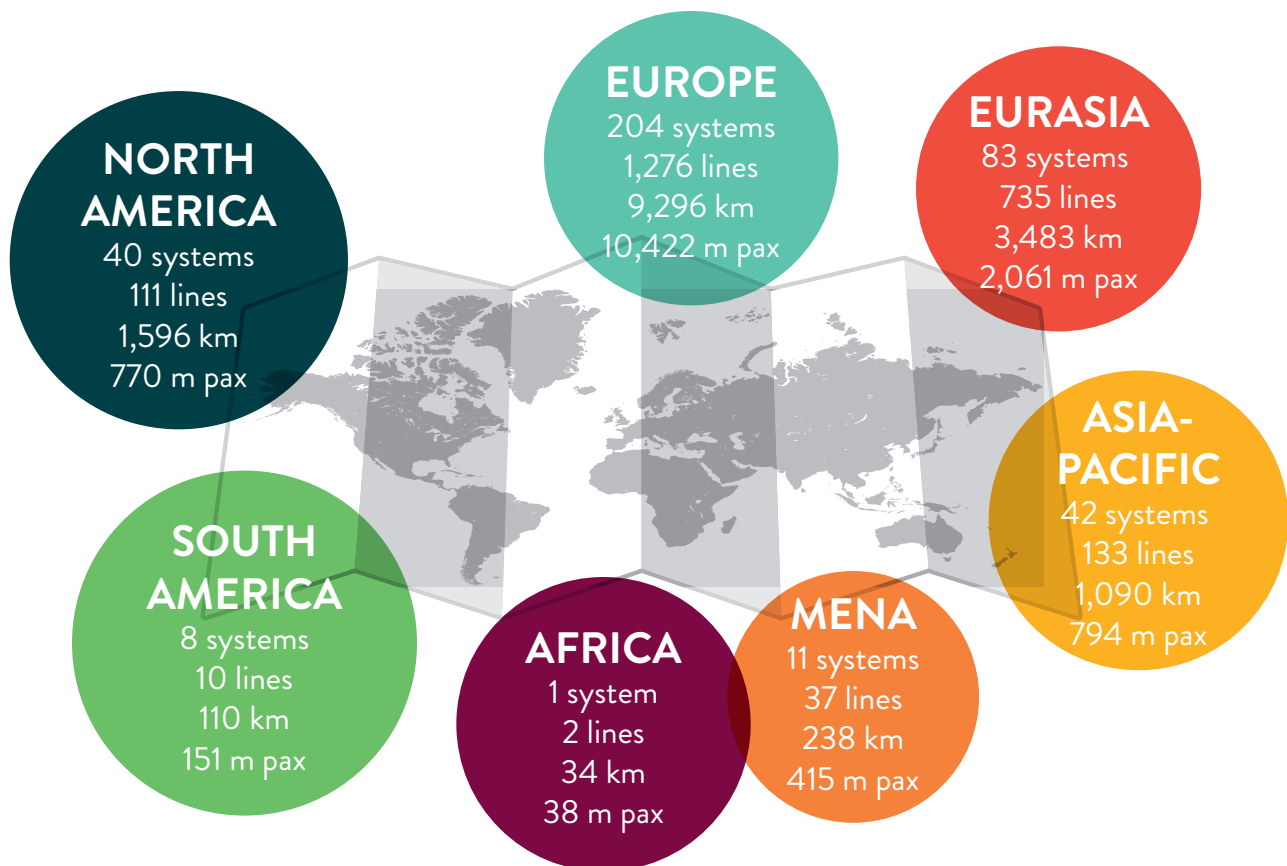# THE GLOBAL TRAM AND LIGHT RAIL LANDSCAPE

OCTOBER 2019

INTRODUCTION

As of 31 December 2018, tram and light rail systems (both described as LRT in this article) are available in 389 cities across the world. The present article describes the evolution of LRT since 2015, and provides a snapshot of the situation in 2018.

