

# ATLAS

## High-Speed Rail 2025



Data updated as of december 2024

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## High-Speed Rail Atlas

7<sup>th</sup> Edition: May 2026

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Fundación de los Ferrocarriles Españoles (FFE)

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A special mention goes to Michel Leboeuf (UIC) and Manuel Campos (FFE) for their cooperation in the development of this Atlas

Gratitude is also extended to the UIC Intercity & High-Speed Committee as well as to the people in charge of statistics and information processing of the railway companies and infrastructure managers of each country, for their collaboration



# PRESENTATION

The key characteristics of high-speed rail remain its efficiency, safety, reliability, availability and environmental performance. Today more than ever, high-speed rail delivers on the “triple bottom line” of economic, social and environmental sustainability, a goal long sought by policymakers around the world.

In a context marked by post-Covid recovery, geopolitical disruptions, and the accelerating urgency of climate change, high-speed rail presents a unique and timely opportunity. It enables a shift toward sustainable mobility and should be regarded by both policymakers and the financial sector as a strategic investment for global connectivity and decarbonisation. The current momentum, shared across diverse national and regional contexts, is a clear signal: this is the right time to expand and modernize rail.

By saving time and shrinking distances, high-speed rail contributes to:

- Expanding and modernising mobility options
- Enhancing trade and intercity connectivity
- Reducing congestion on other transport infrastructure
- Advancing global sustainable development goals
- Strengthening regional integration and cohesion

The fight against climate change is now a defining political priority. Rail must respond by enabling a massive modal shift and positioning itself as the transport mode of choice. Wherever high-speed rail is being developed, it is increasingly integrated with upgraded or renovated conventional lines, extending the benefits of fast, reliable, and green mobility to broader territories.

UIC envisions railways as the backbone of tomorrow’s sustainable mobility system. This requires seamless interfaces with other public transport modes and soft mobility solutions. High-speed rail is no longer a stand-alone infrastructure; it is becoming the core of an interconnected, multimodal ecosystem designed to deliver value for passengers, economies and societies.

As a vector of innovation, high-speed rail is also at the forefront of the digital transformation of the transport sector. Technologies such as AI, IoT, big data and augmented intelligence are redefining operations, maintenance, safety (including cybersecurity) and customer experience. High-speed rail is not only adapting, it is leading.

From the early pioneers like Japan, Italy, France, Germany and Spain, high-speed rail has now expanded to a truly global scale. China alone operates a network exceeding 47,803 km, accounting for more than two-thirds of the global total of over 67,723 km in operation worldwide. Major developments are also underway in Türkiye, Morocco, the United States, India, Southeast Asia, and beyond.

Roughly 5,000 high-speed trainsets now operate daily, serving more than 3 billion passengers per year - equivalent to some 1,000 billion passenger-kilometres annually. Wherever it has been implemented, high-speed rail has fostered industrial innovation, regional development, job creation and economic growth; contributing significantly to gross domestic product (GDP) by stimulating investment, supporting tourism, and improving business connectivity across regions.

As public and private stakeholders increasingly seek sustainable financing strategies, mechanisms such as carbon credits and public-private partnerships (PPPs) are emerging as valuable tools to support the deployment of high-speed rail infrastructure. Article 6.4 of the Paris Agreement now enables global cooperation on carbon markets, embedding rail as a strategic climate solution in national plans and finance. UIC is building the MoveCredits coalition -bringing together transport operators, financial institutions, and development banks- to develop the methodologies that will allow verified emissions reductions from rail modal shift to be recognised and traded within international carbon markets.

And why not imagine its future role in high-speed freight logistics, in line with the rise of e-commerce?

As the global association of the railway sector, UIC -working with its network of members, research institutes, and academic partners- is committed to:

- Promoting innovative thinking
- Supporting successful implementation
- Driving transformative developments in the rail industry

Now more than ever, UIC and its expert community stand ready to provide the data, knowledge, and best practices needed to support the global development of high-speed rail.

I trust that this 2025 edition of the UIC High-Speed Rail Atlas will provide you with a clear and detailed view of the world’s high-speed rail systems, from infrastructure and rolling stock to innovation and future outlooks.

**François Davenne**  
UIC Director General



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# ABBREVIATIONS AND SYMBOLS

|            |  |      |   |       |   |
|------------|--|------|---|-------|---|
| AC         | Alternating current  | HSL  | High-Speed Line                         | NTV   | Nuovo Trasporto Viaggiatori (now "Italo")                           |
| AEG        | Allgemeine Elektrizitäts-Gesellschaft                          | HT   | Hull Trains                             | ÖBB   | Austrian Federal Railways (Österreichische Bundesbahnen )           |
| AGV        | Automotrice à Grande Vitesse                                   | Hz   | Hertz                                   | ONCF  | Moroccan National Railways (Office Nationale des Chemins de Fer)    |
| ASFA       | Anuncio de Señales y Frenado Automático                        | ICE  | InterCity Express                       | PBKA  | Paris-Brussels-Cologne-Amsterdam                                    |
| ATB        | Automatische TreinBeïnvloeding                                 | IRS  | International Railway Solutions         | PKP   | Polish national Railways (Polskie Koleje Państwowe)                 |
| ATC        | Automatic Train Control  | JNR  | Japanese National Railways              | POCL  | Paris-Orléans-Clermont-F.-Lyon                                      |
| ATP-EBICAB | Automatic Train Protection-Emergency Brake Intervention in Cab | JRC  | Central Japan Railway Company           | PZB   | Punktförmige Zugbeeinflussung                                       |
| AWS        | Automatic Warning System                                       | JRE  | East Japan Railway Company              | RENFE | Red Nacional de los Ferrocarriles Españoles                         |
| b.s.       | Block station  | JRK  | Kyushu Japan Railway Company            | RPS   | Disruptive Radar Positioning System                                 |
| BACC       | Blocco Automatico a Correnti Codificate                        | JRW  | West Japan Railway Company              | S     | Series (in rolling stock sections)                                  |
| BPL        | Bretagne Pays de la Loire                                      | km   | Kilometre                               | SBB   | Swiss Federal Railways (Schweizerische Bundesbahnen)                |
| BREL       | British Rail Engineering Limited                               | Km/h | Kilometres per hour                     | SCMT  | Sistema di Controllo della Marcia del Treno                         |
| CAF        | Construcciones y Auxiliar de Ferrocarriles                     | KTX  | Korea Train Express                     | SEA   | Sud Europe Atlantique   |
| CMK        | Centralna Magistrala Kolejowa                                  | kV   | Kilovolt                                | SNCF  | Société Nationale des Chemins de fer Français                       |
| CNM        | Contournement de Nimes-Montpellier                             | KVB  | Contrôle de Vitesse par Balises         | SR    | Suseo High Speed Rail Corporation                                   |
| CNR        | Canadian National Railways                                     | kW   | Kilowatt                                | T     | Trailer coach   |
| CR         | China State Railway Group Co., Ltd                             | kW/t | Kilowatts per ton                       | t     | Ton   |
| CTC        | Centralized Traffic Control                                    | L    | Locomotive                              | TALGO | Tren Articulado Ligero Goicoechea Oriol                             |
| CTCS       | Chinese Train Control System                                   | LGV  | Ligne à Grande Vitesse                  | TBL   | Transmission Baliza-Locomotive                                      |
| DC         | Direct current   | LHB  | Linke Hofmann Busch                     | TCDD  | Turkish National Railways (Türkiye Cumhuriyeti Devlet Demiryolları) |
| DSB        | Danish State Railways (Danske Statsbaner)                      | LNMP | Ligne Nouvelle Montpellier-Perpignan    | TGV   | Train à Grande Vitesse  |
| ERTMS      | European Rail Traffic Management System                        | LNP  | Ligne Nouvelle Paris-Normandie          | THSRC | Taiwan High Speed Rail Corporation                                  |
| ETCS       | European Train Control System                                  | LZB  | Linienzugbeeinflussung                  | TPWS  | Train Protection and Warning System                                 |
| ETR        | Eletto Treno Rapido  | M    | Motor coach                             | TVM   | Transmission Voie-Machine   |
| FFE        | Spanish Railways Foundation                                    | MB   | Motor Bogie                             | UIC   | International Union Of Railways                                     |
| GDP        | Gross Domestic Product   | mm   | millimeter                              | ⋯     | Direct current  |
| GPSO       | Le Grand Projet du Sud-Ouest                                   | NR   | Northern Rail                           | ~     | Alternating current   |
| HS         | High-Speed   | NS   | Dutch railways (Nederlandse Spoorwegen) | ‰     | Per-mille   |

# DEFINITIONS

|                          |   |
|--------------------------|---|
| Alternating current      | An electric current that reverses its direction many times a second at regular intervals, typically used in power supplies  |
| Block station            | A place at which railroad manual block signals are displayed  |
| Direct current           | An electric current flowing in one direction only   |
| Electrification          | Type of electrification installed (3 kV, 15 kV, 25 kV)  |
| High-Speed passenger     | Passenger carried by a High-Speed train for a trip in totality, partly or not at all on a High-Speed line   |
| High-Speed rail          | <p>It is a grounded, guided transport system and could also be categorised as a railway subsystem. The most important difference, however, is the speed. As travel times had to be reduced for commercial purposes, speed emerged as a decisive factor with HSR providing the necessary improvement, which is why UIC considers a commercial speed of 250 km/h as the principal criterion for defining a line as high-speed. Nevertheless, average distance is a second criterion when a line does not have to compete with air travel, where it may not be as important to run at 250 km/h. A lower speed of 200 km/h and above (any lower is within the capability of a conventional train) and more commonly 220 or 230 km/h, is enough to capture the highest possible market share for a collective mode of transport. This also applies to very long tunnels whose construction cost depends on the diameter linked to the square of the speed.</p> <p>For speeds of 200 km/h and above, the infrastructure can be categorised as "high-speed" if the system in operation complies with the necessary standards regarding track equipment, rolling stock (generalisation of trainsets), signalling systems (eliminating trackside signals), operations (long-range control centers), and the geographical or temporal separation of freight and passenger traffic.</p> <p>The High-Speed Railway Network can also include infrastructure sections that link high-speed lines without them needing to have all of these characteristics.</p> |
| Line in operation        | It is now operating on High-speed   |
| Line long-term planning  | It is not approved, just planned  |
| Line planned             | It is approved but not start constructing   |
| Line under construction  | It is now constructing on High-Speed  |
| Line under study         | Similar to "long-term planning" status  |
| Maximum commercial speed | Maximum speed at which a train can operate on a track   |
| Maximum train speed      | Maximum speed that a train can reach, without any limitation in the infrastructure  |
| Signalling               | Type/s of signalling enabled (ERTMS / ETCS, TVM, LZB, ASFA...)  |



# INTRODUCTION

High-Speed Rail is first and foremost about serving people: providing fast, reliable, accessible, comfortable and sustainable travel that meets evolving passenger expectations. As demand for smarter, greener mobility grows, high-speed rail must continue earning trust and loyalty by delivering a seamless, high-quality experience that makes the train the preferred choice.

Within the UIC Global Passenger Forum, managed by the UIC Passenger Department, high-speed rail remains a central focus of activity, coordinated by the UIC Intercity & High-Speed Committee (ICHSC). This sector brings together all railway companies and public authorities involved in the development and operation of high-speed rail systems.

