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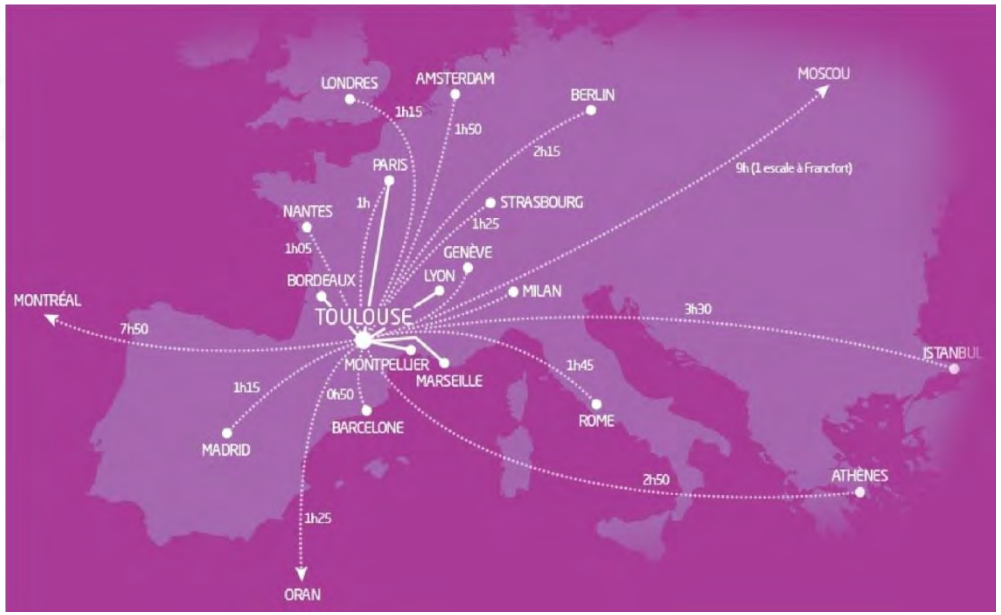
# “Comparison between ropeway systems and other public transport systems - the example of Toulouse “


Cyril LADIER

Bozen/Bolzano 6. - 9. June 2017





# Toulouse

## Presentation

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# Toulouse

## City of excellence

Spencer, robot européen,
un des sujets d'étude sur l'interaction robot-humain
au LAAS-CNRS à Toulouse.

*Spencer, a European robot, one of the subjects of a study on human-robot interaction at the LAAS-CNRS laboratory in Toulouse*



