HOW TO DELIVER PUBLIC TRANSPORT ON REDUCED BUDGET

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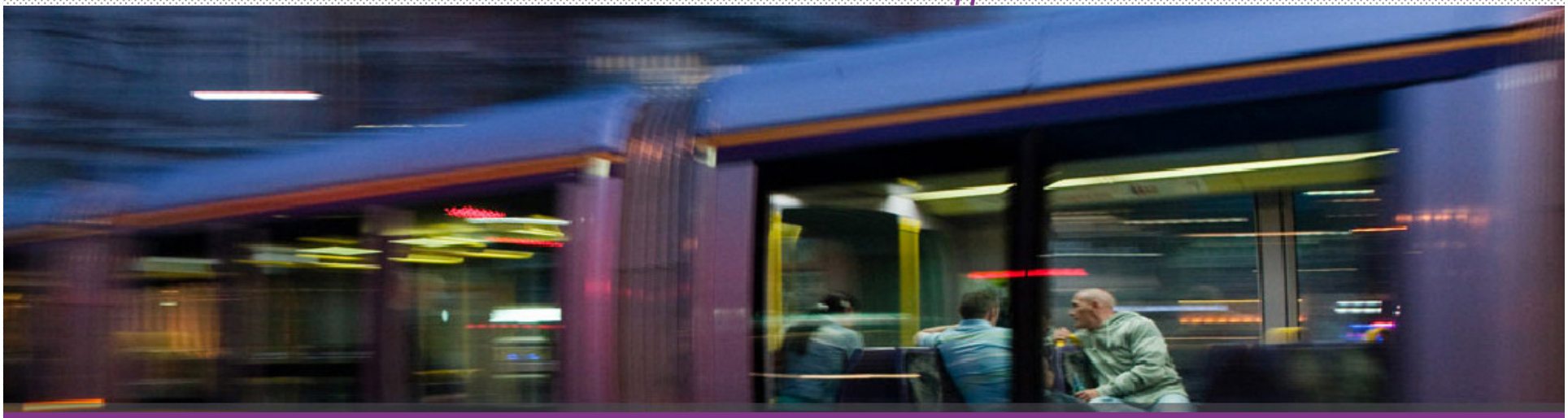

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Sinotropher Conference – London - May 25, 2011 -

SUMMARY

PART - 1 Climate change, oil and economic crisis , how to deal with public transport development ?

PART - 2 The tramway, aka LRT: is there a place between BRT and Metro ?

PART - 3 In slight density areas how to be efficient and less expensive ?

PART 1 – CLIMATE, OIL AND ECONOMIC CRISIS
How to deal with public transport developement ?

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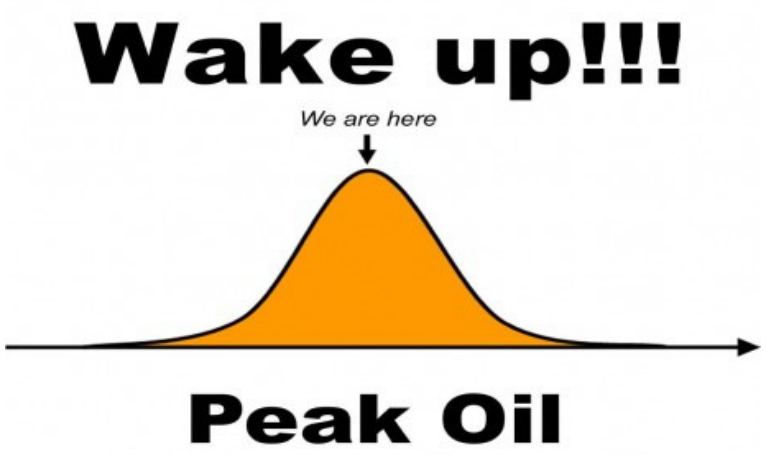
OIL AND ECONOMIC CRISIS
The main perceptible trends

- Oil more and more expensive
- Necessity to increase Public Transport supply
- Public funding more and more difficult
- Public Transport : High operation costs and low incomes



WHAT SOLUTIONS ?

