COLAS RAIL

On track for the future

COLAS RAIL

1. Introduction

2. Choice between Public Transportation Modes

3. Innovations and Optimisations

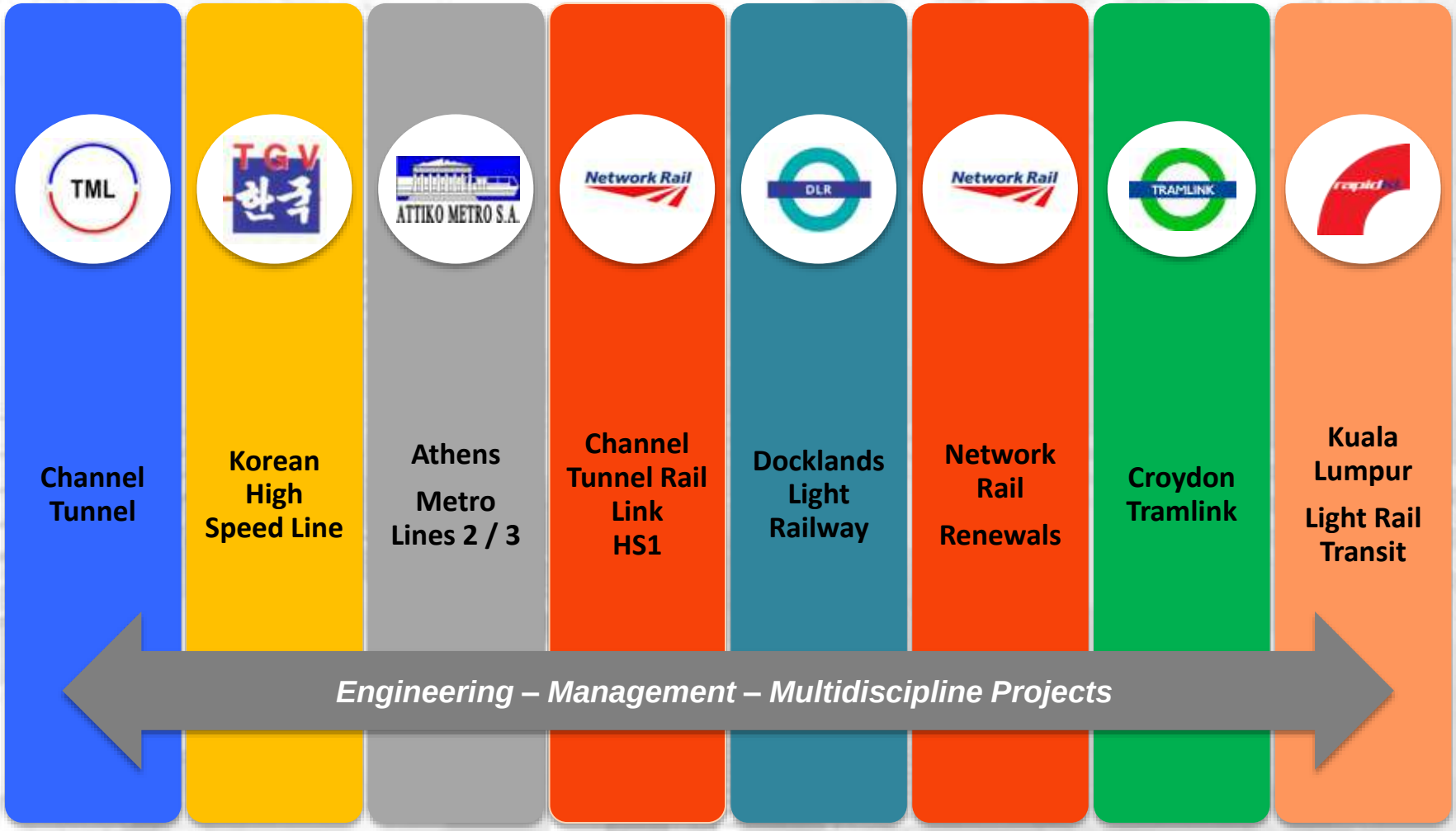
1. Introduction

COLAS RAIL

Tramway, the future of mobility...