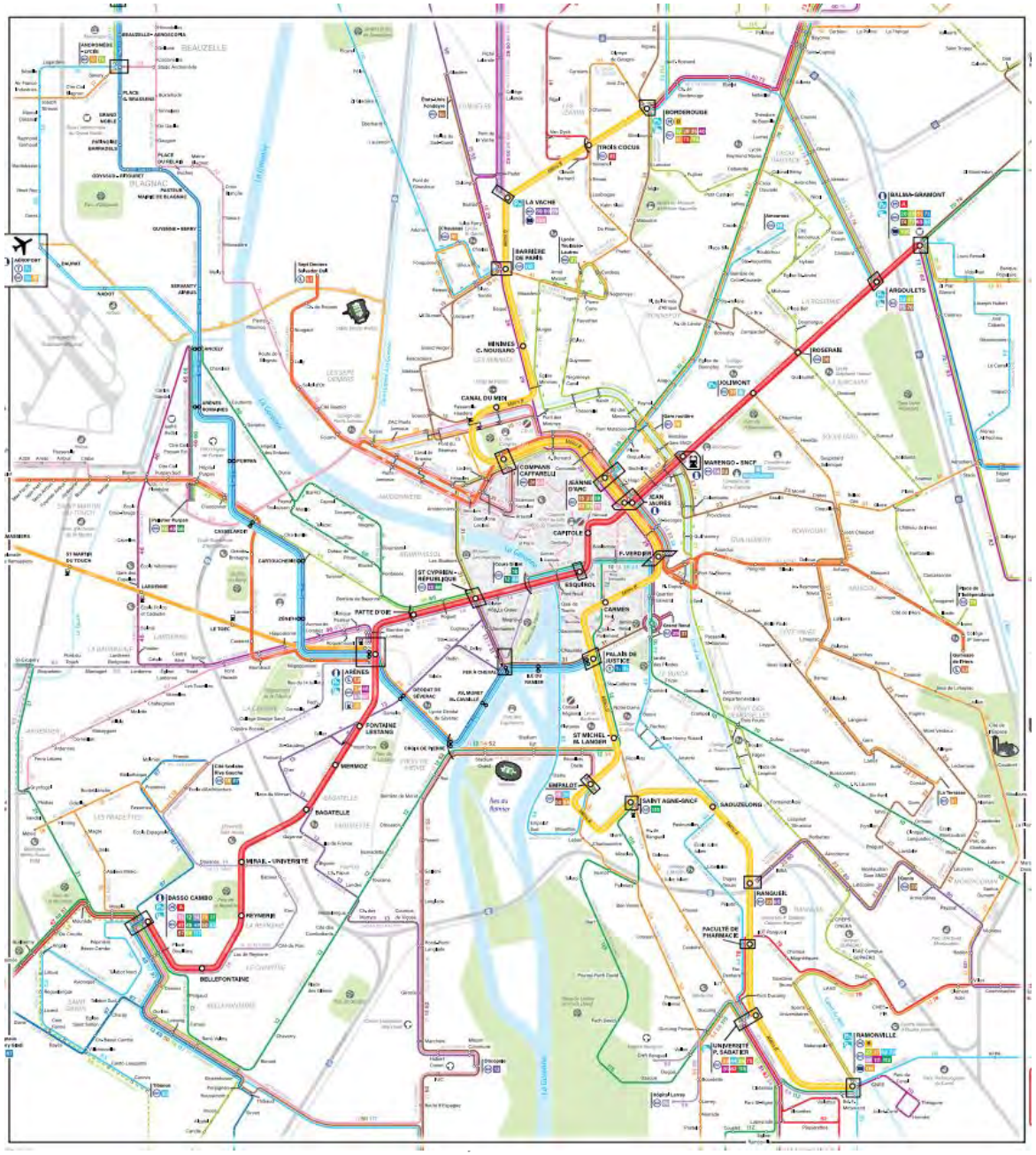
# Toulouse

## Public Transport

2 lines 27 km
More than 400 000 trips per day

2 lines 16 km
More than 40 000 trips per day

95 lines
More than 240 000 trips per day



COVOITURAGE UN SERVICE TISSÉO — Carpooling

citiz TOULOUSE — Carsharing

Pastel Ticketing system


Mobility Agency

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# Toulouse

## Looking to the future

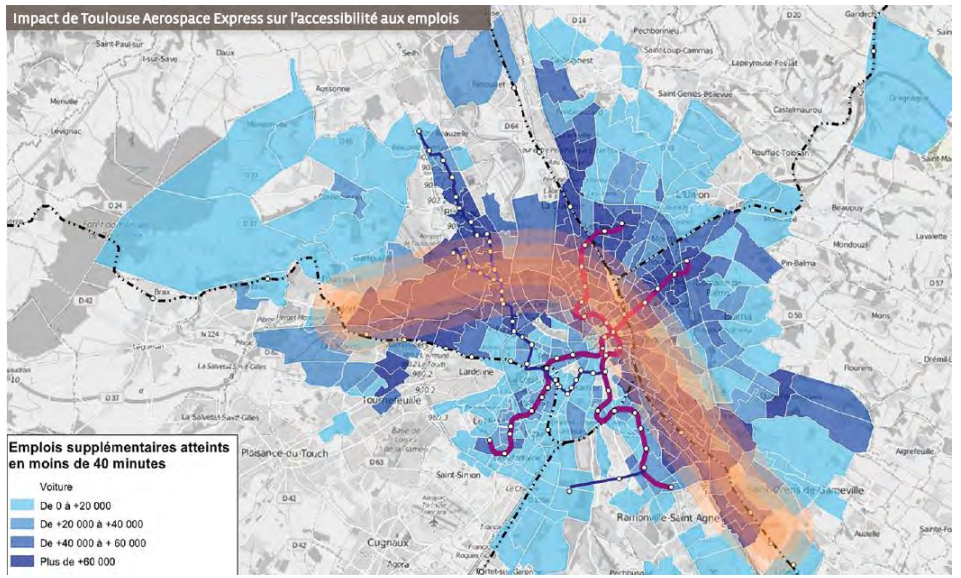
- Toulouse is one of the most dynamic and attractive metropolitan area in France, for economy, housing and studies:
- + 15 000 new inhabitants per year,
- + 150 000 new employments over last 20 years.

**BUT…**
66,000 private sector jobs are not to date covered by public transport facilities, most of them are part of the Aerospace Valley world competitiveness cluster

**We have three major objectives for the future:**

- Reinforce accessibility to the metropolitan area of Toulouse,
- Maintain the attractiveness of business and employment areas,
- Organize the mobility conditions in the perspective of an sustained growth.

***500 000 new daily trips at horizon 2025***




**Toulouse Aerospace Express: a 3rd line of metro**
The major diagonal for the economy, innovation and quality of life: covering **one of every two jobs of the Greater Toulouse**

*One « Projet Mobilités » for major Investment*

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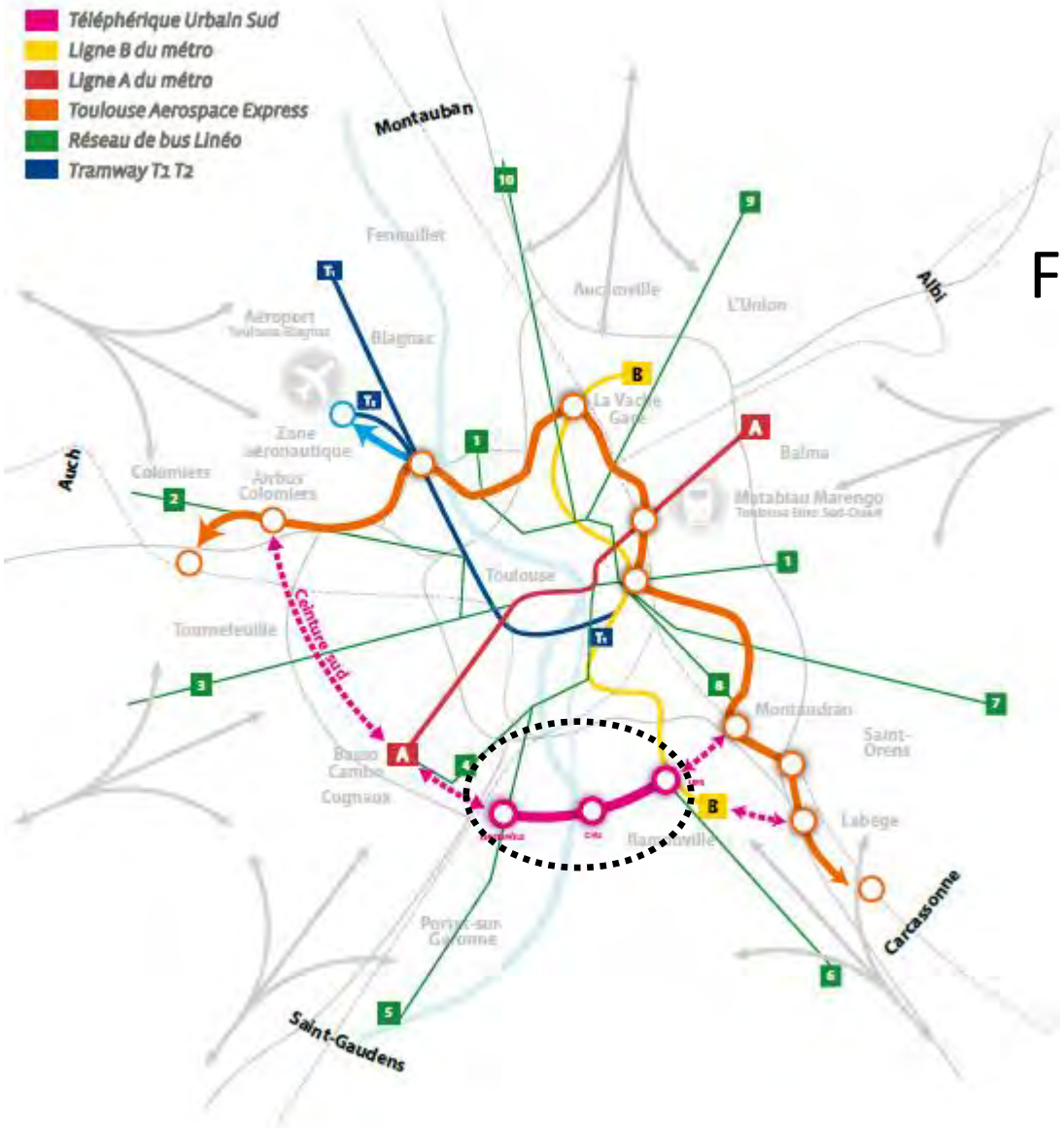
# Toulouse

