2 URBAN RAIL SYSTEMS IN FRANCE 1993

2.1 GOVERNMENT POLICIES AND ORGANISATION OF PUBLIC TRANSPORT

2.1.1 The New Urban Rail Systems in France

The planning of light rail systems in France began in the 1970s when a growth in populations and increasing congestion in cities led to a new interest in public transport. Metro systems were the favoured solutions for the major cities, beginning with Marseille (opened 1977) and Lyon (1978) in addition to an expansion of the Paris railway network. The automatic (VAL - Véhicule Automatique Légère) Metro in Lille opened in 1983. Around 1975, the Government began to consider the best system for medium-sized cities where a Metro is too expensive, and as a result a new generation of tramways was developed, starting with Nantes (opened 1985) and Grenoble (1987). Currently, there are proposals for further VAL or tramway systems in Paris, Strasbourg, Toulouse, Bordeaux, and other cities (see Table 2.1).

2.1.2 Responsibilities for Public Transport in France

In a typical French provincial city (Paris is organised differently) two bodies are responsible for public transport. First is the Organising Authority (AO - Autorité Organisatrice), a policy-making body with similar functions to a British Passenger Transport Authority. The Organising Authority is typically a Syndicat Mixte comprising elected representatives of the communities in the conurbation and sometimes of the Département as well. The second body is the Operating Agency (Exploitant), typically a Société d'Économie Mixte, ie a consortium of public and private bodies responsible for running the transport system either directly or (as is common for bus

operations) by letting franchises to private companies. In British terms the Operating Agency may be seen as having the planning and operating functions of a pre-deregulation Passenger Transport Executive but with semi-private or arms-length ownership arrangements similar to those of a post-deregulation Passenger Transport Company.

The details of the actual organisations and responsibilities vary. In Lyon, for example, the Metro is planned and constructed by SEMALY, the Operating Agency, but the actual operation is franchised to a private company TCL which also runs the buses. In Lille, the Operating Agency itself is run under contract by a private firm. In Marseille, by contrast, the functions of Operating Agency and Organising Authority are combined in one body RTM, which is thus akin to a British municipal operator - a result, perhaps, of the fact that unlike Lyon or Lille the Marseille conurbation is dominated by the City of Marseille itself, so there is no need for a joint body of communities. Lille, on the other hand, is a dispersed conurbation of 86 communities, some of them free-standing towns, and has a Community Council (CUDL) which has similar powers to the former British Metropolitan Counties, including roads and traffic and urban planning in addition to acting as Organising Authority.

2.1.3 The French Government's Role

Public transport in France is the responsibility of the local communities, with input from the Département or Region where their interests are involved. The National Government's role is rather similar to that of the British Government: it sets the regulatory framework, it deals with matters regarding safety and

control, and takes an interest in transport planning on a national scale.

In addition, the national government has taken an active role in promoting public transport since the 1960s, when increasing congestion in the centre of cities provoked the studies of fixed-track systems.

2.1.4 Finance

Until recently, it has been Government policy to fund 50 per cent of the infrastructure cost of elevated and ground-level rail systems, and 40 per cent of underground railways, as well as providing finance for investment in road services. At the end of 1987 it was decided to reduce the maximum subsidy to 30 per cent, in view of the limited availability of funds and the growth in the number of proposed systems. Different regulations apply in Paris. Figure 2.1 shows the amount paid in State grants for urban rail to each city over recent years.

State subsidy is only available for capital costs. The other principal source of public funds for capital costs is Versement Transports, a payroll tax levied on all employers (save the smallest) and earmarked for expenditure on transport. Initially introduced for the Paris region in 1971, it was extended in 1973 to cover all large towns, at a rate of 1.5 per cent for conurbations with fixed-track systems and 1 per cent elsewhere. Recently the limit has been raised to 1.75 per cent, and Lyon at least is considering taking advantage of this increase to aid with the construction of Line D of its Metro. Figure 2.2 shows the source of funds for capital projects over recent years (the data refer to Provincial France, ie all of France outside the

Paris Region).

Public transport in French cities covers typically around 40 to 50 per cent of its operating costs from revenues, which for this purpose include reimbursements for concessionary fares. Versement Transports is an important source of funds for operating costs as well as for capital costs, and has grown rapidly over recent years, as shown in Figure 2.3 (which also covers Provincial France).

In most cases, the installation of a metro or tramway has resulted in a greater proportion of the operating costs of the public transport system as a whole being covered from revenue, typically up to around 60 per cent. In Lille, the automatic Metro itself covers 95 per cent of its operating cost since wage payments are very low. As far as French policies are concerned, the revenue:cost ratio is all important as a measure of efficiency, and increasing the ratio is one of the prime objectives in building a fixed-rail system. The ratio is also a key factor in obtaining Government grants for new buses and equipment.

2.1.5 Policies Regarding Urban Development

On the whole, promoting urban development has not been seen as a main objective when investing in fixed-rail transport in France, though it was a secondary objective in Lille and for Line D in Lyon.

Two mechanisms are available for local authorities to influence development. The ZAD (Zone d'Aménagement Différé) is simply a control mechanism to stop speculation; it allows local authorities the right to buy land at a price fixed before the

rail system opened. In this way, any betterment value on the land accrues to the local authority rather than to the developer. ZADs have been used only to a limited extent to control speculation, because local authorities do not have the money for large-scale land buying.

The ZAC (Zone d'Aménagement Concerté) is an instrument for promoting development. The local authority buys land for development, draws up an overall plan, and puts in services. It then sells land to developers, so that although each plot is constructed privately, the overall result conforms to the plan. Developers enjoy certain tax and planning advantages.