The Committee covers a broad range of activities to support global high-speed rail development:

- Conducting international studies on key issues such as intelligent systems for high-speed operations, optimal speed and performance strategies, affordability and the impact of market liberalisation, multi-modal connectivity with air transport, financial frameworks for infrastructure investment and comparative benchmarking of high-speed systems across regions
- Partnering with universities worldwide to share knowledge, promote academic collaboration and attract top talent into the railway sector
- Delivering international training sessions on high-speed rail planning, operations and management
- Maintaining and regularly updating the UIC high-speed rail database, the backbone of this Atlas
- Contributing to the development of IRS (International Railway Solutions) standards for high-speed rail operations and systems
- Co-organising the UIC World Congress on High-Speed Rail, the leading global event on high-speed mobility -the 12<sup>th</sup> edition was successfully held in Beijing (China) in July 2025, showcasing the global reach and evolution of the sector, with the next edition to be announced in due course

In parallel with these activities, UIC is increasingly engaging in initiatives aimed at reinforcing the environmental and economic sustainability of high-speed rail development.

Looking ahead, UIC is coordinating the MoveCredits coalition, a multi-stakeholder initiative bringing together rail operators, financial institutions, and development banks, to unlock access to carbon markets for rail and public transport. By developing robust carbon crediting methodologies aligned with the Paris Agreement's Article 6.4 mechanism, the coalition aims to create new revenue streams that strengthen the financial case for high-speed rail investment worldwide.

The UIC Intercity & High-Speed Committee (ICHSC) has committed to maintaining and enriching this Atlas as a unique and authoritative global reference. It offers a comprehensive system-level overview that includes infrastructure, rolling stock, operations and key technical features.

This publication begins with aggregated global data, structured by UIC regions to reflect the diversity and distribution of high-speed rail systems. It includes insights on:

- Countries operating or developing high-speed services
- Network lengths and top operating speeds
- Historical milestones and projected expansions

The second part of the Atlas presents country-specific details within each UIC region, including:

- Detailed maps
- Lines in commercial service, under construction and planned
- Long-term projects
- Rolling stock data (trainsets, depots, manufacturers)
- Technical characteristics (travel times, slopes, electrification systems, signalling, viaducts, tunnels, etc.)

The quality of this Atlas rests on the accuracy of the data, all of which has been provided and validated by UIC members and other sector stakeholders directly involved in high-speed rail implementation.

As such, this document serves as a trusted global reference for high-speed rail professionals, policymakers, academics and industry leaders.

All information presented in this edition is current as of 31 December 2024.

**Bertrand Minary**  
**UIC Passenger Director**



INTERNATIONAL UNION  
OF RAILWAYS

# 1. GLOBAL HIGH - SPEED DATA

2. EUROPE

3. ASIA - PACIFIC

4. AFRICA

5. NORTH AMERICA

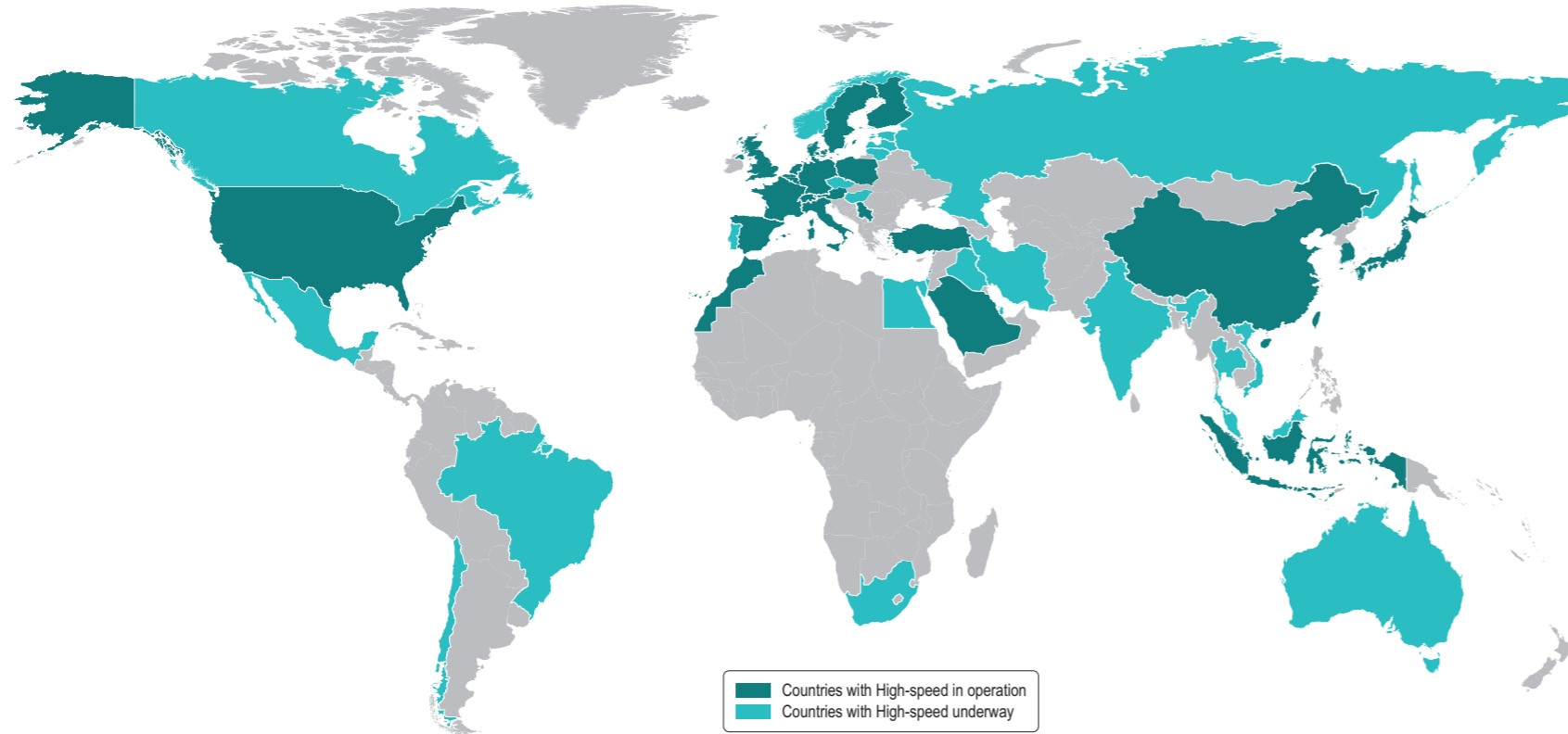
6. MIDDLE EAST

7. LATIN AMERICA

INDEX OF COUNTRIES

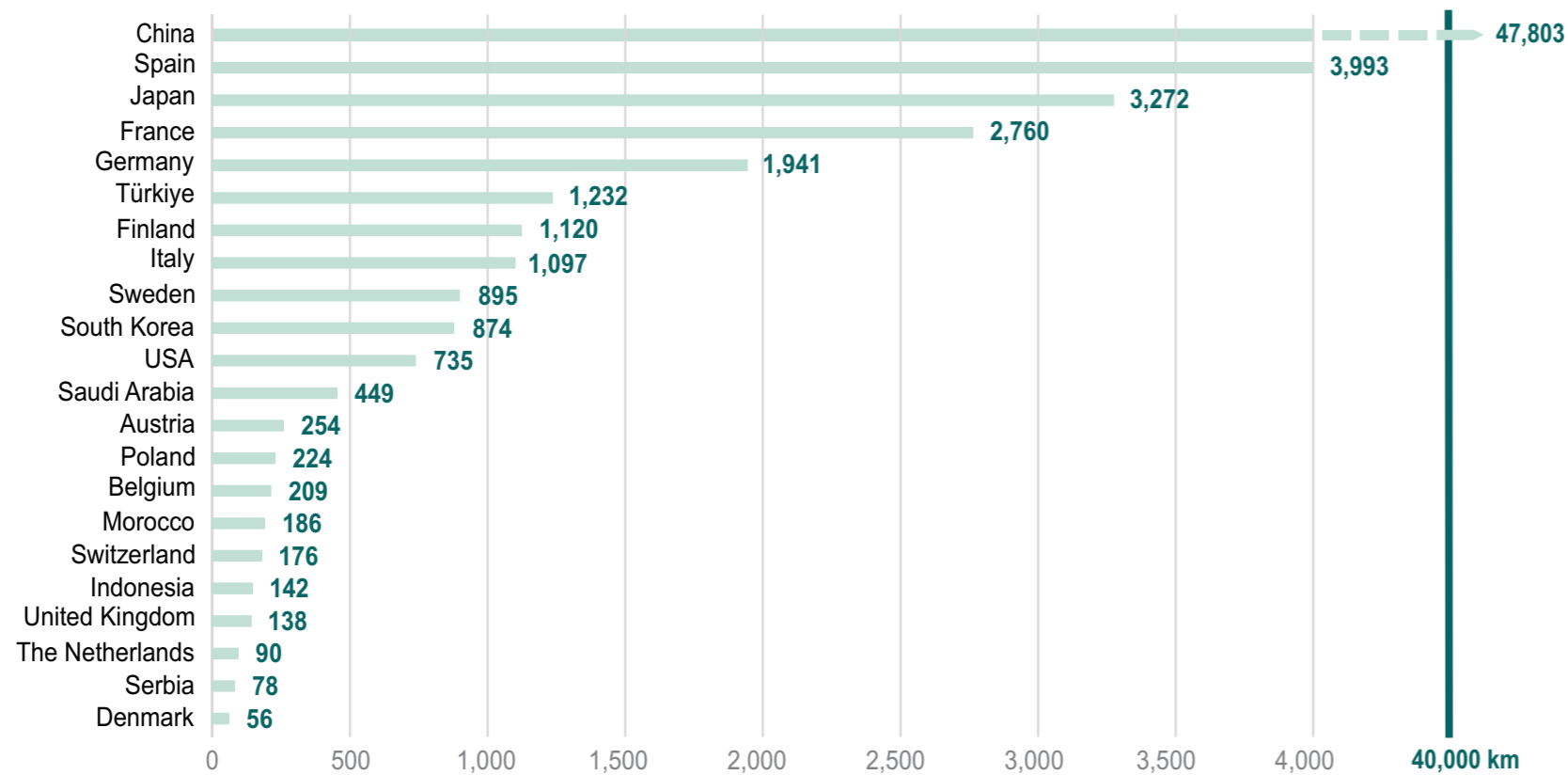
# 1.1 GLOBAL DATA

### Countries with a high-speed rail network in commercial operation and underway



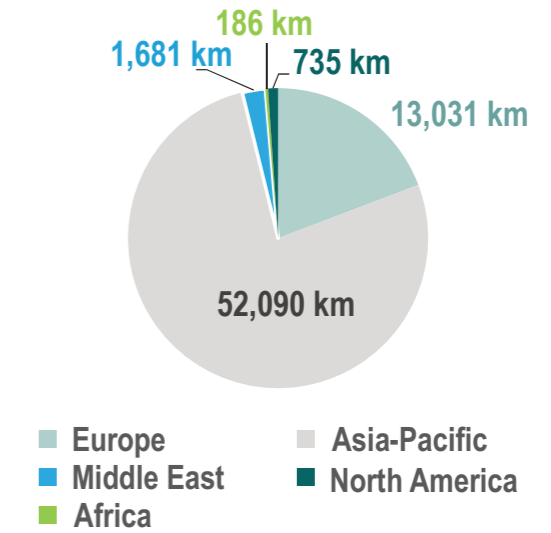
Note: Vast island territories in extreme latitudes are not considered for this map