## Future of public transport

**3 billions of Euros to be invested in public transport at horizon 2030**

- **Current main projects are :**
  - **Doubling of the Line A capacity**
  - **An High Performance Bus network named Lineo (10 new lines)**
  - **The South belt with the implementation of an innovative Cable Car system**
  - **Toulouse Aerospace Express, 3rd line of metro**
  - **+** 4G in metro



***Business and employment area to desserve …***

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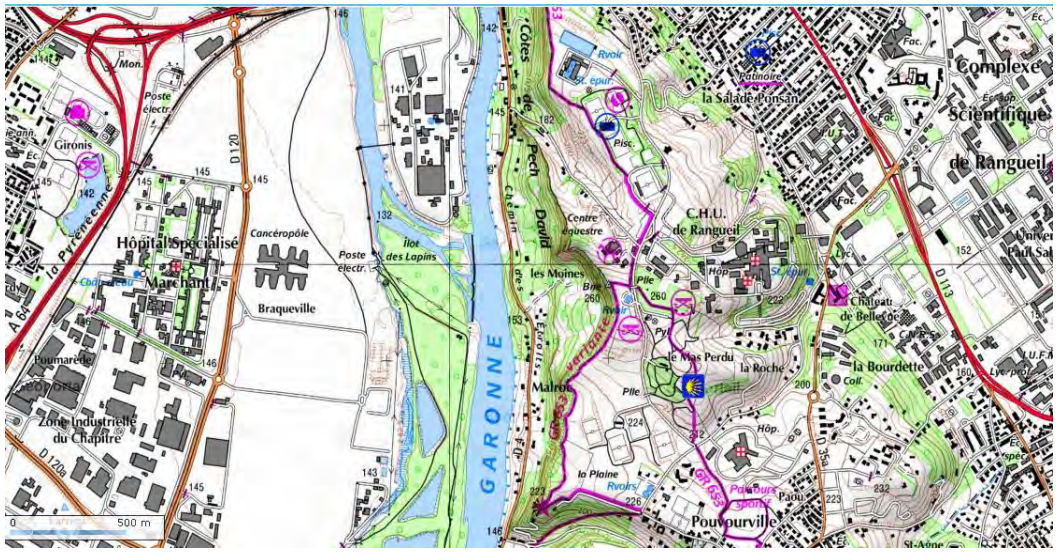
Rangueil Hospital
230 000 consultations / year

***… in a constrained area***




# Toulouse

## Project Area


Rangueil Sciences Campus
27 000 students and 4 000 teachers / searchers / staff


Oncopole
Reasearch and treatment center against cancer
More than 3 000 jobs

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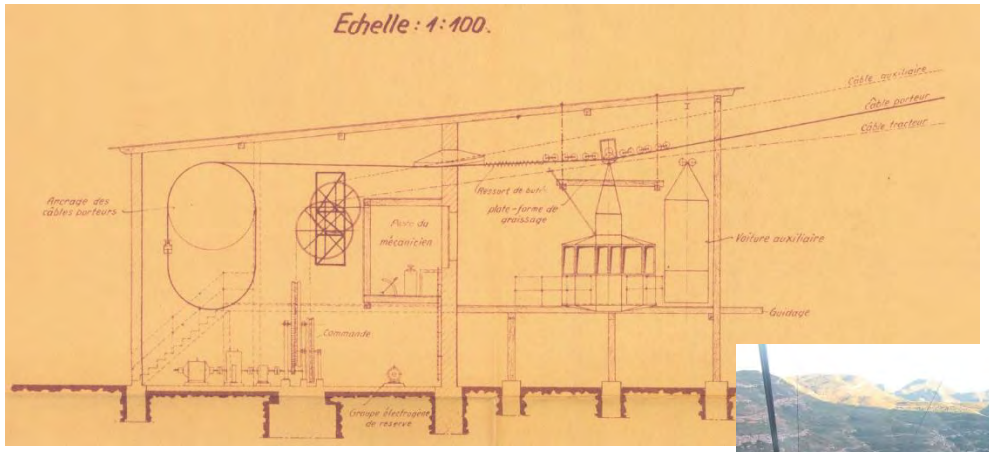
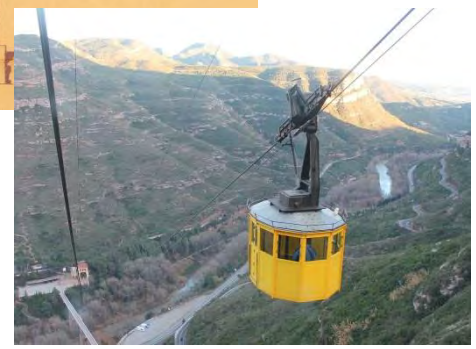
# Road projects

## From the 1920's


Jaussely Plan
1926-1928

When cable car project in Toulouse were
just for leisure
(studied by Bleichert / Zuegg in 1936)