EUROPE
204 systems
1,276 lines
9,296 km
10,422 m pax

EURASIA
83 systems
735 lines
3,483 km
2,061 m pax

NORTH AMERICA
40 systems
111 lines
1,596 km
770 m pax

ASIA-PACIFIC
42 systems
133 lines
1,090 km
794 m pax

SOUTH AMERICA
8 systems
10 lines
110 km
151 m pax

AFRICA
1 system
2 lines
34 km
38 m pax

MENA
11 systems
37 lines
238 km
415 m pax

A REMARKABLE RENAISSANCE

LRT has enjoyed a renaissance since the new millennium, with no less than 108 new cities (re)opening their first line. As Figure 1 shows, Europe has traditionally been a leader in LRT development with 60 new systems, not including new lines in existing systems and line extensions. Europe is followed by Asia-Pacific and North America with 20 and 16 new systems respectively.
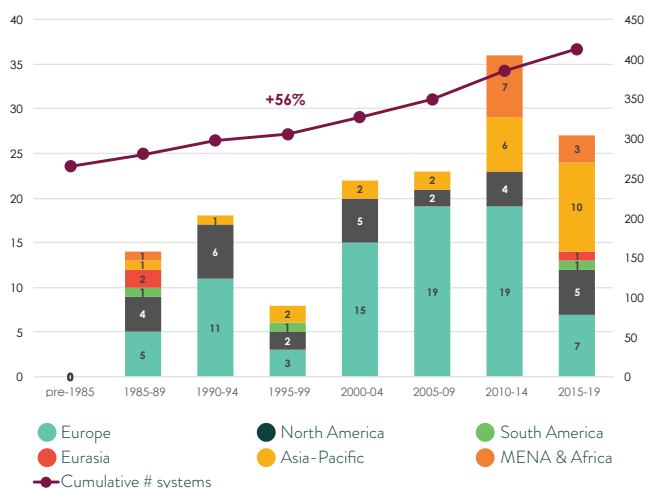
Figure 1: LRT system opening per half-decade, 1985-2019

Between 2014 and 2018, 1,153 km of new LRT has opened worldwide (see Figure 2). 2017 was a watershed year as, for the first time, green-field LRT projects in Asia-Pacific exceeded those in Europe (see Figure 3). The trend is expected to continue as China has started massive investment in these intermediate capacity systems, and Europe has to dedicate significant resources to asset maintenance and modernisation (brown-field).
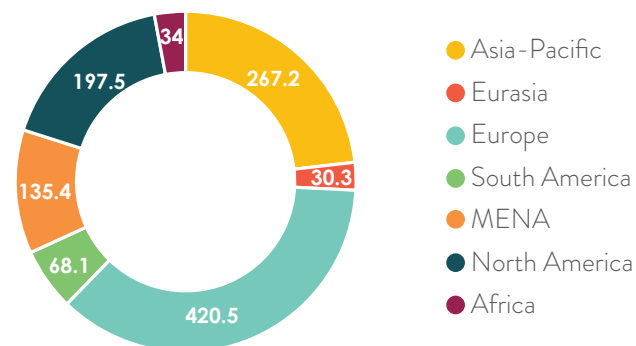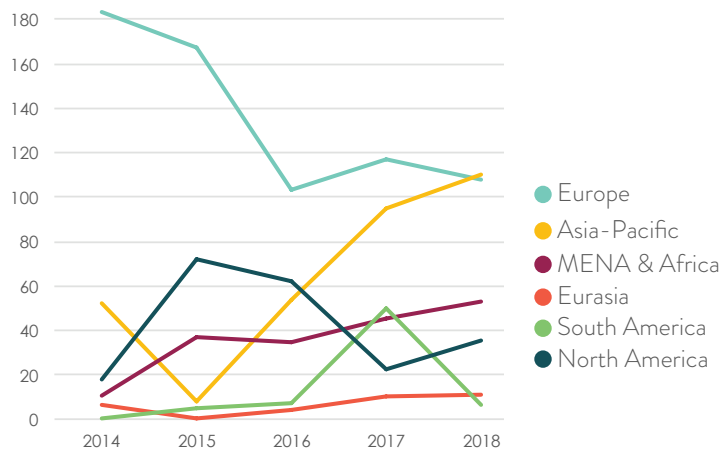
Figure 2: New LRT infrastructure (km), 2014-2018

Figure 3: Evolution of LRT development (km)

