

2017



# LIGHT RAIL VEHICLES – GLOBAL MARKET TRENDS

Forecast, Installed Base, Suppliers, Infrastructure and Rolling Stock Projects

## **LIGHT RAIL VEHICLES – GLOBAL MARKET TRENDS**

### **Forecast, Installed base, Suppliers, Infrastructure and Rolling Stock Projects**

Environmental problems, traffic jams and a shortage of parking space in cities pose obstacles for their future development. More than ever, growing metropolitan areas need a comprehensively efficient public transport system in order to remain liveable. The investments required for modern metro systems are very high. Often light-rail transit (LRT), a lower-performance system with much lower investment and operating costs, will suffice. A resurgence in LRT is evident worldwide since the turn of the century. In the new study “Light Rail Vehicles – Global Market Trends”, SCI Verkehr has analysed this rail industry segment in detail. The most notable result of this study: the dynamic growth of 4% for new procurement of LRV will continue over the next five years. The main reason for growth is the increasing number of cities deciding to construct new light-rail systems or to extend the existing infrastructure. Regions contributing the most to growth are North America, Asia and Africa/Middle East. In regions with an existing extensive LRT network, such as Europe and the CIS, further growth is expected, mainly due to replacement of old vehicles.

#### **In concrete terms, the study includes:**

- An overview of the worldwide market for light rail vehicles differentiated by region, including an in-depth analysis of all relevant national markets
- An overview of the most important drivers behind the procurement and refurbishment of light rail vehicles in the individual regions
- A summary of light rail transit systems, future infrastructure projects, network lengths and forecast of the network development up to 2026
- A comprehensive analysis of the current fleet stocks, including quantities and age structures as well as future procurement potential
- An analysis of the current market shares of important LRV manufacturers as well as a forecast of customers' future vehicle requirements,
- An overview of light rail vehicle manufacturers including a brief description of their current range of products and services as well as production capacities
- A condensed summary in diagramme form of the most important fleet-specific features of light rail vehicles

SCI Verkehr analyses markets from the bottom up: based upon systematic observation of railway markets, a detailed worldwide database of installed bases and projects forms the foundation for in-depth studies on various segments of the railway industry. The vehicle database, which currently comprises 30 000 data records, is a particularly valuable resource. This study is also based on the evaluation of data from the information service SCI/RAILDATA, publicly-accessible sources, interviews with internal and external experts as well as SCI Verkehr's continuous observation and analysis of the market.

The study is available in English from August 2017.

SCI Verkehr GmbH is an independent consultancy company specialising in the technology and economics of transport. We have close connections to the rail industry, with consultants in a wide range of specialist fields. We have an extensive network of experts in Germany and abroad and we specialise in market and strategy issues for the mobility sector. Our activities focus on companies in the transport and rail industry, logistics, public and private transport companies and transport and economics departments in public administrations at national, regional and municipal levels.

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## 5 The Market for Light Rail Vehicles in Asia

### Market Overview

Asia			LRV	Trend
	Installed Base	Units 2016		↑
		Average development 2016-2021 (p. a.)		
		Average age 2016 (in years)		
	Market For New Vehicles	Average volume 2015-2017 (EUR million p. a.)		↑
		Average development 2016-2021 (p. a.)		
		Volatility market volume 2016-2021 (SAW)		
	Market For After Sales	Average volume 2015-2017 (EUR million p. a.)		↑
		Average development 2016-2021 (p. a.)		
		Volatility market volume 2016-2021 (SAW)		
<p>                     ↑ Boom/Strong Growth                       ↗ Small Growth                       → Stagnation                       ↘ Small Decrease                       ↓ Clear Decline                 </p> <p> <b>Volume:</b>            &gt; +5%p.a.            +2 to +5% p.a.            0 to +2% p.a.            -2 to 0% p.a.            &lt;-2% p.a.                 </p> <p> <b>Installed base:</b>   &gt; +1.5%p.a.            +0.5 to +1.5% p.a.            -0.5 to +0.5% p.a.            -1.5 to -0.5% p.a.            &lt;-1.5% p.a.                 </p>				

SCI Verkehr expects to see strongly increasing vehicle fleets and growing procurements. China will contribute the largest share to market growth in the medium term. Various other countries will receive a modern LRT system for the first time. Procurements are expected in China, Japan, Thailand, Taiwan and the Philippines in the medium term.