TABLE 2.1

Urban Rail projects with State support (as at April 1989)

1. In Operation:

   Marseille: Metro Lines 1 and 2 (total length 18 km)

   Lyon: Metro Lines A, B, C (total length 14.4 km)

   Lille: VAL Metro Line 1 (13.5 km)

   Lille: Metro Line 1-bis (11.7 km) (opened April 1989)

   Nantes: Tramway Line 1 (10.7 km)

   Grenoble: Tramway Line 1 (8.9 km)

2. Under Construction:

   Lyon: Metro Line D (11 km); expected opening 1990 (now delayed to mid-1991)

   Toulouse: Metro VAL Line A (9.1 km) (~~1992~~ 1993)

3. State Aid agreed in principle:

   Strasbourg: Metro VAL Line 1 (now to be a tramway)

   Grenoble: Tramway Line 2

4. Being considered for State Aid:

   Marseille: Extensions to Metro Lines 1 and 2

   Reims: Tramway

   Nantes: Tramway Line 2

   Bordeaux: Metro VAL

   Rouen: Tramway

   Lille: Metro Line 2

   St Étienne: ~~Convert existing tramway to reserved track~~ 15 low-floor articulated [illegible] are ordered, first delivery beginning in March 1991 – A new depot and the 2 km extension beyond Terrenoire will be opened in 1991 –

   Rennes: VAL Metro ~~or tramway~~

   Brest: Tramway

5. Other projects in course of study:

Montpellier

Lyon

Nice

2.2 MARSEILLE

2.2.1 The Urban Area

Marseille, the largest city on the Mediterranean coast of France, lies in a geographical basin, on the littoral strip between the sea to the west and the mountains on the other three sides. The city itself has a declining population of 845,000, the conurbation an expanding population of 1.1 m, and there are 300,000 dwellings and 330,000 jobs in the area.

The city of Marseille itself is the dominant community in the conurbation, and the functions of transport Organising Authority and Operating Agency are undertaken by the same organisation, RTM, which thus has the characteristics of a British municipal operator.

Though Marseille is still a major port and naval base, the traditional maritime industries are declining. There has been some success in developing newer industries such as electronics instead. However, it is apparent to the visitor that Marseille is the least prosperous of the French cities studied.

2.2.2 Development of the Metro

The justification for building the Metro was to improve public transport and travel conditions in the urban area without excessive running costs. Easing the problems of traffic congestion was a major objective, and was the reason for choosing an underground railway, because the city centre is too densely built up to allow any street-level system. The recent availability of funds through Versement Transports was also clearly a factor in the decision, as was strong pressure from

local politicians and officers.

The Metro consists of two lines, each 9 km long and with 12 stations (two of which, Castellane and the main railway station Gare St Charles are common to both lines). Line 1, from Castellane in the city centre to La Rose in the north-east, opened in 1977, and Line 2, from Bougainville in the north to Ste Marguerite Dromel in the south, opened in stages between 1984 and 1987. Most of the line is underground, with a little elevated track at the outer ends. In order to ease problems of severance, the only ground-level section is the line out to La Rose, which runs in the median of an urban motorway.

The two lines form a circle around the city centre, covering the area between the Vieux Port and the shopping centre, so that nowhere in the centre is more than a few minutes walk from a station.

One line remains of Marseille's former tramway, running from the city centre to St Pierre in the east. This line was renovated in 1984, to coincide with the opening of Line 2 of the Metro, with new vehicles, an interchange station at the inner terminus at Noailles and a bus interchange at the outer end.

More than a quarter of the population lives within 500m of the rail network (Metro and tramway), though the area served is only 12 per cent of the city area. Within 800m lies 20 per cent of the geographical area, but a third of the population and over half the jobs lie within this catchment.

Bus services were reorganised and integrated when the Metro opened, with feeder buses at all stations, except the outer end of Line 1. For Line 2, there are two bus networks which converge

on interchange points at Ste Marguerite Dromel and Bougainville. All transport modes in the city have common flat-fare tickets (6.50F per journey, with discounts for carnets and multiride tickets) which allow free interchange.

Further extensions of the two lines are planned. Firm plans exist for an extension of Line 1, due to open in 1992, eastwards from Castellane to the local hospital centre, and for an extension of Line 2 northwards from Bougainville into the poorer housing areas near the docks. Lines have been reserved for further extensions of Line 2 into the more prosperous areas south of Ste Marguerite Dromel.

2.2.3 Costs and Funding

The cost of Line 1 was 3000 MFF at 1989 prices. Line 2 was, at 2700 MFF, a little cheaper than Line 1 because the depots and central control room were already there, and also there are two stations in common.

The State Government provided 30 per cent of the capital cost, and the Département 15 per cent. The remainder came from the City, some from direct taxes and some from Versement Transport, which was increased from 1% to 1.5% for the purpose.

Current operating costs on Line 1 of the Metro are 100 MFF/a, and on Line 2, 60 MFF/a. The revenue:cost ratio of the public transport system as a whole is around 55 per cent. With an integrated system, it is difficult to allocate revenues between bus and Metro, so it is not possible to give a revenue:cost ratio for Metro alone.

2.2.4 Patronage

Total boardings ("voyages") on Line 1 of the Metro are 105,000 per day, and on Line 2, 115,000 per day. The two lines together carry 170,000 passengers per day (1987 data), representing 35.5 per cent of the public transport journeys which total 480,000 per day or 159m per annum. This is more than in 1954, when public transport was at its peak, and more than double the number in 1968.

As far as passenger-journeys ("déplacements") are concerned, the number is lower because of interchange, but the 1987 total of 104m represents an increase of over 30 per cent on the 1976 (pre-metro) figure of 79m. Passenger-journeys increased by 23 per cent with the opening of Line 1, and by 11 per cent when Line 2 opened.

There has been an increase in journeys involving interchange. Bus-Metro interchange has naturally increased, with the introduction of feeder services: 80 per cent of bus routes now serve a Metro station. Car-Metro interchange is well used, with 2000 parking places at park-and-ride stations. Long distance travellers also use the Metro: 2 per cent of the Metro traffic arises from the main railway station, and 1 per cent from the coach station (representing a quarter of all arrivals in Marseille by coach).

Public transport in 1987 supplied 35.8 vehicle-km per inhabitant, as opposed to 26.4 in 1976, an increase of 36 per cent (a similar amount to Lyon). Personal mobility (measured as the average number of journeys per person per day) increased from 0.33 in 1976 to 0.39 in 1988, again similar to the increase found in other French cities with fixed-track systems. The increase in

mobility was bigger in the north-east sector of Marseille (Line 1), and average mobility fell in the eastern sector which is not served by the Metro.

The Metro in Marseille is mainly used for obligatory journeys. Surveys on Line 2 in 1984 (when only the central section was open) showed that 58 per cent of journeys overall, and 90 per cent in the morning peak, were for work or education. Journeys between home and work constituted 37 per cent of all journeys on Line 2, compared with 26 per cent of journeys by public transport in 1976 before Metro opened. On Saturdays Metro carries around 60 per cent of its weekday flow, and shopping is an important journey purpose. Most of the increase in travel when the Metro opened was for work and shopping journeys.

