



## ***FUTURE OUTLOOK FOR RAIL AND ITS PROSPECTS TO SATISFY FUTURE DEMAND FOR PASSENGER AND FREIGHT TRANSPORT***

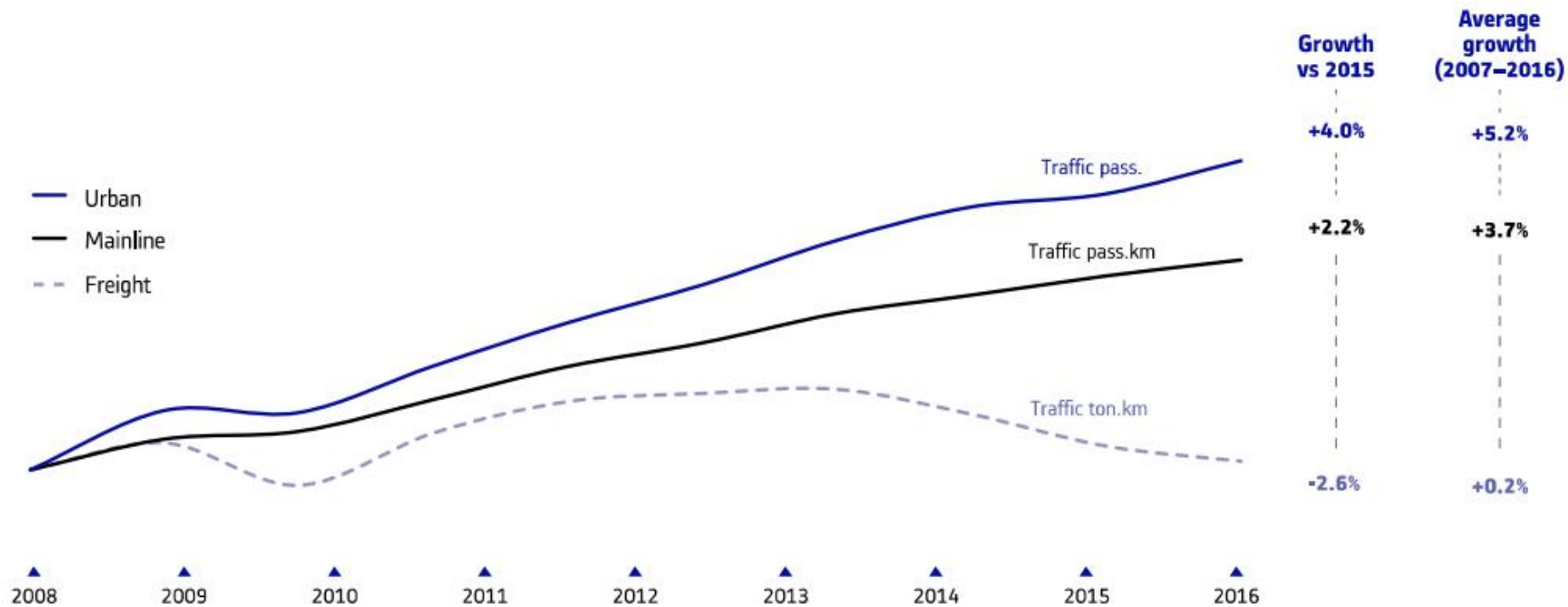
IEA-UIC workshop

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# Worldwide rail traffic evolution during the last 10 years

WORLDWIDE TRAFFIC EVOLUTION FROM 2007 TO 2016 <sup>(1)</sup>



(1) Urban traffic figures are for Top 30 cities worldwide; mainline and freight traffic figures are for all major national operators worldwide.  
Source: Alstom and UIC.

# Key drivers for rail industry

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The rail transportation market is supported by solid long-term drivers. Urbanisation creates a growing demand for infrastructure, rolling stock (especially for integrated solutions) and signalling notably in emerging countries. Mature markets, on the other hand, are mainly supported by projects aiming at updating and modernising existing infrastructure and rolling stock, as well as by growing environmental concerns.

# Urbanisation

The combination of both economic and demographic growth should entice a growing number of people to live in cities. By 2050, world population should exceed 9 billion inhabitants, of which nearly 70% will reside in urban areas (source: UNFPA, United Nations Population Fund). This trend towards urbanisation is particularly strong in China, India and in the developing countries of Africa and Latin America.