### Length of the high-speed network in commercial operation by country (2024)



Source: compiled by authors based on International Union of Railways

### Length of the high-speed network in commercial operation by UIC Regions



Source: compiled by authors based on International Union of Railways

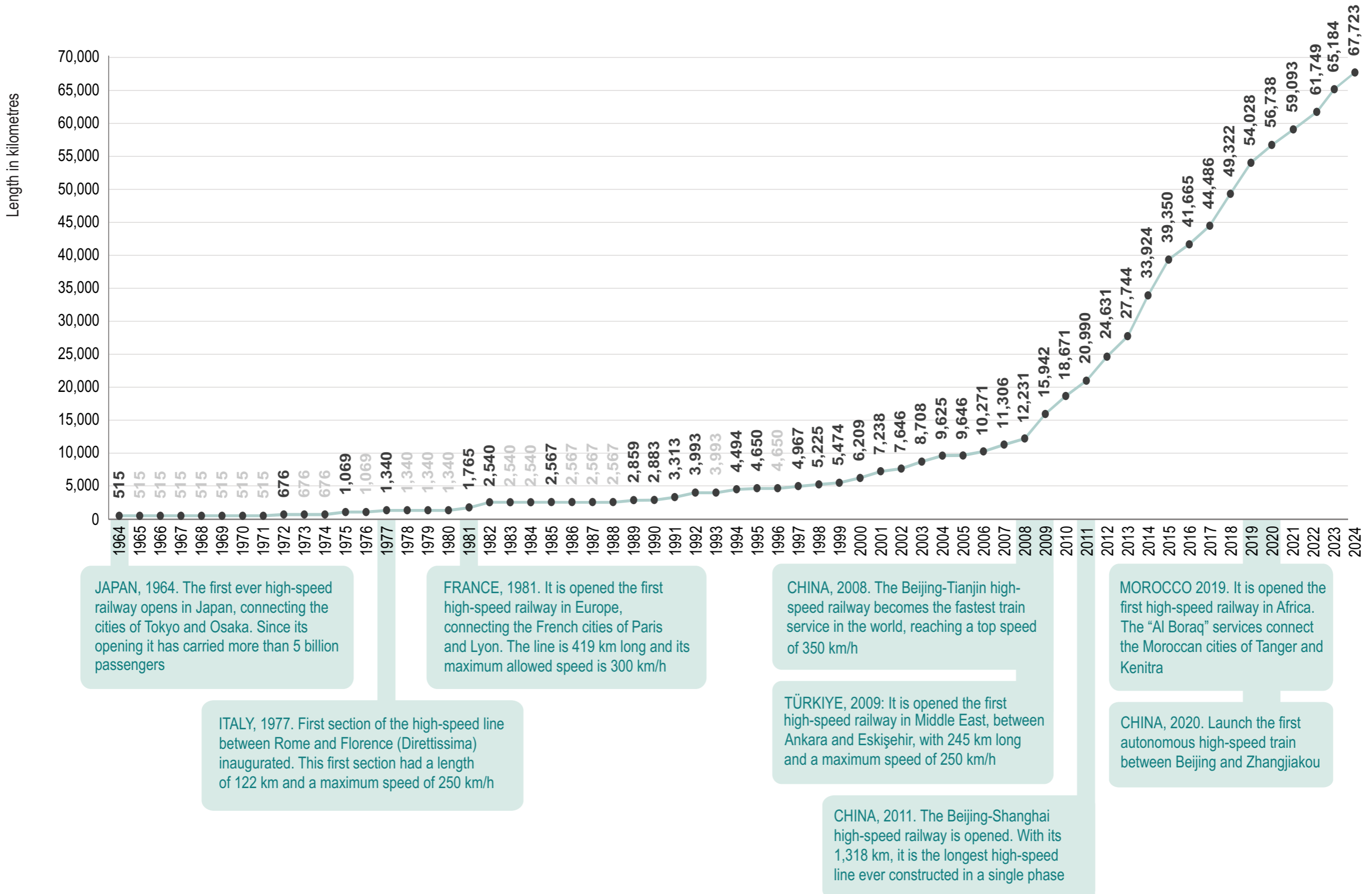
### Length of the high-speed network under construction by UIC Regions



Source: compiled by authors based on International Union of Railways

# 1.1 GLOBAL DATA

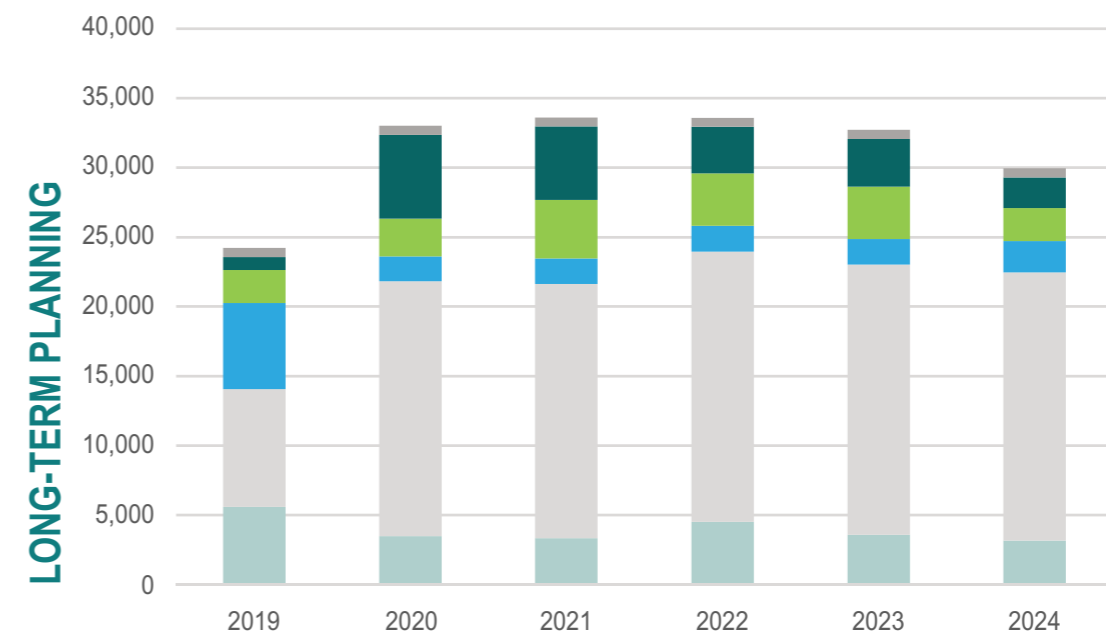
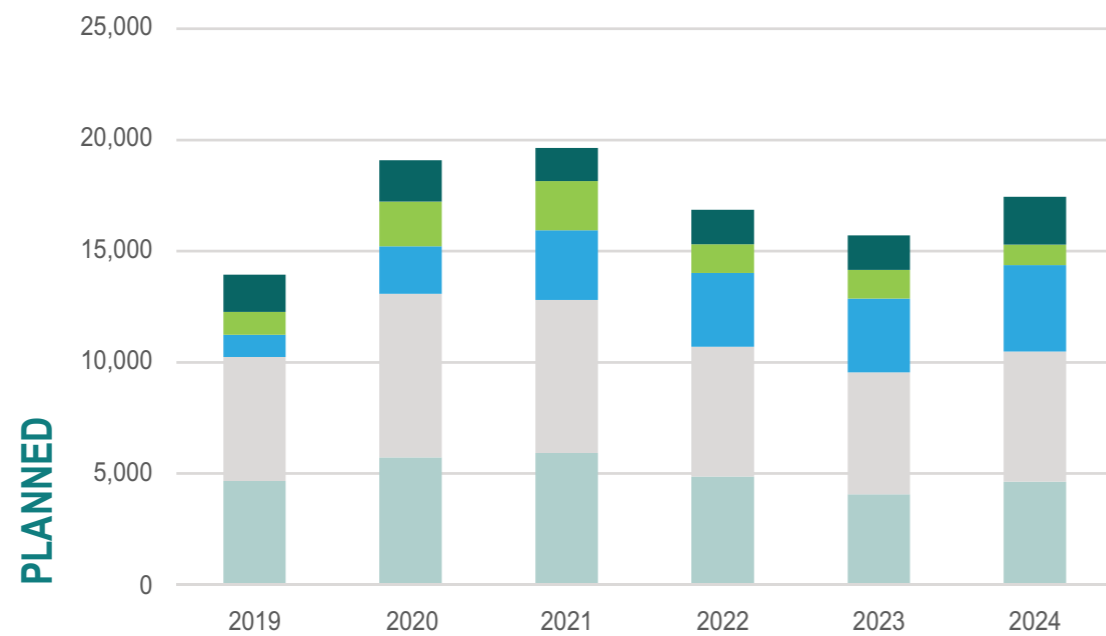
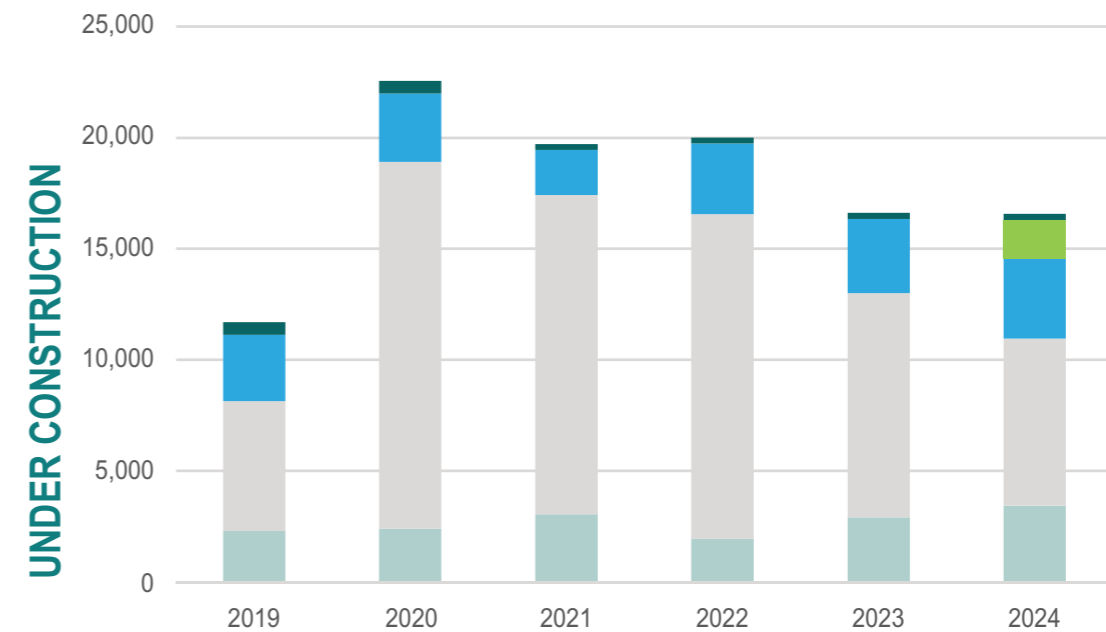
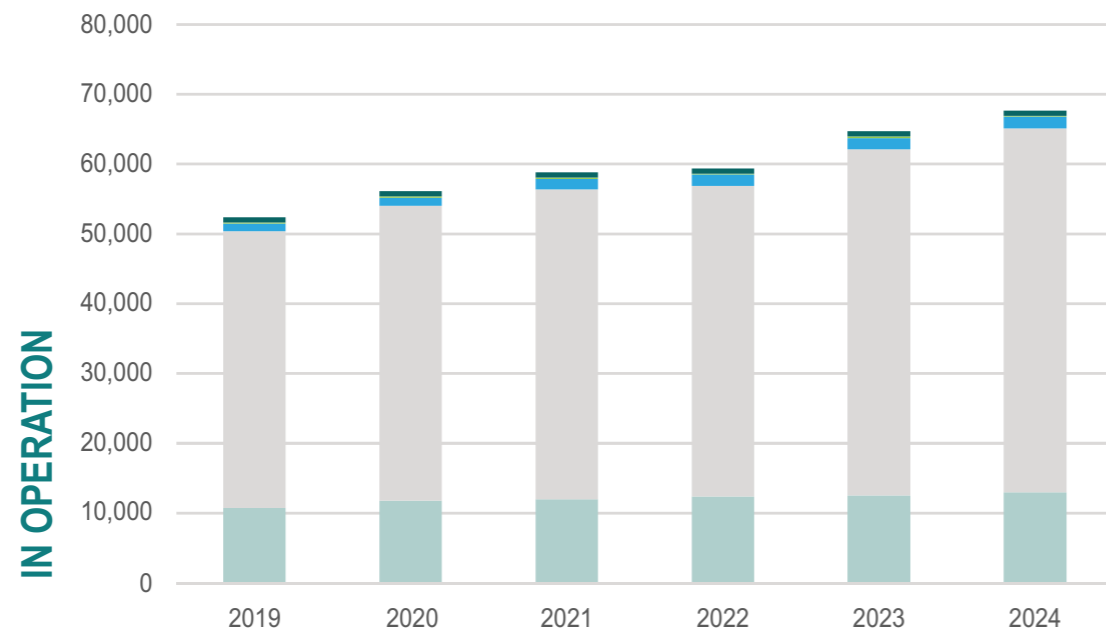
Length of the high-speed network in commercial operation worldwide (1964-2024)