15 per cent of Metro users formerly made their journey by car. There was no noticeable reduction in traffic in the city generally following the opening of the Metro, except that along the main roads served by the Metro it was estimated that traffic was a few per cent less.

Metro is seen as serving a different clientele from buses. It has led to a change of image for public transport generally, which is no longer regarded as being just for those who have no choice. Metro passengers comprise fewer females (52 per cent, compared with 62 per cent on bus) and more people of the higher social classes.

2.2.5 Developments

Although Metro has featured in the land use plans for Marseille published since 1978, there have been no specific measures taken

to encourage activity in the vicinity of stations, apart from those which were already in an action zone. As a result, there were no large-scale developments associated with the Metro.

Marseille has no system by which to recoup the investment in the Metro. Before it was built, the city authorities thought it would be possible to get private developers to build the Metro, but it proved impossible. Attempts to create ZACs and ZADs near the Metro in order to recoup the investment had little effect.

The benefits obtained from time savings on journeys should be apparent in land values. However, in the first year of Metro there was no detectable difference between prices for housing near to and remote from Metro. These findings were confirmed in a more recent study (quoted in Tulasne 1989) of property values in the periphery of Marseille, where Metro did not emerge as a significant factor.

Tulasne's paper contains some data relating to housing construction in Marseille (see Figure 2.6) which tend to show that construction anticipates the coming of the Metro. Before Line 1 opened in 1976, housing constructions in the north-east sector around the line were 9 per cent of those in the whole city, and were 6 per cent just after opening, but in the early '80s they dropped to 2-4 per cent. In the northern sector around Line 2, on the other hand, constructions were 1-4 per cent of those in the whole city up to 1980, but then rose to 5-6 per cent between 1981 and 1986 (Line 2 opened in 1984).

There are a few examples of development effects indirectly connected with Metro. At the end of Line 1 at La Rose, in the late '60s there was a programme of development to build

collective accommodation and small houses for people returning from North Africa after the Algerian wars. The Metro and the urban motorway to La Rose were constructed as part of this comprehensive development. There has been a lot of development around this line since the Metro opened (tower blocks etc), but this is probably more connected with the motorway and with expansion generally than with the Metro specifically. La Rose has now been made into a ZAC.

There are also a few instances where a public development took advantage of the proximity of the Metro, for example:

- a public housing development to the north,
- a new sports stadium at Prado in the south,
- the Dojo Regional Exhibition Hall at Bougainville.
- the Prado Seaside Park which, while not particularly near to the Metro, was constructed on land reclaimed from the sea by dumping spoil from the construction of the Metro.

In addition, it is believed that Metro has boosted the image of Marseille and given the inhabitants a sense of civic pride at joining the "Metro Club". The best example of this is in the city centre where Metro is thought to have been a major contributory factor in decisions on renovation and rehabilitation of the inner city area, the pedestrianisation of a major commercial artery, and the creation of a new Faculty at the University, as well as other investments in the city. It has been a catalyst for a whole set of improvements which have transformed the most important parts of the city.

2.3 LYON

2.3.1 The Urban Area

Lyon is the second largest city in France, with a population (1982) of 1.2m, and has been an important regional centre since Roman times. It is situated at the confluence of the Rhône and Saône rivers, and its location has been an important influence on its development. The city centre is located on a peninsula, 7 km long and 1 km wide, between the two rivers. To the west of the Saône and at the north end of the peninsula the land rises steeply, and this has curtailed the development of the city in this direction. The settlements beyond this rise have therefore been geographically separate from the city centre.

These geographical limits have resulted in Lyon being a compact city with a high density of population of around 25,000 people per square kilometre in places, several times the average for British cities. Eighty per cent of the population lives less than 5 km from the city centre.

From the late 1960s until 1980 the city centre was declining, a trend happening all over France with the increase in suburban shopping centres and buying by mail. During the same period the population expanded due to the end of the Algerian war and an influx of immigrants. Most of this expansion took place to the east and south-east of the city.

2.3.2 Development of the Metro

The Lyon Metro is an underground light Metro similar to the Tyne and Wear Metro. The justification for the Metro system was to create stronger public transport links between the city centre

and the new suburbs which were poorly served, and to reduce car congestion. For the more recent lines, planning grounds have featured as a justification, including focussing investment in urban infrastructure.

Line A of the Metro, 9.4 km in length, was opened in 1978. It follows the peninsula from the main line station at Perrache northwards to the Hôtel de Ville, then turns eastwards through the major suburb of Villeurbanne to end on the ring road at Bonnevay. Bus services were integrated, with feeder lines ending at Bonnevay; 2500 buses per day converge on this station, which is also a park-and-ride point. Line B, a short branch through a new commercial centre at Part Dieu, was opened in 1981. Line C, opened in 1984, is another short branch from Hôtel de Ville northwards to the suburbs of Croix Rousse and Cuire; the first part of the line is very steep and the trains are fitted with rack-and-pinion drive. Apart from a short section of Line C, the whole system is underground. The crossing of the Rhône on Line A was achieved by enclosing the Metro in a box section of a road bridge.

Line D, to the south-west of the city centre, is currently under construction. In order to save on operating costs, it will be an automatic Metro, using a system being developed by the Operating Agency SEMALY. Although much of the civil engineering work is now (mid-1989) complete, development of the automatic system is still continuing and the line is due to open in May or June 1991.

2.3.3 Costs and Funding

Lines A, B and C of the Metro together cost 5000 million Francs at current prices, and Line D is expected to cost another 5000

mFF. The main reason for the high cost of Line D is development of the automatic system and its associated software.

For the lines currently in operation, 25 per cent of the total cost was provided by State subsidy (representing 50 per cent of the infrastructure cost). The remainder was from loans at preferential interest rates, which is repaid from Versement Transports levied at 1.5 per cent. Another reason for the high cost of Line D is that preferential loans are no longer available, and commercial rates must be paid. With the high interest rates currently charged, and low wage inflation causing a slowing of the rate of growth of income from Versement transports, it is forecast that in a few years time the income will not cover costs and an increase in the rate of Versement Transports to 1.75 per cent is currently being considered.