RIDERSHIP

In 2018, annual LRT ridership worldwide reached 14,651 million passengers, with Europe accounting for 10,422 million. For the first time, the symbolic threshold of 10 billion passengers was reached in Europe in 2016. Eurasia is the only other region with patronage figures expressed in billion. Figure 4 shows details of all regions with ridership below the billion passenger threshold.
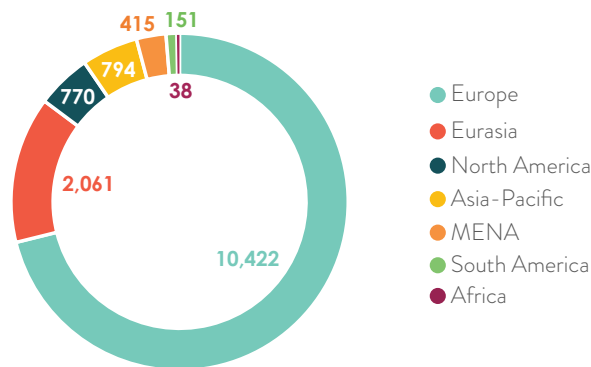
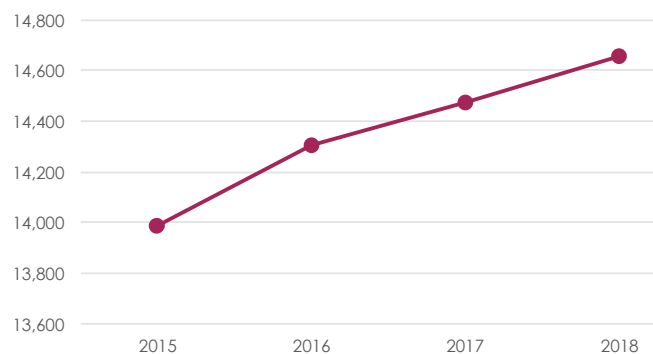Figure 4: Ridership distribution (m. passengers), 2018

Figure 5: Total global ridership evolution (m. passengers), 2015-2018

Total patronage increased by 4.8% (672 million) from 13,986 to 14,651 million between 2015 and 2018 (see Figure 5).

Figure 6 shows that all regions except Eurasia are experiencing demand growth: 30% in MENA (+ 95 million), 64% in Latin America (+ 59 million), 15% in Asia-Pacific (+ 101 million), 7% in Europe (+ 675 million) and 1% in North America (+10 million). Demand in Africa has been stable between 2016, the first full year of operation, and 2018.

However, Eurasia is experiencing a constant decline in ridership, falling 12% between 2015 and 2018. This is partly due to the closure of systems, and partly by the lack of sufficient investment by cities to maintain the quality of their tram services.
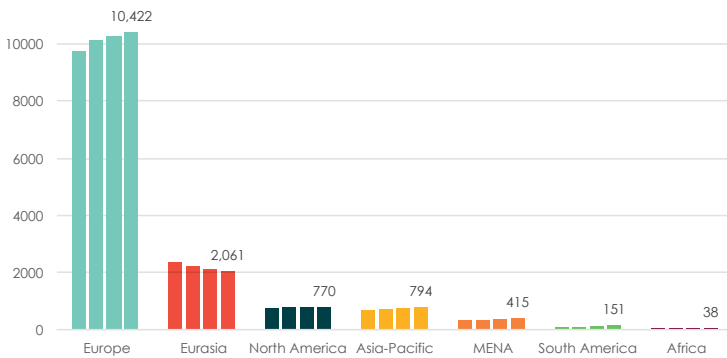
▶ *Figure 6: Ridership evolution worldwide (m. passengers), 2015-2018*

The average number of LRT trips per inhabitant per year is a useful KPI to measure the intensity of use of available services. Such an indicator is only relevant if it is based on a consistent methodology for the collection of population data in the given urban area . The results range between 2 and 56, as shown in Figure 7.
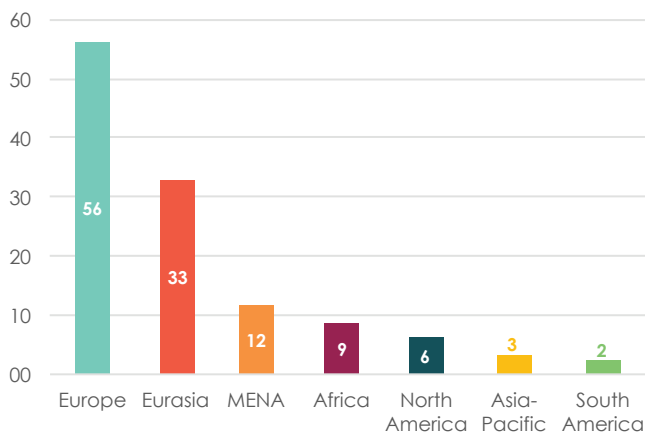
▶ *Figure 7: Number of LRT trips per year per inhabitant, 2018*

There are strong variations within regions. For example, 27 trips for Canada compared to 5 for USA, and 138 for Germany compared to 44 in France.

