, but it is primarily a transport tool which can be used in a second step for urban policies. Thus Laisney and Grillet-Aubert identify a double temporality of tram projects. “In the history of the reintegration of trams in France, there is a rhythm and a logic which are dual. In a first time, the tramway project seeks to connect a lot of equipments located in the most densely populated urban areas (housing and employment). In a second time, by a dialectical process, when the lines are built, urban actors may decide to implement new equipments and new residential areas close to the tram. If the first step is an adjustment, the second is a reversal of the priorities of urban development. Town-planning directives will promote the setting up or densification of the urban fabric in an area which is accessible to the tram, within an average 400 meters radius from the stations (this distance is known as easily walkable)”.

## ***II.2 assessments of French tram projects***

The first part of this report set out to show in which way the french tram can be seen as a urban project's tool, as a territorial planning project.

The present section focuses on the assessment practices of these systems. After a review about the french context of assessments, we start examine if the territorial expected effects which are at the heart of arguments during the phases of conception and consultation become actually a reality once the tram system runs.

### **II.2.1 The regulatory context**

In France, the principle of transport infrastructures assessments is part of an openness objective in order to inform and to involve citizens in the strategic choices made for transport policy.

We can find this principle in the enactment of the inland transport organization which was, until the end of 2010, the law of December 1982 which is called “LOTI law”. This text has been modified by successive laws. It relies on an holistic transport policy built on the basis of a varied supply developed in a logic of complementarity and co-operation between the modes, and systems interoperability.

The new Transport Code promulgated by the French State in November 2010 does not undermine the principles of this law. Its main objective is to gather all the legal clauses in a single document. It replaced the above-mentioned LOTI by resuming its main trends, including the principle of infrastructure projects assessments.

As it was the case with the LOTI law, the transport code provides two phases for the assessment process depending on the nature of the infrastructure project which is partly or entirely financed by public funding :

- a necessity to appraise at the stage of the project development, referring to an a priori assessment,
- an obligation to draw up, for specific projects, an economic and social evaluation after commissioning, corresponding to an a posteriori assessment which is very often called “LOTI bilan”.

### ***The a priori assessment***

As stated in the transport code<sup>26</sup>, the choice to implement a transport infrastructure with public funding have to be based on its economic and social efficiency.

So, the contracting authority must set up its decision on the basis of an a priori assessment which allows to value this decision from several quantitative and qualitative criteria. These criteria have to “be homogeneous, taking into account the effects of transport externalities, in particular on the environment, the safety and the health and allowing comparisons inside the same mode of transport as well as between different modes or combinations of modes”<sup>27</sup>.

This evaluation have to be made public before to the project adoption, either by integrating it to the file for the procedure of public inquiry, or by informing the public through medias.

The implementation's texts of this clause haven't been published at the time of writing this report. In France, the tramway projects since the late 1980s have occurred in the regulatory context of the LOTI law. Also, we recall here the expectations concerning the case of infrastructure project evaluation as specified in the decree of July 1984 made under the LOTI law.

An important point of the assessment relates to the financial aspects of the project. In addition to the estimation of the investment costs (construction) and operation costs (maintenance, operation and renewal) of the infrastructure, the contracting authority must also analyze the financing conditions, including an assessment of its financial profitability if possible.

However, taking into account non financial criteria is also required since the decree calls for an analysis of the project effects on existing or under construction transport equipments and an analysis of their operating conditions. In addition, the assessment procedure must list the advantages and disadvantages caused by the commissioning of the infrastructure. They are included in a calculation of a return rate for the authority including elements such as safety, rational use of energy, economic development and development of urban and rural areas.

In practice, the ex-ante assessment of tramway project often comes down to a socio-economic evaluation resulting in the calculation of an internal rate of return supposed to help for the justification of its profitability since the value of the rate is higher than the one fixed by the State. Let us recall that until 2003, the procedure for having State funding of tram projects required the contracting authorities to provide this socio-economic assessment including the rate of return in the subsidy application form.

This indicator is based on a ratio between the benefits provided by the tram project and the investment costs. The benefits take into account time-savings for all users, benefits in terms of safety, nuisances reduction (air, noise,...). However, in the predominant choice arguments, this indicator is not so much highlighted by local actors than territorial development arguments,... as we saw previously.

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26 See on the L1511-1 article

27 Refer to the L1511-2 article of the Transport Code

### ***The a posteriori assessment***

In France, the major projects of infrastructures<sup>28</sup> financed with public funding are subjected to an economic and social assessment which must be carried out by the contracting authority within five years after their commissioning. This assessment must be made public.

It is a requirement imposed by the LOTI law and taken over by the transport code to ensure transparency in the use of public finances and “to estimate the value of the project for the authority” (Buisson, 1997). In particular, according to CERTU (2003), this assessment have to contribute “to determine whether the results were consistent with the objectives of the authority, by measuring and explaining the gaps enter between expectations and achievements”. It not only allows “to enhance the positive effects of the operation but also, if necessary, to find a solution to the negative effects not initially planned”.

More generally, each a posteriori assessment is considered useful to improve appraisal methods thanks to use of feedback experience (CERTU-DTT 2003).

However, does this obligation to assess five years maximum after the commissioning of an infrastructure allow to measure all the expected effects of the system? It is obvious that this temporality appears inadequate to measure potential effects on urban developments which can be noted in a longer time. It's the same conclusion for changes of mobility behaviors faced to a specific economic situation (for example fuel costs).

According to the central administration of the French State, called “Conseil Général des Ponts et Chjassées” (2002), “the LOTI assessment must allow to see what has been achieved and the effects of all sorts. It must also allow to pass, by reference to the initial assessments, a judgment on the operation in all its dimensions (consistency, cost, efficiency, utility, environmental nuisances, economic and financial profitability)”.

According to the General Council Roads and Bridges (2002), “the record must allow LOTI see what has been achieved and the effects of any kind, and wear, with reference to initial assessments, judgments about the operation in all its dimensions (consistency, cost, effectiveness, efficiency, and pollution ENVIRONMENTAL economic and financial profitability.”

The objective of this LOTI assessment remains above all to make clear the public action of the government, the local authorities on the use of public funds and, as well as, to inform the population.

### **II.2.2 Some methodological supports to accompany authorities in the ex-post evaluation**

The literature which reviews a posteriori assessments by taking into account the specificities of structuring public transport systems is not very vast. Most of the documents refer to the a priori appraisal process, in particular for road projects whose methodologies may not be used for public transports projects.

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<sup>28</sup> The decree of 1984 made under the LOTI law defined the major infrastructures projects according to an investment cost higher than 12.6 millions euros.

The main methodological supports<sup>29</sup> are proposed by the departments of the Ministry in charge of transport in order to help local authorities to carry these assessments but also to provide a common framework allowing to do some national comparisons.

With the absence of a clear regulatory framework about what should be included in a LOTI assessment, the technical departments of the Transport Ministry proposed local authorities a methodological report for this a posteriori assessment which dates from 2002. This note invites them to consider a number of items for their LOTI assessment. Of course, these topics relate to the project's effects on travels through the issues of services to users, of the public transport operating and more largely of the mobility policy at the scale of the urban area. The financial results also take an important part of the LOTI assessment with a focus on the definitive financial data of the operation and a new analysis of its socio-economic profitability.

This note also proposes to authorities to examine the issues of interfaces between the transport project and its environment, the health, the rational use of energy as well as urban space, although as outlined in this note, the temporality of the exercise (3 to 5 years after the commissioning) is not optimal to fully measure such effects. For this latter topic, the note emphasizes the fact that it is essential to recall the initial objectives assigned to the structuring public transport project in order to orient the analysis. Thus, the approach on the urban planning effects takes different forms according to the projects. However, the note advises to reach a common observation on the geographical location of inhabitants and jobs, on the issue of land value and on the perception of urban space.

This note also invites the contracting authorities to consider the scenarios established during the ante assessment (objective scenario and scenario of reference) in order to measure and interpret the differences between the observed trend and the data planned in these scenarios at the time of the a priori assessment.

Beyond the methodological aspects for assessments (follow-up studies or modeling), the question is first of to determine what can actually be appraised. And then, the problem lies mainly in the method - or even the possibility - to separate the effects of the structuring public transport line in general, and of trams in particular, from the effects of the rest of the public network.

The work published by CERTU suggests to operate both a mapped socio-economic assessment including quantitative indicators, and monographs by activities' sectors, which are more suitable for complex situations but have the disadvantage of having results that can not be generalizable to the entire metropolitan area (Cormier, 1998).

This approach, supported by CERTU, in addition to the creation of urban travels observatories, seeks to show only the direct effects of urban transport, through a precise definition of the assessment purpose (a too broad assessment would be illegible), and through a careful interpretation of the identified trends.

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<sup>29</sup> The CERTU which belongs to the scientific and technical networks of the French transport Ministry, published in 1997 and in 1998 two methodological reports on « transport indicators for analysis and monitoring of operations » and on « observation methods of effects on urban planning and quality of life ».

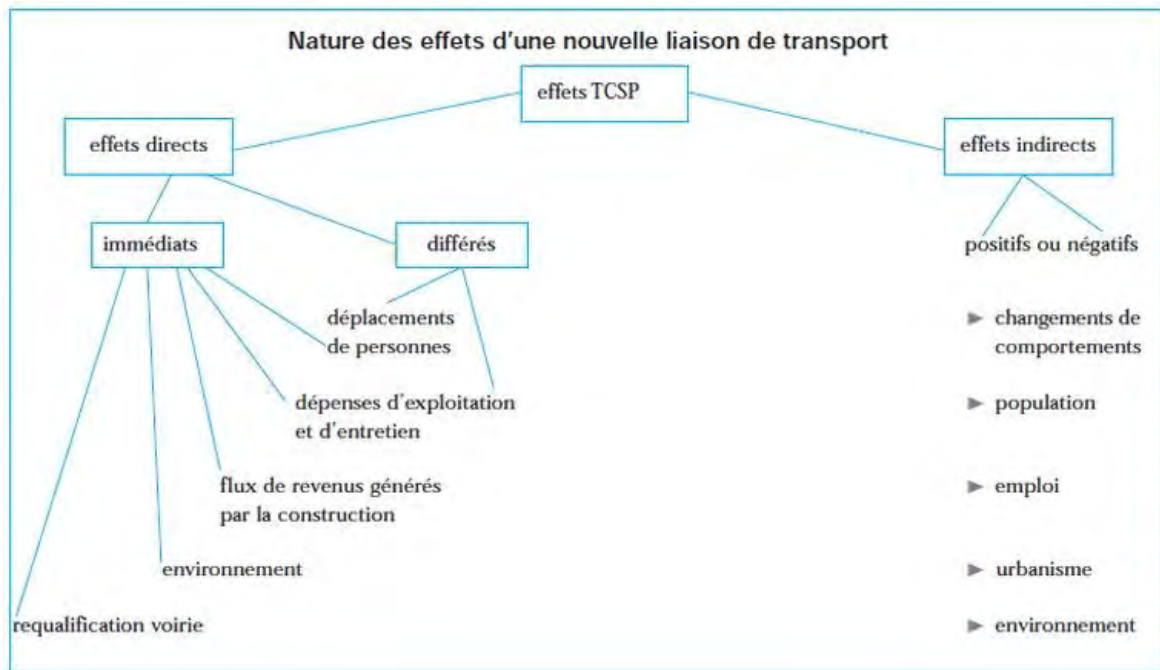


Illustration 14: The nature of the supposed effects of a structuring public transport line - source : CERTU 1998

In addition, the approach of CERTU and the LOTI law without being restrictive, only focuses on the most direct effects of tram – and moreover on a limited number of sectors (health, environment, etc) - However, these effects are likely to be indirect which make the readability difficult, but which invite to carry out strongly an assessment as full as possible... that is to say not only the territorial effects of the structuring public transport networks, but also the link between urban development and transport planning. This would allow to better understand the reality of the urban transport effects on a territory. This raises the question of the limits of the ex ante and ex post assessments.

In the French model of assessment, the question is to appraise if the structuring public transport line is adapted to the needs of the population. This has led several organizations, including the CERTU, to question themselves about the methodology to follow. The author of the work on the structuring public transport assessment (CERTU, 1998) argues that “the process of public transport lines assessments must go beyond the change in the supply of public transport up to the objectives of the urban policy led, by positioning the structuring public transport line within this policy”.

In addition, the various sources dealing with the assessment in France agree to say that the association of all the partners of the project in its follow-up tends to facilitate the coordination and mobilization of actors. Nevertheless, if all of the available literature indicates the topics to be studied with high precision, it forgets to indicate how to interpret them, which is obviously not reassuring for those who think that structuring public transport lines have no structuring effect.

### II.2.3 The ex ante assessment's practice

The ante assessment of French tram projects is required to the contracting authority as a key element to justify the choice of the system, and especially within the framework of the consultation (completion of the impact study for the launch of the public inquiry) or even to obtain a financial support from the French government (conduct of a socio-economic assessment based on an economic cost-benefit analysis).

On this last point, the assessments which had been led answered rather a requirement than a rigour of the methods used and the calculations done. Thus, in a report of November 2010 relating to tram lines of the Paris region, the “Cour des Comptes” underlines that “the ex-ante socio-economic assessments of infrastructures led by the RATP give no detail on the two principal elements that constitute almost all of the socio-economic advantages of the projects. The later are the time-savings for public transport users and those related to the reduction of the road traffic congestion thanks to modal shift. These are not easy to check. (...) Within the socio-economic assessment, the valuation of time-savings is predominant. However, the commercial speed target is over-estimated as well as the modal shift (car to tram), and therefore the corresponding benefit for the authority in the socio-economic cost-benefit analysis. In total, even if traffic forecasts of new tram lines are correct, their socio-economic profitability is over-estimated”.

This finding is not specific to the Paris region, and is frequently found in structuring public transport projects due to methodological problems of estimating attendance, time savings, modal shift ... this calls for criticizing the fact of reducing socio-economic assessment to a calculation of only one rate (return rate) which is generally over-estimated.

## II.2.4 The ex-post assessment's practice

If the ante assessments are fully integrated in the production process of a project, ex-post assessments are more discreet and few as pointed out by a report of the transport Ministry in 2003.

The “LOTI” assessments concern more studies about operation monitoring with the implementation or not of an observatory structure - as that was the case in Grenoble, Strasbourg and Bordeaux - or studies about some specific topics.

### ***The case of Grenoble - line 3 of the tram network***

*Within the framework of the follow-up of tram 3, a program of studies was launched before the start of work, in 2002-2003, that is to say “4 years before its commissioning (May 2006). The objective was to draw up around the route an inventory of the situation as a basis for a “before and after” comparison. This inventory was based on collections of data on travels, urban changes, quality of life, environment but also on approaches on the habits and lifestyles from perceptions of the populations, of the economic actors.*

*Source : AURG*

This report dating from 2003 points to several objectives perceived by the local actors who have taken part in a phase of assessment. These purposes can be gathered in three major groups. The first one relates to the will to respect the legislative and regulatory frameworks which impose an assessment. The second one is more about the idea of a new step of justification and legitimization of the chosen system afterwards, by checking in particular the achievement of the objectives initially assigned to the structuring public transport line (to know the project's effects on the others transport modes, on urban development and environment, to revalue the socio-economic and financial profitability of the transport operation) or by justifying the technological choice, or by appreciating the image of the project to the inhabitants. The third group relates on the will to build the future of the network by seeking to optimize the operation of the structuring public transport line and to be able to define better future projects.

Through the analysis of LOTI assessments of structuring public transport lines made in late 2003, CERTU underlines “large disparities in the nature and the quality of their contents. [...] The origin of this diversity is largely due to a lack of precise guidelines on ex-post assessment methods of transport infrastructures : the decree of LOTI law application, especially its article 4, is very accurate and comprehensive about the contents of ante assessments but is silent about the ex-post ones. The consequence is that each contracting authority may define his own specific method for appraising structuring public transport lines. And that's why many methods are developed and used to carry assessments”.

About the question of a potential link between tram and urban development, French local actors are conscious that the tramway is not the only reason which can explain all the changes observed along the line. The introduction of the LOTI assessment of the first tram line in Strasbourg underlines that “whatever the theme, the tram effects are never the only explanation of the changes noted”.