Since the Metro opened, the public transport system has covered around 55-60 per cent of its operating costs from revenues, compared with 50 per cent before. The Metro itself is estimated to cover 120-130 per cent of its operating costs since it serves the central areas and busy corridors. The overall subsidy in 1987 was 120 mFF, and has been constant in real terms since then.

It is forecast that after line D opens the revenue:cost ratio will rise to 63 per cent, saving 80 mFF per annum, sufficient to cover the investment costs. A "5th tranche" of the Metro is also planned, which will reduce the subsidy even further.

2.3.4 Patronage

The major effect of the Metro has been to increase accessibility and mobility. There was some reduction in road traffic, but it has since been replaced (though perhaps with a different type of

journey, eg less commuters).

The Metro has led to an increase in patronage. On Line A, patronage is currently 4-5 times the level on the bus services which served the corridor previously, and on Line C patronage has increased from 1500 per day before to 15,000 per day soon after opening and 22,000 per day at present. Overall patronage on the Metro is 65m per annum (1987), and 25 per cent of public transport journeys use the Metro.

Public transport boardings ("voyages") overall rose by 55 per cent between 1979 and 1987, and passenger-journeys ("déplacements") by 21 per cent. Some of the increase in boardings is due to interchange between bus and Metro, because a passenger-journey which consists of a bus stage and a Metro stage would count as 2 boardings, but only 1 bus journey before the Metro opened.

The extent of interchange use was an unexpected effect of the Metro. It has been found that people often change to the Metro for only 1 or 2 stations, because they like using it. Surveys show that Metro caters for more men, and more passengers from the higher social classes, than does bus.

2.3.5 Developments

Business activity in the area served by the Metro has increased over the years since the opening. Surveys by the Chamber of Commerce showed that shopping patterns had increased between 1976 and 1980. The extent of the central area itself has also increased - it used to consist of just the peninsula but now also covers the area around Line B, including Part Dieu, an ex-army

depot which was redeveloped in 1976 as a business and shopping centre.

The image of the city, of which transport is one aspect, is believed to have improved since the Metro opened. Part of the reason for this is that the opportunity was taken to pedestrianise a number of streets in the busy peninsula area along the line of the Metro, which was not possible before because of the need to allow car access. As a result, it is now possible to walk for several kilometres through attractive, traffic-free streets in the heart of the city. The improved image is believed to reflect on economic activity, especially as far as international opinion is concerned.

As far as urban development is concerned, there have been a number of new developments, some redevelopments, and some reorganisation of space. In most cases it is not possible to attribute these directly to the Metro, though the improved accessibility to the city centre could have been a factor in choosing locations for development.

Line D appears to have had more effect on urban development, even before its opening. The section from Part Dieu to the end of the line at Gare de Vénissieux is a residential and office environment, and in certain locations houses have been bought up and offices built in anticipation during the construction phase of the Metro. In the Gambetta-Grange Blanche area, nearer to the city centre, land has been bought but not redeveloped yet.

The western end of Line D penetrates through the hillside on the west bank of the Saône to the outlying communities at Gorge de Loup and Vaise. As mentioned earlier, this area is cut off from

the city, and the opening of the Metro will give a substantial increase in accessibility to the shopping and commercial centre. Adjacent to the station at Gorge de Loup is a former chemical factory site, and an extensive redevelopment is taking place at this point with the construction of new housing. There is also a more general growth of population in this area, and this effect has undoubtedly been influenced by the prospect of the Metro.

2.4 LILLE

2.4.1 The Urban Area

Lille, with a population (1982) of 933,000, is the main city of the Nord-Pas de Calais region, and is quite different in character to the other French cities considered here. It is a northern city in every sense that the term is understood in Britain - a polycentric industrial conurbation in the French coalfield. The conurbation consists of 86 communities of which the city of Lille itself is the largest, but the adjacent towns of Roubaix and Tourcoing, and the new town of Villeneuve d'Ascq, are also important separate settlements. Comparisons with British cities cannot be perfect, but if Marseille is a naval and commercial port like Plymouth, and Lyon is a prosperous commercial city like Bristol, and Grenoble is a scenic, hi-tech university city like Cambridge, then Lille is undoubtedly a regional centre with an industrial hinterland like Leeds (with which it is twinned).

Lille is not constrained geographically like the other French cities; there are no hills or major rivers to hinder its expansion, and even the nearby Belgian border has been no barrier, virtually bisecting the continuous urban area which is Tourcoing on the French side. This could account for the population density being apparently lower than in other French cities, as the city has developed outwards rather than upwards, and traffic congestion appears less of a problem.

2.4.2 Development of the Metro

The main justifications for building a Metro system in Lille were to improve public transport, relieve congestion, and to serve new

developments and improve urban structure. One important objective was to provide a public transport system to serve the new town of Villeneuve d'Ascq and to link it with the main city centre of Lille, particularly since Villeneuve d'Ascq is the location of a major University with 30,000 students. The Community Council decided that trams or buses, even using bus lanes, would not be suitable because of increasing traffic congestion. It was therefore decided to build a fixed track system.

The Lille Metro is a VAL automatic railway, mostly in tunnel or viaduct. Line 1, 13.5 km long with 18 stations, runs from Villeneuve d'Ascq through the city centre to the Regional Hospital Centre to the south-west. It opened in 1983. Line 2 is planned as a replacement for the Mongy tramway which links Lille to Roubaix and Tourcoing, but at the present time it has not been decided whether this should be a full VAL Metro system or an upgraded tramway. The third line of the original plans was therefore constructed next, and opened as Line 1-bis in April 1989, running from the main station (Gares) in the city centre to the north-eastern suburbs. At Gares the rails are already laid for connection to Line 2, which could open in 1995. As in Marseille, the two lines form a loop around the city centre, with two interchange stations at Gares and Porte des Postes, thus ensuring good accessibility to all points in the centre.

The stations, especially on Line 1-bis where each station had its individual architect, are impressively decorated - partly as an image-enhancing measure, and partly as an aid against vandalism. One city-centre station (République) is built in the style of a Roman amphitheatre where performances are given from time to time - a novel source of additional revenue for the operator. The

Metro as a whole is something of a show-piece for MATRA, the company which developed the automatic system, and for French industry generally.