The busiest LRT network is Budapest with 427 million passengers recorded in 2018. The top-10 ranking is shown in Figure 8. All systems in this top-10 are long-established tram networks, except Paris where LRT was re-introduced just 25 years ago. The networks in Melbourne and Hong-Kong are the only non-European LRT systems reaching the top-10.
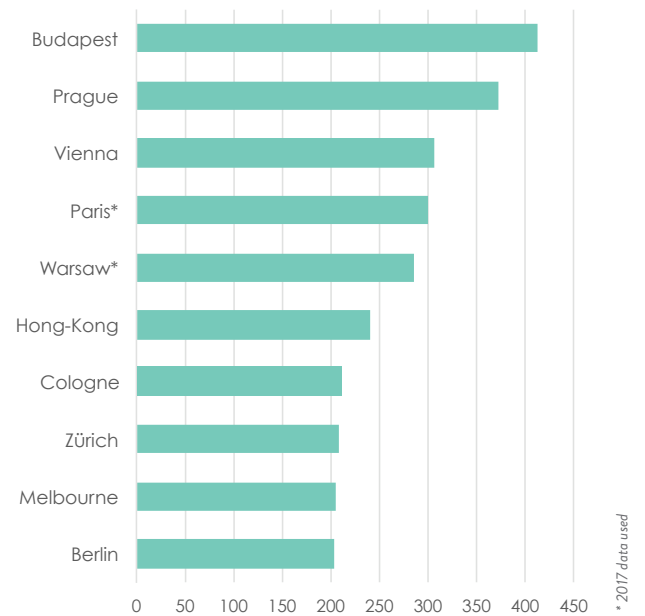
▶ *Figure 8: Top-10 busiest LRT systems (m. passengers), 2018*

The most crowded LRT network is Alexandria with 5.63 million passengers per annum per km of line. The top-10 ranking is shown in Figure 9.
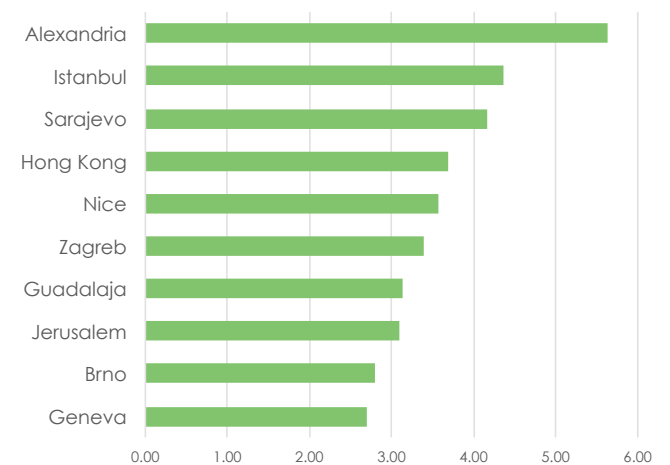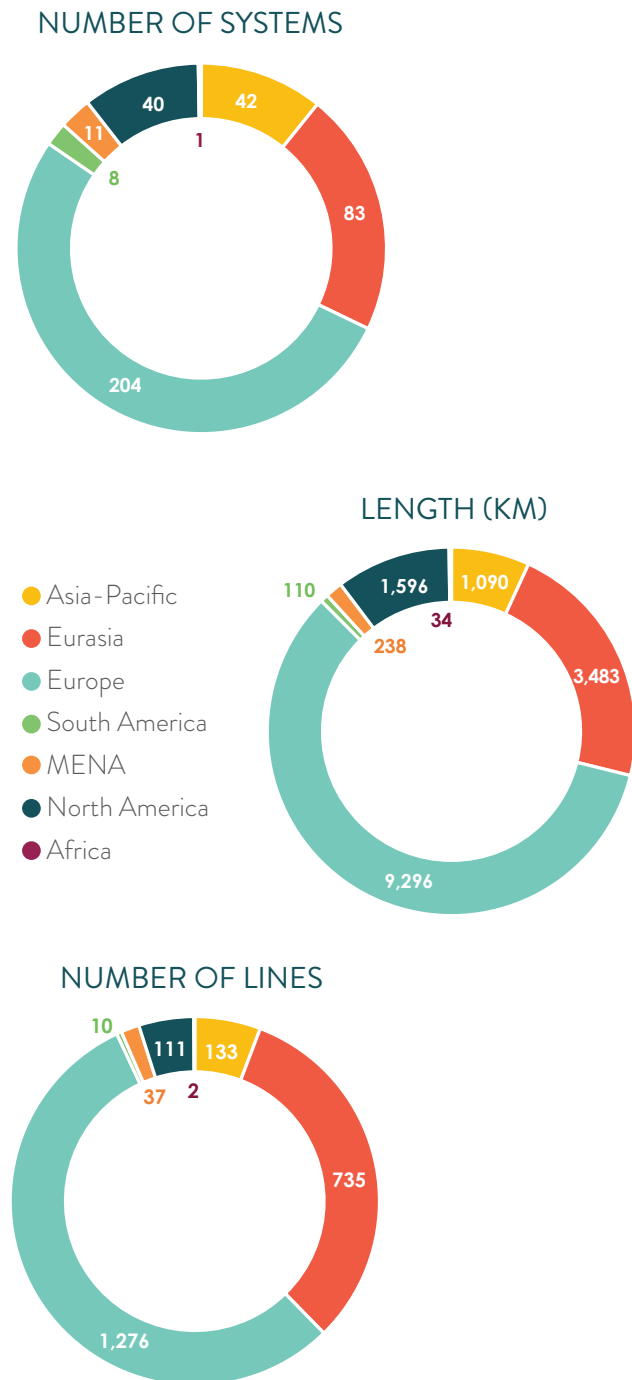