However, the issue of LOTI assessments raises the question of the direct effects due to the tram implementation. According to Faivre d'Arcier, researcher at the Laboratory of Transport Economics in Lyon, the work is to measure the “Net effects” from a “reference scenario without the structuring public transport line”, that is to say from a retrospective reconstitution “of what would have happened without the project”. The complexity of such scenarios leads specialists to suggest to work starting from “control areas, similar districts not affected by the project”.

In fact, the comparative approaches very often use the scale of the urban area as a control area.

In the end, LOTI assessments are more descriptive documents about the transformations and mutations observed which are a result of urban policies' implementation than a result of the only tram line. We will later see in this report that it is difficult to appraise the specific effect of the tram on the dynamic changes in the urban area, except few cases.

## **II.2.5 Which territorial effects are actually put forward?**

The previous sections informed us about tram project's effects expected by local actors. But there is a significant gap between expected and revealed effects and therefore local actors await a lot from the ex-post assessment to fill this gap.

Thus, in France, in order to have information about the socio-economic effects of the tram project, we try to estimate the trends of residential practices, of economic activities, of trades and purchase behaviors, of public planning and equipment policies, of public space rehabilitation, of urban quality, of the practices and perceptions of the city, of the real estate and land market, and finally the property potentialities and public land policies. This assessment may follow a double approach, both quantitative and qualitative, using household surveys for example.

The appraisal practices based on observatory structures, such as in Grenoble or in Mulhouse, reflect the limits imposed by the nature of the information available. If we compare the report of Grenoble in 1992 with the one of Mulhouse in 2006, no significant change seems to have occurred. In both cases, works are based on economic data such as land prices, changes in housing and employment... far from the ambitious program

suggested by CERTU. As a consequence, their authors recognize that it is impossible to separate (and thus to identify) the tram effects.

In this particular context, this present section does not pretend to determine the close links between tram and its territory but would rather to report what the few ex-post assessments have written about this link.

We will primarily rely on the five experiences of Orleans, Bordeaux, Strasbourg, Lyon and Grenoble for which we were able to recover the data. There is no selective criterion prevailing to this choice, the goal here is to illustrate the difficult possible interpretation of the potential effects of tram.

The following tables aim to present the main features of these transport systems.

### **Orleans**

urban area of 265,000 inhabitants in 2000, covering 20 towns

the line A of the tram connects the two ends of the urban area : it's the first line of the tram network [a second line (line B East-West) is under construction, for a commissioning planned in 2012]

3 towns served

linear of 18km

24 stations including 6 park and ride

commissioned in November 2000

final cost ; 291,1M€ HT (value January 1997)

a LOTI assessment carried out in 2007

46,000 pass/day in 2006



*Illustration 15: route of the tram line A - source : AUAO/ LOTI assessment 2007*



### Bordeaux

urban area of 720,000 inhabitants in 2010, covering 27 towns

3 tram lines representing the structuring urban transport network  
4 towns served

linear of 43,3km  
84 stations including 7 park and ride

commissioned in December 2003 (line A) and in spring 2004 (lines B and C) + extension of the 3 lines in 2007

final cost ; 675,8M€ HT (value 2006)

LOTI assessment carried out in 2008  
Implementation of a working committee in 1997 "Trade, tram and city center"

traffic of 56,000 pass/day in 2006 on lines A and B, 20,000 pass/day on line C (the shortest linear)

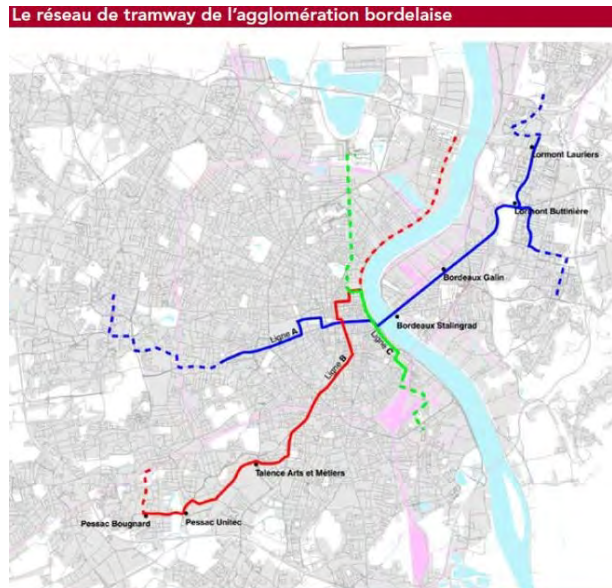


Illustration 16: The 3 tram lines in the urban area of Bordeaux - source : A'Urba

### Grenoble

urban area of 400,000 inhabitants, covering 26 towns

The Tram 3 refers to the 3rd and 4th lines and to the extension of the 2nd tram line of the urban area  
5 towns served

linear of 13,5km  
25 stations including 4 park and ride

commissioned in 2006 and 2007

cost ; 433 M€ HT (value 2006)

LOTI assessment under preparation, some studies of follow-up have been carried out after commissioning

traffic of 48.600 pass/day on the 3rd line (C line) and 5,500 pass/day on the D line in 2008

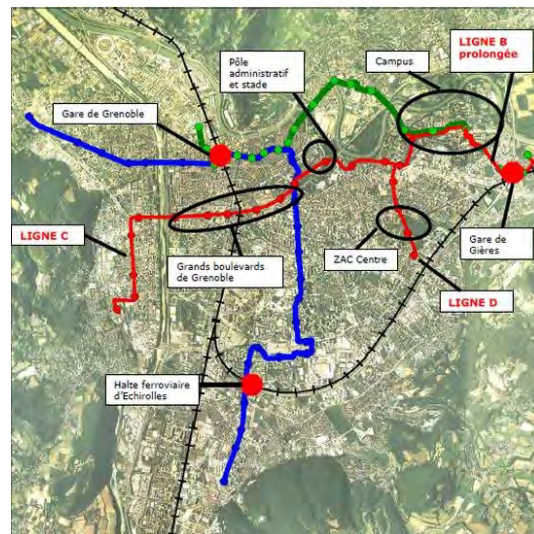


Illustration 17: The Tram 3 project of Grenoble - source : AURG 2006

## Strasbourg

urban area of 450,000 inhabitants in 1999, covering 27 towns

a tram line A integrated in a network of 6 tram lines which serve 7 towns

2 towns served by line A

linear of 12,6km

23 stations including 4 park and ride

commissioned in 1994, and extended in 1998

final cost ; 323,6M€ HT (value 2000)

LOTI assessment carried out in 2001

traffic of 77,000 pass/day in 2000 on line A  
attendance of 300,000 pass/day on the network in 2010

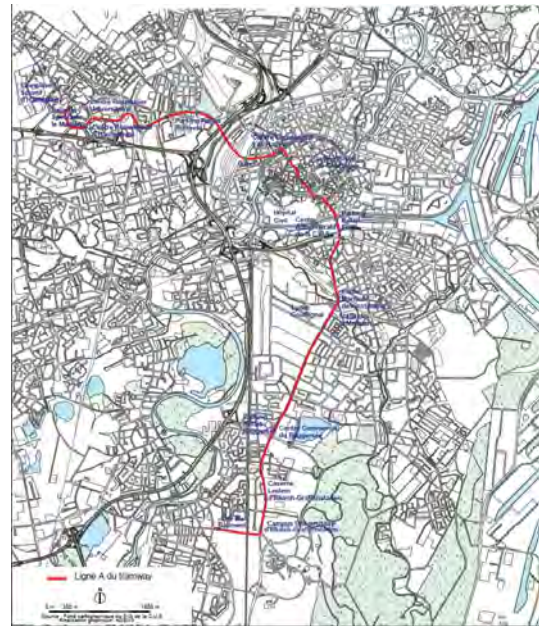


Illustration 18: route of the tram line A in Strasbourg

## Lyon

urban area of 1,3M inhabitants in 2008, covering 58 towns

2 tram lines

2 towns served by the T1 line, and 3 by the T2 line

linear of 8,2km for T1 and 10km for T2 in 2001 (respectively 9,4km in 2005 and 14,9km in 2003)

19 and 20 stations (then 23 stations in 2005 and 29 stations in 2003)

commissioned in January 2001

final cost ; 400,6M€ HT (value 1997)

LOTI assessment carried out in 2008

62,000 pass/day on T1 and 66,000 pass/day on T2 in 2004

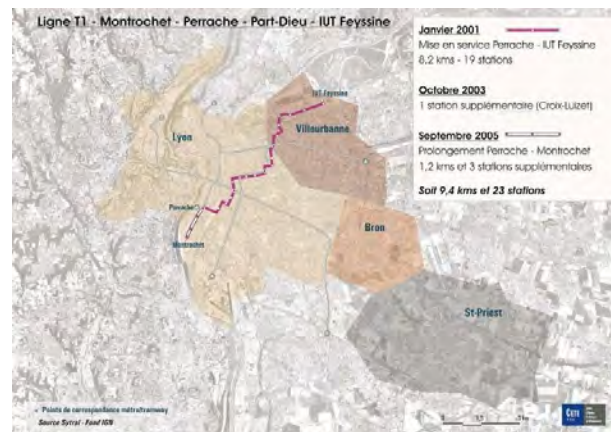


Illustration 19: the T1 line of the tram network in the urban area of Lyon - source : CETE Lyon

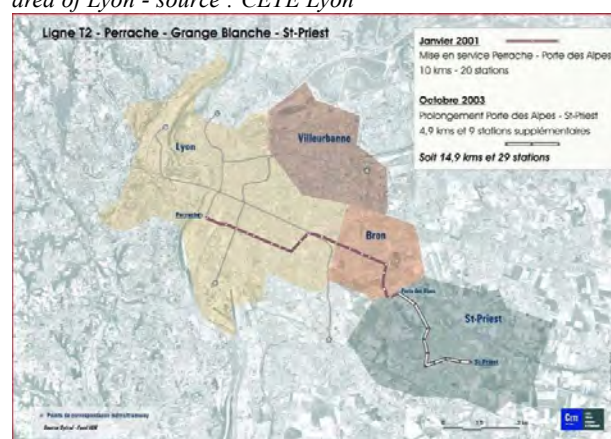


Illustration 20: The T2 line of the tram network in the urban area of Lyon- source : CETE Lyon

Before dealing with the link between tram and territorial development, it is interesting to consider briefly the question of tram effects assessments on urban mobility. This is a major topic appraised in the ex-post assessments.

In the appraising works, the contracting authorities often have a review on their structuring public transport line characteristics and also on its attendance in order to measure the achievement of the objectives on the level of service and use. They also want to be able to assess the effect of this line on the network operating, as well as on the mobility practices. However, they have great difficulty to separate the effects expressly induced by the tram from those induced by the rest of the travel policy (parking, development of cycle paths, highway network, pricing,...). The question is important and raises the value of an assessment of a transport infrastructure which only represents one link of the travel policy. The state of the art would rather in favor of talking about effects on the travel system and urban mobility that rather come under a comprehensive travel policy than under the single tram object.

As we mentioned above, the topic of potential tram effects on urban space is very complex to understand in the context of ex-post assessments of trams. Several methods are generally implemented in the LOTI assessments in order to try to appreciate the effects of structuring public transport lines on urban space : the implementation of observatory structures, thematic surveys, interviews among populations and professional circles, or even micro-territorial studies. The selected indicators, both quantitative and qualitative, are generally measured on different geographic perimeters (urban area scale, urban public transport perimeter, or even of corridors defined around the axis of the tram) and on different temporalities, in order to deduce by comparison a potential influence of the structuring public transport line.

The next section discusses the mutations put forward by the LOTI assessments on urban space.

### **II.2.5.a Some perceptible tram effects on public space and landscape**

It's the most phenomenon – we can talk about a direct effect – that can result to a tram project implementation. In the French conception of tram systems, their implementation offer the possibility to work on public spaces by its appropriating and renewal.

This rehabilitation that is deployed on many sectors of the tram route is based on a restructuration of the crosses areas which both concerns landscape and its functionality. These sectors of works include the space between the fronts of built constructions.

Before considering the landscape concerns, we may say that the tram insertion into an urban space is the opportunity to rethink the functioning of the crossed area by bringing a significant change in its environment.

The objective is to redevelop the public space by taking account all means of transportation. The tramway is then a vector of a new road sharing, of a new redistribution of public space between tramway, pedestrians, cyclists and cars.

	Etat initial		Projet réalisé		Variation (%)
	en m	en %	en m	en %	
Voitures + cyclistes	18,6	62%	13,6	44%	-26.7%
Stationnement	4,4	14%	0	0%	-100%
Piétons	7,5	24%	4,3	14%	-42.7%
Tramway	0	0%	7,8	26%	Création
Végétation	0	0%	4,8	16%	Création
Emprise totale	30,5	100%	30,5	100%	0.0%

Illustration 21: A new road sharing for the road « Colmar » in Strasbourg - source : ADEUS

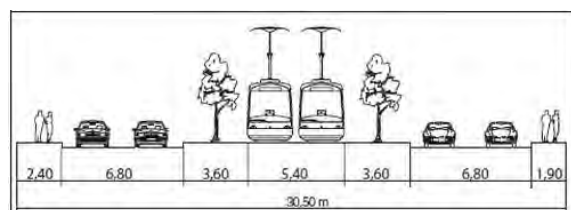


Illustration 22: Cross section of the road 'Colmar' due to the implementation of the tramway in Strasbourg - source : ADEUS



*Illustration 23: The City center of Grenoble before the implementation of the first tram ligne - source : AURG*



*Illustration 24: The city center of Grenoble after the commissioning of the first tram line - source : AURG*

The completion of the tram infrastructure is accompanied by the implementation of pedestrian and/or bicycle lanes along the line. It can be the opportunity to reach a significant reduction in the importance given to cars traffic by reducing the number of traffic lanes or by developing pedestrian areas.

The location choice of the tram platform strongly influences the shape of the public space renewal. French local actors consider that the tram platform installed in the axis of the road generates a more important change than a website side location. Therefore, local actors seek to have an axial location of their tram but the constraints of the crossed sectors lead to consider different potential sequences (website side platform / axial platform / platform shared with cars).



Illustration 25: Axial tram platform, Orléans - source : AUAO

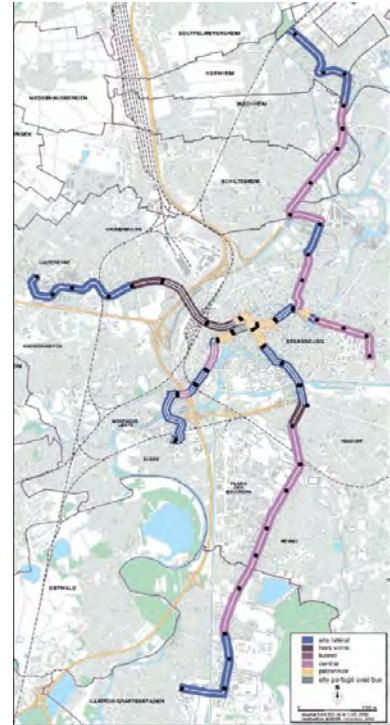


Illustration 26: different locations of the tramway platform - line A Strasbourg - source : ADEUS

The connection between the tramway and railway stations is also the opportunity to work on the development of the stations squares in favor of soft mobilities.

Thus, for the cities crossed by the tramway, its implementation is a major disruption for drivers because of a reworking of the traffic plan.

The implementation of a tram line may also be a way to solve the urban districts cuts caused by some impassable infrastructures such as railway or waterway infrastructures. The creation of new crossings for the tram platform allows by the development of pedestrian and bicycle walkways the possibility to recreate links between these districts.

According to Laisney (2006), the reconquest of olds railway infrastructures by a tram in outlying sectors of urban areas may be a solution de solve the urban cut due to the infrastructure. And so the tram becomes « an essential structuring element in these discontinuous built-up areas, in a process of changes ». Because, « unlike the railway area, the public area of the tram can be characterized by its permeability, its constant accessibility for the pedestrian because the tram platform can be crossed.

There are generally many landscape changes along a tramway line. These transformations contribute to promote a tramway "aestheticism" which is a factor influencing the political choice. That's why the project management group usually includes a landscaper responsible for defining the integration aspect of the project. These transformations are in particular based on sequential treatments of the tram tracks in order to facilitate its landscape insertion with the crossed environment. On the same tram line, you can also move from a mineral atmosphere (with a paved platform) to a planted corridor (with a grassed platform). But these ground treatments are only implemented in urban areas, and sections of low-density areas are very often treated as a railway infrastructure (ballast) with a pedestrian route along the tracks.