Source: compiled by authors based on International Union of Railways

# 1.1 GLOBAL DATA

Length of the high-speed network by status of implementation and UIC Regions (km) (2019-2024)

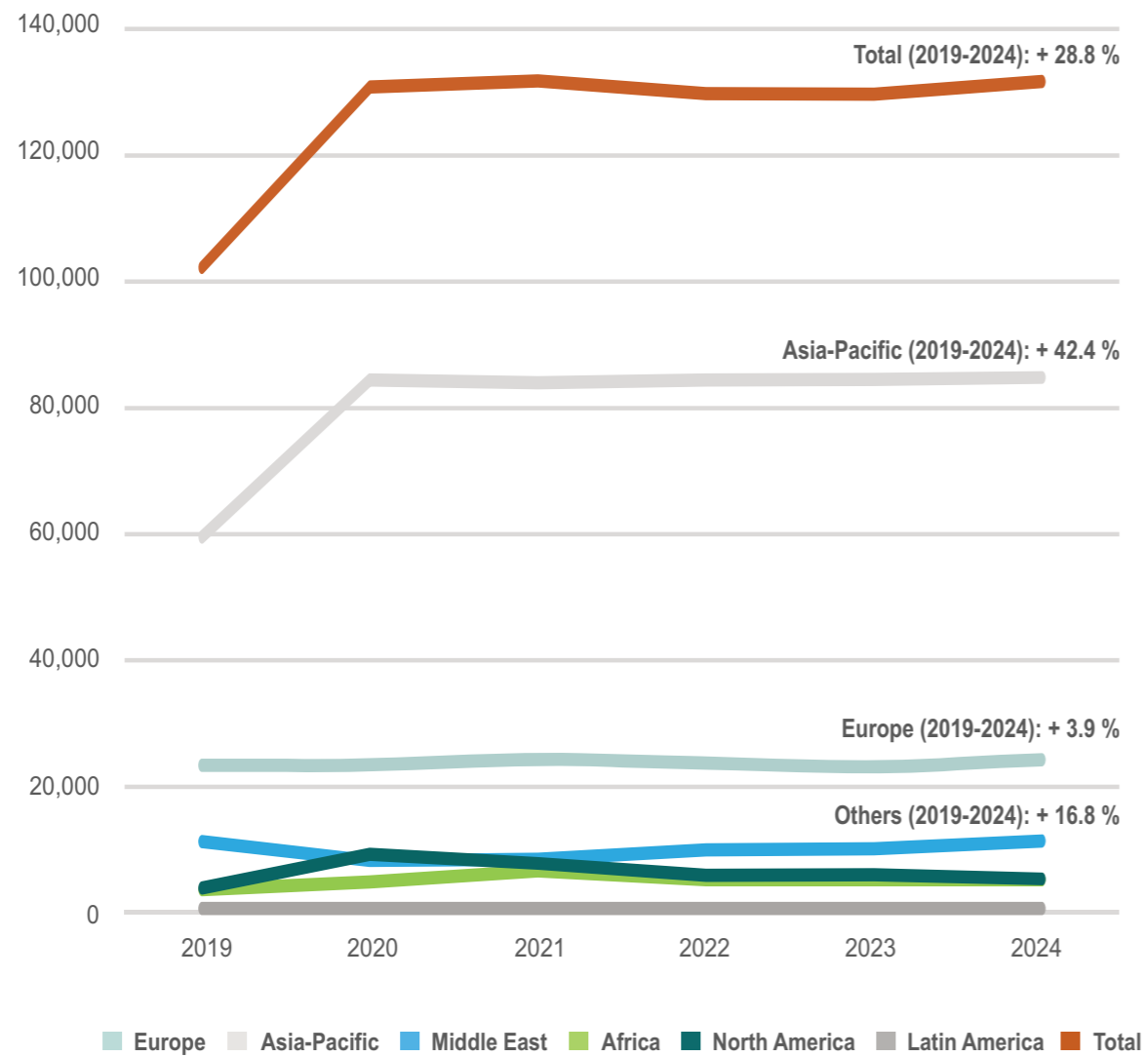


■ Europe 
 ■ Asia-Pacific 
 ■ Middle East 
 ■ Africa 
 ■ North America 
 ■ Latin America

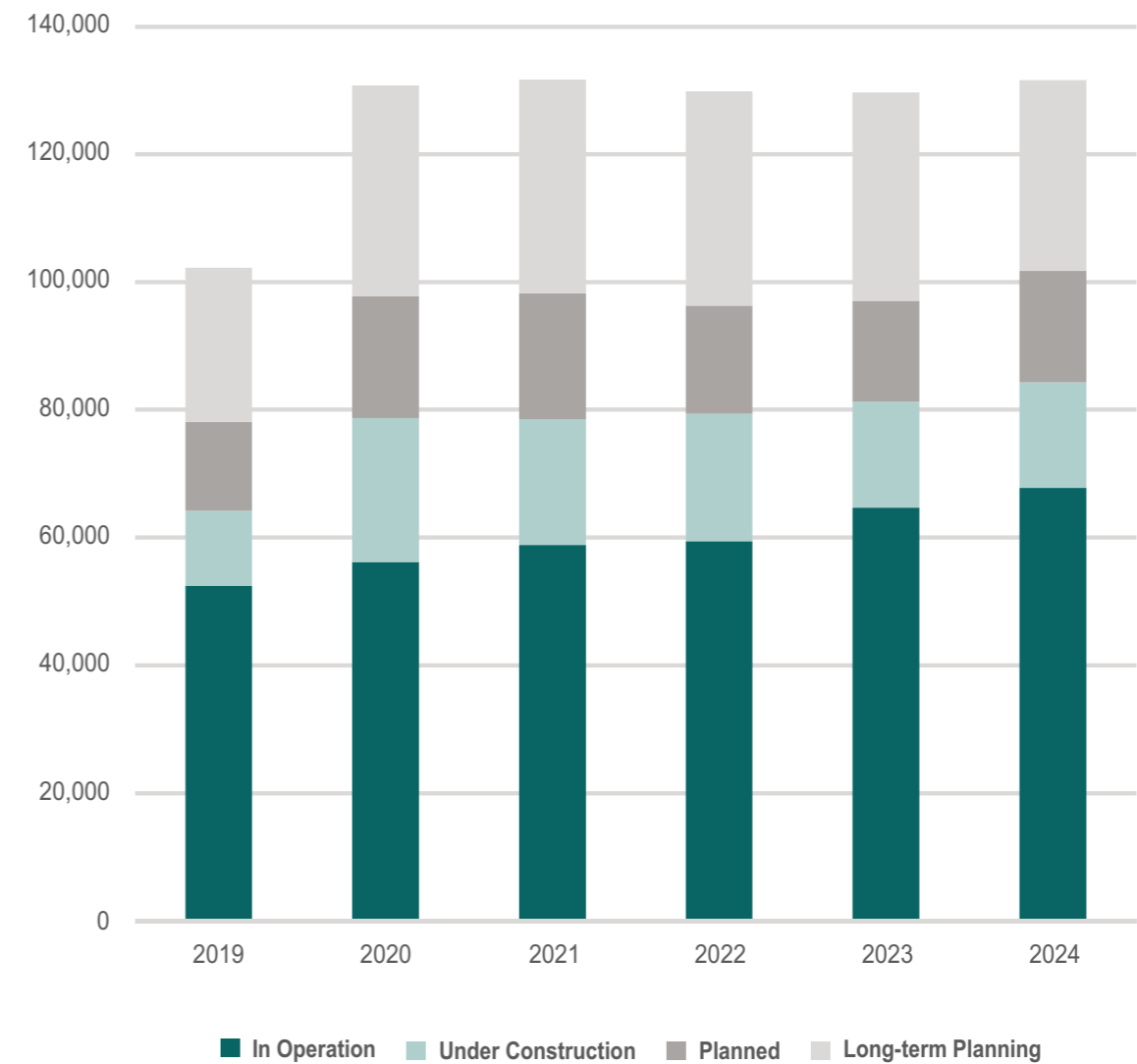
Source: compiled by authors based on International Union of Railways

# 1.1 GLOBAL DATA

Length of the high-speed network (km) by UIC Regions (all status) (2019-2024)