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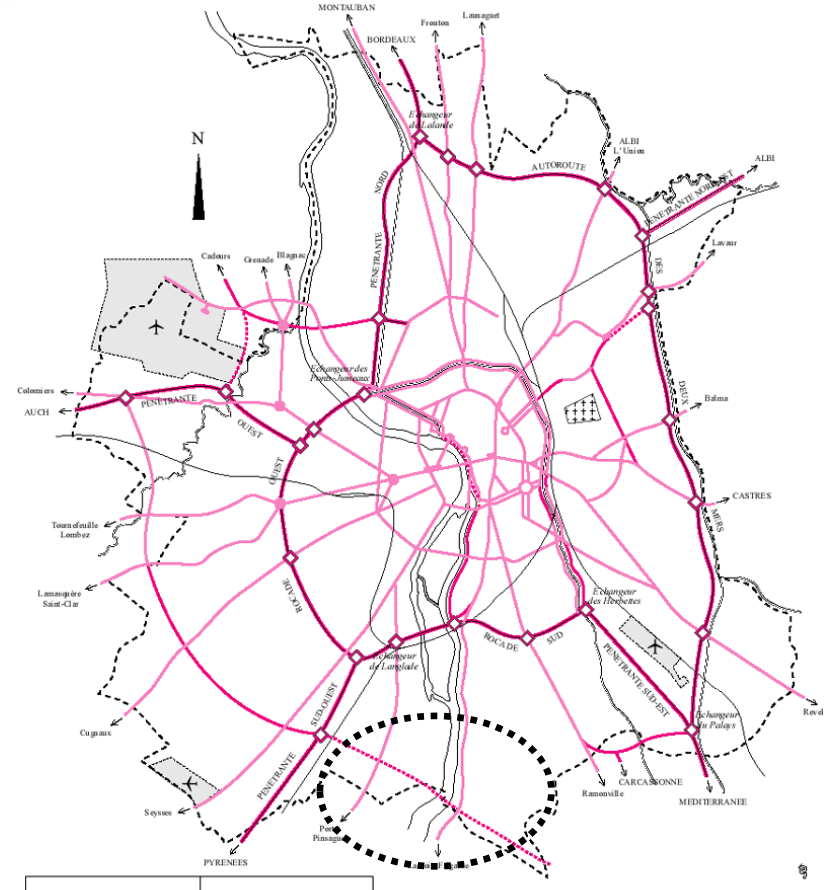
# Road projects

## During the 1960-1970's




Badani Scheme
1965


With little consideration for patrimony and nature

Some were achieved …
but not all of them

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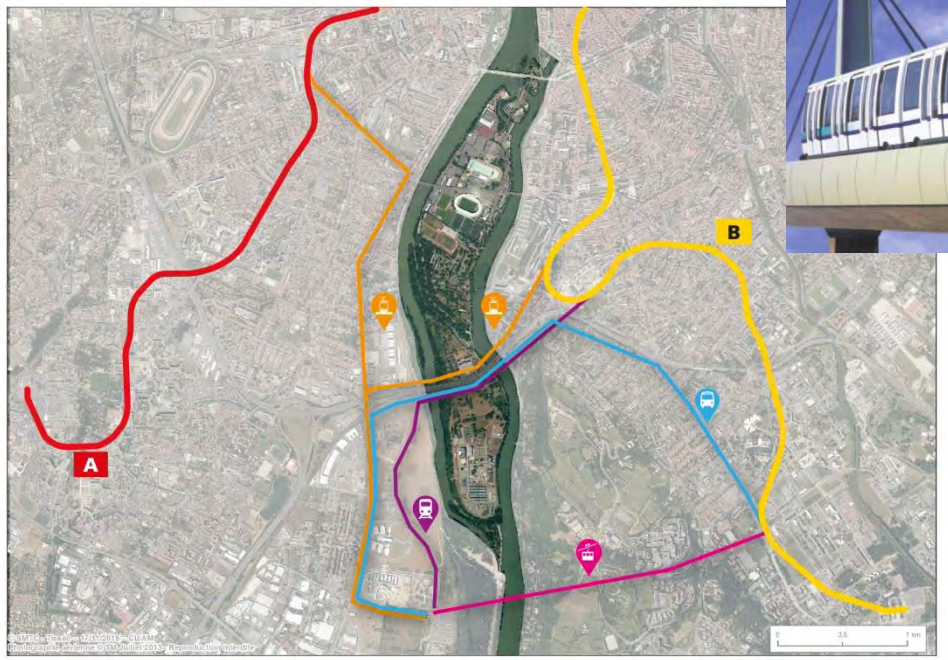
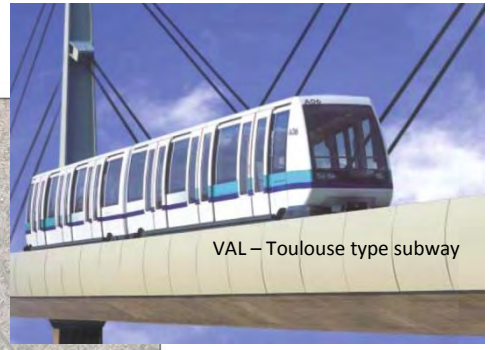
# Public Transport projects