2.4.3 Costs and Funding

The cost of Line 1 was 3800 MFF at 1989 prices. This was made up of 20 per cent subsidy from the State (compared with Lyon and Marseille which received 50 per cent but towards the infrastructure cost only), 20 per cent from Versement Transports levied at a rate of 1.5 per cent, and the remainder from loans. The loans are to be repaid from Versement Transports plus some recoupment of land price betterment through the declaration of a ZAD around each station. The capital cost does not include research and development costs on the automatic system, which was covered by Government grants to MATRA.

The cost of Line 1-bis, which included a new control centre at Gares, was similar, but attracted only 10 per cent State subsidy because other cities also wanted to call on State funds. If Line 2 is constructed as a VAL, it is expected to cost 6500 MFF.

The Lille Metro uses only 240 staff for the 2 lines, covering all maintenance and operation. As a result, operating costs are relatively low; in 1987 they were 95.3 MFF (excluding capital repayments), 95 per cent of which were covered from receipts.

2.4.4 Patronage

The opening of the Metro in Lille caused a large increase in public transport use. In 1983, before Line 1 opened, there were 60m passenger-journeys per annum by public transport; in 1988 there were 95m. Patronage on Line 1 itself was 29m in 1985 - 50

per cent more than was forecast. Line 1-bis is expected to carry 45-50m passengers per annum (the line opened only in April 1989, so figures are not yet available).

Surveys after the opening of Line 1 show that 45 per cent of journeys on the Metro were journeys which were not made before. This apparently large generation of journeys must however be treated with caution because about half of the passengers are students who presumably did not live in Lille before. 24 per cent of journeys on the Metro were made by former car users.

2.4.5 Developments

The main impacts of the Metro on the city were to cause an acceleration in the developments which were already happening in the more dynamic districts - particularly in the city centre, where growth and development had been occurring for some years, and in the new town area around Hôtel de Ville in Villeneuve d'Ascq, which as a planned development is a special case.

The city authorities believe that, in declining districts such as the Fives-Hellemmes area in the inner suburbs, Metro has had little positive effect, and has possibly even accelerated the decline by enabling people to go somewhere else. The visitor's eye confirms the lack of evidence of any regeneration in this area, which has a generally run-down, boarded-up appearance.

Each station was declared as a ZAD in order to prevent land speculation and to recoup some of the benefit from increased land prices for the city. But in declining areas this had a negative effect by freezing the prices so that owners could not sell their property at a reasonable price. This may have actually prevented

development around stations.

All in all there has been little development around Line 1, much of which runs through inner-city areas, even though five years has elapsed since it opened. There is expected to be little development around Line 1-bis either.

There are more signs of change in the city centre. There are 3 or 4 streets which have been pedestrianised, and extra pedestrian squares around Rihour and République where there was a car park and streets before. These may have been made possible by a reduction in traffic. The Community Council estimated that there are now 3000 fewer cars in the centre of Lille because of the Metro, though there was no noticeable reduction in traffic and congestion.

2.5 NANTES

2.5.1 The Urban Area

Nantes lies in the west of France, near the mouth of the River Loire. The conurbation has a total population of 474,000 and consists of 19 communities of which the city of Nantes itself, with 247,000 population, is the biggest. The city centre lies mainly to the north of the Loire; bridges connect it with the Island of Beaulieu and the suburbs on the south of the river, the largest of which is Rezé.

Nantes grew up around traditional maritime trade and industries, especially shipbuilding and repairing. It is, perhaps, the equivalent of the Tyneside area in Great Britain. The main docks and shipyards were to the west of the city centre and on the island. The railway and the original tramway followed the earlier bank of the Loire and together formed a strong boundary to the city, but since the railway was built the Loire has changed its course and there has been an extension of the city southwards on reclaimed land. In recent years the city has seen a period of growth, and traditional industries have given way to "softer" land uses - electronics factories, the development of the university, and the establishment of Nantes as a regional centre.

2.5.2 The Tramway

The Nantes tramway proposal was developed in the late '70s and early '80s after the inauguration of SIMAN and SEMITAN, respectively the publicly owned Organising Authority and Operating Agency for public transport in the Nantes conurbation. The availability of funds from Versement Transports, as in other French cities, was also undoubtedly a factor. The new tramway was

planned as part of an integrated transport system, with feeder buses to the suburban stations and with areas away from the tramway line being integrated as well with new bus stations, interchange points and articulated buses.

The intention was that with the same number of vehicle-km travelled, it would be possible to offer more seat-km. However, in 1983 a new city council was elected with different policies regarding public transport. The new council insisted that there should be the same number of seat-km on the total system after the tramway opened as before. Corresponding reductions were therefore made in the bus services.

The tramway opened in January 1985, running from the eastern terminus at Halluchère via the city centre (Commerce), to Bellevue in the west, 10.6 km in length with 22 stations. These termini, plus the intermediate station at Souillarderie and the city centre station Commerce, form bus interchange points. In April 1989 the line was extended northwards by 2 km to the new sports stadium at Beaujoire. The opening of the extension coincided with the formal inauguration of the whole tramway by the mayor of Nantes, with a parade of historic tramcars, bands, laser shows, open day at the depot, etc.

A second line of the tramway is planned for opening in 1991, serving the north-south corridor, interlinking with Line 1 at Commerce and crossing the Loire to the suburb of Rezé. The section from Commerce to Rezé has already been served since 1986 by articulated buses operating on a reserved busway (including a new bridge over the Loire); this can readily be converted to a tramway in the future.

2.5.3 Costs and Funding

The original section of the tramway from Halluchère to Bellevue cost 590 MFF at current prices. As with other French systems, the State gave a subsidy of 180 MFF to cover 50 per cent of the infrastructure cost; the remainder was financed by loans through the Organising Authority SIMAN, to be repaid over 25 years from revenues and Versement Transports. The extension of Line 1 to Beaujoire cost 53 MFF, with no State subsidy. A rise in the rate of Versement Transports to 1.75 per cent is contemplated, as a condition of the award of a State grant (at the new rate of 30 per cent) for Line 2.

Since the introduction of the tramway, the revenue:cost ratio for the whole public transport system has risen, from 46.4 per cent in 1983 to 51 per cent in 1985 and 54.4 per cent in 1987. In 1987 the total operating cost of the public transport system was 244 MFF (16 per cent higher than in 1984) and the total receipts were 133 MFF (30 per cent higher than in 1984); as a result, the total subsidy, which previously had been rising, has been kept at around its 1984 level.