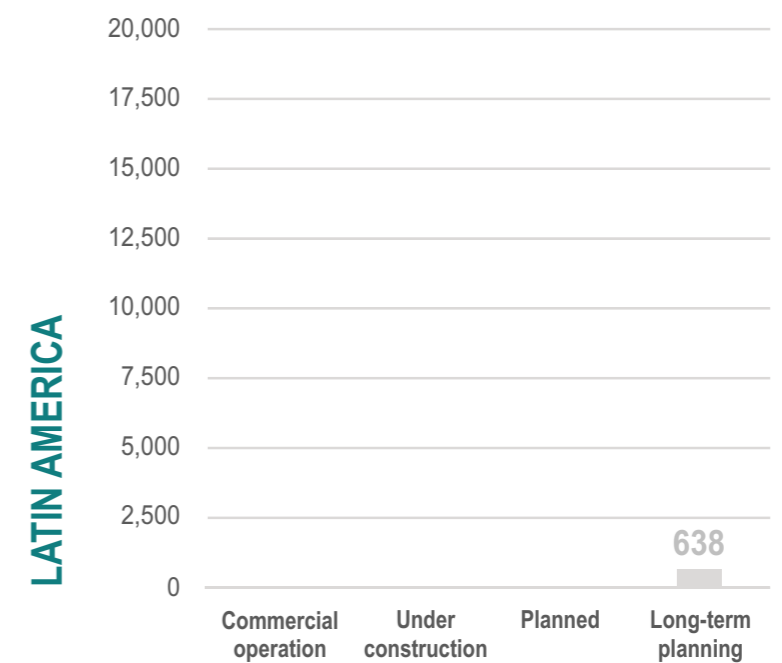
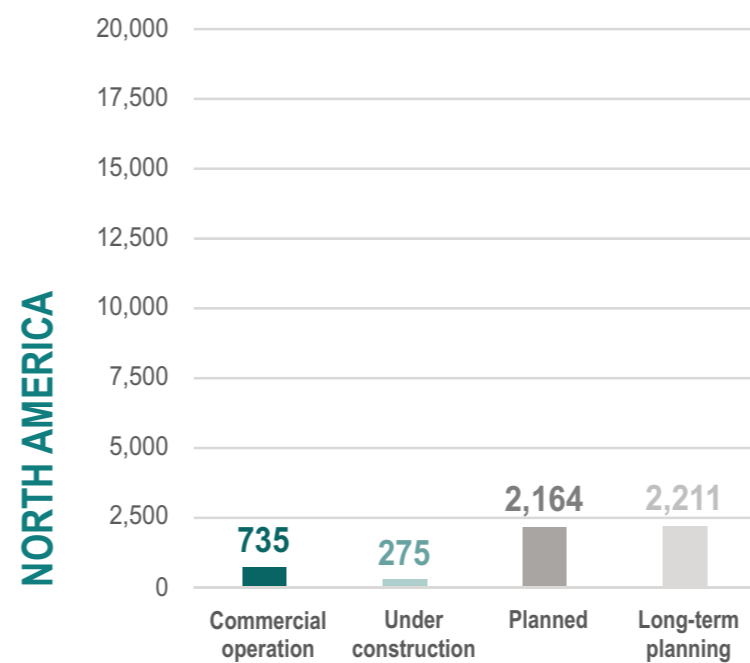
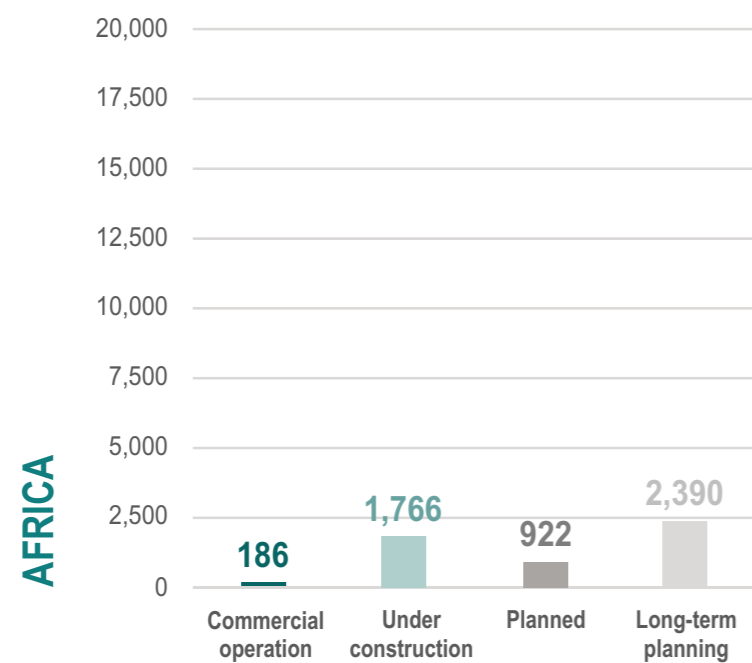
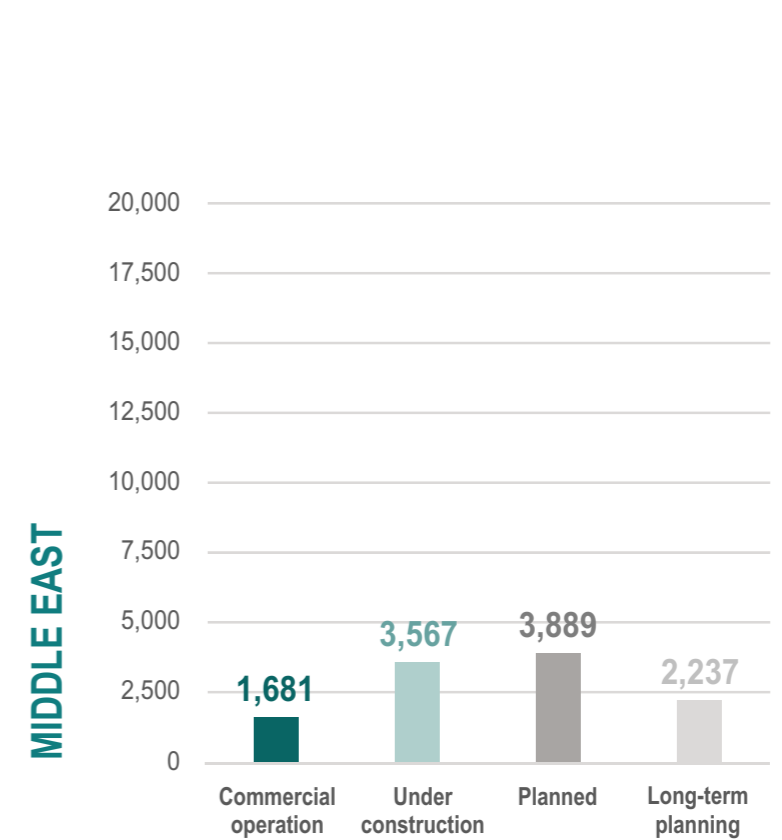
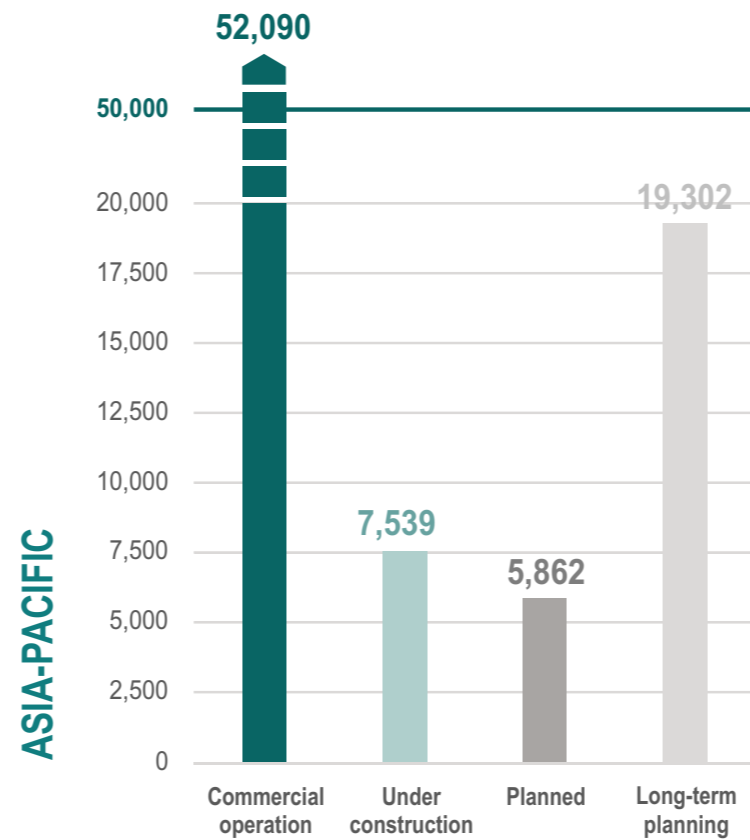
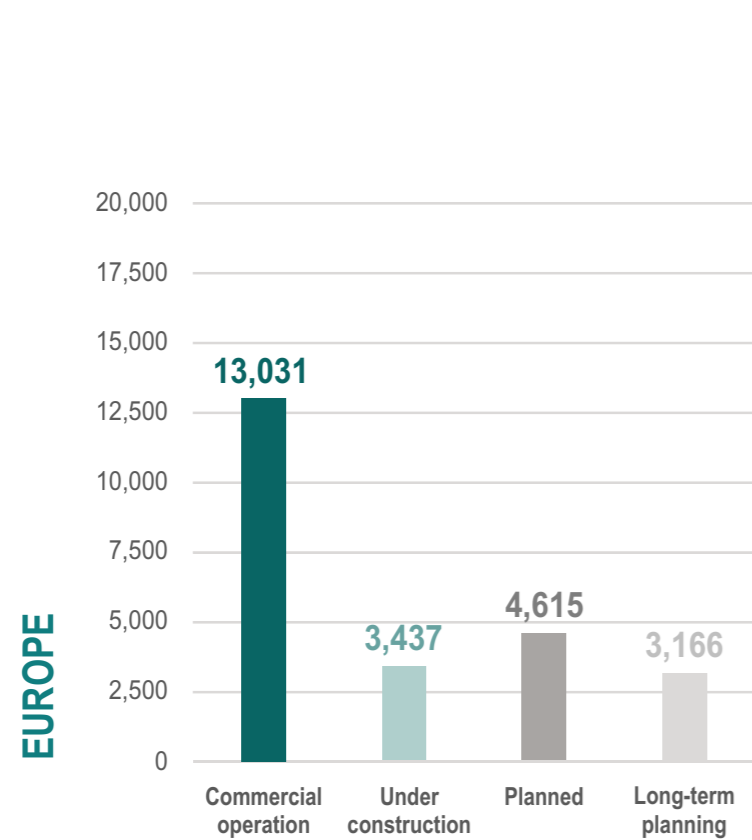
Length of the high-speed network (km) by status of implementation (worldwide) (2019-2024)



Source: compiled by authors based on International Union of Railways

# 1.1 GLOBAL DATA

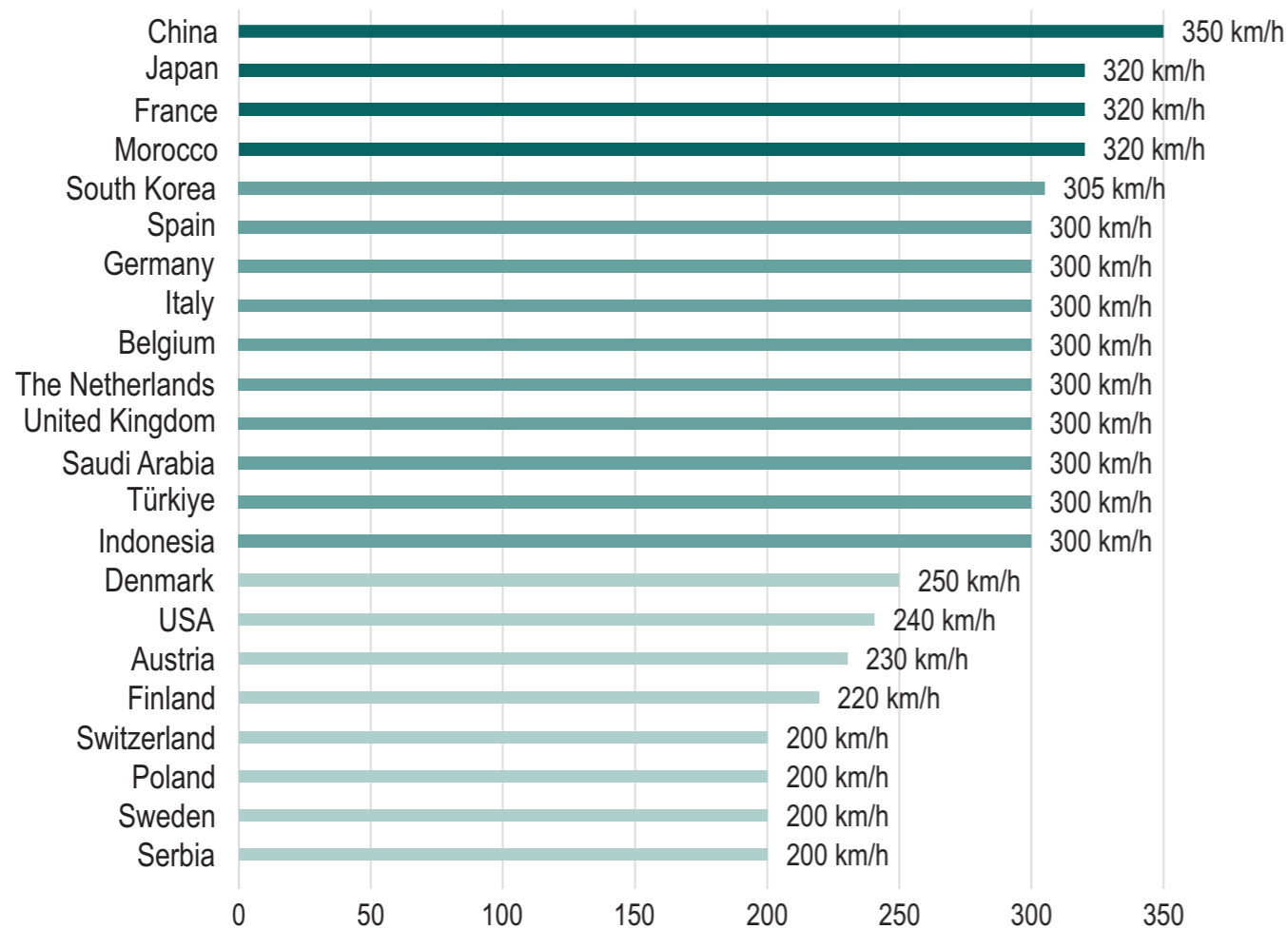
Length of the high-speed network by UIC Regions (km) (2024)