### Market environment/infrastructure development

[.....]

5 countries in Asia have light-rail systems in operation. China ranks first, overtaking Japan in 2016. Although there are large tram fleets in India and North Korea, the market for vehicle procurement and maintenance is insignificant for the most part. Neither India nor North Korea is planning significant investments in their domestic LRV market before 2020. The Philippines recently invested into extending the network. The first light-rail line in Taiwan will go into operation in Kaohsiung in mid-2017.

[.....]

Most of the new systems that have been announced will be in China. Besides the countries considered in detail (China, India and Japan), there are new systems planned in the medium term in Pakistan, the Philippines, South Korea, Taiwan and Thailand.

[.....]

Top 10 cities by LRV fleet size

Rank	Country	City	Number of vehicles (units)	Average age (years)	Route length (km)	Track gauge (mm)	Operator
1	North Korea	Pyongyang	240	29	53	1 435	Pyongyang Transport
2	China	Hong Kong	210	34	49	1 435/ 1 067	Hong Kong Tramways
3	China	Changchun	125	6	61	1 435	Changchun Mass Transit Co
4	India	Kolkata	120	41	68	1 435	Calcutta Tramways Co Ltd
5	Philippines	Manila	100	12			Light Rail Transit Authority (Manila)
6	Japan	Kyoto	88	21	12	1 435	Kyoto-shi Kotsu Kyoku
7	China	Dalian	80	12	30	1 435	Dalian City Transport Company
8	Japan	Nagasaki	77	50	11	1 435	Nagasaki Denki Kido
9	Japan	Kagoshima	72	39	20	1 435	Kagoshima-shi Kotsu Kyoku
10	Japan	Osaka	72	40	19	1 435	Tosa Electric Railway

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[.....]

New development of LRT infrastructure

[more than 5 km network extension, start of construction expected before 2026]