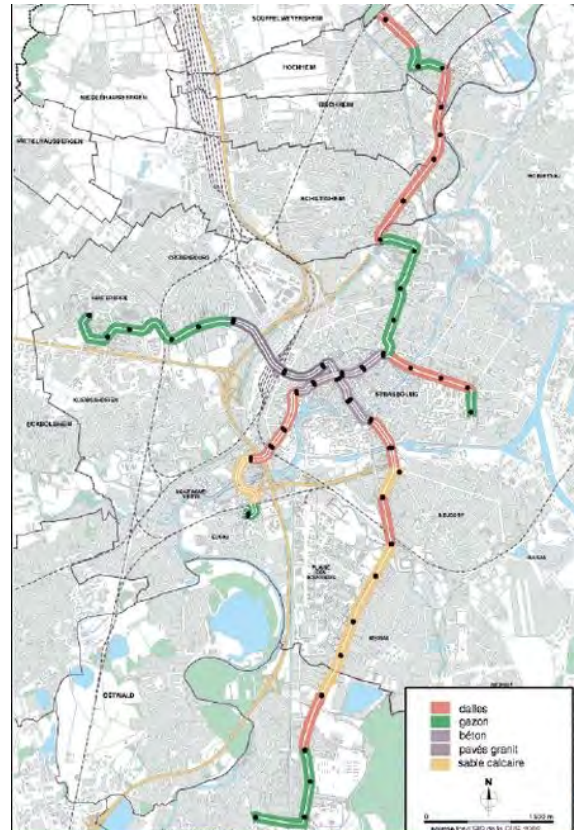


Illustration 27: The tramway in Strasbourg : different sequences of platform treatment - source :ADEUS



Illustration 28: Grassed tram platform with two lateral pedestrian routes - Orléans - source :AUAO



Illustration 29: tram platform ballasted - Orléans - source : AUAO



Illustration 30: End of the tram line of Orléans : a mineral and pedestrian platform - source : AUAO



Illustration 31: tram route lined with large trees - Orléans - source :AUAO

According to Beaucire (2007), in the case of the tramway of Orleans, the wish to have the better urban integration has resulted in "the profound transformation of the appearance of public spaces that were configured by several decades of policies oriented to traffic priority."

Marking the tram axis is often sought either by the implementation of a specific color paved edge, or by planting trees. The inclusion of street furniture (shelter, bench, trash, candelabras) in the same spirit as the tram conception is also important and may be the subject of a specific design study. This illustrates the aesthetic of the project.

Besides, some squares crossed by the tram undergo profound reprocessing on the one hand to allow the tram path, but on the other hand to contribute to their improvement and to their increased warmth. The recourse to architectural competition procedures allows the contracting authorities to foresee a new centrality, a new urbanity of those squares. The renewal of the crossed streets generally occurs at 360 degrees, between the front of built-up buildings and takes into account the underground networks for public lighting. However, we can note that these landscape principles mainly applies to urban crossings. Outside, especially in the non-urbanized areas, the tram works are limited to the tracks and stations.



*Illustration 32: Treatment of the square « de Gaulle » in Orleans - source : AUAO*

For some French tram systems, urban art is part of the developments of streets and squares. Indeed, some local authorities make the choice to implement a specific accompanying program of artistic along the tram. It is based on the procedure "1% art", which applies to public buildings of the government and those of public authorities by reserving a percent of the cost for the commission or acquisition of one or more works of art specifically designed for the construction.

We can see different architectural forms most often made by local artists on some tram linear sectors or on some squares crossed by the tram.

In Strasbourg, the artistic accompanying along the tram lines was a political wish in order to contribute to the improvement of the quality of life of the tram residents by creating public spaces which are "pleasurable and useful."

Beyond aesthetics or even the desire to reintroduce some arts in the city (because the link between the theme of works of art and the tram is not the primary objective sought or desired by local actors), the issue that can be raised is to know if the existence of these works may have an influence on economic activity, especially on trades, by enhancing its attractiveness through its image? To date, no analysis on this point has apparently been led. That is a revealing sign that the intention is primarily to provide "urban aestheticism, purely and solely" or even to give to the tramway route an "unusual urban identity which is often the pride of towns" (Redondo B.).

### ***II.2.5.b Urban changes along tram lines...***

Besides the renewal of public space, some changes in private spaces had been noted along some tram lines, in particular some outside aspects of housing buildings or of office buildings.

In Strasbourg, the results of a survey about the potential changes on outside aspects of buildings show that 29% of buildings impacted by the tram had been modified : front buildings changes (coating, window, structure) for 19% of them, mutation of the function of the building (housing, trades, offices,...) for 12%. The agency in charge of urban and regional planning in Strasbourg note that even if the most important part of mutations of building aspects has been observed in the town-center (41%), some modifications have also been noticed in other crossed sectors, except the western part of the line « because of the recent character of the buildings or their status ».

These visual reports based on before/after comparison's surveys highlight the urban changes along a tram line but they are not able to specify whether they are related to the tramway or should have been produced without the tram.

All the actors agree that a tramway may impulse an important process of qualitative and aesthetic changes in crossed areas. According to Laisney (2006), "changes effect of a tram is particularly important in the treatment of the outskirts of the town. In this context, the specific tram aesthetism contributes to a converging line of landscape quality". Local actors are aware of this and see the tram as « an opportunity of enhancement" (Laisney, 2006).

### ***II.2.5.c Are Tramway and trades discordant ?***

The topic of the trade function is widely approached in assessments. Indeed, this subject inflames debates during the phase of consultation, especially with the retail traders impacted by the tram project.

It can be appraised according two complementary methods : the trade supply available in the urban area and the buying practices of consumers. But we can note that the first point is very often the heart of investigations in order to give answers to concerns expressed before the tram commissioning by the retail traders.

Indeed, these actors see in the implementation of a tram system an important risk factor of customers lost – in particular customers who come by car -.

But the benchmarks seem to show that, except the period of tram works which can have a negative effect, and except the opinions of a few people, retail traders reach their previous activities levels. However, it is difficult to isolate the tram effect from the influence of the local, the regional or the national economic context (crisis effect).

It seems that the tramway may be a factor which could accelerate the pre-existing trends :

- The change in the image of the city due to the tram may affect the type of trade along the tram linear : emergence of services, restoration and tertiary activities.
- A weakened situation of a trade, especially trades such as tobacconist's, bakery,... could be increased with the tramway and the potential consequence is the trade closure faster than expected.

*In Bordeaux*, the assessment carried out in 2004, shortly after commissioning, forecast some perceptible effects of the tramway. It was based on an appraising of the situation between 1999 and 2004 from a sample of 1.000 companies representing economic



activities located along the tram out of the 5.000 companies in the corridor. It underlines that « 46% of the firms questioned considered that their revenue decreased [...] and 27% of the companies noted a decline of their customers rate exceeding 20%. It mainly concerned passing customers because the rate of corner customers seems to have better endured the situation”.

However, as the CERTU work<sup>30</sup> dating from 2004 emphasizes, in 2003 the firms located in the tram corridor kept trust because they hoped that “the tramway would give value to their location”.

In *the urban area of Lyon*, the analysis of the potential influence of the two tram lines on trade was appraised from the feelings expressed by traders who were located near the tramway<sup>31</sup>. It highlights opposing perceptions about the evolution of business activities. Thus, even if half of traders thought that the tram was a "business advantage that influences the attendance, the revenue and increases the value of the business", the majority of retailers present before the tram seems to have a negative point of view about the evolution of their activities. They seem essentially marked by the tram works phase and they claimed they have stand a significant drop in their sales during this period. According to the urban planning agency of Lyon, the tram seems to have played an important role in "the stabilisation of business", even if there were some shops closing. However, the evolution of the market structure observed in the city center with more local services does not seem to be related to the tramway. It seems to be more a result of a general mutation trend already observed at the time of tram commissioning.

In *Orleans*, the assessment of the first tramway line showed a shift in the type of businesses with a strong growth in individual services' activities in the tram corridor, a decrease of food shops and equipment stores. However, this trend seems to traduct a national phenomenon, even at the scale of the urban commercial area, related to the question of commercial space required for this type of business and even to the issue of car accessibility.

Moreover, as pointed out by the urban planning Agency of Orleans, "the shops which are close to tram stations, mostly belong to corner shops centers whose influence does not exceed the scale of the district".

The tram perception by traders turn is ambivalent. The assessment highlights that more than an half of retailers said they were disappointed by the tram because it has not brought significant improvements in terms of customers, even if they did not really hoped for that. On the other hand, the tram commissioning could have been an opportunity for some merchants to modernize their store or to change their supply in order to remain attractive. In addition, traders appear unsatisfied with car parking conditions near their shops, with a feeling of a general shortage of parking places in the center.

Nonetheless, the fact remains that the tram is not a major factor taking into account by a trader in its search for a new location. Some interviews carried out for the assessment showed that only 20% of the respondents felt that the tram had played a role in the location's decision.

In *Strasbourg*, the ex-post assessment of the first tram line carried out in 2000 mentions a drop in the number of shops in the city center which is essentially due to the dynamics of trade locations observable in other cities without the tramway may be a recognized causal link.

Despite this decline of the supply (number of shops), the attractiveness of the center has

30 CERTU and CCI of Bordeaux, « Travels and trade », 2004

31 The method was based on the carrying out of 80 interviews of traders.

increased. Indeed, the attendance of commercial areas in the city center of Strasbourg, which were already dynamic before the tram, has raised. It is not only due to the tram but also to "urban development operations accompanying the tram works who valued the commercial supply" (ADEUS, 2000). However, the pedestrianization's operations carried out in the center led some shops requiring a good accessibility by car to relocate to other areas.

To conclude, the few available ex-post assessments do not show a direct tram effect on trade business. All stakeholders agree that it is very difficult to isolate the specific effect of a tram from the other factors influencing the commercial sector such as lifestyles and individual purchasing practices (for example development of e-shopping), the purchasing power, the national economic context, local policies ... At most, we should talk about a phenomenon of a catalyst that accelerates the process of trend?

However, we should say that shops located in the tram corridor have an advantage for their attractiveness when we take into account the fact that the French tram contributes to an embellishment of its environment and may have a showcase effect?

#### ***II.2.5.d Tramway and job creation***

Local elected officials often expect that the tram could contribute to a stable maintaining of the number of employments and to a creation of jobs.

The assessments generally talk about a positive effect of the works' phase on employment. For example, the economic effects of the tram of Orleans (Buisson, 1997) were appraised to a level of 700 new jobs for 5 years. The analysis led by Hamman and Blanc (2011) shows that in Strasbourg, "the Urban area authority highlights the positive dynamics of the tram works in terms of employment, citing "more than a thousand people directly involved". In Montpellier, the two years of work of the 2nd tram line would have allowed to create more than 3,500 direct employments and to provide work for more than 300 companies. In early 2009, in the context of the financial crisis and difficulties for some firms, the start of work of the 3rd tram line in Montpellier was brought forward "in order to contribute actively to the reflation of the local economic growth". The tram is even seen as a cure for the economic crisis!

In terms of territorial economic attractiveness, the tram is commonly presented as an important tool for local economic development. The effects of territorial opening up and improved accessibility for companies and trades that promote both locations in the city center as well as in artisanal and industrial areas. However, it is difficult to demonstrate the achievement of these expectations, and assessments are very discreet on this topic.

#### ***II.2.5.e What evolutions have been measured on land and real estate prices in the tram corridor?***

##### real estate and office market

According to experts and market studies available, the urban development and planning agency of Strasbourg emphasizes that the key factors of business location are based on criteria of accessibility by car and of offices' quality both in terms of location, environment, services and standing. Thus, this agency concludes that "the tram service appears to be an additional criterion of selection, but not decisive in the major part of the choices". The marketing of the office programs available at the time of the tram commissioning (1994 and

1998) only occurred in 2000 along the tram line of Strasbourg seem to be explained by several factors including the economic recovery at that time, the shortage of quality supply in the urban area, the difficulty to reach the city center, but also the tramway. It seems to have been a facilitator of sales.

However, the ex-post assessment in 2000 points some examples of companies who seem to have chosen their location for tram service and/or the proximity of tram stations.

If we consider the factor prices, the urban planning agency specifies that the trend of the values reflects the evolution of the economic situation and that it “is apparently not affected by the proximity of the tram”.

The agency however underlines that the accessibility conditions both by road and car parks, and by public transports influence upward the prices of office real estate.

### Strategy of real estate actors

In Bordeaux, according to a survey carried out among real estate professionals (source : Tempo Cité, September 2002), only a single actor had considered the proximity of the tram as a selling argument. For the others, the tram was not a decisive factor for the location of real estate operations even if the majority agreed on the importance of the structuring public transport line for the future development of the urban area. In 2001, all local actors have taken into account this parameter in the location choice of their different programs. The result of this new approach is a high increase of new housings part in the perimeter of the tram corridor: 27% in 1998, 48% in 1999, 45% in 2000 and 37% in 2001.

The proximity of a tram has become a major selling argument in all commercial leaflets of real estate professionals. In 2001, the public sector seems to be less reactive to anticipate the tram effects. Indeed, the programmings of social housing operations and the future development programs are outside the tram corridor”.



*Illustration 33: Tramway of Valenciennes - Construction of a residential building on the outskirts of Denain - source : photo CETE Nord Picardie 2011*

In Lyon, the interviews of real estate professionals also showed that the tram could play a facilitating role and could be a selling argument, in particular outside downtown, since the tram implementation schedule was available.

### What effects on property?

Whatever the territory, the local actors fear that the implementation of tram lines leads to rising prices of land and real estate. So they envisage since the design phase of the project to set a policy in order to keep the land factor under control.

Is this fear justified? We are going to see through some analysis carried out if there is really a link between tram and land and property values.

The choice of the A line of Orleans was primarily justified as an answer to the problematic of travels “with the desire to reach to the maximum potential users and to serve the most populated cities of the urban area”.

Beyond this transport aim, the LOTI assessment reminds that another objective was assigned to the line: the “answer to a problem of urban planning and land valuation”, the tram is then seen as a potential factor of revival of the real estate dynamism.

But the trend's analysis of the number of transactions showed some contrasts between the cities crossed by the tram, with more transactions inside the corridor than outside in 2 towns (Orleans and Fleury-les-Aubrais) but lower in another town. However, this phenomenon was already perceptible before the tram commissioning. The assessment of the first tram line of Orleans concludes that “the impact of A line on land and property transfers does not reveal a particular phenomenon. Indeed, at the scale of the urban area, the changes are strongly related to the land supply on the market and to the urban development policy about new urbanization by creation of new housing estate and development areas”.

In Lyon, it seems that the tram did not have an effect on the fall of the number of real estate transactions along the tramway line, the drop was also observed at the scale of the urban area.

In spite of that, the construction market appeared “gradually boosted by the commissioning of the tram” on the second structuring axis. Indeed, before the implementation of the tram, the level of transactions on the later reached that recorded along the first axis whereas the number of transactions on the 2nd axis was lower than on the 1st axis. Is that due to an effect of the positive image of the tram?

The upwards prices trends both in old and new property markets, observed in the influence areas of the two lines – as well as on the rest of the urban area – are more related to the pressures of the real estate market in Lyon – characterized by a high demand and an insufficient supply - than simply the fact of the implementation of structuring transport axes.

Besides, the housings morphology does not seem to be influenced by their location (inside or outside the influence area of the tram). In Lyon, the impact study of the two tram lines concludes that “the tram proximity seems to neither influence directly the housings typology (primarily conditioned by the global market), nor the value of rents which essentially depends on comfort features of housings and buildings”.

Overall, and whatever the case considered, it is very difficult to assess the part of the upward (or downward) trends of land and property values induced by the tramway. The prices formation is indeed closely linked to the market context at the scale of the urban area (supply versus demand), and to the potential land property available. Also, in a context of scarce land, the real estate operators are engaged in a price war to acquire these grounds. That does not allow public operators with more limited purchasing capacities to enter into this competition. This land higher bid is then passed on the selling price by the supply of high standard products. Thus, in Lyon, one mentions a potential indirect influence of the tramway on the upmarket process of new buildings, resulting from the valuation of property close to the tram.