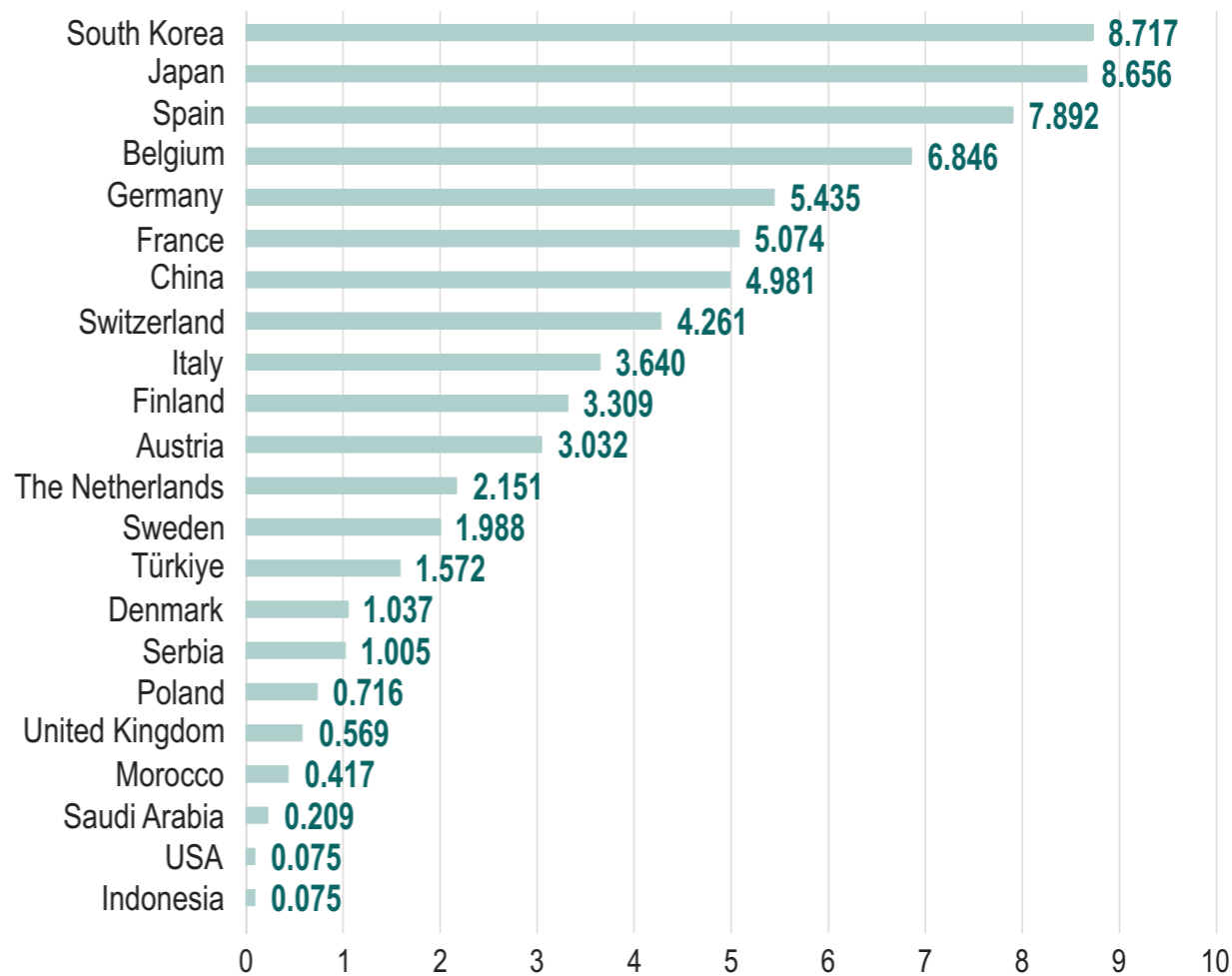
Source: compiled by authors based on International Union of Railways

# 1.1 GLOBAL DATA

Maximum speed of high-speed rail network by country (2024)



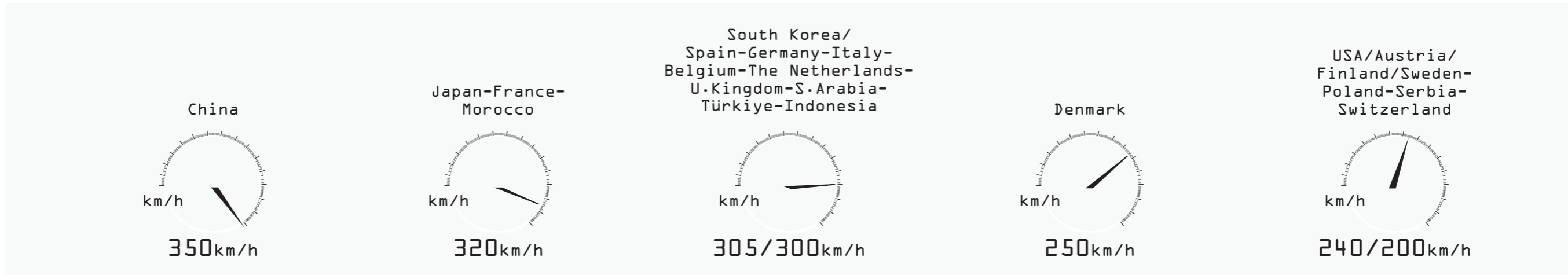
Density of high-speed network in 2024 (metres of high-speed lines / country area in km<sup>2</sup>)



Note: Density ratio for Denmark has been calculated excluding Greenland area

Source: compiled by authors based on International Union of Railways

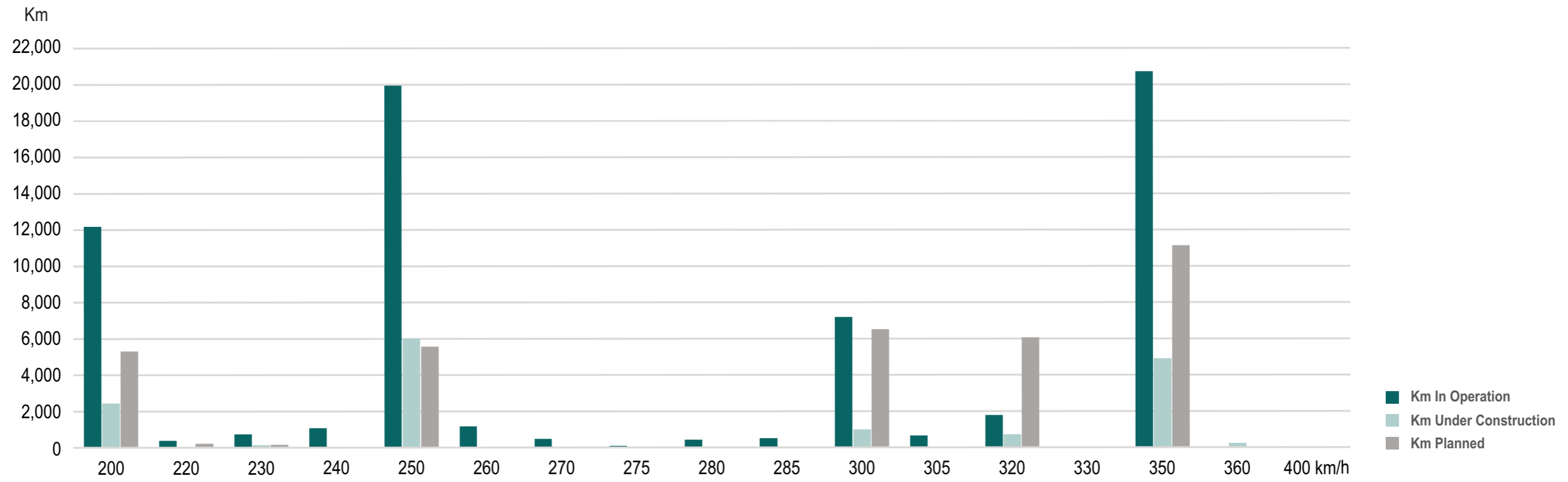
Maximum speed of high-speed rail network by country (2024)



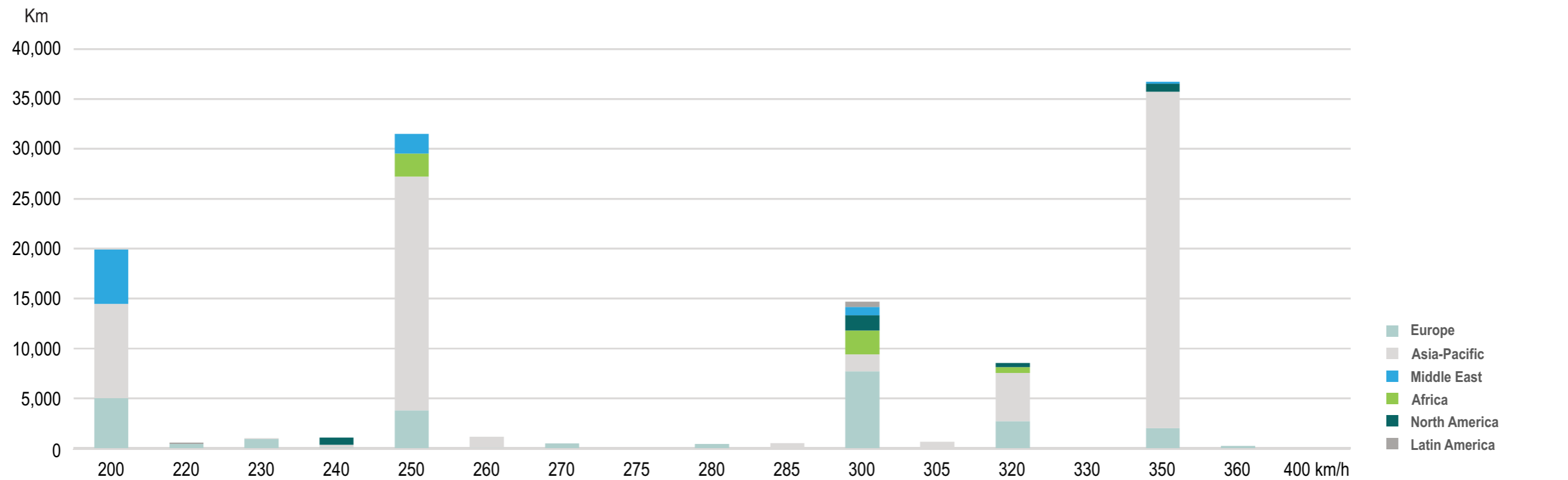
Source: compiled by authors based on International Union of Railways