Christophe Chassagnette

Chief Operating Officer Asia



COLAS RAIL

Tramway, the future of mobility…

Colas Rail

An International Presence

4000
Employees

3000
Projects

1 B€
2015 Turnover

COLAS RAIL

Tramway, the future of mobility…

2. Choice between Public Transportation Modes

COLAS RAIL

Choice between Public Transportation Modes

Selection Criterion

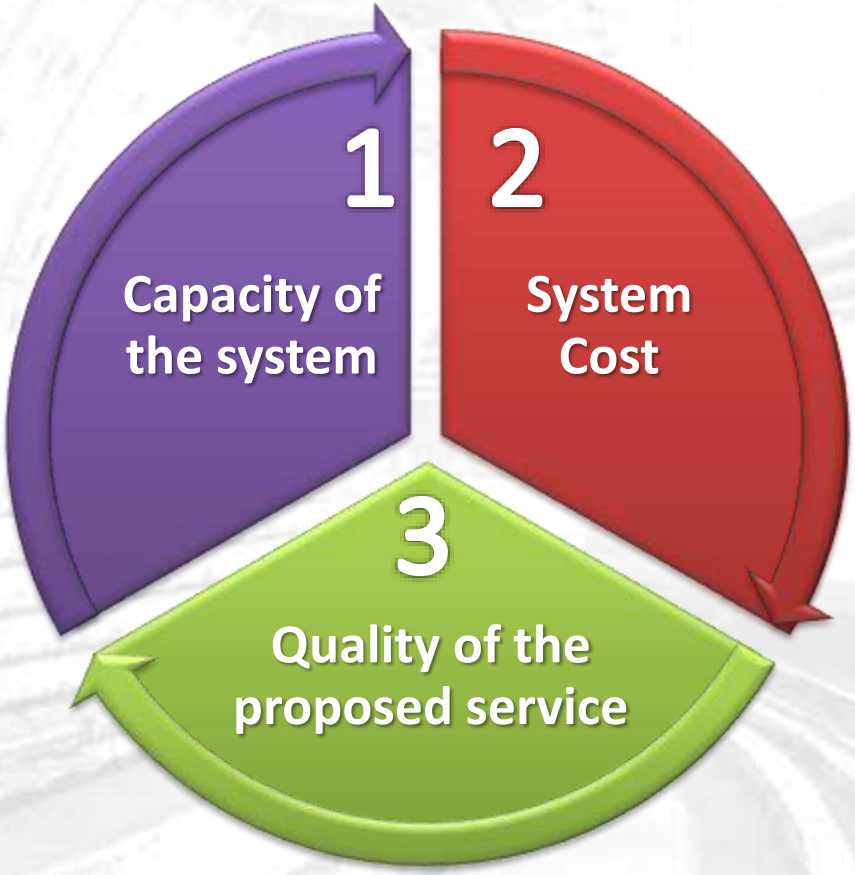
?