In the next years, if the lack of oil is confirmed, the issue of Public Transport infrastructure development will be more critical than today

Which transport systems to use?

BRT or Light Rail ?
Light rail on surface or underground metro?

Where to find the funds when the growth of energy costs will absorb a part of the financing means?

How to realise this fast enough?

In this context the various forms of light rail will play an important role depending on their excellent ratio capacity/cost.

PART 2 - THE TRAMWAY, AKA LRT

Is there a place between BRT and metro ?

An efficient, esthetic,

sustenable

mass transport

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BRT, A RIGHT SOLUTION FOR EMERGING COUNTRIES

- BRT or BHNS (in French!) is an interesting solution to have a good efficiency with a limited investment cost, specially if wages are low.

- But in European Countries, BRT operation cost per passenger is higher than tramway operation cost :

  - *With the limited capacity of the vehicules : (150 people for the longer authorized bus vehicle, double articulation, 24 meters length) driver wages has a high weight in operation cost, and energy consumption per passenger is higher(x 2,5 times) than light rail*

  - *And, last but not least, noise, pollution and safety are less acceptable for residents*

Bogota's TransMilenio

THE MODERN TRAMWAY HOLDS THE RIGHT PLACE BETWEEN THE BRT AND THE METRO

The capacity of the vehicles places the tram between buses and metros :

- articulated bus : 105 places (18m long) to 150 places (24m long)
- tramway : 200 places (30m long) to 350 places (45m long)
- metro : 300 to 1500 places, depending on the length of the trains.

The total investment cost per kilometer for a complete line also places the tram between BRT and metro:

- BRT with new infrastructure : €5 to 15 M/km
- tramway : €15 to 40 M/km
- metro : €80 to 200 M/km.

The operating cost per kilometer traveled within the same country places the tramway between bus and metro.

TRAMWAY, A LARGE CAPACITY MASS TRANSPORT

Could we generalise the Turkish case with cheap and high capacity light rail ?