In order to measure the possible relation between a tramway line and the land and property values, an hedonic modelling work into account the different factors of price formation was carried out for the case of the T2 Val de Seine tram commissioned in 1997 in Paris region. According to Boucq (2008), the analysis of the gross evolution of the flats average price per m<sup>2</sup> does not show a priori a tram effect on prices. The hedonic modeling tool then allows to isolate the effect of an improvement of accessibility by the tram services on the prices evolution. The simulations show that from 1996, that is to say one year before the commissioning, there is a positive effect of the improved accessibility on prices that persists until 2003. That allows Boucq (2008) to conclude that there is “a gradual adjustment of prices in the years following 1996, and especially over the 4 years following the commissioning of T2”. The assessment of the land added-value induced by the tram led to an estimate of the increase of housing sales prices related to the improved accessibility, around 9% of housing price. In a context of lack of such works about city transport projects, it is however difficult to conclude about the representativeness of this approach.

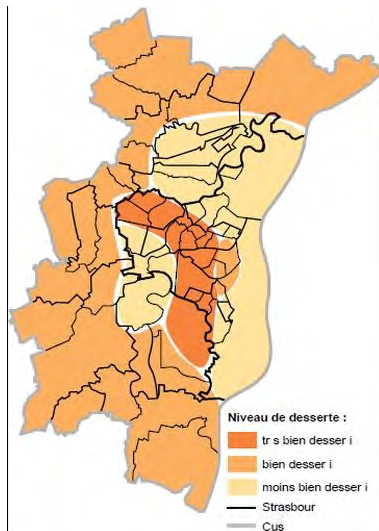
### Is there a possible influence of the tram on rents?

As part of the carriage of the LOTI assessment of the A line of Strasbourg, the urban planning agency analyzed the trend of rental prices of private market in the urban area according to the quality of public transport service, aware that this evolution is strongly dependent on exogenous criteria of the transportation system (tenant age, housing size and housing location - center/periphery).

The segmentation of the urban territory into different areas according to their level of service was based on two indicators relating to the quality of service :

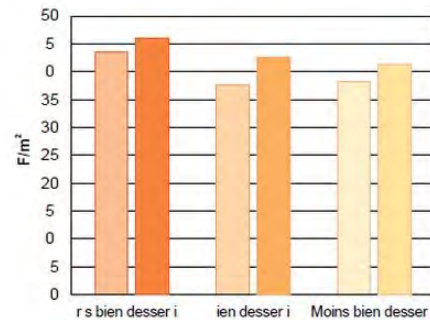
- the type of service, direct service versus service including one or more modes changes
- the average speed along the route.

This analysis showed that although prices in a very well served area are higher than ones in other areas, the price evolution in these area (as a percentage) is lower (proportion of 6% compared with 13% in a well served area and 7.8% in a less well-served area). But no direct link between tram and price has been shown. The pressure of the rental market and the changes in the housing stock (especially size) are more explanatory factors than the tram could be.



*Illustration 34: Division of Strasbourg conurbation according to the level of service of public transport - source : ADEUS 2000*

The “very well served” area corresponds to the tram corridor and to the wide city center, the “well served” area is the second suburbs and the eastern districts of the urban area. The “less better served” districts are the northern towns and the western districts not served by the tram.



*Illustration 35: Private housing rents in 1994 and in 1995 depending on the level of service - in Francs/m2 source : ADEUS*

### **II.2.5.f Urban planning operations in the tram corridor**

The LOTI assessments deal with the question of urban planning operations in the influence area of the trams but the temporality of this appraising - five years after the commissioning - restricts the possible approach.

In Orleans, the assessment reminds that the tramway implementation was accompanied by a series of development operations (revitalization, urban renewal and urban sprawl) some of which were already included in the urban planning documents, while the others were redesigned with the new opportunities.

We can observe that there is a development of urban tram line projects that will serve areas far away from the city center, less dense but carrying urbanization issues.

Although everyone agrees to say that the tram alone can not be a vector of urban development, some actors expect it to act as an accelerator of projects already envisaged in urban planning documents. Can the example of Orleans however suggest that the tram axis is a privileged sector for new constructions?

The urban planning agency of Lyon recalls that for professionals, the predominant criterion for the choice of the new buildings location is the right of land use. The existence of a tram service is a factor among others such as services, proximity shops or even living environment... all factors that will influence the selling prices.

The example of the mobilization of construction companies around the second tram line in Lyon shows the importance of the living environment image to launch new real estate operations which could be profitable. In fact, “we had to wait the effective valuation of the served districts to observe the implementation of operations which were considered before risky”. In a market context where the demand is quite higher than the supply, the rate of new constructions would probably have been the same in Lyon. However, the urban planning agency emphasizes that the second tram line seems to have helped to structure the new supply in a more difficult context of land valuation and land mutability.

In the urban area of Lyon, the assessment considers that the tram line number 2 was the driving force behind the transformation of the center of Bron, which itself contributed to its definition.

It is also the case of the tram lines in Montpellier. According to the Ministry of ecology (2001), “the tram has structured the urban development projects for 10 years. The first line defines the central axis for the city expansion towards the sea; the second line is a support for urban development in low density suburban areas, and the third line is a support for development operations, employment operations and housing operations”.

In Orleans, the A tram line, although it serves an already built urban fabric also “has prefigured the service of evolving districts”. As a conclusion of the LOTI assessment in 2007, Beaucire concludes that “in the field of urban planning, we can stand out the combination of revitalization operations (center of Fleury-les-Aubrais), urban renewal operations (small island of “la Râpe”), and urban extension operations (Le Larry), all geographically located on the layout of the line which offered the opportunity to develop a more concentrated urbanization [...] among conditions of optimal service by urban public transports”.

## III. Decision-making models for trams in Europe : contrasted paths

*The third part of this report focuses on the observation of the contrasts in the decision-making models for tram projects in three major European countries : the United Kingdom, Germany and France. We choose to put in perspective the decision-making models for at least two reasons :*

- *First, because they could partly explain the different paths in terms of infrastructure equipments. Originally (early 20th century), all major cities in these three large countries were served by a tram line or a tram network. Then, the path got differentiated with on the one hand the old networks which have been removed, preserved or modernized and, on the other hand the new lines, which were non-existent, few or many.*
- *Secondly, because the knowledge of important national decision-making models constitutes a basis of assumptions to be tested in order to deepen territorial effects of a “tram-based system” : the differences in institutional support, the assessment approaches, and the expectations/objectives of the project leaders can be considered as factors explaining how public policies can seize opportunities related to the opening of a tram line.*

*In this third part, we will go back, in the three national contexts, to the evolution of tram networks and to the principal principles and instruments of the decision-making models in the United Kingdom, Germany and France.*

### III.1 The United Kingdom : an economic rationality

#### III.1.1 Institutional context and local transport structure

In the United Kingdom (UK), the transport planning, traditionally associated with civil engineering, had been for a long time consisted in “predicting and providing” : that is to say in forecasting the future demand of transport and in supplying the corresponding network, generally by building more roads. From the 1990s, the successive adoption of new laws and regulatory devices shows a change course – assuming that the uncontrolled growth of traffic is neither desirable, nor feasible : Planning Policy Guidance 13 in 1994 (revised in 2001); New Deal for Transport in 1998 (kind of project of outline-law that is directly applicable); Transport Ten Year Plan 2000<sup>32</sup>.

This legislative mobilization is based on a triple concern about road traffic congestion, environmental effects (which can be natural or built) and social risk on vulnerable populations. In this context, the reference to the concept of sustainable development is a support for the governmental action.

These regulations focused on the issue of integration :

<sup>32</sup> <http://webarchive.nationalarchives.gov.uk/+http://www.dft.gov.uk/about/strategy/whitepapers/>



- integration within and between different modes of transport,
- integration with environmental constraints,
- integration with urban planning and right of land use,
- integration with policies of education, health and economic development.

The principal tool for local transport planning in England is the Local Transport Plans (LTPs). LTPs were instituted by the Transport Act 2000 based on *White paper* of July 1998 entitled “a new deal for transport : better for everyone”. The article written by Menerault and Mongin (2000) draws lessons of this “news deal” in terms of local planning in England.

On the one hand, the authors note that the strengthening of the local authorities role is a key element of the new system. Indeed, the County is from now on expected to play a key role in harmonizing local strategies within a territorial system which unites towns, districts and other Counties (regional framework). Counties are in charge of the conception and the development of the LTP with the 7 metropolitan ex-counties (including greater London). Other local entities – called Unitary authorities - get similar responsibilities. However, the role of the central government remains very important since he has a double control of the procedure : upstream, through the production of specific standards contained in *the guidance on provisional Local Transport Plan* that local authorities have to respect to build LTPs; downstream, through the lever of governmental subsidies.

On the other hand, Menerault and Mongin (2000) show that LTPs differ from *the Transport Policies and Program* they replace :

- by their nature, because, unlike *Transport Policies and Program*, LTPs are designed as urban planning tools with a transverse purpose;
- by their temporality, as LTPs are part of a five years medium-term perspective, after which they are reviewed; the former documents had an annual range;
- by their compatibility, as LTPs have to be compatible with the objectives of *Regional Planning Guidance*, with thresholds defined by the *Road Traffic Act Reduction of 1997*, in terms of traffic limitation, with the requirements of the *County Structure Plan* about land planning, as well as with the future *Air Quality Plans*. The *Transport Policies and Program*, had to be compatible with the only *County Structure Plan*;
- by their financial modality; counties have with LTPs, a greater flexibility of resources thanks to a global subsidy paid annually over a five years period; they are thus not strictly dedicated annual resources, as it was the case of *Transport Policies and Program*.

Although many of the first round of LTPs (2001–2006) contained little analysis and planning, being little different from bidding documents that councils had previously grown used to writing to secure central government funds, it is anticipated that the second round (2006–2011) will establish the statutory transport plan as a significant and thoughtful process that makes a thorough contribution to urban and rural planning.

### **III.1.2 Funding system and principles of tram assessments : the key “cost-benefit analysis”**

The UK model regarding tram assessments is influenced by the economic logic. The prevailing idea to the implementation of an infrastructure is that it will contribute to a financial value. The demonstration of the economic cost-effectiveness profitability of

projects is mandatory through econometric calculations like the “cost-benefit analysis”. These measures are not used to validate a political choice, they are used to prove the existence of benefits generated by the new infrastructure. So, the ex-ante assessment has a crucial importance in the implementation of infrastructure projects such as trams.

From 1968, the section 56 of the “Transport act” defines the method to obtain funds from the central government, including tram projects. Under this method, the cost of the public service concession has to be covered by non-users benefits, including the congestion reduction and development effects on development [MACKETT, EDWARDS 1998]. Benefits for users have also to be related to the adjustment of transport costs. The assessment objective is to compare the sum of expected costs with the sum of benefits of one or several actions. The implementation of a reference source “statement 0” is necessary in this process.

Mackett and Edwards (1998) specify that, in the specific context of British economic assessment, travel time savings are converted into monetary units and are aggregated to represent the main benefit of the new line construction (main advantage regarding to costs). The other benefits potentially relate to the reduction of road accidents which may also be converted into monetary units by using the concept of life value or of avoided accident value. The reduction of congestion and car use may reduce air pollution, which can be considered as another advantage. However, all of these advantages are very sensitive to the assumptions made, for example the time and life values that are obviously difficult to measure accurately.

In 1998, the Ministry of Transport, Environment and Regions introduced a new assessment method (the “New Approach To Appraisal” NATA), rooted in a perspective called the “new realism”. This has combined both the results of costs and benefits and those related to the assessment of environmental effects, and to balance them. NATA was initially applied to issues concerning national roads, in the Roads Review in 1998, but little by little it was generalized to all the modes of transport. Although it is conceived to provide a stricter assessment of road projects and to promote “sustainable” transport, the NATA continues to invest in roads projects while carrying out a considerable effort for public transport : that had been described as the “pragmatic multimodalism” (Walton, Shaw, 2003). NATA is now the cornerstone of transport appraisal in the United Kingdom [MACKETT, EDWARDS 1998].

The main objectives of the development of new urban public transport systems are thus adjusted to meet the assessment criteria :

- improving public transport is often the main objective, usually associated to a social purpose, for example providing a better accessibility for precarious or non motorized populations;
- serving the city center - where most of economic activities are located - more efficiently thanks to the capacity of guided public transport systems;
- reducing congestion is a common goal for recent projects. That suggests an increased concern about congestion problems or an increased confidence about the capacity of a new public transport system to solve this problem;
- environment improvement is a recent concern; it seems that the perception of new transport systems role on environment improvement is a recent phenomenon coming from the United States with its strong environmental legislation (Mackett, Edwards 1998).

The major change in transport assessment within the NATA context, relates to the application of the European directive about “the effects appraisal of central plans and programs on the environment”. The directive requires authorities to undertake strategic

assessment methods to measure the effects on environment (Strategic Environmental Assessment SEA), as part of the definition of the plan and the appraisal process. The directive has applied since 2004 and will apply to the second generation of LTPs (Department for Transport, 2004).

*Hucknall - the tram terminus of Nottingham line : area of urban development and station for the automobile folding back (Thwack Map, 2010)*



### **III.1.3 Limits of the UK model and difficulties in the implementation of tram projects**

The local authorities can include the implementation of a tram in their Local Transport Plans. LTPs are subject to strategic assessment methods of the environmental effect which are established by national regulations that are based on EU regulations. Even if the projects funding are not completely submitted on governmental subsidies - a local tax on car parking at the workplace is available to Counties and Unitary Authorities to finance improvement of the transport system -, the own financial resources of local authorities are very limited. Local authorities must rely on governmental subsidies to carry out LTPs. However, as the ministry of transport uses the method of “calls for proposals” to support exemplary local initiatives – for example those aiming to develop the economy and reduce carbon emissions – local authorities are under a situation of competition for the allocation of resources. This context leads them to produce a document as complete as possible, but also in compliance with the criteria defined by the government (Menerault, Mongin, 2000). Regarding possible tram projects, there may be a temptation to over-estimate the expected benefits in order to have more governmental subsidies.

The process to obtain funds from the central government encourages an overestimation of non-users benefits, through the effects on the reduction of traffic congestion and pollution. As governmental funding is function of total expenditures, it involves excessive forecasts in the number of travelers expected, and therefore, an expensive transport project; it is the “overforecasting” syndrome [MACKETT, EDWARDS 1998]. The real number of rail passengers is on average 51% over-rated; the percentage is about 20% for road traffic (Flyvbjerg, Holm, and Buhl, 2005). On the other hand, the estimated costs in infrastructures plans are about 44% higher than those estimated in the studies in the case of railway projects (20% for the road projects) : underestimation of costs by the studies cost-benefit (Flyvbjerg, Holm,

and Buhl, 2002). Costs estimates which are used to decide whether such projects should be implemented are highly and systematically mistaken. The underestimation can not be explained by an error : it may be explained by a wrong strategic statement, in other terms by lying. The political implications are clear : legislators, administrators, investors, media representatives, and citizens, who read these figures, should not trust the cost estimates nor the cost-benefit analyzes produced by project promoters and their analysts (Flyvbjerg, Holm, and Buhl, 2002). Funding mechanisms seem to be a problem as they require the demonstration of economic effects which do not seem to occur on the level of forecasts [PICKRELL 1992]. The Supertram case in Sheffield [in 1994] benefitted from an over-estimation of non-users advantages [monetization of traffic level decrease, of a reduced number of accidents, of environmental benefits and of full-time employments creation] which allowed the implementation of the project on the model of the “Transport Act ” of 1968 [MACKETT, BABALIK 2003].