2.5.4 Patronage

The total number of boardings on the public transport system in 1988 was 69.8 million (after correcting for the effects of a strike), as compared with 51.1 million in 1984, the last full year before the tramway opened. This represents an increase of 37 per cent. Some of the increase, of course, is accounted for by extra boardings as passengers interchange between bus and tram. In terms of passenger-journeys, the number increased from 41.1 million in 1984 to 53.7 million in 1988, an increase of 28 per

cent. Before the tramway opened, passenger-journeys had been increasing at 7 per cent per annum. Thus, the tramway does not appear to have changed the rate of increase, probably a result of the simultaneous reduction in bus services.

A marketing campaign took place when the tramway opened, aimed at young people who were seen as a potential source of public transport users. A "Billet Jeune" ticket offering a considerable fare reduction for young people was introduced, and it is estimated that half the increase in revenue is attributable to this ticket, the other half to the tramway itself. Certainly, it appears to the visitor that many young people to use the tramway, a finding confirmed in an attitude survey carried out by the Town Planning Agency.

2.5.5 Effects on Urban Development

The older part of the city, near the centre, is composed mostly of apartment blocks. The newer area, outside the ring road, was developed from the '60s onwards and also has many apartments, but more recently, individual houses have been built, so that nowadays 50 per cent of the population in the conurbation live in houses.Shopping centres for these new developments, and commercial developments around the ring road and along the main radial roads, have been established during the last 20 years - a sign of the city entering a period of growth.

Among the new developments, a number have taken place in the areas served by the tramway. As usual, it is not possible to say with certainty to what extent the existence of the tramway influenced the decision whether, and where, to build the new developments, but it seems likely that the tramway was a

contributory factor.

In the Gares-Commerce area, the city centre streets have been pedestrianised or restricted to traffic. This makes the centre a pleasant place to walk around, particularly at Commerce where there is a large open square with cafes and shops. Some new shops have been established in the area.

At Manufacture, a kilometre or so to the east of the centre in the area where the tramway borders the railway, the City of Nantes council rehabilitated some old factories and turned them into offices and public buildings. The area now has a commercial, rather than industrial, environment. An equivalent distance to the west of the city centre, a new arts and literature centre called Médiathèque has been established, with libraries, discos and specialist shops. Other individual developments along the line through the city centre between Médiathèque and Manufacture have taken place, which are gradually turning the area from a rather run-down dock-side road into a pleasant riverside promenade.

Data from the Agence d'Urbanisme (Town Planning Agency) in Nantes show how planning permissions for residences (Permis de Construire) have increased over recent years. Between 1983 and 1986 the number of permissions granted over the whole of the conurbation remained fairly constant, while there was a rise of 40 per cent in the inner area (consisting of the City of Nantes and the community of St Herblain). Along the tramway corridor (within 400m of the line), however, there was a very significant sharp increase from 153 permissions in 1983 to 528 in 1986, a factor of 3.4. These changes are illustrated in Figure 2.9.

Closer inspection of the data reveals that the sharp rise was caused more by a small number - 6 or 7 - of large developments near to the tramway rather than many individual permissions. Some of these larger developments are to the east of the city on green field sites - ie in the area where the city would expand naturally whether the tramway was there or not. Figure 2.10 shows the distribution of developments by size, and demonstrates that in the tramway corridor there were more large developments than in the city generally (this difference, however, is of low statistical significance).

The conclusion is that there is positive, though not conclusive, evidence that housing developments took place preferentially in the tramway corridor following the opening.

2.6 GRENOBLE

2.6.1 The Urban Area

Grenoble, with a population of 391,000, is the chief town of the Département of Isère in the Dauphiné region of the French Alps. It lies at the junction of the Drac and Isère rivers, and is located in a valley between mountains. Only on the south side is there scope for expansion of the city.

The region depends on traditional industries such as sheep-farming and forestry. Grenoble itself, however, has developed rapidly since the '60s and has become known as a hi-tech city, a centre for electronics and nuclear research, and an important university city. The driving force behind this rapid development was the mayor, Hubert Dubedout, who made Grenoble a "pilot town" for experiments of all kinds - artistic and social as well as technological. The decision to build a tramway system in Grenoble was made under M Dubedout's administration, and though he was replaced in 1983 by the more conservative M Carignon, the project was by then well-advanced, and a referendum confirmed the decision.

It is interesting to note that under the French system of Government, the mayor of a major city like Grenoble personally has much more influence than is the case in Britain. Part of the reason for this is that Government Ministers are not Members of the National Assembly; they therefore tend more to make their name through local politics than in Britain, and it is not unusual for a Mayor to hold Government office as well (the current Mayor of Grenoble is also Minister for the Environment, and the Mayor of Paris is a former Prime Minister). The influence

of the local Mayor was an important factor in the investment in the Nantes tramway also, and in the recent decision in Strasbourg to proceed with a tramway rather than a VAL Metro system.

2.6.2 The Tramway

The justifications for building a light rail system were to improve public transport and ease overloading of buses, to arrest operating subsidies, and to help access by disabled people to public transport. Improving the image of Grenoble, as with many of the projects described above, also featured as an objective. The tramway system was seen as the backbone of the public transport network which has been restructured around it. The reasons for preferring a tramway were that demand and population density were not high enough to support a metro in a small city such as Grenoble, and also that the ground was unsuitable for tunnelling.

One of the objectives in designing the tramway was to make it accessible to elderly and disabled people; the handicapped associations in Grenoble were instrumental in supporting the tramway at the time of the referendum. For this reason, it was decided to develop a new design of low-floored vehicle which would be more accessible than the vehicle used on the Nantes system which had opened a year or two earlier. The Grenoble tramcar has its electronics and control equipment built into the roof, leaving room for a low (30 cm) floor. This floor extends most of the length of the tram, through axle-less trailer bogies in the centre of the vehicle, and only rises to a higher level over the tractor bogies at the ends of the car. Platforms are correspondingly low, and have been constructed as part of the street pavements with barely-perceptible slopes.

The tramway opened in 1987, with 8.8 km of line and 21 stations. The line is at ground level; in the suburbs it runs mostly alongside the highway but separated from the traffic, and it runs through the streets in the city centre. The City council took the opportunity to pedestrianise much of the city centre when the tramway opened.