Istanbul

260,000 daily passengers

60 meters lengh

450 places

Montpellier

130,000 daily passengers

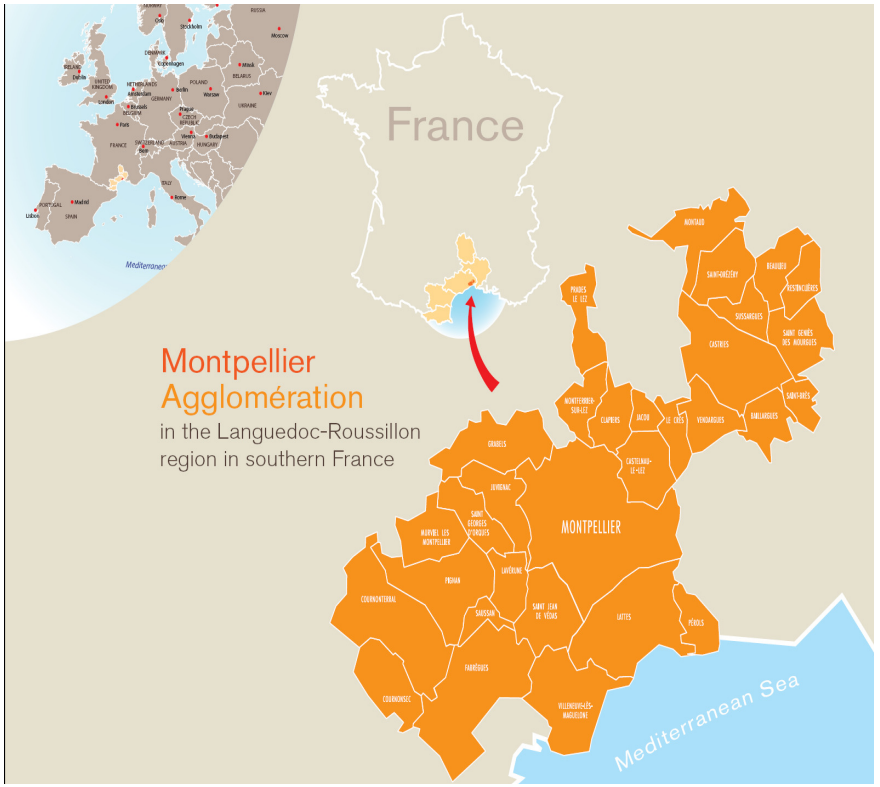
40 meters lengh

300 places

THE CASE OF MONTPELLIER : A GLOBAL APPROACH OF SUSTAINABLE MOBILITY

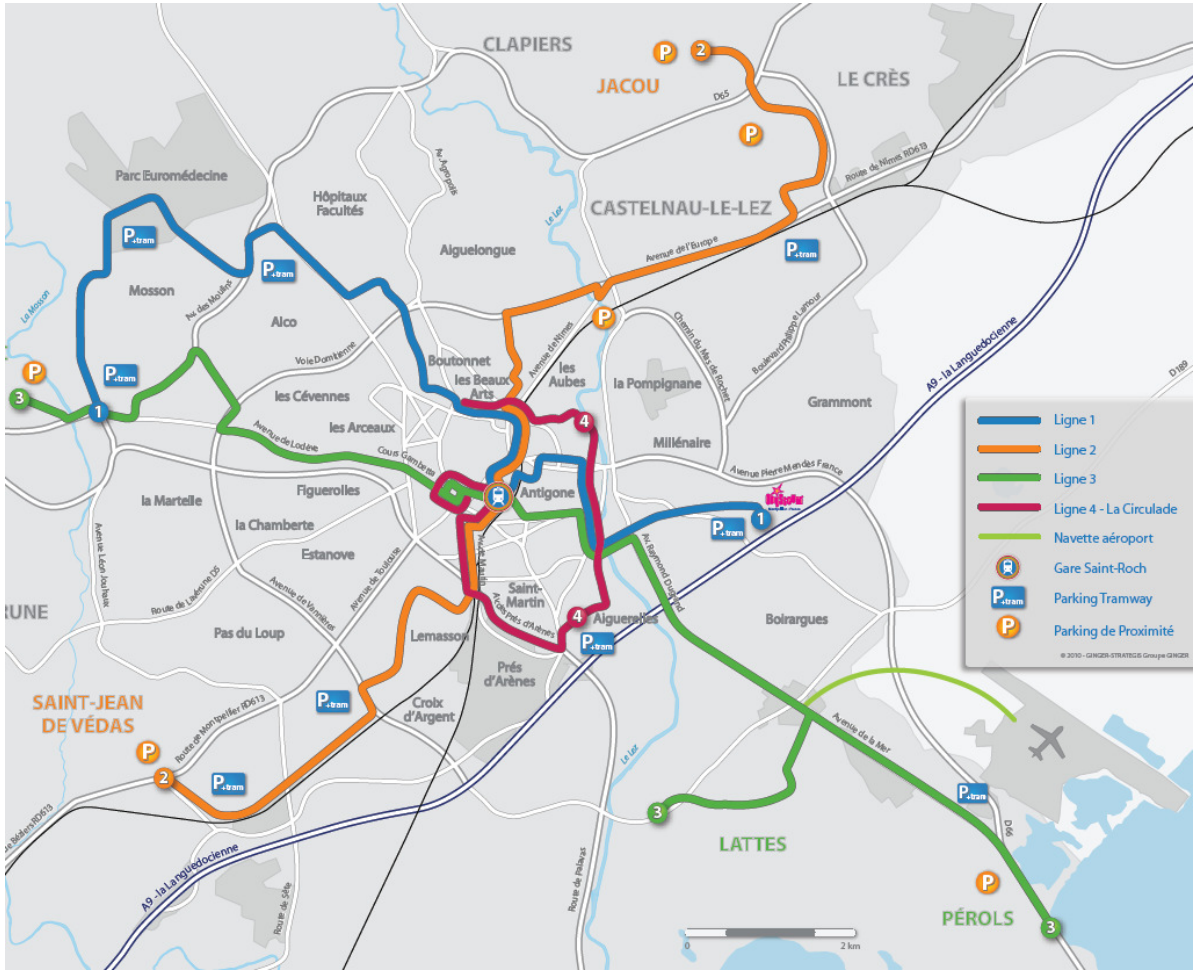
For mobility policy, Montpellier Agglomération has defined a global approach that covers all mobility-related programs:

- Limiting car traffic in the city with a strong parking policy and a systematic use of paid parking in “the city of 1900”
- Developing public transport with a large tram network
- Coordinating moderate public transport fares with higher parking fees
- Transforming the entire historical center into a pedestrian area,
- Developing “active modes” of transport :
  - cycling,
  - walking.



THE CREATION OF A 4 TRAM LINES NETWORK IN 15 YEARS

55 kms, 1.5 Billion Euros, 70 million passengers / year on 4 tram lines



Line 1: *15 km, opened in 2000, backbone of tram network in the major area of development.*

30 vehicles 40m, 290 people

Line 2: *20 km, opened in 2006, located on the historical axis of communication.*

22 vehicles 30m, 210 people

Line 3: *21 km, opening in 2012, is intended to reach sea and beaches.*

20 vehicles 45m, 310 people

Line 4 : *9 km, opening also in 2012 will enable internal service of the large town center.*

8 vehicles 30m, 210 people

FOR EACH LINE, ONE DIFFERENT COLOR

Line 1

Line 2

Line 3

But for Tram, Buses, P+R, Car sharing and Bicycle self service :

One single ticket

THE 4 REASONS FOR CHOOSING THE TRAM IN MONTPELLIER

A future without oil

"By 2050, the cities that managed to create a transport infrastructure network not running on oil will have a decisive advantage."

Georges Frêche, President of Montpellier Agglomération, on the launch day of work on Line 3 (April 2009)

A controlled investment

Tramway line 1: an infrastructure four times less expensive than a metro and transporting as many travelers as a line of the Marseille metro, the large neighbor.

A more beautiful city

The construction of the tramway, surface transport, beautifies and renovates the roadways used, letting even those who will not use it share in the benefit of the investment.

A good quality / price ratio

The operating cost savings offset the investment cost and put the total cost per passenger transported on the same level as that of a bus passenger.

COMPARED ANALYSIS OF TRAMWAY, BUS AND BRT COSTS IN THE CASE OF MONTPELLIER

YEAR 2008		TRAMWAY (actual figures)	simulation BRT (likeNantes)	URBAN BUSES (actual figures)
		LINE 1 15 km	Same as L1 tram	12 Lines
PHYSICAL DATA	Rolling Stock	33 trains	33 articulated CNG buses	136 buses
	Capacity (seats + standing) 4 P / M2	285 places	105 places	70 places
	Places Km offered (in 1000PKO)	501,100	189,000	425,800
	PASSENGERS/YEAR (in thousand)	30,000	11,300	18,620
INVESTMENT COST (in millionsof 2004 euros)		407	139	105
2008 ANNUAL COST per PKO	Investment cost per PKO	5.6 cents	5.0 cents	2.2 cents
	Operating cost per PKO	3.2 cents	7.6 cents	7.1 cents
	TOTAL	8.8 cents	12.6 cents	9.3 cents
COST per TRAVELLER transported	Investment cost per traveller	€ 0.93	€ 0.84	€ 0.49
	Operating cost per traveller	€ 0.53	€ 1.27	€ 1.61
	TOTAL	€ 1.46	€ 2.11	€ 2.12

THE MAIN LESSONS FROM THE COMPARISON

- The BRT costs three times less in investment than TRAM, but, per PKO, investment cost is **quite the same** because of low capacity of buses.

- Per PKO, BRT operation cost is much more expensive than tramway.

- **Tram system has a total annual cost per PKO better than BRT !**

- So, in Europe the choice between a BRT and a modern tramway is mainly related to the potential customer base: less 3 000 pers/hour BRT, more 3 000 pers/hour Tram.