*Example of project's assessment of tram according to the method “Cost-Benefit Analysis” of “Transport act” (1968, section 56) (Mackett, Edwards 1998)*

Sheffield Supertram (1994)	Manchester Metrolink (1992)
<p>In case of Sheffield Supertram, the request for financing under section 56 estimated the costs as follows :</p> <ul style="list-style-type: none"> <li>• cost Net of the system : £141 million</li> <li>• expected income : £110 million</li> <li>• difference of £31 million covered by the non-users benefits valued at about £49 million (£25 million for traffic decrease's effects, £1 million for the decline of accidents and for environmental benefit, and £14 million for full-time employments creation).</li> </ul> <p>Without these effects estimated at £49 million, the system would not have been justified economically. However, the facts show that the travelers number with Sheffield is well below the forecast and that it is unlikely that secondary effects will occur.</p>	<p>In the case of Manchester Metrolink, the non-users benefits have been estimated at £121.65 million, £51.31 million came from cost reduction due to traffic and £55.86 million from the reduction of road congestion.</p> <p>These figures imply that a significant reduction in the car traffic was anticipated. However, the observations show that a small proportion of car users had change their transport mode and had taken the train. It also shows that no congestion reduction can be assigned to the new system.</p>

It seems that the assessment process brings a lesser concern on issues about integration of urban development and of new tram lines. If the economic profitability of a project can be taken as a land valuation, the activation of this financial leverage remains delicate. The salvage of capital gains is difficult while the resale of valued lands requires a proactive land anticipation. The urban regeneration is not included in the main criteria of economic assessments which are more focused on car traffic reducing. The “Supertram” project in Sheffield did not lead to urban renewal projects despite the attempts (Mackett, Babalik, 2003). This situation is linked to an insufficient integration between the urban renewal project and the tram project (Dabinett and Al, 1999; Lawless, 1999).

*Sheffield Supertram [Free foto 2006]*

Since the implementation of the new assessment method [New Approach To Appraisal NATA] in 1998, few major infrastructures projects have been achieved for lack of convincing results in the appraisal tests. A large number of tram projects however bringing many societal benefits were rejected [MACKETT, EDWARDS 1998].

Some works raise the question about the errors [or lies?] observed in the cost-benefit analysis [Flyvbjerg, Holm, Buhl 2002.2005]. Even when it is properly applied, the cost-benefit analysis at a micro-economic level risks to ignore significant advantages of the infrastructures, if they concern externalities [OECD 2007]. However, an inaccurate cost-benefit analysis leads to inefficient decisions, as defined by Pareto and Kaldor-Ploucks. These studies indicate that the results of the cost-benefit analyzes should be interpreted with caution because they can be highly inaccurate. Work in the field of "new geographic economy" [Krugman 1996] highlight large potential benefits of infrastructures that a traditional cost-benefit analysis does not catch or appraise. Recent work suggest other methods of assessing transport projects such as the "Economic Impact Analysis [EIA]<sup>33</sup>" which takes into account the expansion of the labor pool and other factors that tend to be ignored in the traditional use of Benefit Cost Analysis [Weisbrod, Reno 2009]. The need to identify other productivity benefits at the time of transport projects decision making has been clearly established by the identification of the weaknesses of the Benefit Cost Analysis (BCA Eddington Transport Study, 2006).

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33 The EIA (Economic impact analysis) differs from cost-benefit analysis (CBA). On the one hand, the EIA is broader because it takes into account the relocation of economic activities and the resulting effects on a given sector, while CBA is not usually tied to a specific study area ... . On the other hand, CBA may also appear broader because it includes the non-economic benefits that represent a value to people however they do not perform directly the flow of money into the economy (such as effects value of improvements on personal savings, safety, security and quality of life, travel time).

## **III.2 Germany: a functional rationality**

### **III.2.1 A model organization of public transport**

The German model is characterized by an efficient approach for the coherence of mobility systems. Since the railway reform (1994) and the regionalization of public transport (1996), the organization and the financing of the regional rail transports are the responsibility of the Länder. There are two levels of organizing authorities for local transport depending on whether one considers rail transport passengers (SPNV<sup>34</sup>) or passengers on other transport modes (OPNV<sup>35</sup>). The SPNV are generally organized by the Länder while the OPNV fall on the Stadt-und Landkreise; the latter joining in communities of transport (Verkehrsverbunden). However, cooperation in the field of transport within urban areas are very different from one Land to another.

The key actor of the local transport organization is the “Verkehrsverbünd”. It is a “transport community” built from the legal and organizational union of local authorities (“Landkreisen” or “kreisfreien Städten”), occasionally with the transport companies of the region. The “Verkehrsverbünd” works to implement common and coordinated urban public transports (OPNV). It generally takes the form of a limited liability company in which the “Kreise”, “Städte” and often the “Land” are partners. The legal forms of this structure are different : associations of local transport authorities (eg : the KVV around Karlsruhe), companies associations (eg : the TGO around Offenburg), mixed structures (e.g. the VVS around Stuttgart), mixed structures in parallel (ex: the VRN around Mannheim Heidelberg/Ludwigshafen).

Transport communities are responsible for developing the local transport plan for the urban area. The transport community expresses the project and public transport companies translate the concept into action [Priemus, KONINGS 2001]. This “Verkehrsverbund” system seems to be a successful formula for the organization of public transport, not just for the attractiveness of the city-center for public transport users, but also by the integration of suburban and urban services to propose a truly coordinated regional transport system [PUCHER, KURTH 1996]. In Germany, by the existence of these operating structures, there is no boundary between transport perimeters while the urban, suburban and regional railway transport is developed in an integrated way (Perez, 2009). Moreover, the complementarity of urban and regional strategies creates opportune conditions for the development of suburban railway systems.

Such a synergy turns out to be winning on a financial point of view. According to the Franco-German project, “Bahn.Ville”, the example of the “Voreifelbahn” in the region of Bonn shows that an efficient co-operation enables to use, in a targeted way, public subsidies in the region. The best use of financial resources is mandatory because of the difficult situation of public finances. With synergy effects, the transverse co-operations could achieve maximum efficiency (BahnVille).

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<sup>34</sup> « Schienenpersonennahverkehr » (SPNV) : regional trains (Interregio-Express, Regional-Express, Regionalbahn), RER (S-Bahn).

<sup>35</sup> « öffentlicher Personennahverkehr » (ÖPNV) : Tramway (Strassenbahn), underground (U-Bahn)

*Kassel, A city committed to tram-trains,  
www.tramnews.net. www.lrta.org january 2010 pp.23-26*



### III.2.2 Investment choices primarily made according functional concerns

Compared to France and United Kingdom, Germany has kept most of its tram networks inherited from the late 19th century. Thus, the debate on modern networks assessment mainly focuses on tram lines modernization even if there are some recent tram-train projects [Karlsruhe 1992, Sarrbrücken 1997, Kassel 2005...]. The trams preservation in the cities was supported by a massive investment in public transport (Perez, 2009). This support began in the 70s with the laws about public transports funding which helped the development of S-Bahn networks in almost all urban areas in Germany.

It's interesting to notice that the German public transports receive large subsidies for investments, but none for the operation (Perez, 2009). Therefore, local authorities have a limited room for manoeuvre for funding the transport activity, whereas they seek to have well funded systems. They were sometimes forced to increase fees over the past decade. However, it came up to increase the number of passengers but with a less strongly increasing of the cost. That led to a lower overall cost per passenger carried.

The assessment of transport systems in Germany is characterized by a more functional and technical logic, that is to say it is oriented towards the efficiency of transport systems and mobility. German urban public transports minimize "the image" effect in favor of transport functionality. The profitability of the transport system and its performance for the flux flow are the priorities of modernizing projects and of new tram projects. Very dynamic in terms of investment, new urban railway networks ensure to find an operating balance "by seeking for flow", while trying to attract the users to develop attendance.

**Objectives of the RegioTram in Kassel<sup>36</sup>**

RegioTram offers five seducing advantages to the passenger :

- Direct: direct accessibility to Kassel districts without connection;
- Fast : frequency of 30 minutes on all RegioTrams with more stops (without a longer travel time due to the performance of acceleration and braking). Schedule coordination with the buses and regional trains to reduce connection times.
- Attractive : modernized and new stations, and new organization of stations which make more pleasant the access to the RegioTram.
- Comfortable : high comfort of the vehicles with wide entrances, paces for the pushchairs and bicycles, nice seats, air-conditioning...
- Modern : modern transportation systems that reach directly, quickly, in an attractive way, and comfortably their destination.

In the decision-making process, there is a large place for technical studies and transport engineering. The rational attitude in the mobility policy sometimes leads to minimize the role of the tram in the requalification of the urban environment. If we consider their urban treatment, trams merge in the public space; excepted the rail tracks imbedded in the ground and the catenaries, “these infrastructures/equipments do not in fact exist in the urban landscape” (Frenay, 2005). The tram is primarily a means of transport compared to French projects which invest a lot in design and amenities external to the transport system.

The fitting out of stations in German tram networks can be reduced to their simplest expression. They do not carry a symbolic character of modernity or of promotional showcase as in France. In fact, advertising is put on vehicles. In Germanic cities, the landscape development is most of the time far less sophisticated than in France but for the good reason that their projects are fundamentally framed by urbanization, without having to add any new artifice [FRENAY2005].

The concept of station practically does not exist in German cities observed : the public space remains fairly homogeneous there : “it literally sticks to the urban fabric crossed” (Frenay, 2005). Moreover, German railway projects tend to set up as many stations as necessary; they look more like simple halts than like stations as their design is rudimentary, requiring no heavy public support (Perez, 2009). Some small towns (for example the town

<sup>36</sup> <http://www.regiotram.de/index.php?id=402>



of Wörth am Rhein, 18 000 inhabitants) are served by 7 tram-train stops over a distance of 3 km. It does not seem problematic to lose 15 or 20 seconds per stop as stops are sometimes located every 250-300 meters. The idea is not to have an important station which allows a large flow of people, but it's to have small decentralized stations within the districts to ensure a fine service of the residents (Perez, 2009).

The difference with the other European decision-making models concerns also investment choices. The fuel tax has led to significant changes on tram networks. Since the 1960s, projects aim to convert trams into “stadtbahn” [underground light subway] in the central metropolitan areas. The argument depends mainly on technical reason since the objective is to maintain the performance of the transport system by avoiding traffic mix. To avoid the “tram walls”, about fifteen urban areas have put into practice this logic [like Karlsruhe today]. So, whatever the type of tramway (underground or on surface with landscape treatment, these modes become integrated with the public space to the point that “they could be practically considered as not existing in the townscape” [Frenay 2005].

*Project of tram-train implementation in underground on Marktplatz in Karlsruhe [Spig.com]*



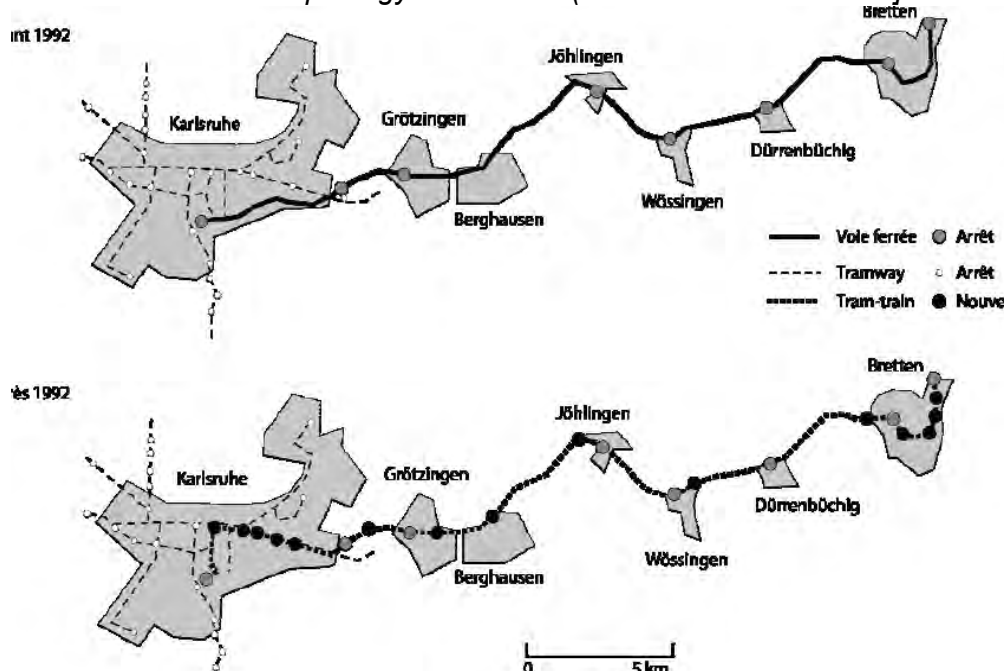
### III.2.3 A strategy for a co-development of the city and of transport

The thorough planning of German urban areas shows that the supremacy of the technical approach in the transports conception is not opposed to the arrangement of urban forms. It is quite the contrary, as the Germanic logic finely structures public transport policy and urban renewal policy [WULFHORST 2007]. As regards coordination between transport and land planning, Germany is quite different from the others countries because of the length of time of its regulatory requirements; based on a set of principles in favor of an urban networking and an economical management of areas, the model of “decentralized concentration” defined by the Federal Law on urban planning is the legal framework of coordination between urban planning and transport. These principle has been considered since a long time as a kind of reference source for planning policies (BahnVille).

Conditions of urban development are generally very regulated in Germany : the lands which are not served by infrastructures are frozen for urbanization; agricultural or woody areas are not considered as building lands. So if the town wants to grow, as it is the case today, a strategy based on an uncontrolled urban sprawl is impossible : urban development occurs through the densification of existing urban fabric, through urban renewal and land valuation around public transport axes. The development of infrastructures have to match with the urban structure of the territory (BahnVille). So, public transports in exclusive right of way are defined according to urban planning which, in return, is organized along the structuring transport networks. Let's keep in mind that infrastructures planning is done on the long term, 20 or 30 years in advance.

For example, in Wörth am Rhein, the transport system adapted itself to the town planning : as the urban builds were quite some distance from the railway infrastructure, a deviation of the tram-train line was implemented to serve the urban center (Perez, 2009).

*Example of an adjustment of the tram-train layout with urban morphology - Karlsruhe (source : Wulfhorst 2007)*



An opposite situation also exists : in Freiburg, the town planning was arranged around the transport axis. The choice was made to build and operate a tram line through non-built areas, that is to say in a context of 'profitability loss' before the urbanization of these areas. The objective was both to support land prices, and to convince the future residents to use this mode of transport (Frenay, 2005). However, some works claim that in Germany, there is no policy seeking to promote the concept of TOD (Transit-oriented-development) because the economic climate does not allow it (Hass-Klau, Crampton, 2005).

In Germany, the region is, since a long time, an intermediate legal planning level between cities and Länder. Regional development plans, adapting the federal or Länder plans, allow to determine the urban centres, the non built areas, the transport axes and the "regional built-up areas". These procedures offer the opportunity to act according different levers for the interface between transport and urban planning, for example by providing only or mainly

“regional built-up areas”<sup>37</sup> along railway infrastructures, and on the contrary “limited development areas”<sup>38</sup> in unserved areas (BahnVille). Besides, several major urban metropolitan areas are covered by institutional structures who are able to plan the territorial development (Regionalverband, regional planning agencies, etc), on a wide perimeter including suburban areas of their influence area.

*Rheinbach in the area of Bonn : small car park in the back of the station giving access to the “Voreifelbahn” (CETE NP 2005)*



Despite good practices and a voluntarist general context, situations are very contrasted and the achievement of the co-development strategy is not always efficient. The planning led by the Länder often content itself with enacting general objectives, and its effectiveness should not be overestimated (BahnVille). Regional planning may be restricted to rarely clarified and ordered principles whose implementation faces to the sovereignty and the will of towns. Moreover, a sectoral structure of transport organization (except rare cases) may weaken the coherence with urban planning. Authorities in charge of public transport policy simply define the railway supply without always taking into account the potentialities of future urban development areas, and still are grappling with a short-term logic (Bahnville).

<sup>37</sup> « Regionale Siedlungsschwerpunkte »

<sup>38</sup> « Eigenentwicklerkommunen »

### ***III.3 France: a political rationality***

#### **III.3.1 The tram on the political agenda**

Without going back to the institutional context and to transports assessments already mentioned in the second part of the report, we seek to deepen the marker of renewal policies of tramways in France, that is to say the political logic.

The scientific and technical literature coincides to show the importance of the elected representatives role in the choice of a transportation system and in the implementation of projects. By giving a high visibility to its promoter - which often happens to be the mayor of the city center of the urban area [Di Commio 2005] -, the tram represents a community, whereas the car is the stamp of individuality [Chemetov 2000]. This mode of transport in its modern version is the subject of rites through celebrations during which the political support is systematically reaffirmed [Hamman 2011]. The tram “becomes an effective showcase of urban policies and is an opportunity to create political consensus” (Di Commio, 2005).