The line starts at Grand' Place, a shopping development, bus interchange and car park on the southern edge of the city, close to a large exhibition centre (Alpexpo). It runs northwards into the city along a major highway, then threads its way through the city centre mainly in pedestrianised streets. It then serves the main railway station before turning westwards, crossing the river Drac, and entering the adjacent town of Fontaine. In the narrow streets of Fontaine the tram has priority; sometimes the street is reserved for the tram, sometimes, where it is wide enough, there is one line of traffic. Interestingly, traffic appears to respect the reserved track which is protected only by white-lining, whereas along the tramway route in Marseille - a much wider street - traffic appears to use the whole width of the street freely except when there is actually a tramcar there.

A second line of the tramway, 5.8 km long, is planned to open in November 1990. It will share some of the city centre route from the station with Line 1 but then will branch eastwards to serve the University, involving a double crossing of the Isère.

2.6.3 Costs and Funding

The total cost of the system was 1020 MFF at 1985 prices, of which the state contributed 390 MFF (38%), being 50% of the

infrastructure cost plus a contribution towards noise reduction and environmental improvements. The remaining cost was financed from loans to be repaid from versement transport.

Before the tramway opened the revenue:cost ratio on the public transport system was around 40-45 per cent. Following the opening of the tramway, by April 1989 this ratio had risen to 52 per cent, and was expected to reach 58-59 per cent with the opening of Line 2. As a result of the tramway, the network provides more seat-miles with fewer vehicles and fewer employees; this is an important factor in reducing cost, as 70 per cent of the operating cost is accounted for by wages.

2.6.4 Patronage

It was forecast that total annual public transport usage would increase from 38m to 45m (18%) following the opening of the tramway. It did in fact rise by 15% to around 40m per annum, but traffic was depressed during construction, so the rise from the level of several years previously (37m) was not so large as forecast. Ridership on the tramway itself is 55,000 to 60,000 per day (equivalent to about 18m pa.). Traffic in the corridor served by the tramway increased 1.5 - 2 times over its previous level, though where 46 buses per hour had been required in this corridor before, there are only 16 trams per hour now. The frequency on the tramway has gradually been increased from every 10 minutes soon after opening to every 4 minutes from September 1989, when extra vehicles will be introduced.

The tramway is very heavily used in the evenings, serving as it does the city centre with shops, theatres and cinemas. The tramway runs until after midnight and is still busy even then,

although most of the connecting buses cease at 21:30.

Surveys show that half the passengers on the tramway interchange with bus. Many passengers also travel to the tramway by car, then park-and-ride at Grand' Place or one of the three car parks in Fontaine. Around 10 per cent of the passengers on a weekday, and up to 17 per cent on Saturday, do so. The vast majority of these travellers go to the city centre, and half of them on a weekday, and 90 per cent on Saturday, are going shopping. Up to three-quarters of these passengers would have travelled by car if the tramway had not been available.

2.6.5 Developments

In the 1960s Grenoble had an urban plan which created a Green Belt in order to prevent urban sprawl spreading up the valleys; this had the effect of concentrating development in the existing urban centres. In addition, height restrictions were used as a planning control which were more generous for larger developments. These moves were designed to make the city easier to serve by public transport.

There are three main effects of the tramway in the field of urban development. One is, as mentioned above, that as part of the installation of the tramway, the city centre was extensively pedestrianised, including both narrow winding streets where shop fronts had to be moved back to allow room for the tramway, and wide boulevards which have become major pedestrian thoroughfares served by the tramway but with room for pedestrians to wander around the shops and sit at cafes. These moves have made the city centre a very attractive place to visit and shop. Before the tramway opened, there were fears among shopkeepers that they

would lose trade as a result of customers no longer being able to park right outside the shop door, but in the event these fears have not materialised and most people now consider the changes to be for the better. It is reported that many new shops have opened as a result of the tramway.

The second effect is the redevelopment of old railway yards near to the station as an office, hotel and factory centre called Europole. It was hoped that the site would attract major companies to base their headquarters in Grenoble, but in the event it is used more by local companies relocating to a more central site. Although Europole is close to the tramway, it is not very well served, and the coming of the tramway was probably only a minor factor (if a factor at all) in the decision top develop there; the coming of the TGV to Grenoble and the proximity of major motorways were more important.

The third effect was that in the town of Fontaine the planning of the tramway offered an opportunity for redeveloping the 19th century town centre, as an alternative to locating the tramway in the back streets which would have caused less change but would have made the tramway less effective. Since little money for redevelopment was available from the Département, the Transport authority SMTC provided money as part of the construction cost of the tramway. A number of apartment blocks and other developments are being constructed around the tramway line by the organisation HLM, a housing association which provides accommodation at moderate rents.

Extensions to the tramway line may lead to further development. One possible route for Line 3 is from the station northwards via Europole to the CNRS nuclear research site. This could lead to

further development at Europole, but the nuclear site, being neither a tourist attraction nor a large employer, is unlikely to have much effect. A second possibility is a southwards extension from Grand' PLace and Alpexpo through the industrial park to a new interchange with the proposed suburban railway, then across the motorway through currently underused land to the urban centre at Échirolles. This line would show a good deal of potential for development as it is to the south that the natural area of expansion of the city already lies.

2.7 OTHER FRENCH CITIES

2.7.1 PARIS

Paris is, of course, by far the largest city in France, with a population of 2m in the City and 10m in the region, and in most aspects, including organisation and financing of transport, it is very different to other French cities. There is a 5000 MFF 5-year plan for investment in Metro and railways, with 7000 MFF allocated for the next 5-years. National government provides 70 per cent of the operating subsidy for transport in Paris, with the remainder from the Départements in the Ile de France region and the City of Paris.

RATP, the Parisian transport authority, is to build a tramway line in the suburbs of Paris to connect the Metro termini at St Denis and Bobigny (IRJ 1985). The line is 9.1 km long and runs on a reserved track alongside the highway, but segregated from traffic except at road junctions. The vehicles are to be the low-floor design used in Grenoble.

The objectives of the tramway are to increase public transport use in the suburbs, to connect the suburban centres of St Denis, Courneuve and Bobigny, and to assist in the revitalisation of St Denis where an old industrial area is being replaced by a pedestrianised commercial centre.

The line is due to open in 1992. It is expected to cost 800 MFF, of which 600 MFF is for infrastructure and 200 MFF for rolling stock. Funding is to be 50 per cent from the State, 42.8 per cent from the Region Ile de France, and 7.2 per cent from the Département - the latter representing the excess cost of trams over buses.