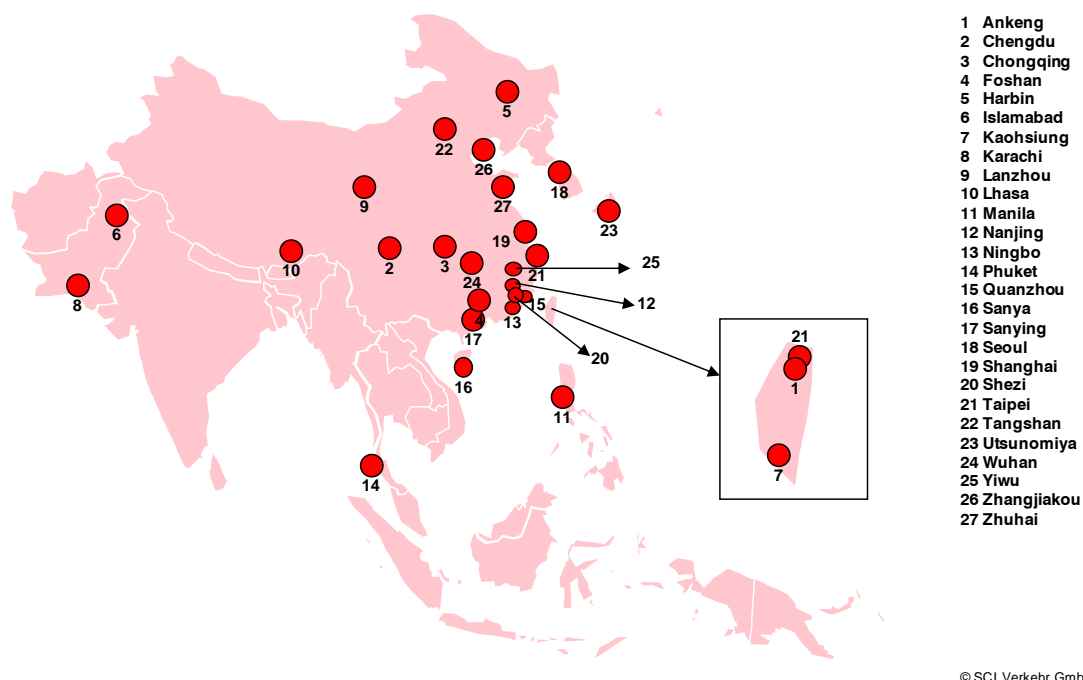
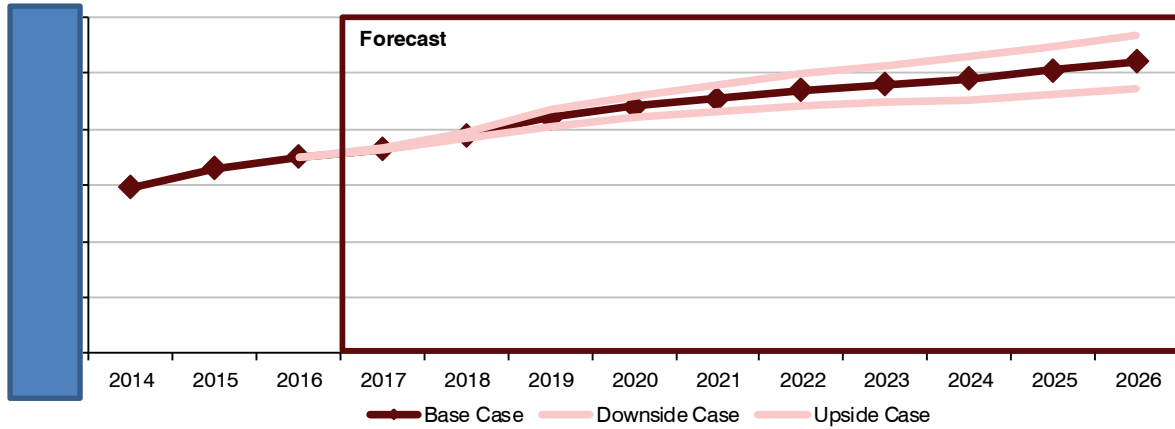


Figure 1: New development of LRT infrastructure in Asia

In the base case scenario, SCI Verkehr expects an increase in the network by 240 km between 2016 and 2022 (CAGR of 6% p.a.), mainly due to new projects in China. The long-term potential remains very high, as many cities do not have an urban rail system yet and need some kind of efficient public transport system.

**LRT system in operation [route-km]  
Asia**



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Figure 2: LRT systems in operation in Asia

**Important publicised new developments and upgrades to LRT projects in the timeframe considered:**

Country	City	Project Title	Length (km)	Project Status	Expected Completion
Pakistan	Karachi	LRT Karachi	18.8	Planning	2021
Philippines	Manila	LRT Manila Line 2 extension Recto - Pier 4	4.0	Planning	2020
		LRT Manila Line 2 extension Santolan - Masinag	4.0	Construction	2017
		LRT Manila line 6	19.0	Construction	2022
		LRT Manila Line LRT 1 ext. Roosevelt - Beclaran - Cavite	11.7	Construction	2020
South Korea	Seoul	LRT Seoul Wirye New Town - Sinsa-Dong	14.8	Construction	2021
Taiwan	Kaohsiung	LRT Kaohsiung catenary free first line	22.1	Construction	2019
		Taipei	LRT Taipei Green Mountain Line	14.0	Construction
	MRT Taipei stage 3: LRT Ankeng Line		7.8	Planning	2022
	MRT Taipei stage 3: LRT Sanying		7.0	Planning	2022
	MRT Taipei stage 3: Shezi, Shilin and Beitou LRT	18.0	Planning	2025	
Thailand	Phuket	LRT Phuket first line	15.0	Planning	2025