## Studies from 2006

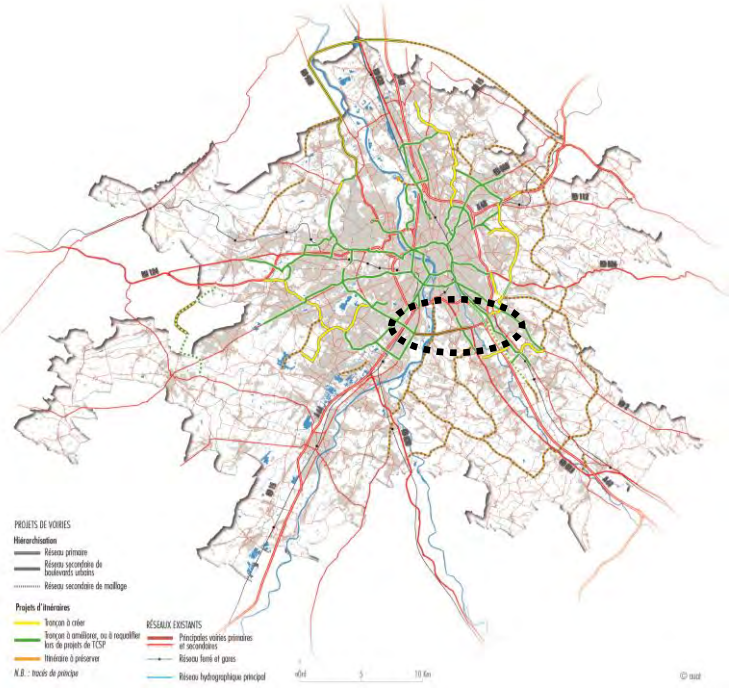


VAL – Toulouse type subway

LOHR – Clermont Ferrand / *Clermont Ferrand Wheel Light Rail*

Even if road projects were not abandoned

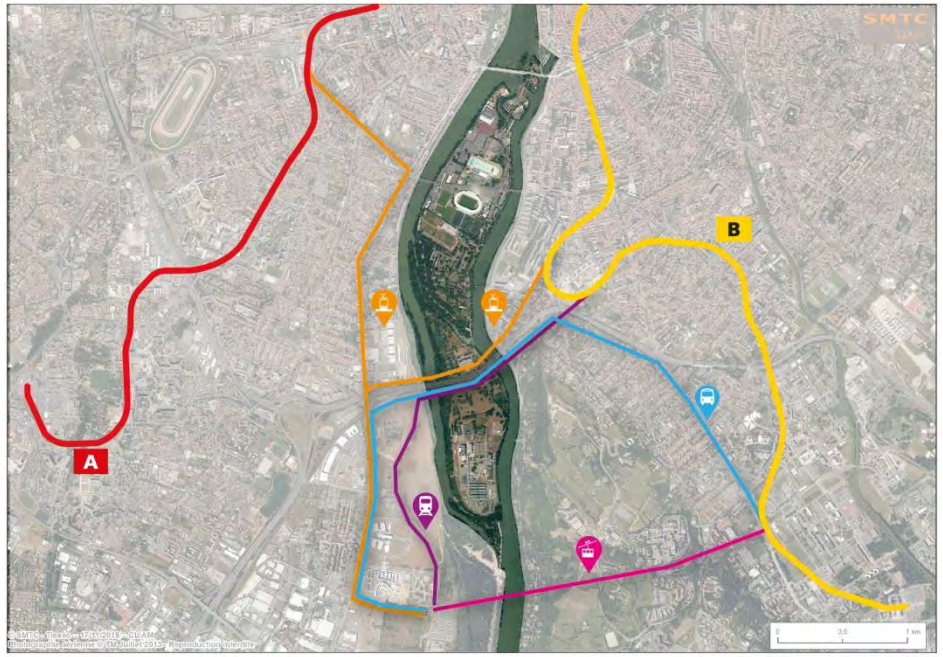


Tramway – Lyon / *Lyon Light Rail*

PHILEAS – Douai / *Douai BRT*

# Public Transport projects

## Studied in details

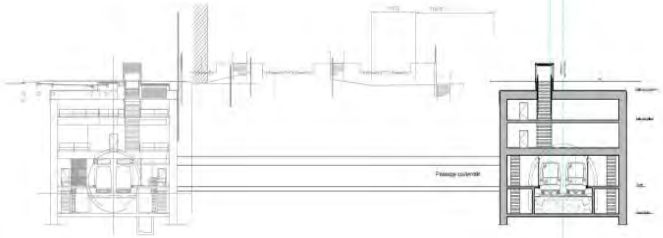



**Les scénarios testés**

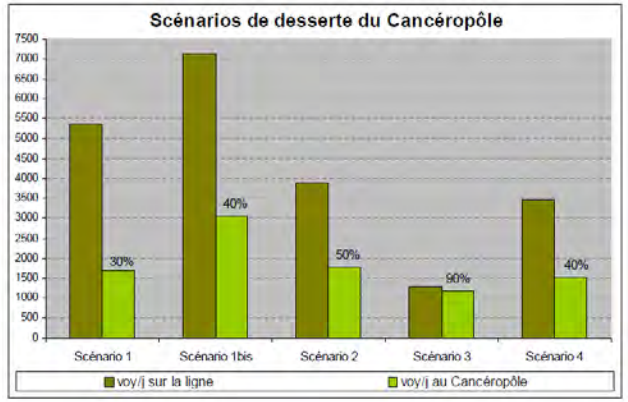
- **Scénario 1**
  - Ligne A à Arénes
  - Mode tramway (prolongement de la ligne E)
  - 10 stations dont 5 sur le Cancéropôle
  - Variante : Test de sensibilité à la contrainte de stationnement sur le secteur Cancéropôle
- **Scénario 2**
  - Ligne B à Empalot
  - Mode tramway
  - 10 stations dont 5 sur le Cancéropôle
- **Scénario 3**
  - Ligne B à Niel (nouvelle station sur ligne B)
  - Mode métro léger
  - 5 stations dont 3 sur le Cancéropôle
- **Scénario 4**
  - Ligne B à Université P. Sabatier
  - Mode télécabine
  - 4 stations dont 2 sur le Cancéropôle


Traffic studies

Light rail



Subway



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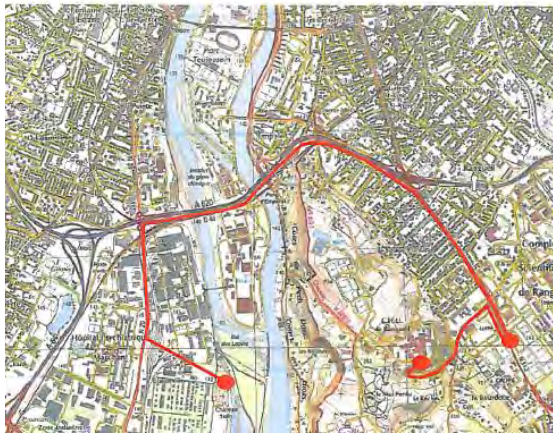
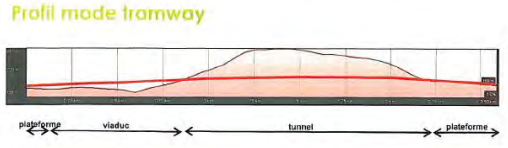
# Public Transport projects