2.7.2 STRASBOURG

The local council in Strasbourg (population 372,000) has recently made the decision to build a tramway system similar to that in Grenoble (Aufresne, 1989). This decision is to be ratified by public consultation ~~in October 1989~~ 1990. As planned, the tramway will be 30 km long, thus avoiding too many interchanges which would be necessary with a shorter system. The line is estimated to cost 3000 MFF, and will require a 1 per cent increase in local taxation. The Bas-Rhin Département, the Alsace region, and the State will contribute to the cost. Work is planned to start in 1991, and the tramway will probably enter service in 1994.

Originally, it was planned to install a VAL automatic Metro system like the one in Lille. This was to be 18 km long and would cost 4200 MFF. Supporters of the VAL system have pointed out that it would cause less disruption to traffic, both in construction and in operation, and would provide a faster journey time. The decision to opt for a tramway is recent, following local elections at which investment in transport was an issue. It was made on grounds of cost, of urban development, and of a tramway being more suitable to the structure of the city.

2.7.3 TOULOUSE

Line A of the Toulouse (population 538,000) Metro, a VAL system, is under construction and is due to open in 1990 1993. It is 9.1 9,7 km long with 16 15 stations, and has 5.8 km of bored tunnel and 1.1 km of cut-and-cover tunnel. The cost is estimated at 2200 3.300 MF(88) MFF, of which 500 550 MFF will come from State grant. The decision to build a VAL instead of a tramway, which would have cost 1300 MFF, was a

narrow one taken by the Organising Authority on a casting vote.

Line B will be 7.9 km long and will cost 1800 MFF. Line C is to be an upgraded SNCF commuter line from the main Matabiau station (IRJ 1989, RGI 1985).

2.7.4 BORDEAUX AND MONTPELLIER

Studies are under way for a 10 km VAL system in Bordeaux (population 637,000) costing about ~~3000~~ MFF and for a 13 km line using the Aramis people-mover system in Montpellier (IRJ 1986).

2.7.5 REIMS, ROUEN, RENNES, BREST, ST ÉTIENNE

An ~~upgrading~~ of the tram system is planned in St Étienne, the only French city which kept a tram network when others abandoned theirs in the 1950s. Reims plans a 7.4 km tramway line extending southwards from the city centre at an estimated cost of ~~667~~ MFF (Simpson 1989b). Brest, with 2 lines totalling 11 km at a cost of ~~200~~ MFF, Rouen and Rennes are also considering new tramway systems, along the Grenoble ~~and Nantes~~ model (IRJ 1986).

2.8 SOME CONCLUSIONS ON THE EFFECTS OF URBAN RAIL IN FRANCE

Many of the effects of urban rail in France are similar to those found in other countries, differing perhaps in scale or degree. These conclusions will be discussed in a later section of the report. Here, we highlight some factors which have influenced the development of urban rail which depend on the particular circumstances in France.

2.8.1 Commitment to Public Transport

In France, public transport is seen as a public service, and commitment to it is high. The major objective for the development of urban rail systems in France is to improve public transport - in other words to provide a faster, more reliable, greater capacity transport system than can be provided by buses alone. In order to maximise the use of the rail system, transport is integrated, with feeder buses serving Metro or tramway stations, and a common flat-fare ticketing system. These transport objectives are often coupled with the objectives of providing an alternative to congested roads, and even of reducing congestion itself.

Although there are other objectives for developing urban rail in France, such as improving business activity, improving the image of the city, and providing a spur for urban development, these are usually secondary to improving public transport.

One major way in which this commitment to public transport manifests itself is in the relatively high (by British standards) level of subsidy which is tolerated; a revenue:cost ratio on the whole public transport network of 60 per cent is considered good, 50 per cent is typical, and lower ratios not unusual.

Another facet is the importance of the revenue:cost ratio itself as an estimate of efficiency. Many transport operators have as a major objective the maximisation of this ratio, rather than a commitment to reduce subsidy as an absolute amount. Some transport systems have in fact achieved a reduction in the actual level of subsidy by installing a light rail system, but in France it is regarded as a good thing if the new system achieves a higher proportion of costs covered from revenues even if the actual subsidy increases.

Services in the large cities in France are centrally planned in much the same way as they were in British PTEs before deregulation, and transport services in the cities are fully integrated. However, French transport in general is not publicly owned. On the contrary, France has achieved an interesting mixture of central planning and private ownership of transport. Most bus operators and some Metro operators in France are privately owned, and in many cases the Operating Agency itself is a consortium of public and private interests.

2.8.2 The Effect of the Urban Structure

In some respects, the structure of French cities lends itself to Metro and public transport. Population densities are around twice as high in French cities as in British cities of equivalent size. This is mainly due to the French tradition of living in apartments rather than in individual houses; this greatly increases the number of people who live within walking distance of a Metro station and leads to the development of compact cities. The apartment tradition is slowly being eroded, as seen in Nantes where most of the newer suburbs on the outskirts of the

city consist of individual housing.

Several of the cities with Metros also have geographical barriers to movement and development in the form of rivers and mountains, and these too have caused the cities to develop upwards rather than outwards. Few British cities are close to hills which limit development.

2.8.3 The Importance of Political Structure

It has already been noted that in several of the French cities the local Mayor has had a personal influence on the decision to build a light rail system. In addition, in France the system of government itself favours decision making at a local level, with the powers of local government being defined in the Constitution rather than, as in Britain, being devolved by Parliament and subject to periodic change. As a result, the process of obtaining approval to build a light rail system is better defined. The local authority draws up its plans and submits them to the Prefect - the local representative of the national government. Once approved (a process which involves a public consultation), all parties can have confidence that the scheme can go ahead as planned.

The availability of funds is also a determining factor in developing a French light rail system. The importance of Versement Transports as a reliable source of income has already been noted, and this in itself has enabled schemes to proceed with the assurance of a steady source of funds. Grants are also available at 4 levels of government (State, Region, Département and City) compared with 2 in Britain (National Government and PTE or County Council).

2.8.4 The Effect of the Planning Process

Local authorities in France are more actively involved in planning through the development of local plans and development initiatives than is the case in Britain, where local authorities tend to have a reactive role. Coupled with the municipality's role as transport Organising Authority as well as planning authority, this favours the process of planning light rail as part of a comprehensive development, in a way which only occurs in Enterprise Zones such as Docklands in Britain.