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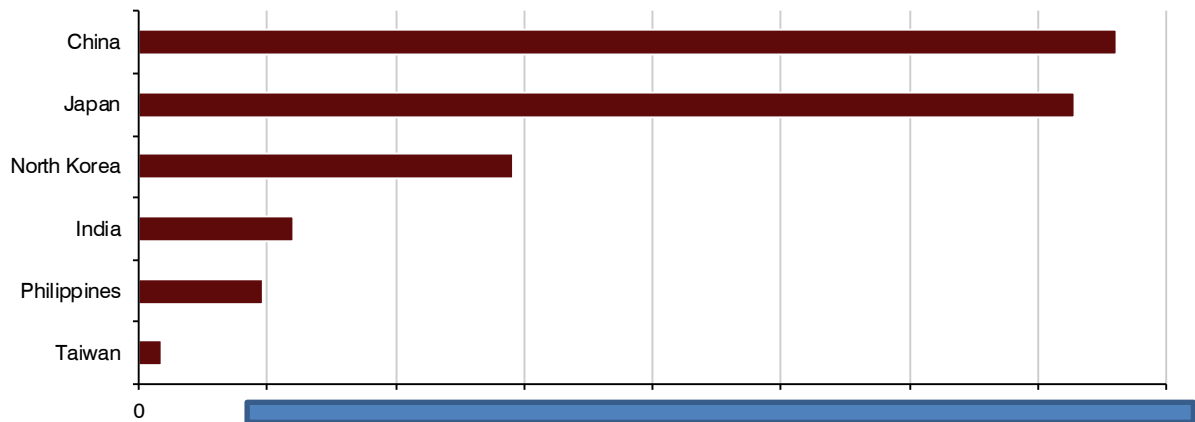
[.....]

**Installed base/age structure**

In 2016, China overtook Japan as the country with most LRV vehicles in operation in Asia. Around 2000 vehicles are in operation in this region; more than 70% are being operated in China and Japan.

[....]

**Installed base [Number of units]**  
**Asia**

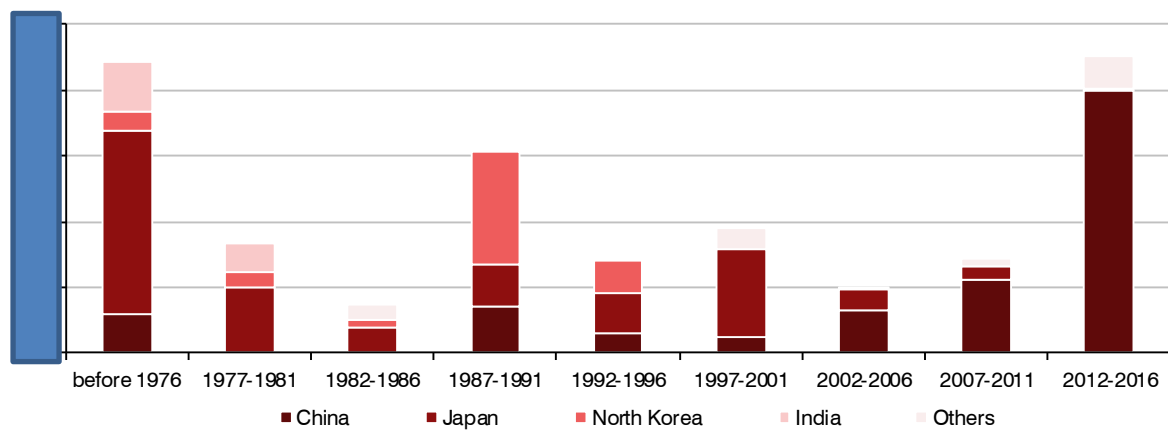


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Figure 3: Installed base in Asia

There are predominantly very old vehicles in operation in Japan, India, North Korea and Hong Kong, whilst mainland China has a very young fleet. The tramway in Hong Kong has the special feature that it is operated with old double-decker vehicles, which are part of the tourism programme in the city. The average age is currently 28 years.

**Age structure [Number of units]**  
**Asia**



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Figure 4: Age structure of LRVs in Asia



**Manufacturers/Products/Market Shares**

[.....]

CRRC dominates the market, as China has been the largest country for new procurement in recent years. CRRC's subsidiaries imported modern technology for 100% low-floor and catenary-free LRVs from various European companies and invested in own R&D for further developments.