COLAS RAIL

Tramway, the future of mobility…

Choice between Public Transportation Modes

Selection Criterion



COLAS RAIL

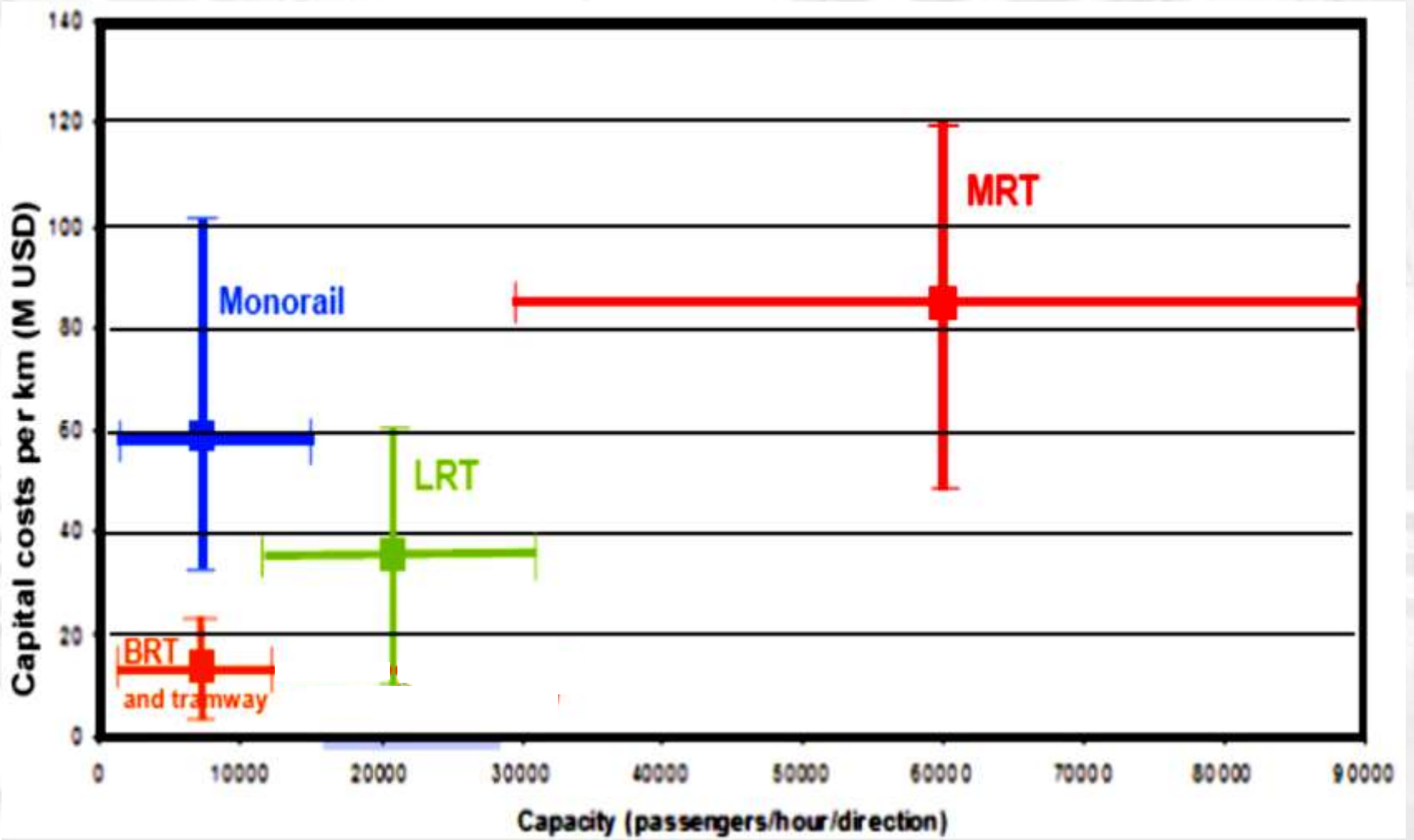
Choice between Public Transportation Modes

Budget and Financing Model

1. Initial Investment Cost
2. Operation Cost
3. Maintenance Cost

Choice between Public Transportation Modes

Transit Systems: Mode Comparison



COLAS RAIL

Tramway, the future of mobility…

Choice between Public Transportation Modes

Transit Systems: Mode Comparison

	BRT	TRAMWAY	MONORAIL	LRT	MRT
Capacity (pphpd)	3,500	6,000	8,000	20,000	45,000
Speed (km/h)	18	20	20	25-30	25-35
Passengers per train	70	200-300	200-300	400	800
Average Price (€/km)	10M€	20M€	60M€	50M€	85M€
Civil Works	At-grade	At-grade	Viaduct	Tunnel Viaduct	Tunnel Viaduct
Power Supply		OHL/Battery	Conductor Rail	Conductor Rail	Conductor Rail/OHL
Utilization	Cities +70 000 inhab.	Cities +100 000 inhab.	Airport / Cities	Cities +300 000 inhab.	Cities +600 000 inhab.