*Celebration of the 10 years of the Tram in Lyon (CETE NP, 2011)*



In France, modern trams projects have been integrated into electoral programs of many municipal teams. This explains the wave of several official openings before the end of municipal terms of office. Indeed, the construction work (approximately 2 years) may give rise to discontentment not favorable for elected officials in exercise (Stambouli, 2007). After its completion, the tram is generally in the first lines of the political assessment. The involvement of the elected representative is anyway a quasi essential guarantee of success. Since they “come out” of the urban transport perimeter, tram-trains ask other institutional problems. So, their support by “national elected officials who are implied in major national railway organizations, strengthens their chances of achievement in a context not favorable to their development” (Baroness, 2010). According to Philippe Segretain<sup>39</sup>, former president of Transdev : “The tram is primarily a political vision, the result of a double choice by elected officials : the will of a modernization of public transport and the choice to give priority to public transport system on the road – that is to say reorganizing the street rather than going under”.

<sup>39</sup> See on the magazine « Urbanisme », november-December 2000, n°315

The dominant “reference source” of the tramway in Saint-Denis-Bobigny is clearly political, not sectoral (in the sense that there would be a transport sector) (Offner, 1998). “The tram gave to the city of Montpellier and to its elected representatives the capacity to bring to light the urban policy conducted for 24 years and thus to reveal the city that they have created” (Sylvie Groueff)<sup>40</sup>. And also, “Leaving a track of their passage is obviously one of the ambitions of the elected officials in charge of a city”.

### III.3.2 The French decision-making model is both questionable and efficient

Since the decentralization laws in France (in 1982 and in 1999-2000), urban planning and transport policy are characterized by power struggles between the State and local authorities concerning the projects. To summarize the tram decision-making process in France, it should be noted three key stages of the process through the tensions between the national framework and the local project : the “rationalization”, the “justification” and the “legitimation” which correspond to the demonstration of the choice relevance, of its feasibility, of its legitimacy (shared with the general public). The French decision model finds a balance between the national model and the local choice. This balance even precarious, shows some form of efficiency for the achievement of the project.

**RELATIONSHIP BETWEEN NATIONAL AND LOCAL FRAMEWORK  
IN THE DECISION-MAKING PROCESS OF FRENCH TRAMS**

Stages	The national framework...	... face to the local project	Balance of the model
<b>To demonstrate the choice relevance</b>	Technical reference document from the governmental services on the “relevance of transport modes” ...	... but the political choice is influenced by the image of the mode, by its modernity.	Strong power of seduction of the tram and possibility to develop “low-cost” tram.
<b>to prove the feasibility of the choice</b>	The Law [LOTI, 1982] makes compulsory the socio-economic assessment of transport projects ...	... but the value of the socio-economic assessment is incidental compared to a “turnkey” argument.	“Complicity” between the State and local authorities on the arguments and very incentive funding
<b>To show that the choice is shared and fair</b>	The Law [Barnier 1995] sets the rules of public debate and consultation for transport projects...	... but the consultation leads to a validation of the initial choices and negotiation of counterparts [route, insertion...]	The choice of the mode is not negotiable, the project is above controversies

Firstly, the demonstration of the choice rationality is mainly political and does not really take into account the debate on the modes relevance. Especially, in a context of decentralization, it is difficult to limit the choice range of an elected official on such a “visible” subject. Replacing the technical argument, the political arguments such as the seek of a balance of the quality of the projects in an urban area (which prohibits to implement a tram on a slope and a bus on the other), often come to help the modern tram.

Secondly, the justification of the tram choice is less matched to the socio-economic assessment process than to the determination of elected officials. The French context of decentralization partly explains this supremacy of local choices in the national legal framework as regards tram. However, the balance of the French model is also due to the role of the State who proposes more incentive devices [for example funding] than constraining devices [for example assessment]. This conniving role of State is observed at least on three

<sup>40</sup> In the magazine « Urbanisme », november-December 2000, n°315

levels (assessment, specific transport tax the “Versement Transport”, calls for projects in favour of structuring public transport systems). The national policy of the Grenelle of the Environment explicitly states that it “consecrates” the tram as a flagship of sustainable development policies.

Similarly, the development by the State of a standard assessment method (ex-post appraisal) for structuring public transport operations also meets an objective of argument (Offner, 1993). The objective is less to establish an objective and critical assessment of the achievements than to convince (the Minister of the Budget, the Government) about the interest for the community to participate in financing subways, VAL, trams. According to Offner (1993), the follow-up studies should be interpreted in similar terms, as management tools of success, as tools to legitimate a posteriori an action. In France, the difficulty to promote ex-post assessment of equipments and public policies in France is obvious.

*Cover of a booklet of the Ministry of Ecology  
on “the tramway revival in France” (2010)*



Finally, the process of legitimizing the choice by the public generally is based on some balance. Even if the opposition to the tram project is strong (sometimes leading to a chaotic and long decision-making process like in Valenciennes), the consultation does not lead to a complete reconsideration of the project. Generally, the choice of the mode seems to be excluded from the consultation. Thus, in the consultation process, “the way to justify the tram does not suffer the discussion” (Offner, 1998). According to Offner, the tramway is a “claim in itself” : “the question of the tram meaning does not arise. The project purpose exceeds itself

through its implementation” (Offner, 1998). Philippe Hamman gives the same analysis : “The construction of a large project would come above political controversies embodying the general interest thanks to its transcendence” (Hamman, 2011). It both allows “to act, gather, decide and to make know” (Offner, 2001). The opposition to a tram project “becomes illegitimate because it is related to specific, local, sectoral, corporatist interests (...). The urban tram project is made noticeable according to the register of a shared project, in aid of all people, and therefore does not need to be negotiated : why and how should one compromise over achievements which deal with the general interest and benefit to every one? The non-negotiated project is not self evident; it is the result of a social highlighting of the project and its legitimacy” (Hamman, Blanc, 2011), in particular in the consultation phase.

This decision-making model for French tram projects is both questionable and very efficient.

- Questionable, because the political logic gives emphasis to “fictional”. The tram is an urban marketing tool which does not suffer the discussion; it is a “claim in itself” making unnecessary to legitimize the project afterwards [OFFNER 1998]. Moreover, the assessment is quite shy, and is often only used to justify the political choices. At the stage of the project, the economic justification is reduced to a risky estimation of the internal rate of return (TRI), corresponding to the ratio between the advantages and the cost of the project. The French tram is acclaimed, which make people say to a few detractors that “the tram is one of these myths that our societies, and particularly the French contemporary society, have the secret” (Carmona, 2001).
- Efficient, because this model is characterized by a real “instrumental efficiency”<sup>41</sup>: almost all the French urban areas of more than 200,000 inhabitants have one or several modern tram lines. According to Offner, four factors that make easier the implementation of a large equipment such as a tramway can explain this efficiency : first, the project is seen as the solution based on the reproducibility of “good practices”; secondly, the tram is a rallying project, it facilitates the implementation of a governance by syncretism; thirdly, “the large” project proves to be effective because the fact to build it in the hierarchy of the political support required, is a pledge of simplification; finally, a tram project is visible (it should be looked at, admired as much as it must be used) and thus embodies the success of public action (Offner, 2001).

In this key role of local and national policies, modern tram projects give prominence to “the image effect”. French projects offer “high landscape qualities” by a complete renewal of the street crossed, between the built-up facades, including the basement [burying and works on underground networks] and even above ground [various furniture, plantation, lighting...] [FRENAY 2005]. The implementation of a tram goes hand in hand with a major restructuring of the surrounding public space and can lead to conceive this mode as a real “planning tool” to rethink the city. Some people even speak of “urban planning tram” [Paquot 2000], of its role “as an actor of urban renewal” [Beaucire 2000] and as a “stimulant and multiplier of urbanity”. In France, the tram is not only considered as a modern transport means but even as a “city model” [HAMMAN 2011].

41 The words of Offner (1993) are particularly explicit on this point :

“the effect myth allows and legitimates action of the decision maker; it allows the development of sectoral projects, despite of the interrelationship's evidence between public policies. And yet, all is not going well in the best of worlds because this operating myth introduces some malfunctions. By dividing transport policies into several projects (line extension effect, effect of the restructuring of a bus network, tarification policy's effect, automation effect of the subway, ...), - according to the famous Cartesian principle obsoleted by the "complexity" of the world - it minimizes the coordination requirements between the different elements of the mobility system, between actions in favor of flow management or of land use etc.. It obscures the need for accompanying measures. The political myth finds here its limits. Nevertheless, it is not condemnable. Its instrumental rationality justifies its existence. ”

*The tram of Valenciennes, Janus Price of the city 2005  
(Dujardin, Duquesne, Marique, 2008)*



### **III.3.3 Urban regeneration and image effect : a reflection of the political role of the tram?**

As a rolling object, the tram has become an element of urban decor (Cartier, 2005). In France, the esthetics of trains, very polished, visually expresses the identity of the city. That's why each city adopts its specific design with the contribution of famous designers. In short, the tram seems to be a movable emblem of the city. It is an open urban object. It is particularly incorporated in the framework of advertising : through the tram, the city attracts attention. But especially, it is an "attractive object, not to say a real attraction in itself" (Cauquil, 2002).

According to Frenay (2005), French projects offer great landscape qualities, thanks to the systematic choice to completely renovate the public space. If these projects aim to be the more sustainable as possible, they also appear particularly successful, unitary (strong feature) and well done at the landscape level. The improvement of stations is particularly well finished : "they impose on the urban space with a seamless design" (Frenay, 2005).

Ultimately, the tram appears with a particularly marked image, as a symbolic, physical and instrumental point of view. In this sense, it has an undeniable role in the marketing policies of cities (Cartier, 2005). The tram is a showcase of the city that goes hand in hand with a major restructuring of the public space. However, "the network effect" and the functional scope of new French tram lines may be considered as a background : tram implementation is often associated with very generous compensations to the benefit of cars whether it is



concurrent or complementary (Frenay, 2005). Moreover, the optimization of the services or the routes with the conventional railway network does not seem to be a priority.

Finally, the tram cost is a corollary of this research of modernity, or even of “luxury” in the associated developments. The French tram appears to be “the anti-Strassenbahn” : if we take the example of Dresden (AI) where there is an inherited large railway network, the functional part was implemented first (that is to say the transport object) and then the comfort developments and amenities came progressively (shelters in stations, etc...); in France, it's “all inclusive”, the lighting posts, the landscaping of avenues, the paving (etc...) but as a result, it is a line which is built, and not a network.

*Photomontage of the tram in Reims (Reims Metropole 2010)*



These different potential roles of the tram (maximization of the image effect, weakness of the network effect) is an evidence of the political rationality which implements the infrastructure. This logic seems to have an effect on the form (image reflected by the line) and on the core (reality of its organization in the mobility system).

*This third part has reviewed the dominant mechanisms of tram projects assessments. Beyond the methods used (CBA, EIA, SORTING...) generally based in Europe on comparable econometric methods (Bristow, Nellthorp, 2000)<sup>42</sup>, there is a decisional dogma which embodies the implementation of these infrastructures : the logic is economical in England, functional in Germany, and political in France. According to the cases, other European countries may be closer to one or the other of the three models or to another logic, but our study does not allow to affirm it. These trends are set in “caricatural” way and have to be considered as assumptions (that will be confronted with the field work presented in the fourth part) and not as final results.*

<sup>42</sup> « It is clear from this review that EU countries have a tradition in the use of CBA for the appraisal of public sector transport infrastructure projects. There is a high level of consensus as to the direct impacts that should be included in a CBA »

Country	Evolution of tramway networks	Dominant decision-making model	“style”	Assumption about tram developments
The United Kingdom	almost systemic and anticipated suppression of tram lines relatively few new lines	Economic Rationality	Profitability	<i>Have to contribute to new built-up areas with creation of capital gains; developments of P+R in order to facilitate the transfert from car to train for the environmental assessment.</i>
Germany	Majority preservation of old networks and modernization but relatively few new lines	Technical Rationality	Performance / efficiency	<i>Have to serve more closely the transport demand in synergy with existing transport system and the urban renewal; implementation of many simple stations.</i>
France	Systemic Removal (After the Second World War) and nowadays a lot of new lines	Rationality policy	Image effect and design beautiful	<i>Have to contribute to the embellishment of the city through a well finished requalification and to give an impression of modernity; have to accompany public policies and urban marketing.</i>

*The interest of this discrimination of the decision-making processes is precisely to be able to anticipate expected objectives and territorial effects of tram projects. Some people even speak of “style”<sup>43</sup> for the developments of tram projects : profitable (economically), efficient (functionally) or beautiful (in a town-planning meaning). Therefore, how could we implement beautiful, efficient and profitable trams?*

## **IV. An exploratory analysis of the territorial effects of “tram-based systems”**

*The fourth and last part of this report focuses on the scientific approach conducted in the second phase of the Sintropher project study. It deals with a study which aims to put in perspectives various tram contexts in Europe, constituting a panel for the analysis of territorial effects of tram projects. The objective is more precisely to observe the mechanisms of decision-making process, expectations and aims of different projects, in order to compare the forecasts with the achievements. We seek to confirm or refute our assumptions about the major decision-making models in Europe, including their “style” or “trademark”. We will explain in this section the methodology we use and the selected case studies.*

### **IV.1 A scientific approach**

#### **IV.1.1 Recall of our positioning**

Before presenting the method for the analysis of the case studies, the lesson drawn from the literature invites us to adopt a triple point of view.

*Firstly*, we seek to exceed the assessment reasoning which gives priority to the individualization of direct consequences of the project considered, to the detriment of taking into account the opportunities it represents as a policy tool [OFFNER 1993]<sup>44</sup>. In other words, we seek to exceed the simple topic of transport infrastructure assessment to analyse the tramway role in the assessment of public policies. Why should a tool such as the tram, alone produce structuring effects on a territory, whereas it is explained that it is necessary to “de-technicize” the public action and to go over the sectoral vision of urban policies? If we consider that the coherence of sectoral interventions is a key challenge, why would it be necessary to seek to isolate the possible effect of an action and not to assess the meaning of the public policies? The ideal might be to demonstrate that the results of the coherence of local policies worthes more than the sum of the tools implemented. It doesn't a matter finally if the “tram” has no “effect”, if it contributes to allow a broader objective. “appraising urban public transports : the budget, carbon, but also equity and urbanity. In Short, the society” (Magazine Transports Urbains 2009).

*Secondly*, we do not refute an economic reading of the networks utility, but a reading which would be only economical : the simple econometric calculation, even renewed, does not seem to be a sufficient answer to the analysis of transport networks. Indeed, the socio-economic measure has showed its limits and meets difficulties to be renewed : “The traditional techniques of projects assessments in preparation of the decision are primarily

<sup>44</sup> Offner added : "And so we continue without qualms to assess the value of a transportation project in large part by the travel time it is supposed to save money, while it is well known that these time savings have, in more or less short term, different meanings : expanding employment areas and extension of suburban areas, restructuring of activity programs. The concept of assessment, formalized in France by the law LOTI in 1982, should encourage the highlight of such discrepancies between the a priori assessment criteria and the reality of global evolutions of interactions between mobility systeml, locations system and system about social practices and relations. It does not postulate least so far, the relevance of before-after comparisons that may reveal changes directly attributable to the transport infrastructure "(Offner, 1993).

involved in this celebration of effects. The cost-benefit analyzes try to take into account the direct or indirect effects, if possible by quantifying and monetizing them. It is not here the subject to rebuild the history of economic calculation, we have to note that the attempts to modernize these approaches (rationality of budget choices, multi-criteria analyses, etc) retained the initial logic of the effect dearly to economist engineers” (Offner, 1993). So, we chose not to conduct quantitative socio-economic analysis because this method, unrealizable with rigor in a constrained time, hides a number of territorial opportunities of the tram lines: “the two obsessions which saturate the public debate, the carbon on one side, the tight budget on the other, are likely to bury, if we do not take care, the contribution of the identification and of the measure of the societal externalities which can be positive or negative” (magazine Transports Urbains 2009). So we do have to give in to the simplicity.