- **It is better to have large trams (40 m or +).**We can even think about huge trams (60 / 70 m), because the additionnal investment cost is slight and additionnal operating cost is very slight

- Per PKO a traditional urban bus network does not cost less than tram. **In order to develop the use of public transport, it is better to invest in mass transport.**

INCREASING CAPACITY : CASE OF L1 IN MONTPELLIER

Tram length can be increased progressively. The higher the capacity is the cheaper the system is per passenger.

PART 3 – IN SLIGHT DENSITY AREAS
How to be efficient and not expensive

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IN SLIGHT DENSITY AREAS, WHAT PUBLIC TRANSPORT MODE ?

1. **Buses :** - Very easy to operate, but low capacity and commercial speed

   - Low modal split : between 3% to 8%

   - High operation cost per passenger : Montpellier 2010 - 2.50€/P !

   A right alternative : « R » BRT (Regional bus rapid transit) on highway with a car pooling lanes, or other direct routes with few stops and hight priority

3. **Regional Trains :** - In Europe, expensive mass transport because of complexity of heavy rail network, safety rules, mixed freight, regional and high speed traffics, etc…

   France is the worst case : 20 € per train kilometer !

   - Efficient on routes with high level of ridersphip and high capacity trains

3. **Tram trains :** - They are an interesting solution in some cases, but they can also be expensive because of technical complexity and mixed traffic with heavy trains and urban trams

REGIONAL TRAM , WHY NOT ?

With the economical issues posed by high costs of regional heavy rail (or tram-trains !) how to build with less funds and operate with reduced costs?

- going further in the periphery
- dividing by two (or by 4 in France !) the cost of regional rail/tramtrain

The regional tram or North-American light rail (lightened) :

For the same reasons that we have reintroduced or modernised urban trams, shouldn't we re-invent the regional trams?
North-Americans do it, couldn't we generalise it with even "lightened" costs?
Single track more easy to insert in the urban fabric, more distances between stations, etc.

A right structuring of surface networks is necessary to take advantage of the efficiency of a "surface metro"