# 1.1 GLOBAL DATA

Length (km) of the high-speed network worldwide according to maximum speed and status of implementation (2024)



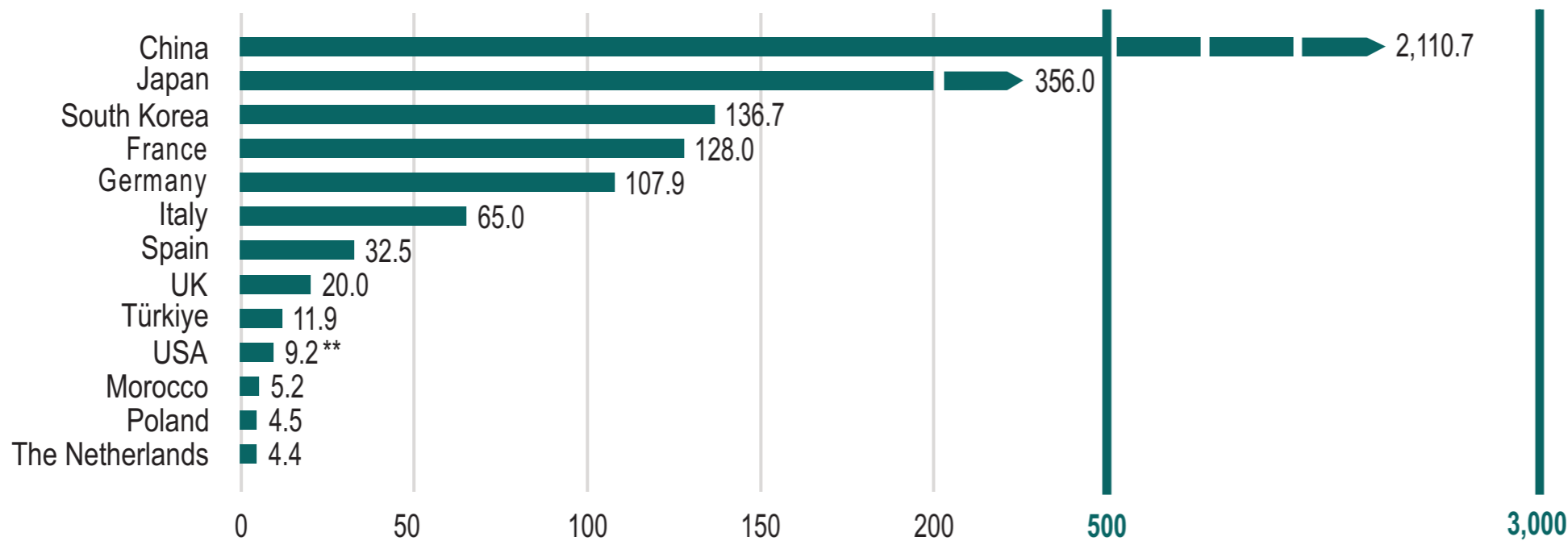
Length (km) of the high-speed network worldwide according to maximum speed and UIC Regions (all status) (2024)



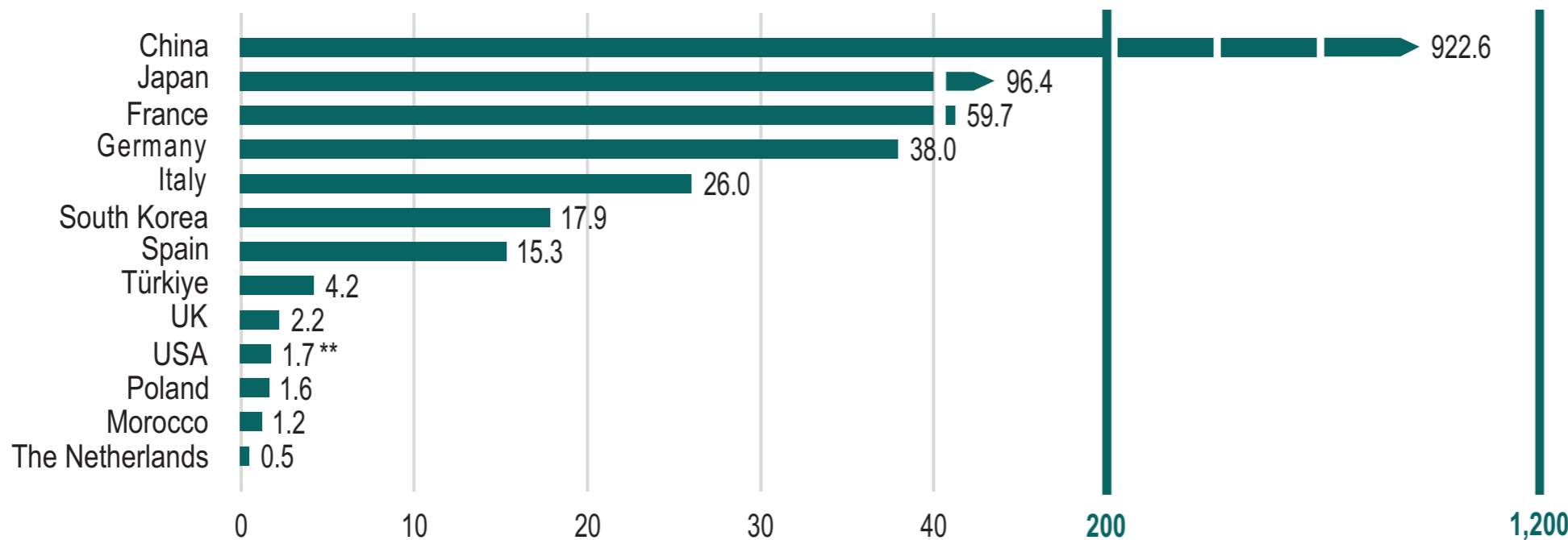
Source: compiled by authors based on International Union of Railways

# 1.1 GLOBAL DATA

Number of passenger (millions) by countries (2023)\*



Number of passenger.kilometre (billions) by countries (2023)\*



Notes:

(\*) In cases where several operators are active within the same country, data refer to aggregated figures

Passenger (Pax) and Passenger.kilometre (Pax.km) data for Spain are derived from aggregated information provided by the "Observatorio del Ferrocarril en España (OFE)"

Passenger (Pax) data for Italy are based on UIC estimates based on publicly available sources, while Passenger.kilometre (Pax.km) data are derived from aggregated information provided by "Autorità di Regolazione dei Trasporti (ART)"

(\*\*) Figures referred to fiscal year Oct 2021-Sep 2022

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Europe (I)

| LINE                                | COUNTRY             | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|-------------------------------------|---------------------|-------------------------|------|--------------------------|
| Rome - Florence                     | ITALY               | 250                     | 1977 | 271                      |
| LN1 LGV Paris Sud-Est               | FRANCE              | 300                     | 1981 | 425                      |
| LN2 - LGV Atlantique                | FRANCE              | 300                     | 1989 | 292                      |
| Linz - Wels                         | AUSTRIA             | 200                     | 1990 | 24                       |
| Hannover - Würzburg                 | GERMANY             | 280                     | 1991 | 327                      |
| Mannheim - Stuttgart                | GERMANY             | 280                     | 1991 | 99                       |
| Madrid - Sevilla                    | SPAIN               | 270                     | 1992 | 471                      |
| LN4 - LGV Rhone-Alpes               | FRANCE              | 300                     | 1992 | 122                      |
| Calais - Folkstone (Channel Tunnel) | FRANCE / U. KINGDOM | 160                     | 1994 | 50                       |
| LN3 - LGV Nord - Europe             | FRANCE              | 300                     | 1994 | 346                      |
| LN3 - LGV Interconnexion EST IDF    | FRANCE              | 300                     | 1994 | 105                      |
| Helsinki - Turku                    | FINLAND             | 200                     | 1995 | 156                      |
| Brussels - French border (L1)       | BELGIUM             | 300                     | 1997 | 72                       |
| Hannover - Berlin                   | GERMANY             | 250                     | 1998 | 258                      |
| Stockholm - Örebro                  | SWEDEN              | 250                     | 1999 | 187                      |
| St. Pölten - Ybbs                   | AUSTRIA             | 200                     | 2001 | 44                       |
| Helsinki - Oulu                     | FINLAND             | 200                     | 2001 | 673                      |
| Jämsänkoski - Jyväskylä             | FINLAND             | 200                     | 2001 | 53                       |
| LN5 - LGV Méditerranée              | FRANCE              | 300                     | 2001 | 259                      |
| Leuven - Liège (L2)                 | BELGIUM             | 300                     | 2002 | 65                       |
| Cologne - Frankfurt                 | GERMANY             | 300                     | 2002 | 177                      |
| Cologne - Aachen                    | GERMANY             | 250                     | 2002 | 70                       |
| Amstetten - St. Valentin            | AUSTRIA             | 200                     | 2003 | 37                       |
| Madrid - Lleida                     | SPAIN               | 300                     | 2003 | 467                      |
| Zaragoza - Huesca                   | SPAIN               | 200                     | 2003 | 79                       |
| Fawkham Junction - Tunnel           | UNITED KINGDOM      | 300                     | 2003 | 74                       |
| Karlsruhe - Basel                   | GERMANY             | 230                     | 2004 | 182                      |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Europe (II)

| LINE                                     | COUNTRY         | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|--|-----------------|-------------------------|------|--------------------------|
| Hamburg - Berlin                         | GERMANY         | 230                     | 2004 | 286                      |
| Mattstetten - Rothrist                   | SWITZERLAND     | 200                     | 2004 | 42                       |
| Solothurn - Wanzwil                      | SWITZERLAND     | 200                     | 2004 | 11                       |
| (Madrid -) La Sagra - Toledo             | SPAIN           | 220                     | 2005 | 21                       |
| Kinni - Otava                            | FINLAND         | 200                     | 2006 | 44                       |
| Kerava - Lahti                           | FINLAND         | 220                     | 2006 | 63                       |
| Nuremberg - Ingolstadt                   | GERMANY         | 300                     | 2006 | 89                       |
| Turin - Milan                            | ITALY           | 300                     | 2006 | 132                      |
| Córdoba - Antequera-Santa Ana            | SPAIN           | 300                     | 2006 | 111                      |
| Lleida - Camp de Tarragona               | SPAIN           | 300                     | 2006 | 96                       |
| Hoofddorp - Rotterdam West               | THE NETHERLANDS | 300                     | 2006 | 44                       |
| Rotterdam Lombardijen - Belgian border   | THE NETHERLANDS | 300                     | 2006 | 46                       |
| St. Valentin - Asten-St Florian          | AUSTRIA         | 230                     | 2007 | 16                       |
| LN6 - LGV Est Europe (First phase)       | FRANCE          | 320                     | 2007 | 335                      |
| Madrid - Olmedo - Valladolid             | SPAIN           | 300                     | 2007 | 178                      |
| Antequera Santa Ana - Málaga             | SPAIN           | 300                     | 2007 | 58                       |
| Frutigen - Visp (Lötschberg base tunnel) | SWITZERLAND     | 250                     | 2007 | 38                       |
| London - Southfleet Junction             | UNITED KINGDOM  | 300                     | 2007 | 39                       |
| Padova - Venice                          | ITALY           | 220                     | 2007 | 26                       |
| Milan - Bologna                          | ITALY           | 300                     | 2008 | 238                      |
| Naples - Salerno                         | ITALY           | 250                     | 2008 | 38                       |
| Camp de Tarragona - Barcelona            | SPAIN           | 300                     | 2008 | 100                      |
| Göteborg - Lund                          | SWEDEN          | 200                     | 2008 | 283                      |
| Liège - German border (L3)               | BELGIUM         | 260                     | 2009 | 36                       |
| Antwerp - Dutch border (L4)              | BELGIUM         | 300                     | 2009 | 36                       |
| Lahti - Luumäki                          | FINLAND         | 200                     | 2009 | 131                      |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Europe (III)