*Thirdly*, we put at the heart of our observation, the public or private, institutional or technical actors because they are the persons who are able to give an account for the issues, objectives and opportunities of urban transport projects. The “actors” have to be imagines themselves back in the context of territorial issues (Moine, 2006). For example, it is necessary to know the status of the assessment's holder in order to judge the results : is it a partnership approach likely to reach consensus? Is the evaluator a public or private person close to the holder of the appraised project? Which rights does he have (only transport competence or multiple competence able to balance the town planning and transport observations)? Therefore, our study adopts a reasoning based on “geopolitics” aspects. The analysis of the involved actors, of their position compared to the project, (expectations/fears) and their arguments, refer to the questions of “geopolitics planning” as identified by Subra (2007). Beyond the rivalry, it is conflicts, competition, or representations of space, that planning operations such as a tram line are achieved, and finally it becomes a condition of space appropriation, a way “to model” the territory.

Our posture reminds that it is “essential to develop another dimension of the social and economic utility of public transport, both at the individual and the collective level. This dimension is really decisive but more difficult to quantify as it mainly finds place in the externalities of public actions, which are certainly positive but also misty” (Magazine Transports Urbains 2009). According to this source, the tram can also answer to other various dimensions such as the requirement of solidarity, the range of services offered by the city upon which are based both the quality of urban life and the attractiveness of the urban territories, or even a social and cultural mixing place... but how could we quantify the contribution of public transport to these three components of efficiency (solidarity, attractiveness, cohesion)? But more important, how could we ignore it?

#### **IV.1.2 One problematic and three hypotheses to be tested**

The second phase of the Sintropher project relies on a feedback from the analysis of 6 guided transport networks including 4 located in Northwest Europe. The objective is to put in perspective the local situations in different countries to provide understanding elements of the relationship between town planning and transport systems such as tram-train.

Through these 6 examples of intermediate urban areas, we wonder how actors justify the investments and reduce the costs with the aim at the same time to maintain potential territorial effects of such a transport project? In what measures could lower investments

based on modern tram systems which offer the opportunity for middle urban areas to consider these projects, breed also strong potential effects?

The state of the art of the assessment practices in Europe leads to the distinction of three contrasted decision-making models of tram systems (“tram-based systems”). The differentiation of these major national models constitutes our working assumption. By the local study of various tram networks in Europe, we will try to feed the reflection on the three major models; political, economic and technical. One of the goals is to distinguish what is dependent of the national context of the country on the one hand and the singularities and the local initiative of the studied cases on the other hand. Thus we seek to confirm or refute the hypotheses concerning the contrasted choices in the structure of tram projects. Even if the third part focused on the differences between the three major logics between UK, Germany and France, it is necessary to keep in mind that these boundaries could be easier crossed and that other national, regional or local contexts could lead to complex adjustments of these models. In addition, one of the key issues is to consider which mechanisms allow a “cross fertilization” of development models of tram projects. How could we be able to articulate the benefits and good practices of each style of network development ? What conditions to make profitable trams (economically), efficient trams (functionally) or “beautiful trams” (in a town-planning point of view)?

To understand the capacity of low cost systems to boost economic activities, to reduce pollution emissions and to structure town planning projects, we will mainly focus our discussion on the analysis of the congruence between the tramway and the crossed areas. The consulted sources and the method rest on:

- a territorial observation and an institutional analysis of the lands by using various statistical, documentary, cartographic, and iconographic sources;
- a critical analysis of “actors statements” and of the interviews with the local officials relating, on the one hand, to the decision-making processes and the reasons of the choice of the mode and, on the other hand, to the expected objectives and effects of the commissioning of the line;

We chose to develop an original method to observe opportunities and territorial effects produced by the tram system. Some original, synthetic and homogeneous representations between the cases of study, will be produced according to three reading levels:

- an “organizational” reading through the identification of the implied actors and the reconstruction of the decision-making process;
- a “territorial” reading through graphic diagrams of the evolutions around the project;
- a “dynamic” reading of territorial effects of the tram, suburban train or tram-train projects through a three-dimensional analysis. This graph crossing functional, spatial and temporal dimensions is presented in the next section.

## ***IV.2 An original method based on a three-dimensional graph***

### **IV.2.1 The “X” axis, the functional dimension**

The functional dimension corresponds to the types of changes planned or observed in a city with the commissioning of a modern tram. These changes and their relationship with the tram are of different nature. We can distinguish three main topics to apprehend the more or less direct potential mutations due to the tram :

- changes directly related to the tram object : they are, in a way, impacts or observable consequences on the urban landscape or the road sharing directly attributable to the tram.
- potential changes in transport and mobility policies in interaction with the tram. They are potential effects because the tram line is only one element of a comprehensive transportation system; the control of daily mobility requires action on several registers, both on the modal supply (automobile, public transports, bicycles, walking) and on the demand which is linked in particular with urban morphology (Da Cunha 2005). For example, even if it is a clear objective, there is no direct effect to be expected from the implementation of a tram on the decrease of car traffic.
- Some changes in urban policies (economic development, housing, land, social...) that are impossible to link to the tram. We talk about congruence with urban policies because the complex determination of the links with the tram can not be reduced to a causal relationship. And so it deals with observing the parallel evolutions that show a mobilization of actors face to development opportunities (urban, economic,...).

The choices of indicators rise from the objectives of the project, of expectations of the different actors, and of observations. They reflect the priorities and the missions of each actor.

### **IV.2.2 The “Y”axis, the spatial dimension**

The spatial dimension questions the relevant scale for the observation of dynamics in interaction with the tram. Which relevant scale for the assessment? There is not only a single scale, but several scales to be observed according to the analyzed criteria. Inspired by the work of Stambouli (2007), we distinguish three territorial levels:

- the first one concerns the nearness perimeter of the tram line which includes the rail tracks network and the perimeter of co-visibility of the tram (that is to say the space between the built-up frontage). This scale is defined in reference to the layout of the tram.
- The second one concerns the corridor of the tramway line which is the direct area of influence of the tram. The corridor of approximately 400-500 m on both sides of the line, characterizes the area of accessibility by walk to the tram line (Stambouli 2007). This space is also built according to the location of the stations which are at the center of circles of 400-500 m of radius. “Some districts can emerge within 400-500 m around the tram station, based on a pedestrian accessibility to the station and the

existence of the station as a central point” (Stambouli 2007). These corridor's surface can be adapted according to the level of service and the area of influence of stations : some people even talk of area of influence which can reach up to to 2 km.

- The third spatial level is close to the scale of urban planning which may correspond, depending on context, to the institutional perimeter of urban transport [PTU in France]. A fourth level is considered if the scale of urban planning is too narrow. There can be an interest to adopt a broader consideration of the tramway system, on a metropolitan and/or regional scale (eg the employment areal to estimate a possible relocation of activity or an evolution of the commercial dynamism...). This larger scale, can also be concerned by the developments of the tram: “beyond the PTU; in the hypothesis of an urban area well-served by public transports, the intermodality between cars and public transport, often operates at the border of the urban center and the suburban space” (Stambouli, 2007).

location of the potential effects of a tram.	Effect by level of scale
<p><b>From the tram line to the street</b> a line materializing the railway platform of the tram and the road where this platform fits in.</p>	<p>(a) an increase in the supply of public transports; (b) a differentiation of the trade towards more considered purchases or more expensive products than in suburban large surfaces; (c) a sharing of public spaces in favor of soft modes, especially the walk; (d) an improvement of the safety of people, in particular of pedestrians; (e) urban restructuring operations - and in particular of densification; (f) a reduction of noise and air pollution in its proximity.</p>
<p><b>From the corridor tram to the accessible districts by walk</b> the corridor (two parallel straight lines), to approximately 400-500 m on both sides of the platform</p>	<p>(a) a price increase of building plots, housing and rents; (b) a polarization of economic activities and public equipments; (c) an urban restructuring; (d) profound demographic changes in the form of professional or residential mobility; (e) the plantation of trees and an increase of green spaces.</p>
<p><b>From the perimeter of public transports to the sustainable city</b> the perimeter, formed by the envelope which encloses the urban public transport network</p>	<p>(a) an increase in the supply of public transports; (b) the development of intermodality between cars and public transports, completed by exchanges with other modes of transport (bicycles, bus, train); (c) an increase in the public transport demand; (d) an improvement of the accessibility to the city center; (e) job creation by investments of infrastructures; (f) positive change in the perception of public transports (g) a lower energy consumption in transport</p>

### IV.2.3 The “Z” axis, the temporal dimension

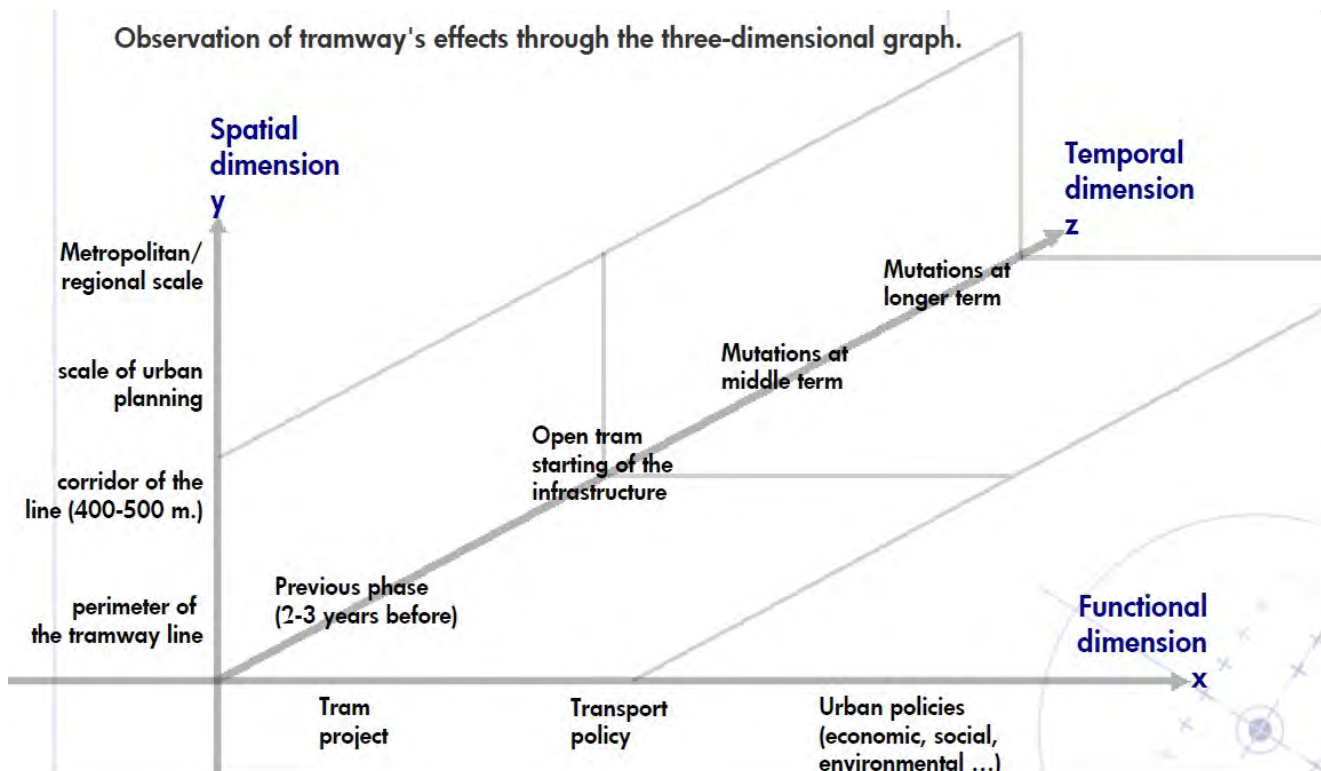
The third dimension is temporal, reminding that a tram project and its effects have also a footprint in time. The observation of “the temporal integration” of urban policies allows to grasp the coherence between the vision of the future, the development strategies, as well as concrete and targeted actions such as the construction of a tram line [WULFORST 2005].

For these transport projects, it is necessary to consider the potential territorial changes on both sides of a “T” moment corresponding to the commissioning of the infrastructure. The previous phase enables to establish a reference situation, to observe the mobilization of actors and to anticipate some phenomena.

Taking into account the effects of a transport network begins before its commissioning with the implementation of a reference frame or “state zero” in order to measure “the net impacts” compared to a situation of reference without a public structuring transport line (on the basis of the expectation of what would have occurred without the project). We often speak about a period of 2 to 3 years before the commissioning but according to the schedule and especially the works period, this indication can not be rigid. Some effects [or lack of effects besides] of the infrastructure can also be apprehended before the start of its operation, eg the prices of land undergoing anticipation mechanisms.

Depending on the spatial scale and the type of effects, the changes can be observed in the middle term [eg for the trends of mobilities] or longer-term [eg for the location of economic activities]. Some territorial dynamics are satisfied with a comparison before/afterwards, while others must be apprehended through a permanent process of assessment. Moreover, it turns out to be useful to observe what occurs on pilot areas, that is to say on similar districts not affected by the project.

### *Representation of the three-dimensional graph*





## ***IV.3 Presentation of the case studies***

### **IV.3.1 Selection criteria**

The objective of the second phase is to put in perspective local situations in different countries to provide some understanding of the relationship between urban or regional planning and the transportation system. The choice of case studies combines technical and practical criteria. The perspective of six case studies in Europe is based on comparable characteristics in terms of railway transport systems commissioned recently, the type of service oriented towards secondary or suburban polarities with a lower density - where there is some potentialities of urban development [Kaufmann, Jemelin, 2003] -, the intermediate size of the urban area, and the scale of the project ["Low-cost" if possible]. These systems of tram, tram-train or light regional train (equivalent to the English term of "tram-based system") are characterized by specific issues of feasibility, cost-effectiveness and attendance. The "low-cost" projects are upper returns on investment limit, and often below the criteria of attendance which traditionally justifies the relevance of these projects. The service to fragmented urban areas or peripheral polarities by light railway systems requires a thorough study of the costs (investment and operation) and of the potential effects of these transport projects usually reserved for other cities (major metropolis and dense urban services).

More precisely, to select comparable cases, several criteria have been taken :

- Choice of a modern tram, tram-train or light train system, recently commissioned (in 1990 or 2000) in order to be able to mobilize the wellsprings of the project and those of local actors;
- serving secondary or outlying polarities with a density lower than the central urban polaritie;
- located in urban areas of intermediate size (less than 500,000 inhabitants).
- More specifically, the project must be at or below the threshold of socio-economic profitability which is traditionally estimated for an urban tram project (In France, this threshold is around 4000 passengers per km of line).
- In terms of budget, in order to be identified as a "low-cost", the project must be lower than a threshold we propose to equal 20-25 M€ per kilometer, by reference to the cost of French urban tram projects.
- Thus, we pay special attention to the projects using the infrastructure's opportunities (existing or brownfield), adapting the choice of facilities and equipments, and opting for a particular operating mode in order to reduce the costs without degrading the performance.

### IV.3.2 Presentation of the 6 cases of study

This selection of case studies cover four operating systems in Northwest Europe and two outside. These case studies are representative of the various decision-making contexts as regards regional public transport in large Northwest European countries (England, France, Germany, Netherlands) as well as in Southern Europe countries (Italy, Spain). This diversity of national contexts give us the opportunity to have a comparative look on the decision-making process and the assessment of local railway projects.

These case studies respect the homogeneity of the selection criteria: they are recent urban or regional railway projects (commissioned between 2004 and 2009, except for Utrecht in 1983, and Saarbrücken in 1997), located in urban areas of intermediate size (only the urban area of Nottingham exceeds 500,000 inhabitants but the size of the city is comparable to the other cases). These transport systems are designed to serve secondary polarities or urban fragmented extensions : going from string of poles (more or less discontinuous according to the cases) of approximately 10,000 inhabitants (around Valenciennes line 2, Bergamo)<sup>45</sup> to small outlying towns (25,000 to 50,000 inhabitants, Hucknall for Nottingham, coastal town of Velez-Malaga, Sarreguemines for Saarbrücken, Denain for Valenciennes line 1)<sup>46</sup>. If Velez-Malaga is the only case that does not reach 200,000 - 300,000 inhabitants like all other urban areas, the study of a connection towards a pole of 25,000 inhabitants is very comparable to the other selected sites.