A REGIONAL TRAM PROJECT IN MONTPELLIER
The line 2 extension to Poussan

Re-use of old railway track Montpellier- Bedarieux

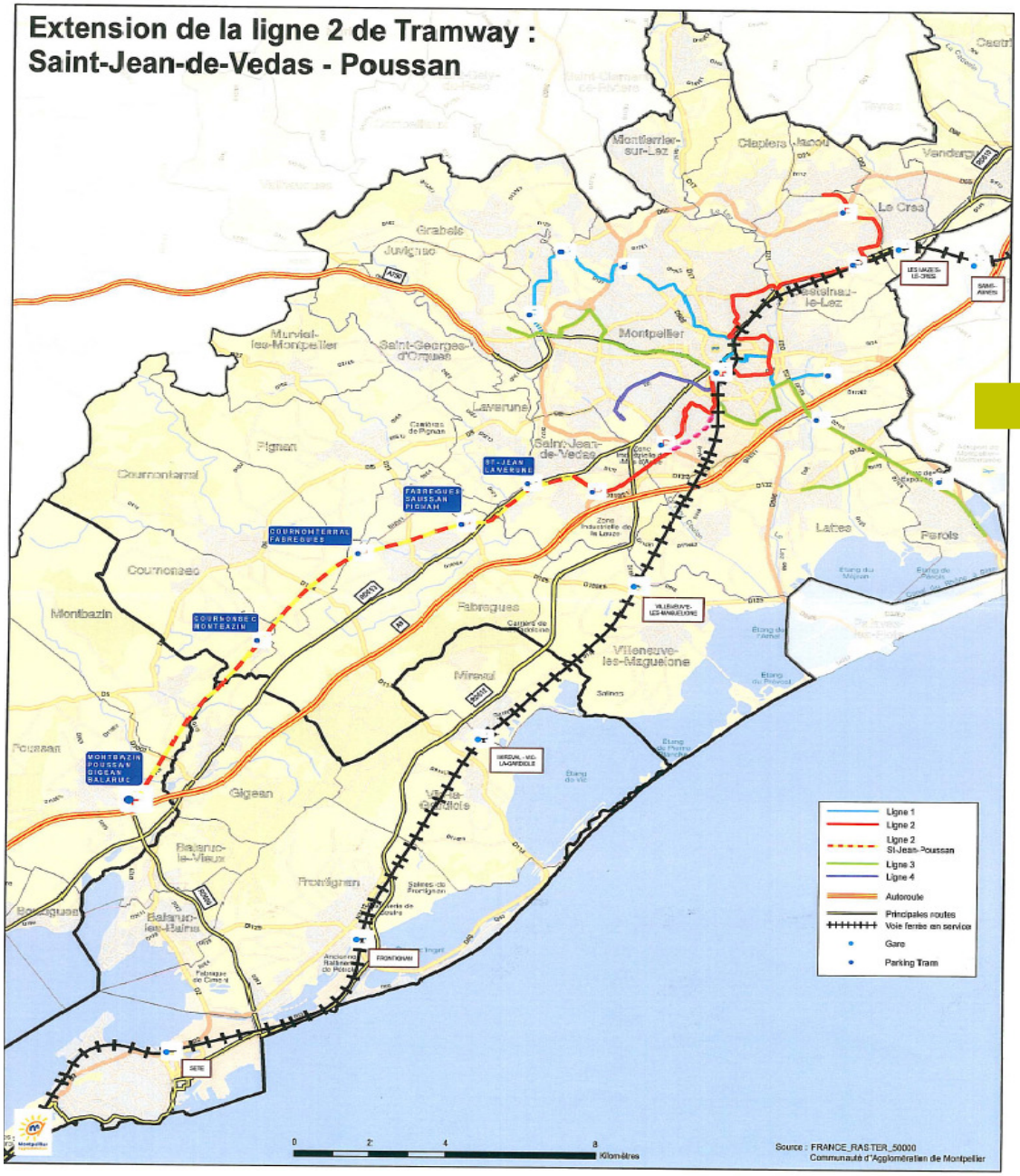
- Building a 18 kms new single track for regional tram between L2 terminal and Poussan
- Use a 2,5 kms « by-pass » between end of L 2 and city center
- 5 new tram stations

Main items

- 50 000 residents in 3 Kms area around new tram stations
- 6 regional tram vehicles (commercial speed up to 90km/h)
- Single track with double track in new stations
- Dedicated regional tram service with mixed use of L 2 (25 kms) to city center
- Time between city centeer railway station and Poussan = 32 mn (25 kms)
- Frequency = 30 minutes

Investment cost : 125 millions € - 6,2 millions € / km

Operation cost : around 4,5 € / km



MONTPELLIER REGIONAL TRAM PROJECT

Transports de l'agglomération de Montpellier

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MULHOUSE - THANN TRAM TRAIN Opening december 2011