[.....]

**Market volume and market development**

Developments up to 2021 are influenced by the following drivers:

Drivers of LRV procurements	Brief description	Relevance	Five-year trend
Urbanisation and demographic change	Asia's rapid urbanisation led to investments in public transport in the past decade. However, Asia's urbanisation may only be just beginning, despite almost 200 million people moving to its cities in the first decade of the 21st century.		
Selection of public transport systems	Most major cities favour metro systems as urban rail transport systems. Lower-cost LRT systems serve primarily as complementary systems. With the increasing number of metro systems in large metropolitan areas, the next step is to establish LRT as a complementary system and to invest in public transport in medium-sized cities.		
New development and upgrade of infrastructure	Upgrading and extension of the LRT network, especially in China.		
Replacement procurements	Outside of Japan there are few old vehicles that have to be renewed. Hong Kong's double-decker trams will not be replaced, as they are an attraction for tourists.		
Investment funds	Better financial provisions due to improving economic situation of important countries (China, India); financial support from international organisations.		
Relevance for procurements:  = very high,  = high,  = medium,  = low,  = none 5-year trend:  = strongly increasing,  = increasing,  = constant,  = decreasing  = strongly decreasing			
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**Important Current and Planned Procurement Projects**

Country	City	Units	Vehicle type	Delivery	Information
Taiwan	Taipei	15	Own model	2016-2017	Taiwan Rolling Stock Co is responsible for supplying the vehicles for the 9.6 km first phase of the Green Mountain Line and the Blue Sea Line project. Construction of the line is being managed by China Steel Corp. The five-section standard gauge low-floor bidirectional cars are 34.5 m long. They have on board energy storage to enable operation without overhead wires across major road junctions. The company is partnering with the German firm Voith Engineering Services in terms of designing the cars. Final assembly as well as the manufacturing of many components was done in Taiwan.
		30	Exposed	2020-2025	Expected procurements for new planned infrastructures.
[.....]	[.....]	[.....]	[.....]	[.....]	[.....]

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Strong growth is expected in this region, mainly due to investments in new light-rail infrastructures in China, which only started very recently. New systems in Southeast Asia also contribute to growth.

**Market volume [EUR million]  
Asia**

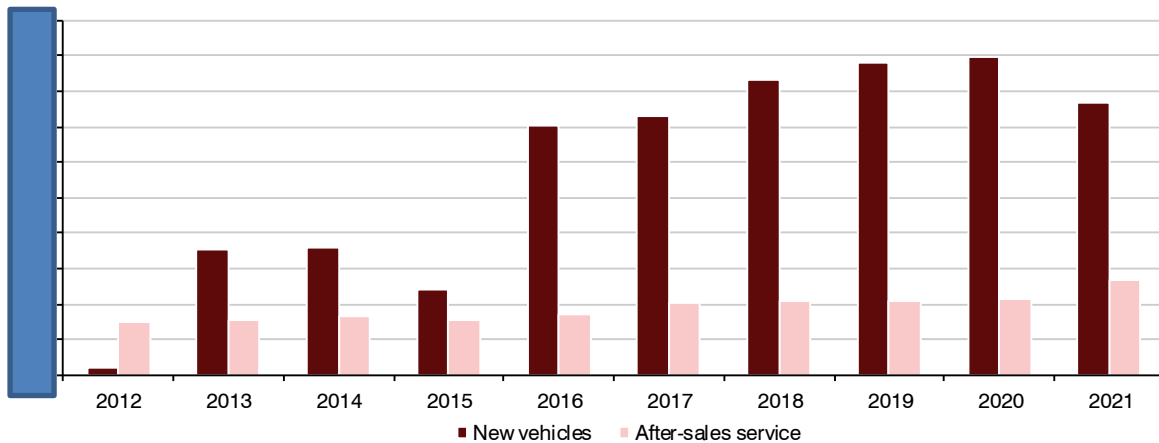


Figure 5: Market volume for LRVs in Asia

## Bestellung Multi Client Study

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