This development triggers the growing saturation of airports, roads and existing railway infrastructure. In this situation, railways typically offer the easiest, safest and cleanest solution as a real and competitive alternative to road or air transportation.

Additionally, especially in developed countries, the population is encouraged to leave behind individual methods of transportation and favour public transportation. This change will be supported by the active promotion of public transportation which is cheaper, more sustainable and more mindful of the environment. Therefore, people responsible for urban planning and development as well as urban populations themselves are looking for efficient, comfortable and intermodal urban transportation systems <sup>(1)</sup>. In this context, rail transportation offers the ideal mobility solutions in terms of safety, comfort and respect of the environment for urban and interurban transportation systems.

Moreover, the extension of suburban areas will require adapted transportation solutions. Innovations to reduce the environmental impacts in urban areas, such as noise and pollution, as well as improving the energy efficiency of these transportation methods are also becoming a major priority. The growing urbanisation should also lead to extending transportation networks that connect big cities to smaller ones.

# Sustainable Development

Greenhouse gas emissions, impact of air pollution on public health, climate change, recycling, recovery, energy efficiency and noise constitute some of the most significant environmental and sustainable development concerns currently voiced by populations and politicians. Today more than 90% of the world population lives in areas where air pollution exceeds the threshold recommended by the World Health Organisation while CO<sub>2</sub> emissions from transport continue to grow. Lead pioneer countries and cities announced future bans on cars running on combustion engines (Norway, France, United Kingdom, China...).

Rail transportation offers higher performance levels than other transportation modes, which should have a positive impact on the evolution of the rail transportation market. However, some challenges will have to be faced in these various sectors in order to meet ambitious emission reduction goals within set time frames.

In the run-up to COP 21, the European Union issued its commitment to reduce greenhouse gas emissions by 40% compared to 1990 levels by 2030, in-line with its global ambition to reduce greenhouse gas emissions by 80% to 95% below 1990 levels by 2050. Transportation, which represents approximately 25% of these emissions, must contribute to this reduction. Among the ambitions set in the White Paper on Transport <sup>(2)</sup>, the following should be noted:

- 60% reduction in emissions as compared with 1990 levels by 2050;
- 30% of road freight (for distances higher than 300 kilometres) must become rail freight and/or maritime freight by 2030;
- over 50% of intercity passenger transportation via rail by 2050;
- no more standard internal combustion engine cars in cities by 2050.

This vision has been further reinforced and detailed through the Communication on European Strategy for Low Emission Mobility published in July 2016 and should be strengthened through the Effort-Sharing regulation which temporary agreement foresees binding targets by countries for sectors not covered by the European Trading Scheme.



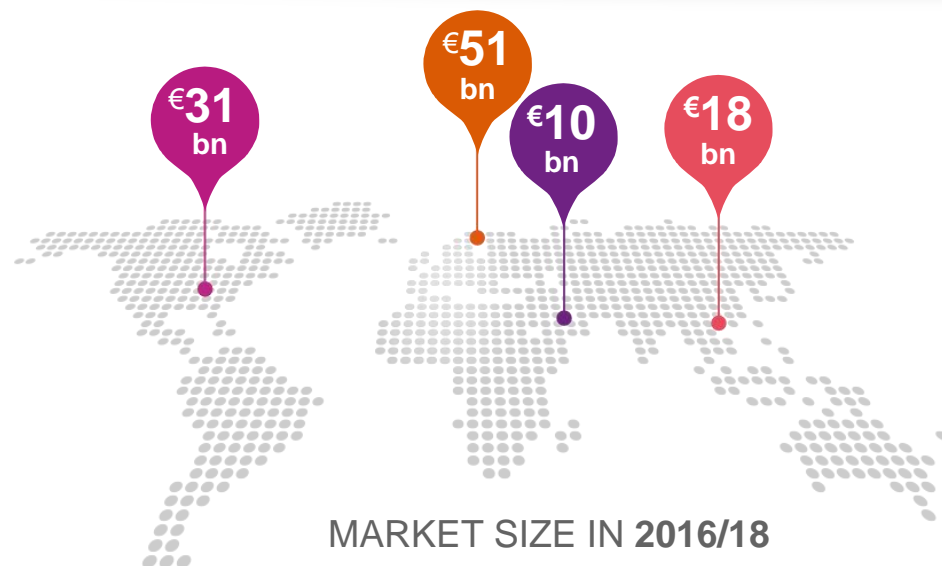
# A dynamic market with solid long-term drivers