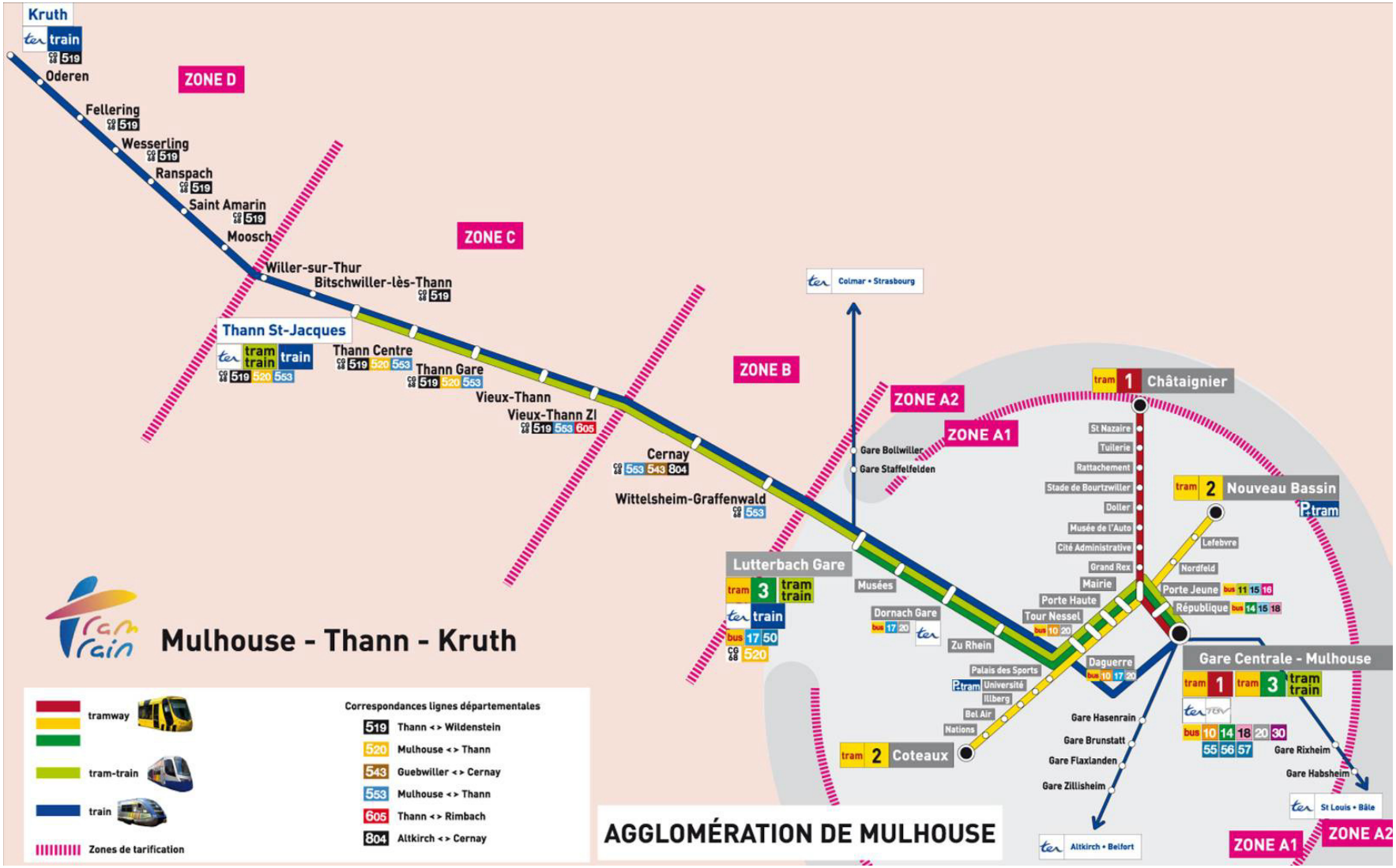
The mains items

- **Length 22 kms** - 2,6 kms mixed use urban tram track
  - 4,2 kms dedicated single track between urban tram track and SNCF track
  - 15 kms mixed use SNCF track and operation
- **Investment cost** - 150 millions €
- **operation cost** - 7€ / tram train kilometer

- **12 Tram Train vehicles AVANTO –** Length 37 m, width 2,65m, 750V / 25 kV –
- **Time between Thann and Mulhouse mairie :** from 43 mn before to 33 mn after
- **Time between Thann and Mulhouse Central railway station** : from 29mn before to 41 mn after !
- **Daily service Thann-Mulhouse central railway station :** - before 24 heavy regional trains
  - after 13 heavy regional trains
  + 32 tram trains AVANTO

- **Frequency** : 30 minutes

MULHOUSE TRAMTRAIN MAP



Le Tramtrain de mulhouse station Porte Jeune

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ANNEXE - MONTPELLIER 2009

	RIDERSHIP Per Year	PASSENGERS Per kms	OPERATING COST Per Kms	OPERATING COST Per Passengers	PUBLIC SUBSIDY Per Passengers
TRAMWAY	45 millions	13,4	9,00€	0,70€	0,27
URBAN BUSES	18 millions	3,5	6,20€	1,80€	1,46
SUBURBAN BUSES	3 millions	1,3	3,20€	2,50€	2,23