COLAS RAIL

Tramway, the future of mobility…

Wider Benefits of Tramway

3. Innovations and Optimisations

COLAS RAIL

Tramway, the future of mobility…

Innovations and Optimisations

Innovations

1- Pre-cast trackbed

2- Pre-assemble track panel installed by trolley

3- Green Track Solution

Innovations and Optimisations

Pre-cast trackbed

- **Pre-cast track bed increases installation rate**
- **Minimize interfaces with other modes, such as cars and cycles on shared roads**
- **Limit traffic impact at junction areas or line interruption during track renewals**

Tramway T3 Paris (2002)
Installation of pre-cast trackbed at junctions areas

Croydon (2010)
Installation of pre-cast trackbed for track renewals

Innovations and Optimisations

Pre-cast trackbed

Installation of pre-cast trackbed at junctions areas

COLAS RAIL

Innovations and Optimisations

Pre-assembled track panels installed by trolley

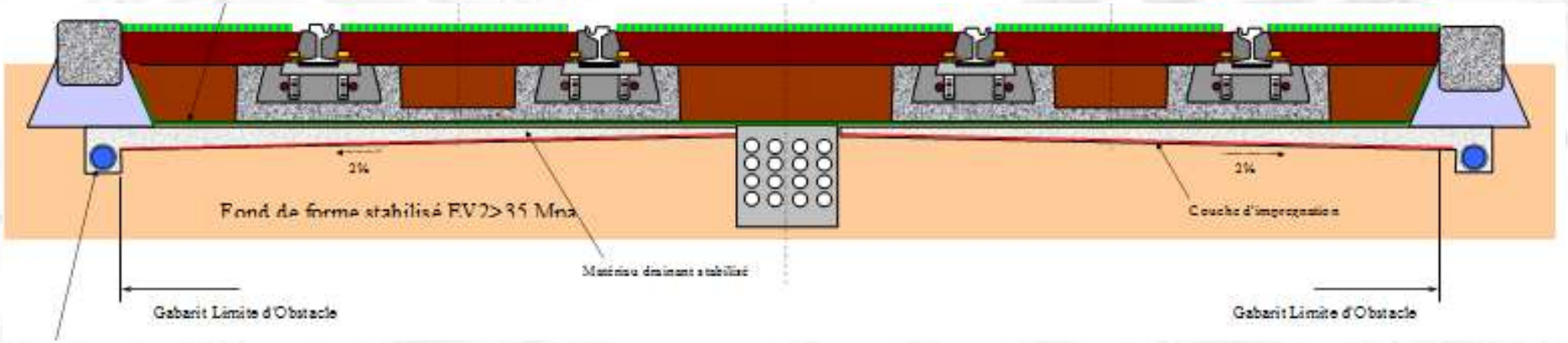
- Increase track installation rate
- Facilitate installation on street with limited access

Main Reference:

Grenoble Tramway

Innovations and Optimisations

Green Track Solution



Reduce drastically the construction materials

Reduce irrigation water consumption

Decrease Initial investment and Maintenance Cost

Maintain a high degree of rigidity and cohesion with the ground

Innovations and Optimisations

Green Track Solution

Installation of precast elements

Installation of rails into precast element recess

COLAS RAIL

Tramway, the future of mobility…

Innovations and Optimisations

Green Track Solution

Top soil filling

After completion. Differences between green track solution and classic permanent way

Innovations and Optimisations

Optimisations

1- Standardisation and Uniform Design

2- Improving capability of operators

3- Reducing the costs of utility diversions

Innovations and Optimisations

Standardisation and Uniform Design

- **Rationalise / Standardise design, operation and practices to reduce cost**
- **Uniformity across the country for future development**
- **How:**
  - **Choosing rolling stock, components, equipment for stations from a standard range**
  - **Using off-the-shelf information systems from existing bus systems**
  - **Proposing simple designs for landscaping**

Innovations and Optimisations

Standardisation and Uniform Design

Mats Example

COLAS RAIL

Tramway, the future of mobility…

Innovations and Optimisations

Standardisation and Uniform Design

Station Example

COLAS RAIL

Tramway, the future of mobility…

Innovations and Optimisations

Standardisation and Uniform Design

- **Joint procurement of Tram Vehicles – Economy of scale**
- **Possible when the timetable for projects is similar**
- **Example : Brest - Dijon joint procurement**