## Studies in 2010 - 2011

Bus with dedicated lanes


Light rail

Cable car technologies

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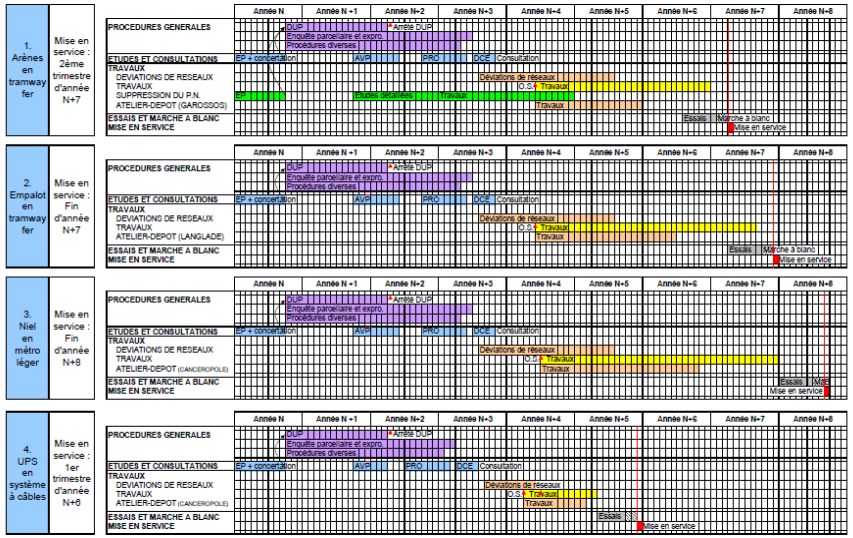
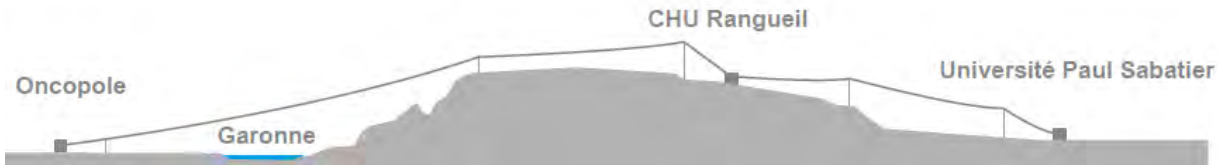
# Comparison between modes

## Cable car is the cheapest and fastest to build

| | Téléphérique *(Cable Car)* | Tramway *(Light Rail)* | Bus *(Bus with dedicated lanes)* | Funiculaires *(Funiculars)* |
|---|---|---|---|---|
| Longueur *(Length)* | 2 600 m | 3 000 m | 7 500 m | 1 700 et 900 m |
| Station Oncopole (*Oncopole Station*) | En élévation *(in elevation)* 50 x 20 m H = 8m | Plateforme en léger remblai (*Platform with light bank*) 30 x 12 m | Plateforme *(Platform)* 20 x 12 m | En viaduc *(viaduct)* 30 x 20 m H = 8 m |
| Station CHU (*Hospital Station*) | En élévation *(in elevation)* 75 à 100 x 20 m H = 3 m | En tunnel *(in tunnel)* 40 x 60 x 20 m Profondeur *(depth)* 100 m | Plateforme *(Platform)* 20 x 12 m | En viaduc *(viaduct)* 60 à 80 x 20 m H = 0 m |
| Station Université (*University Station*) | En élévation *(in elevation)* 50 x 20 m H = 8 m | Plateforme (*Platform*) 30 x 12 m | Plateforme *(Platform)* 20 x 12 m | En viaduc *(viaduct)* 30 x 20 m H = 8 m |
| Ouvrages *(works)* | 5 pylônes *(5 pylons)* | Viaduc *(viaduct)* 800 m Tunnel *(tunnel)* 1 400 m | Site propre *(dedicated lanes)* Viaduc *(viaduct)* 1 200 m | Viaduc *(viaduct)* 2 600 m |
| Véhicules *(vehicules)* | 20 cabines de 35 places *(20 cabines of 35 persons)* | 7 rames de 30 m *(7 30 m long trains)* | 12 bus de 18 m *(12 18 m long buses)* | 4 véhicules de 80 places *(4 80 places vehicules)* |
| Capacité système *(system capacity)* | 1 500 voy/h/sens *(travelers per hour per direction)* | 2 200 voy/h/sens *(travelers per hour per direction)* | 1 200 voy/h/sens *(travelers per hour per direction)* | 900 à 1 200 voy/h/sens *(travelers per hour per direction)* |
| Fréquence *(Frequency)* | 1.5 minutes | 5 minutes | 5 minutes | 5 minutes |
| Temps parcours *(Travel Time)* Oncopole - UPS Oncopole - CHU CHU - UPS | 10 minutes 5 minutes 4 minutes | 5 minutes 2.5 minutes 2 minutes | 20 minutes 25 minutes 5 minutes | 10 minutes 5 minutes 3.5 minutes |
| Coût investissement *(Invest Cost)* | 41 M€ | 250 M€ | 120 M€ | 155 M€ |
| Coût d'exploitation annuel *(Annual operation costs)* | 1.2 M€ | 2.8 M€ | 5 M€ | 1.5 à 2 M€ |
| Insertion | Pylônes and câbles Stations en élévation *(Pylons and cables Elevated station)* | Bonne *(good)* Problème station CHU profonde *(issue with Hospital station depth)* | Nombreuses acquisitions *(property acquisitions)* ; Insertion très délicate route de Narbonne *(Narbonne street narrow)* | Viaduc *(viaduct)* |
| Impacts | Emprise au sol limitée aux gares et pylônes *(very little footprint)* | Difficulté de réalisation du tunnel en terrains instables *(Hard to build tunnel with unstable ground)* | Emprise site propre à libérer délicate route de Narbonne *(lot of properties on Narbonne Street)* | Fondations profondes dans le versant instable *(deep bedrock on the unstable side of the hill)* |