Profile of the rolling stock of the various cases of study (various sources)

FAST NOTTINGHAM TRANSIT			SNELTRAM UTRECHT
SAARBAHN			TRANVIA BERGAMO- ALBINO

45 Tram Project of Valenciennes to Condé (10.000 inhab.) and Vieux-Condé (11.000 inhab.), Saint-Saulve (11.000 inhab.), Onnaing (9.000 inhab.) and Quiévrain (7.000 inhab.) ; Train from Bergamo to Torre Boldone (8.000 inhab.), Alzano Lombardo (13.000 inhab.), Nembro (11.000 inhab.) and Albino (18.000 inhab.).

46 Tramway from Nottingham to Hucknall (30.000 inhab.), Tramway of Velez-Malaga to the coastal town (25.000 inhab.), Tramway from Valenciennes to Denain (20.000 inhab.), Tram-Train from Saarbrück to Kleinblittersdorf 12.000 inhab, Sarreguemines 22.000 inhab.)



All these case studies seek to limit the financing cost of the infrastructure by using existing opportunities (re-use of all or a part of the old railways old in Valenciennes, Bergamo or the existing ones in Saarbrücken) or by adapting the insertion of the new track (in Utrecht, in Nottingham, a part of the line is built along a railway in service, in Velez-Malaga, the types of railways are adapted to the urban environment). Beyond the similarities, these cases reflect a diversity of light railway systems : there are trams, as strictly speaking (Valenciennes, Velez-Malaga, Nottingham, Bergamo) but also a tram-train (Saarbrücken) and a suburban train (Utrecht).

	City	Project	Cut	Service Road	Infrastructure	Cost	Voyages
North-West Europe	<b>ANG</b> <b>NOTTINGHAM</b> 290,000 inhab. [town] 660,000 inhab. [urban area]	Line 1 [2004] Nottingham Express Transit [NET]	14 km, 24 stops	Connection between the central station and an urban pole of 30,000 inhab., with urban continuity	new railway track in urban environment [5 km] and suburban, along an existing railway track [9 km]	250 M€ - 16 M€/km	28,000 pass./day  2000 pass.km/ day
	<b>AL</b> <b>SAARBRÜCKEN</b> 180,000 inhab. [town] 350,000 inhab. [urban area]	Line 1 [1997] Saarbahn	19 km, 16 stops	Connection between the city center and poles from 20,000 to 40,000 inhab. without urban continuity	Use of existing regional railway tracks [14 km] and new lanes in the city center [5 km]	195 M€ - 10 M€/km [13 into urban]	25,000 pass./day  1315 pass.km/ day
	<b>FRA</b> <b>VALENCIENNES</b> 45,000 inhab. [town] 360,000 inhab. [urban area]	Line 1 [2006-2007] Tram of Valenciennes	18 km, 28 stops	Connection between the city center and a pole of 20,000 inhab. without urban continuity	New Railway track in urban environment [9 km] and interurban on old railway influences [9 km]	338 M€ - 19 M€/km [8 in suburban]	29,000 pass./day  1600 pass.km/ day
	<b>NL</b> <b>UTRECHT</b> 300,000 inhab. [town] 435,000 inhab. [urban area]	Line 1 [1983-1985] Utrechtse sneltram	20 km, 24 stops	Connection between the central station and poles of 30,000 and 60,000 inhab. with almost urban continuity	New Railway track mainly in ballast [20 km]	?	38,000 pass./day  1900 pass.km/ day

South Europe	<b>IT</b> <b>BERGAMO</b> 120,000 inhab. [town] 220,000 inhab. [corridor]	Line T1 [2009] Tranvia Bergamo- Albino	13 km, 16 stops	Connection between the central station and a string of poles of 10,000 inhab. with urban continuity	New Railway track on position limits of an old disused meter gauge track [13 km]	155 M€ - 12 M€/km	14,000 pass./day  1100 pass.km/ day
	<b>ES</b> <b>VELEZ-MALAGA</b> 75,000 inhab. [town]	Line 1 [2006] Tranvía de Vélez- Málaga	5 km, 9 stops	Connection between the city center and a coastal city- of 25,000 inhab.	New Railway track with various types of urban insertion [5 km]	37 M€ - 8 M€ /km	5,000 pass./day  1000 pass.km/ day

### IV.3.3 Justification and specific interest of crossing cases

Beyond a general justification, some more specific points are to be reported to understand the logic of the selection of case studies.

The case of **Nottingham** is interesting to compare with the case of **Valenciennes**: in both cases, the first tram line was implemented by using land holdings of the rail network to serve an outlying pole. The Nottingham Express Transit line (NET), opened in 2004, is located, for more than an half of the trail along the existing railway. In this specific situation there is a large urban cut due the accumulation of railway tracks. In Valenciennes and in Nottingham, it is mainly interesting to study how the synergy with the railway system is organized, and to determine why an interconnection has not been chosen? Beyond, the national decision-making contexts can give us lessons about different ways of approaching the urban insertion of a transport project. Isn't it difficult to integrate the tram into urban dynamics when it fits along or on old railways tracks?

*Comparison before/after the arrival of the first line of Nottingham Express Transit*



The case of **Valenciennes** is interesting because it takes place in an urban context inherited from the industrial era which was unfavorable to public transport service (all the more by a structuring public transport line). The choice of the tram was finally forced to connect the centrality of Valenciennes with different polarities of the borough. The tram

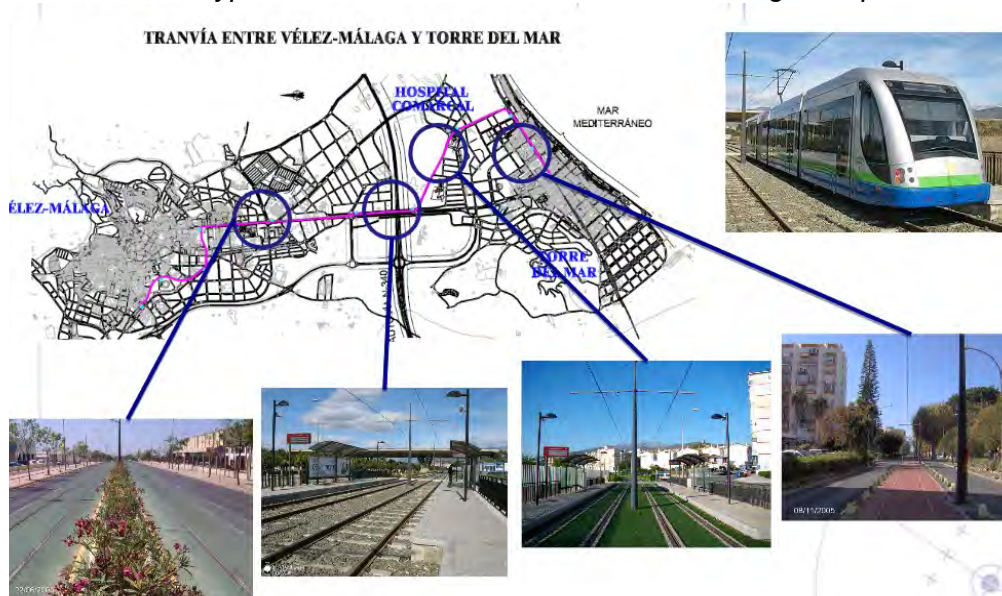
system fits well in highly fragmented urban morphologies : historical center, university area, secondary pole of Denain with no urban continuity with the city-center (line 1), a string of poles of 10,000 inhabitants more or less in urban continuity with Valenciennes (line 2). The cross border context of the project of line 2 (service of Quiévrain in Belgium) also reinforces the interest of the case study.

Among the other cases selected, **Bergamo** is the one that is the closest to the urban fabric of industrial cities of Northwest Europe. Its urban morphology with high challenges of urban renewal reminds the case of Valenciennes or Mulhouse. Thus, in another national context, the case of Bergamo can provide interesting points of comparison. Indeed, the tramway towards Albino is a rail link among the industrial valley which is built on a former railway. This case demonstrates the stakes of the rehabilitation of a transport infrastructure on an old metric railway connection deal with problems of urban regeneration.

The last case allows to take into account the decision-making process of another large South European country, Spain. The tramway of **Velez-Malaga** is shorter (less than 5 km) than all the other cases and fits in a bipolar city much less populated (less than 100,000 inhabitants). The choice of this case is mainly due to the possible setting in perspective with two partner regions of Sintroper : West-Flanders in Belgium and Fylde Coast in England. The construction of a coastal modern tram in a small touristic town is directly linked to the concerns of the partners. This is a case which questions the choice of the tram compared to contrasted uses (tourism, leisure, besides the traditional uses : work, studies...) and over different time scales (high demand on weekends, in the evening, during summer or school holidays...). Thus, this low cost project appears to be quite suitable for our case selection, especially if we take into account the efforts of mutual adaptation of the line to the various urban configurations :

- on a wide entering boulevard, there is a neat double rail link;
- between the two city-centers, close to the highway and towards the peripheral commercial poles, the platform is in ballast;
- in a new sector of urban extension accommodating health and leisure facilities, the path is landscaped;
- in the dense urban center, the infrastructure is reduced to one lane, which is more discrete.

#### *Various types of insertion of the tram of Velez-Malaga in Spain*



Through these 6 examples of urban intermediate areas, we wonder how actors justify the investments and reduce the costs while consistently taking care to maintain potentials of territorial effects of such a project of transport? To what extent can lower investments (based on modern tram systems, allowing smaller urban areas to consider these projects), also result in strong potential benefits?

*This fourth part has laid the foundation for the case study of the second phase of Sintropher work. On the methodological level, a qualitative analysis of the statements of actors and an interpretation from a three-dimensional approach will be preferred. In terms of cases study, the 6 cases meet practical and scientific criteria which ensure a broad consideration of the issues of the research.*

## Conclusion

Mainly bibliographical, this report provides useful knowledge for the continuation of the Sintropher project. In particular, we explicitly point out the absence of causality in the relationship between the transport infrastructure and territorial dynamics. The discourse on transport impacts generally masks this major reality : there is no determinism but a systemic framework where we can observe the interrelationships over time; and so it is often better to use Observatory methods to analyze reciprocal adaptations between a network and its territory rather than an assessment at a “T” time before/afterwards. The cases of tram and light train networks are difficult to isolate because they correspond to a diversity of technological devices with specific characteristics. The “Light rail” family is particularly wide but its history, showing a net decline in the years 1960 to 1980 and then a current contrasted revival, demonstrates its importance in building a sustainable city. However, the place of assessment is central in the contemporary public action. In order to design the city through tramways, is it necessary to understand precisely and objectively their role in the urban functioning, and to determine their strengths and weaknesses as instruments of “new urbanism”.

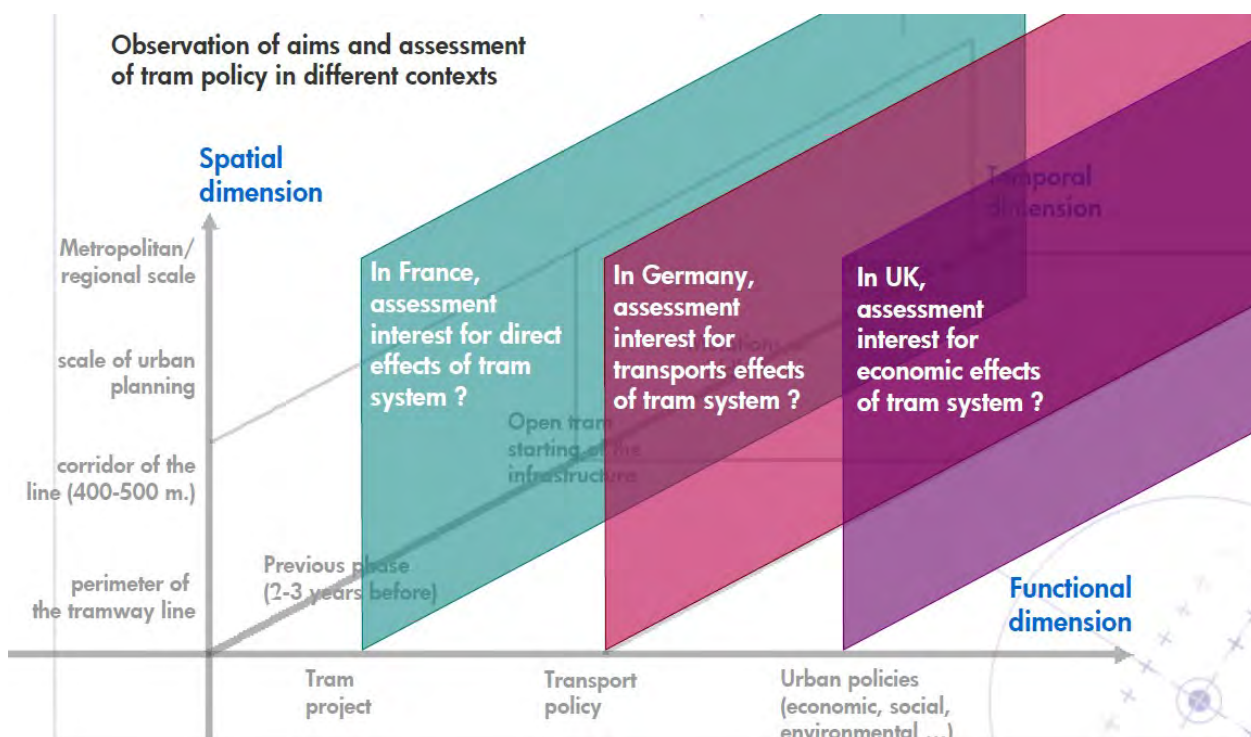
The report detailed the role of French modern tramway as an issue of land planning. (...) This “urban planning” function of tram lines is built by the political project which uses the tram as a tool to create beauty, modernity, and to transform the image of the city. Thus, the technical arguments and the socio-economic validation are often in the background, or even appear as accessories with the political decision.

The contrasts between the assessment methods of infrastructures in France, in the United Kingdom and in Germany have been identified even if they are more assumptions than an absolute truth. The United Kingdom emphasizes the economic logic and pays particular attention to the ex-ante assessment of a tramway project. The challenge is to find a “profitable” economic model, showing the profitability of the investment. Germany is more interested in the performance of the mobility system and so in the functionality of the transport network. And France, as it was explained above, follows a political logic which leads to focus on the image, the design of the system or the landscape valuation. The three models each have their logic of action and regulation but none is truly “ideal”. Therefore, the question is to know how to combine the qualities of each assessment model. To what extent, could a tram be “beautiful”, “profitable” and “efficient” when we associate the urban, economic, and transport functions of the French, English and German models?

The search for structural effects often lead to isolate a sector like economy or urban planning, and to neglect all the potential interrelationships of a tram with its environment. The focus on the tram assessments implies that we should be able to give a value to an object independently of others whereas urban dynamics are overlapping each other in time and in space. This is why our choice is to analyze the territorial changes around the tram in a triple dimension : functional, spatial and temporal dimension. By drawing a complete list of items concerned with the implementation of a new infrastructure, we can identify the dynamics for which we can speak about a more or less direct effect of the tram. Our original methodology is different from hedonic models of land price, and other econometric calculations : the complex interactions of the tram with transports, urban planning, economy (etc) are impossible to isolate while the determination of the specific role of a transport mode in the transformations observed is quite as difficult. The observation of territorial changes expected and observed remains our key main entrance. But the observation of the

mutations, is interpreted not as a consequence of the infrastructure but as a possible mobilization of the actors and of public policies to accompany the implementation of a tram.

Our assumptions are declined on the three-dimensional graph : the French political model would tend to focus on direct visual effects of the tram; the German functional model on the effects on the mobility system in a context of integrated transport policies; the English model on the economic effects of urban policies (in itself a more ambitious search for impacts but also more complex and hazardous to demonstrate). These assumptions will be tested through six case studies in France (Valenciennes), Germany (Saarbruck), the United Kingdom (Nottingham) but also in other European countries : the Netherlands (Utrecht), Spain (Velez-Malaga) and Italy (Bergamo). The cross analysis of local decision-making processes and territorial effects of these six tram lines are the subject of the second phase of the WP2 Sintropher project.



The finality of our approach is to demonstrate that the result of putting in coherence local policies is worth than the sum of the implemented tools. It doesn't a matter if finally the "tram" does not alone produce its "effects", if it participates in the development of a sustainable urban goal founded on the articulation of potential public transport service with the various forms of urban and social structures ?



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