URBANISATION

GOVERNMENTAL FUNDING

SUSTAINABLE DEVELOPMENT

ECONOMIC GROWTH



- Market worth more than **€110bn** (+ 3.2%)
- **Solid growth** drivers
- Market driven by **urban & integrated systems**
- Significant growth in **all geographical regions**

Average annual  
growth between  
2013/15 - 2019/21

**AMERICAS**

+ **2.3%**

**EUROPE**

+ **3.0%**

**MIDDLE EAST  
& AFRICA**

+ **3.2%**

**ASIA PACIFIC**

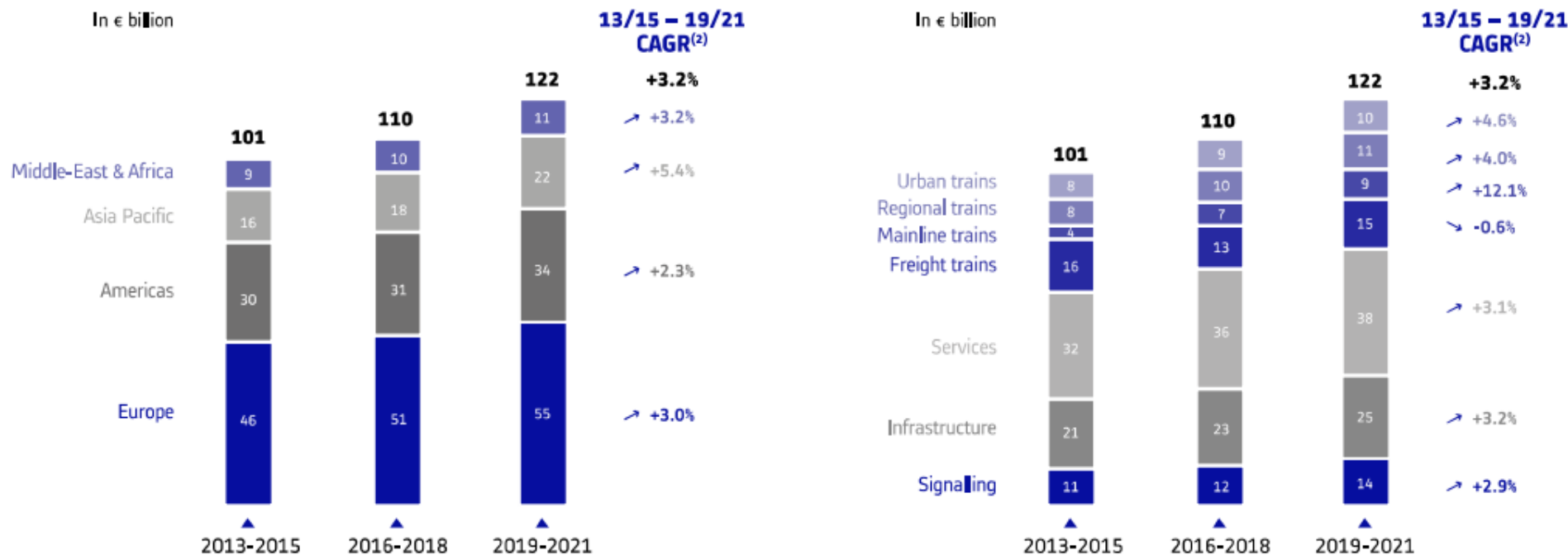
+ **5.4%**

*Note: Annual average - Accessible market*

*Source: UNIFE Market Study 2016*

# UNIFE (European Railway Industries Union) market prospective

## MARKET PER REGION AND PRODUCT <sup>(1)</sup>



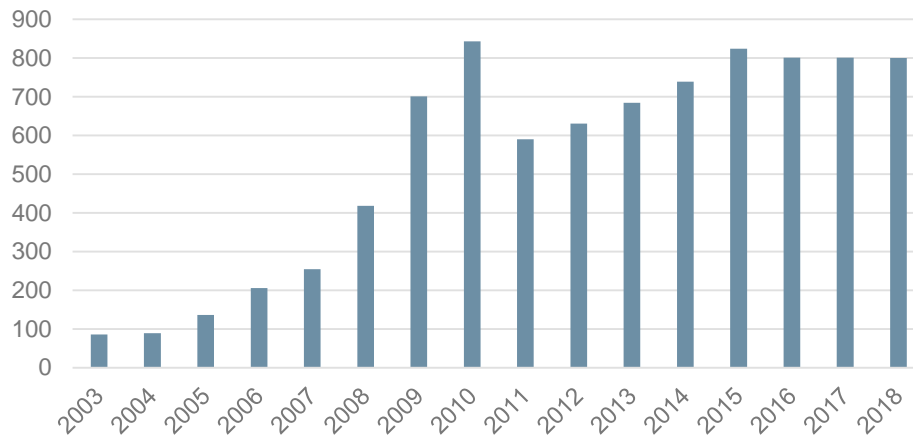
(1) Annual average – Accessible market.