▶ *Figure 9: Top-10 most crowded LRT systems (m. passengers per km of line), 2017*
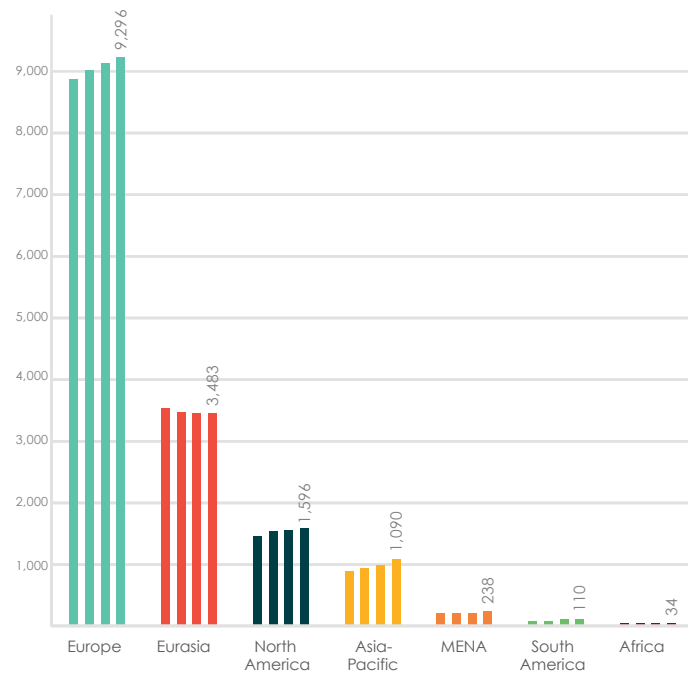
INFRASTRUCTURE DEVELOPMENTS

As of 31 December 2018, there were 389 cities with LRT. Cities with multiple operators, like Hong Kong, Madrid, Lyon, Paris and Basel are counted as one system.

2,304 lines in the world cover 15,847 km. Figure 10 indicates how these lines are distributed by region.

Between 2015 and 2018, LRT infrastructure grew steadily in almost every region of the world for a total of 662 km. The growth rate, however, varies greatly from one region to another, ranging from 62% in South America to 1% in North America. The only region exposed to stagnation is Africa and the only region exposed to decline (-83 km) is Eurasia, mainly due to closure of tram systems in 10 cities since 2015.

NUMBER OF SYSTEMS

- 42
- 1
- 83
- 204
- 8
- 11
- 40

LENGTH (KM)

- ● Asia-Pacific
- ● Eurasia
- ● Europe
- ● South America
- ● MENA
- ● North America
- ● Africa