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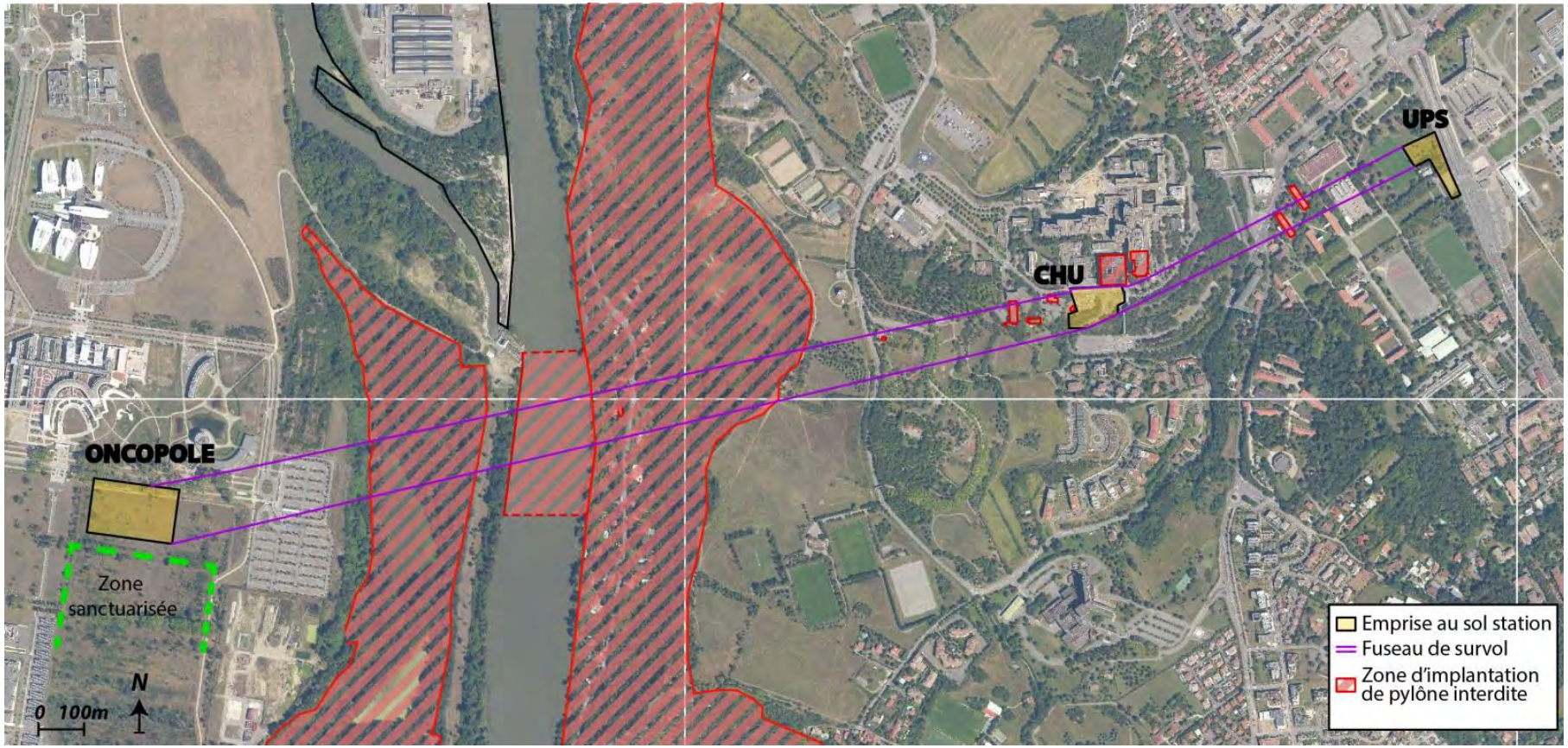
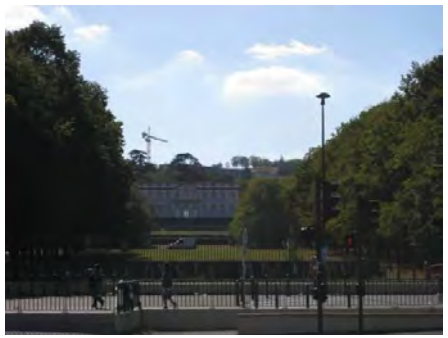
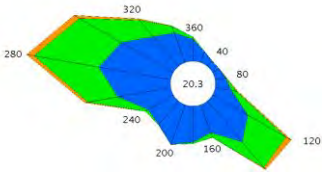
# Cable car project