(2) CAGR: Compound Annual Growth Rate.

Source: UNIFE Market Study 2016.

# The Chinese market

China Railways annual investments in Bn CNY



New metro cars put into operation



**25 000 kilometers of high speed line  
(more than 200 kph) at end 2017**



# New technical solutions to decrease CO2 emissions and energy consumption

## ■ New solutions to avoid diesel traction without having to electrify the line

- Electrification of a railway line is very environment-friendly but represents an expensive investment
- **Low density lines cannot afford such investment and today use diesel trains which are emitting CO2**
- Solutions are developed by most of Rolling Stock suppliers to avoid these CO2 emissions:
  - Batteries but issue of limited autonomy
  - Hydrogen with the use of fuel-cells: the two first trains running on hydrogen have been put into commercial operation last Monday
  - Hydrogen could be use to revamp existing diesel fleets, including diesel locomotives

## ■ Energy Management

- Optimization of the energy use to allow a reduction of energy consumption for the same service: driving automatization or assistance
- Development of solutions to improve the energy efficiency of the urban transport networks (example of HESOP reversible sub-stations)
- Development of new technical solutions to decrease the energy consumption:
  - Permanent Magnet Motors: already on use
  - Alstom has the 2020 objective to decrease the energy consumption of all its trains by 20% (vs the situation in 2014)

# New technical solutions to decrease CO2 emissions

16 Sep 2018

## **World premiere: Alstom's hydrogen trains enter passenger service in Lower Saxony**



# New technical solutions to increase the capacity of a line

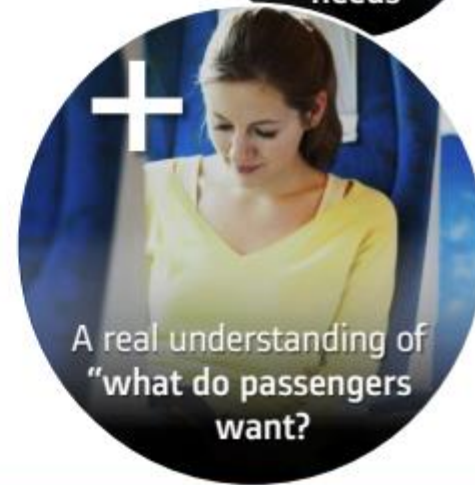
## ■ Extension of the capacity of the urban transport networks is more and more an issue in growing cities

- New metro lines are expensive and a first improval can be to improve the capacity of transportation of existing lines
- **The best way to achieve such increase of transportation capacity is through signaling solutions allowing a decrease of the headway between two trains**
- Driverless solutions are a good solution to increase the capacity but also the flexibility of a metro line

# Passengers experience: a key concept to attract citizens to use rail

## For new transport infrastructures, passenger satisfaction becomes a priority

- In the past, **functional criteria** were sufficient
  - Safety, reliability, efficiency, punctuality, capacity, ...
- Today, **global Passenger Experience** needs to be taken into account
  - Cleanliness, individual comfort, accessibility, connectivity, real-time information, personalised services, ...
- Tomorrow, the challenge will be to **provide the most accurate response** to passenger
  - More and more tailored solutions



→ Focus on passengers, with the suitable level of safety, comfort and pleasure, required for success of new transport infrastructures



# To offer to the customers a door-to-door chain of transport

## ■ The last mile issue

- The main advantage of automobile to rail transport is to offer an easy door-to-door chain of transport

## ■ Automatic driverless shuttles to complement the rail offer



# The train to compete, for freight, with ships and with airplanes

## ■ Container lines by train between China and Europe

- A way for rail to compete against ships by providing a quicker intercontinental transport

## ■ Freight High Speed trains

- To compete against airplanes especially for express freight transport



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