- 1,090
- 34
- 3,483
- 9,296
- 110
- 238
- 1,596

NUMBER OF LINES

- 133
- 2
- 735
- 1,276
- 10
- 37
- 111

▶ *Figure 10: Fixed assets distribution by region, 2018*

▶ *Figure 11: Evolution of line length worldwide (km), 2015-2018*

As Figure 12 shows, there are notable differences between network structures (line length and distance between stops) across the world. While the European average lies at 7.3 km, lines tend to be longer on average in regions with newer systems and limited number of lines like South America, North America and Africa (11-17.1 km). In regions with older and more complex systems, lines tend to be shorter in average (like in Europe, Eurasia and Japan).
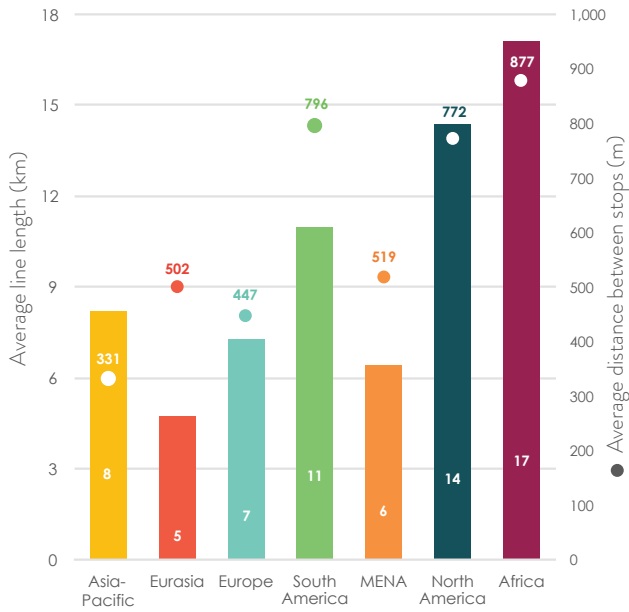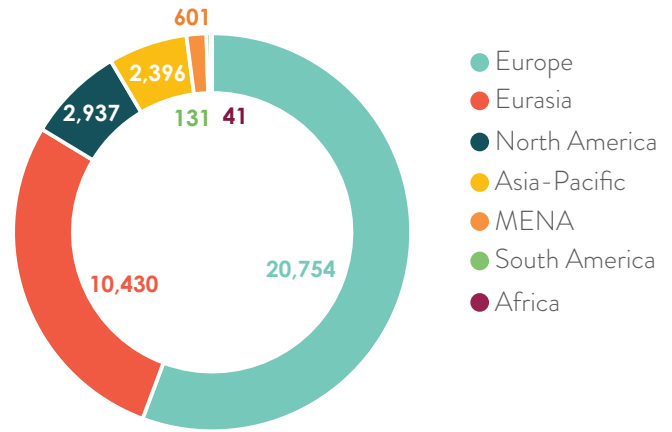
The longest LRT network is Melbourne (250 km) followed by St. Petersburg (246km) and Berlin (193.2km). The top-10 ranking is shown in Figure 13.
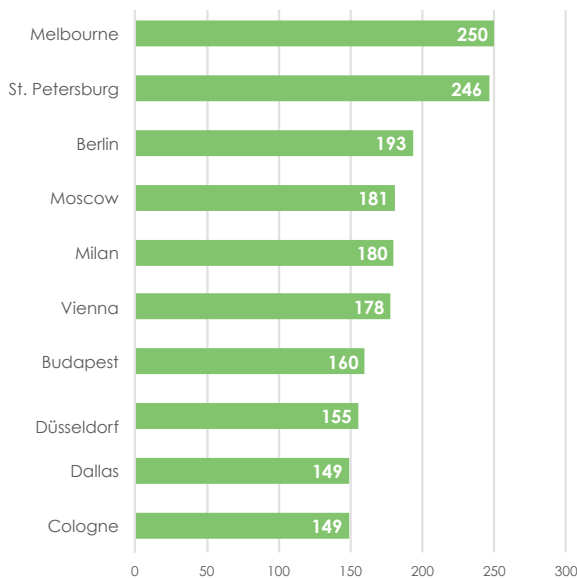
MOBILE ASSETS

The fleet available to operate 2,304 LRT lines worldwide consists of 37,290 trams and light rail vehicles. The fleet is distributed as shown in Figure 14.

Currently 12,421 vehicles worldwide are partial or full low-floor, representing 37% of the total, ranging from 100% of the fleet (Africa) to much lower levels, as indicated in Figure 15. Of course, the proportion of state-of-the-art low-floor LRVs depends on the market structure (recent LRT systems opened since early 90's compared to legacy systems) and the financial capabilities of operators and authorities to renew ageing fleets.
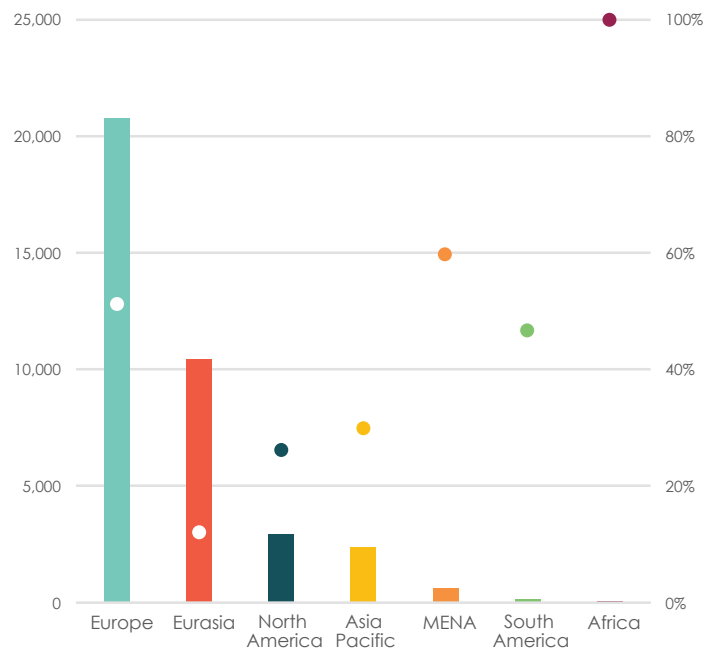
▶ *Figure 15: Number of total fleet and percentage of low-floor vehicles by region, 2018*