## Constraints





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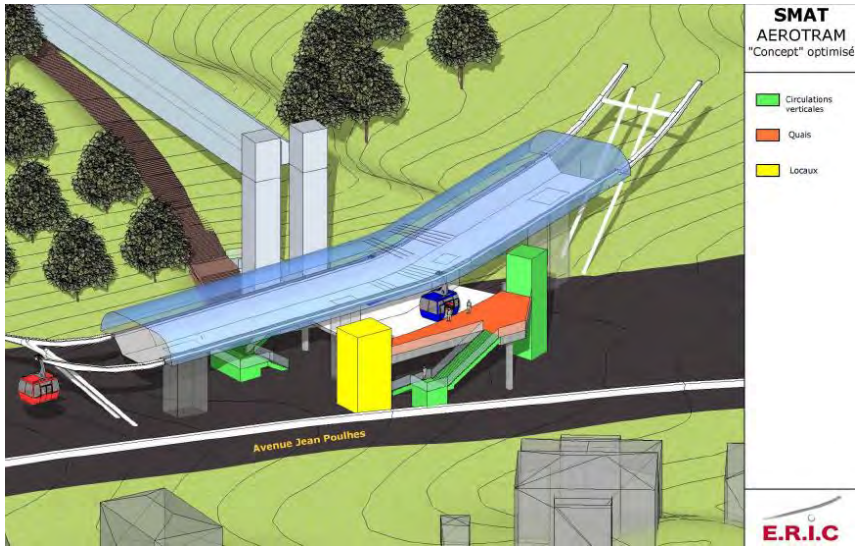
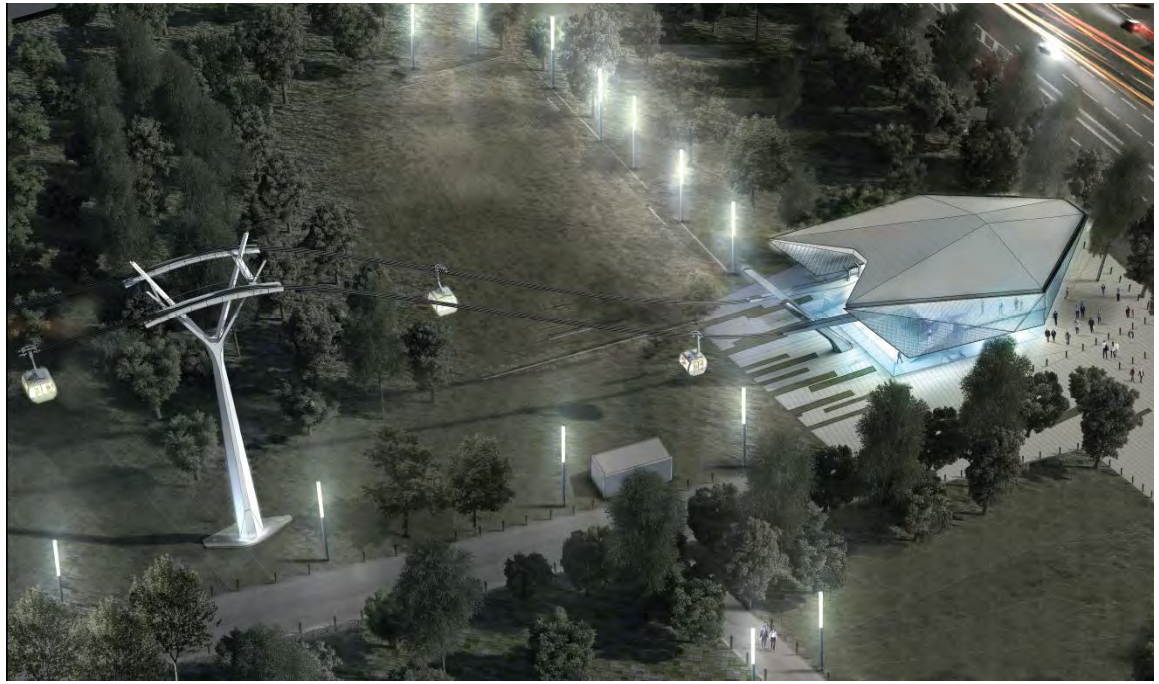
# Cable car project

## The studies



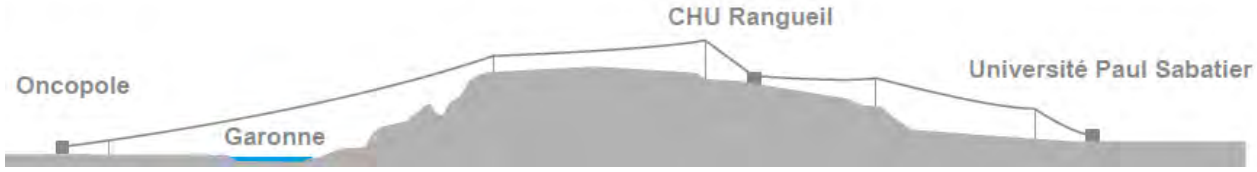



Projet Etudes Préliminaires / *Preliminary Studies Project* © Wilkinson Eyre Ltd.

# Cable car project

## The studies

Proiet 3S / *3S project* © PPA




Proiet Monocâble / *Single-cable project* © POMA

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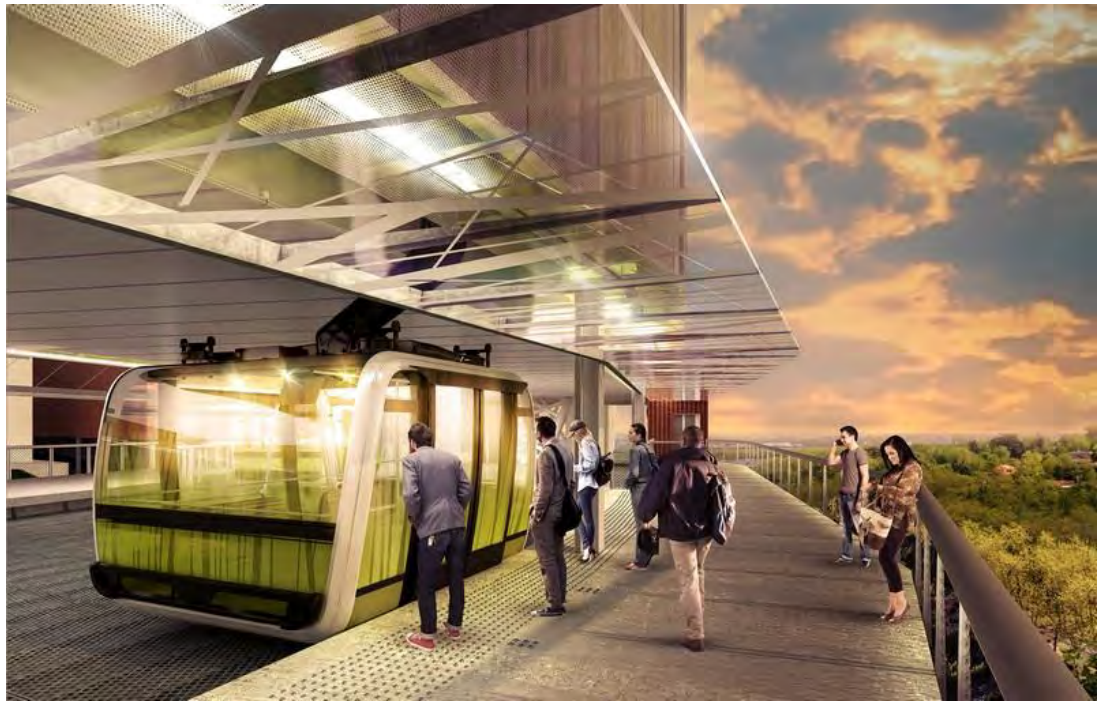

# Le Téléphérique Urbain Sud

## To come by the end of 2019

Groupement POMA