Innovations and Optimisations

Improving capability of Operators

- **Tramway operators to consider pooling maintenance facilities and expertise**
- **Maintenance depots becoming ‘centers of expertise’ in a certain field**
- **Synergy for maintenance and repair strategies and processes**
- **Pooling of spare parts**
- **Shared ownership between operators of heavy maintenance equipment**
- **Greater sharing of expertise within the sector**

Innovations and Optimisations

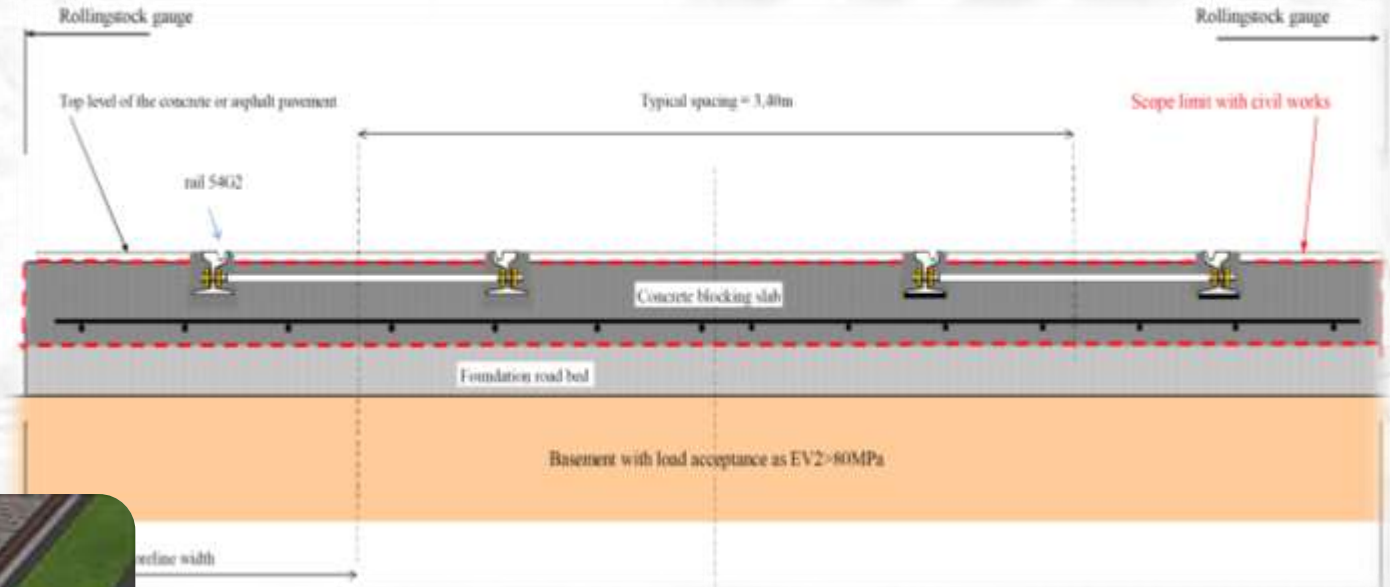
Reducing the cost of utility diversions

- **Tramway routes that run on highways/roads are often deemed to require the diversion of utilities (water and gas pipes, power cables) which are usually placed in roads and pavements**
- **Significant part of the cost of a scheme (10% of total investment cost)**
- **Objective : avoid diversion of utilities by using of a lighter weight track-bed consisting of:**
  - **Pre-cast concrete strips under each rail (e.g. Green Track Solution)**
  - **Embedded Track Solution (e.g. Precast track bed, Q-Track System…)**

Innovations and Optimisations

Shallow trackbed

Continuously supported embedded rail system



Rail encapsulated for easy replacement and maintenance

No Fasteners No Sleepers

Shallow Trackbed 30 - 40cm only

COLAS RAIL

Tramway, the future of mobility…

Innovations and Optimisations

Conclusion

Tramway System is :

- **Green / User Friendly / Urban developer / …**
- **Cost effective**

Multiple ways to drive the cost further down :

- **Optimisation of constructability to reduce construction time**
- **Reduce construction depth / minimise utility diversions**
- **Green for “real”**
- **Standardisation of design / maintenance**
- **Economy of scale**

COLAS RAIL

Thank you for your attention !




COLAS RAIL

On track for the future