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An indicator of fleet density (number of vehicles per km of infrastructure) was defined to characterise the fleet size required to provide urban LRT services (see Figure 16).
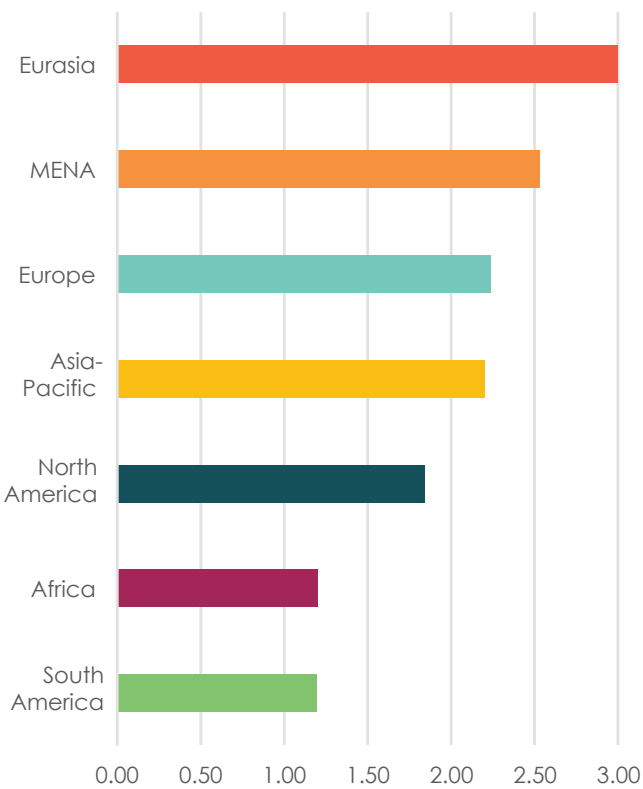
Figure 16: Number of vehicles per km of line, 2018

The global average is 2.2 vehicles per km of line. The high value in Eurasia is likely to be caused by a higher than average fleet age and number of number of vehicles not in regular use. In MENA, the average is driven up by the frequent double-traction operation using long trains counting as two LRVs (Tunis, Casablanca, Rabat...).

Data about vehicle-kilometre were available for 32 countries. Weighted average annual mileage per vehicle worldwide, ranging between 78,000 km (North America) and 44,000 km (MENA). Europe, as the largest LRT region, is 52,000 km. The discrepancy depicted in Figure 17 can be partly explained by the fleet age structure as well as the urban areas' spatial characteristics. Longer systems with longer distance between stops are likely to clock more kilometres every day.
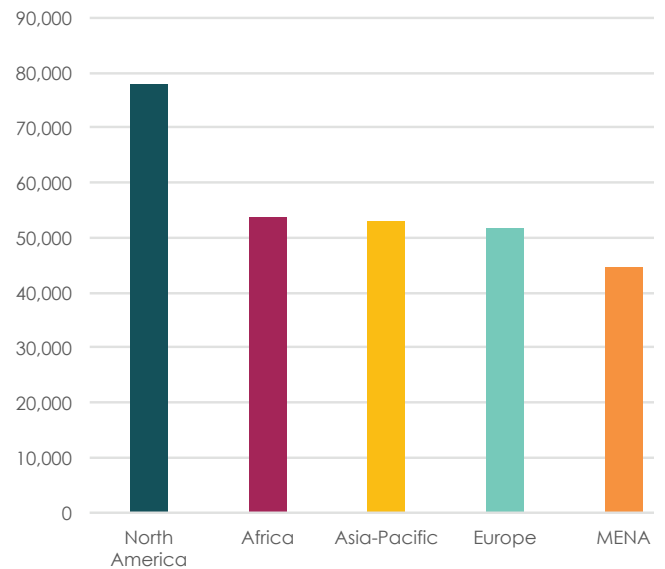

Figure 17: Average annual mileage per LRV (km), 2018

PERSPECTIVE

With continued pressure to reduce congestion, to im-prove air quality in cities and to reduce greenhouse gas emission contributing to climate change, LRT will contin-ue to obtain support of decision-makers and the travel-ling public. LRT is clean, silent and space-efficient. Over 1,000 km of green-field LRT projects are expected to open for revenue service in the next three years.

However, in Europe and Eurasia, more attention and re-sources will be paid to the maintenance, modernisation and replacement of assets like fleet, tracks and stations to keep ageing systems attractive and fit for operation-al purpose. For this reason, the growth of green-field projects in these regions will continue to slow down as illustrated by Figure 18. This trend will also affect North America in the future. The LRT growth will be mainly driven by the Asia-Pacific region.
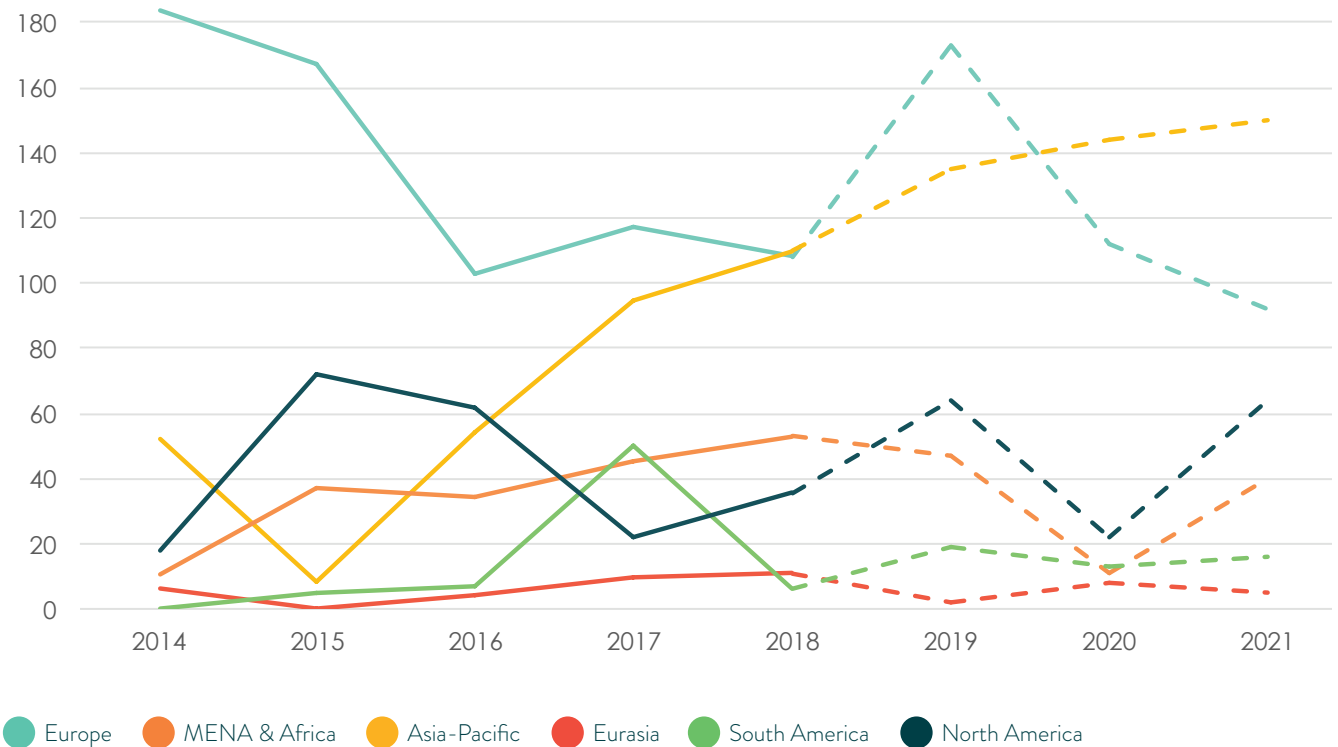
▶ *Figure 18: Forecast for new LRT infrastructure (km) by region*

DEFINITION AND METHODOLOGY

The data for this document was extracted from a database compiled by UITP using official company data and other authoritative sources, such as national statistics office and national associations. LRT and trams are urban rail-guided systems operated at least partly on line-of-sight, on infrastructure shared with other users and partly on their own infrastructure (Right-of-Way type 2). Systems operated on guided rubber-tyred multi-articulated vehicles with right-of-Way 2 are included. Infrastructure predictions are based on scenarios developed from UITP's rail project database.

The full dataset is available upon request.

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