| LINE                                      | COUNTRY | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|---|---------|-------------------------|------|--------------------------|
| Rome - Naples                             | ITALY   | 300                     | 2009 | 233                      |
| Florence - Bologna                        | ITALY   | 300                     | 2009 | 91                       |
| Bypass Madrid                             | SPAIN   | 200                     | 2009 | 5                        |
| Santiago - A Coruña                       | SPAIN   | 200                     | 2009 | 61                       |
| Nyland - Umeå                             | SWEDEN  | 200                     | 2009 | 180                      |
| (Figueres -) Spanish border - Perpignan   | FRANCE  | 300                     | 2010 | 24                       |
| Madrid - Albacete Junction - Valencia     | SPAIN   | 300                     | 2010 | 362                      |
| Albacete Junction - Albacete              | SPAIN   | 300                     | 2010 | 73                       |
| Figueres - French border (- Perpignan)    | SPAIN   | 300                     | 2010 | 20                       |
| Sundsvall - Nyland                        | SWEDEN  | 200                     | 2010 | 30                       |
| LN7 LGV Rhin-Rhône Branche Est            | FRANCE  | 320                     | 2011 | 146                      |
| Munich - Augsburg                         | GERMANY | 230                     | 2011 | 62                       |
| Ourense - Santiago                        | SPAIN   | 300                     | 2011 | 85                       |
| Vienna Knoten Hadersdorf - St. Pölten     | AUSTRIA | 230                     | 2012 | 50                       |
| Knoten Radfeld - Knoten Baumkirchen       | AUSTRIA | 220                     | 2012 | 36                       |
| Wels - Attnang-Puchheim                   | AUSTRIA | 230                     | 2012 | 30                       |
| (Karlsruhe) - Katzenberg tunnel - (Basel) | GERMANY | 250                     | 2012 | 18                       |
| Bypass Yeles                              | SPAIN   | 200                     | 2012 | 6                        |
| Göteborg - Kornsjo                        | SWEDEN  | 200                     | 2012 | 180                      |
| Barcelona - Figueres                      | SPAIN   | 290                     | 2013 | 131                      |
| Albacete - Alicante/Alacant               | SPAIN   | 300                     | 2013 | 165                      |
| Erfurt - Leipzig/Halle                    | GERMANY | 300                     | 2015 | 123                      |
| Grodzisk Mazowiecki - Opoczno             | POLAND  | 200                     | 2015 | 224                      |
| Santiago - Vigo                           | SPAIN   | 200                     | 2015 | 95                       |
| Valladolid - León                         | SPAIN   | 200                     | 2015 | 166                      |
| Olmedo - Zamora                           | SPAIN   | 200                     | 2015 | 99                       |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Europe (IV)

| LINE   | COUNTRY     | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|--|-------------|-------------------------|------|--------------------------|
| Sevilla - Cádiz                                | SPAIN       | 200                     | 2015 | 153                      |
| Ybbs - Amstetten                               | AUSTRIA     | 230                     | 2016 | 17                       |
| LN6 - LGV Est Europe (Second phase)            | FRANCE      | 320                     | 2016 | 122                      |
| Milan - Brescia                                | ITALY       | 250                     | 2016 | 68                       |
| Erstfeld - Biasca (Gothard base tunnel)        | SWITZERLAND | 200                     | 2016 | 67                       |
| LGV Bretagne Pays de la Loire                  | FRANCE      | 320                     | 2017 | 219                      |
| LGV Sud Europe Atlantique (Tours-Bordeaux)     | FRANCE      | 320                     | 2017 | 340                      |
| Ebensfeld - Erfurt                             | GERMANY     | 300                     | 2017 | 107                      |
| Nuremberg - Ebensfeld                          | GERMANY     | 230                     | 2017 | 83                       |
| Copenhagen - Ringsted                          | DENMARK     | 250                     | 2019 | 56                       |
| Valencia - Vandellós                           | SPAIN       | 220                     | 2019 | 219                      |
| Antequera-Santa Ana - Granada                  | SPAIN       | 250                     | 2019 | 109                      |
| Vandellós - Tarragona                          | SPAIN       | 200                     | 2020 | 47                       |
| Giubiasco/S. Ant. - Vezia (Ceneri base tunnel) | SWITZERLAND | 250                     | 2020 | 18                       |
| Zamora - Pedralba                              | SPAIN       | 300                     | 2020 | 110                      |
| Murcia Junction - Orihuela - Beniel            | SPAIN       | 240                     | 2021 | 54                       |
| Pedralba - Ourense                             | SPAIN       | 300                     | 2021 | 119                      |
| Wendlingen - Ulm                               | GERMANY     | 250                     | 2022 | 60                       |
| Beniel - Murcia                                | SPAIN       | 240                     | 2022 | 16                       |
| Venta de Baños - Burgos                        | SPAIN       | 300                     | 2022 | 91                       |
| Plasencia - Badajoz                            | SPAIN       | 200                     | 2022 | 142                      |
| Chamartín - Atocha new tunnel                  | SPAIN       | 120                     | 2022 | 7                        |
| Belgrade - Novi Sad                            | SERBIA      | 200                     | 2022 | 78                       |
| León - Pola de Lena (Pajares New pass)         | SPAIN       | 250                     | 2023 | 76                       |
| Lund - Arlöv                                   | SWEDEN      | 200                     | 2023 | 11                       |
| Ängelholm - Maria                              | SWEDEN      | 200                     | 2023 | 24                       |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (I)

| LINE                                     | COUNTRY              | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|--|----------------------|-------------------------|------|--------------------------|
| Tokyo - Shin Osaka (Tokaido)             | JAPAN                | 285                     | 1964 | 515                      |
| Shin Osaka - Okayama (San-yo)            | JAPAN                | 300                     | 1972 | 161                      |
| Okayama - Hakata (San-yo)                | JAPAN                | 300                     | 1975 | 393                      |
| Omiya - Niigata (Joetsu)                 | JAPAN                | 275                     | 1982 | 270                      |
| Omiya - Utsunomiya (Tohoku)              | JAPAN                | 275                     | 1982 | 79                       |
| Utsunomiya - Morioka (Tohoku)            | JAPAN                | 320                     | 1982 | 426                      |
| Ueno - Omiya (Tohoku)                    | JAPAN                | 130                     | 1985 | 28                       |
| Tokyo - Ueno (Tohoku)                    | JAPAN                | 110                     | 1991 | 4                        |
| Fukushima - Yamagata (Yamagata)          | JAPAN                | 130                     | 1992 | 87                       |
| Takasaki - Nagano (Hokuriku)             | JAPAN                | 260                     | 1997 | 117                      |
| Morioka - Akita (Akita)                  | JAPAN                | 130                     | 1997 | 127                      |
| Yamagata - Shinjo (Yamagata)             | JAPAN                | 130                     | 1999 | 62                       |
| Morioka - Hachinohe (Tohoku)             | JAPAN                | 260                     | 2002 | 97                       |
| Qinhuangdao - Shenyang North             | CHINA                | 250                     | 2003 | 405                      |
| Shin Yatsuhiro - Kagoshima Chuo (Kyushu) | JAPAN                | 260                     | 2004 | 127                      |
| Geumcheon-gu (Seoul) - Dongdaegu         | SOUTH KOREA          | 305                     | 2004 | 269                      |
| Taipei - Kaohsiung                       | CHINA-CHINESE TAIPEI | 300                     | 2007 | 345                      |
| Nanjing South - Hefei                    | CHINA                | 250                     | 2008 | 148                      |
| Beijing South - Tianjin                  | CHINA                | 350                     | 2008 | 118                      |
| Qingdao - Jinan                          | CHINA                | 200                     | 2009 | 393                      |
| Hefei East - Hankou                      | CHINA                | 250                     | 2009 | 380                      |
| Shijiazhuang North - Taiyuan             | CHINA                | 250                     | 2009 | 228                      |
| Ningbo - Cangnan                         | CHINA                | 250                     | 2009 | 351                      |
| Wuhan - Guangzhou South                  | CHINA                | 350                     | 2009 | 1,079                    |
| Chongqing North - Liangwu                | CHINA                | 200                     | 2009 | 263                      |
| Zhengzhou East - Xi'an North             | CHINA                | 350                     | 2010 | 553                      |
| Hachinohe - Shin Aomori (Tohoku)         | JAPAN                | 260                     | 2010 | 82                       |
| Dongdaegu - Busan                        | SOUTH KOREA          | 305                     | 2010 | 131                      |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (II)

| LINE                                       | COUNTRY | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|--|---------|-------------------------|------|--------------------------|
| Cangnan - Fuzhou                           | CHINA   | 250                     | 2010 | 211                      |
| Fuzhou - Xiamen North                      | CHINA   | 250                     | 2010 | 234                      |
| Chengdu - Qingchengshan                    | CHINA   | 200                     | 2010 | 65                       |
| Shanghai - Nanjing                         | CHINA   | 350                     | 2010 | 323                      |
| Jiujiang - Nanchang West                   | CHINA   | 250                     | 2010 | 138                      |
| Shanghai Hongqiao - Hangzhou South         | CHINA   | 350                     | 2010 | 174                      |
| Haikou - Sanya                             | CHINA   | 250                     | 2010 | 308                      |
| Guangzhou South - Zhuhai                   | CHINA   | 200                     | 2011 | 143                      |
| Changchun - Jilin                          | CHINA   | 250                     | 2011 | 111                      |
| Hakata - Shin Yatsushiro (Kyushu)          | JAPAN   | 260                     | 2011 | 130                      |
| Beijing South - Shanghai Hongqiao          | CHINA   | 350                     | 2011 | 1,318                    |
| Guangzhou South - Shenzhen North           | CHINA   | 250                     | 2011 | 111                      |
| Longyan - Beixitou (block station)         | CHINA   | 200                     | 2012 | 119                      |
| Hankou - Yichang East                      | CHINA   | 200                     | 2012 | 292                      |
| Zhengzhou East - Wuhan                     | CHINA   | 350                     | 2012 | 526                      |
| Bengbu South - Hefei                       | CHINA   | 350                     | 2012 | 131                      |
| Dalian North - Shenyang North              | CHINA   | 350                     | 2012 | 383                      |
| Shenyang North - Harbin                    | CHINA   | 350                     | 2012 | 546                      |
| Suining - Chengdu East                     | CHINA   | 200                     | 2012 | 151                      |
| Beijing West - Zhengzhou East              | CHINA   | 350                     | 2012 | 676                      |
| Taishansuo (b.s.) - Liuzhou                | CHINA   | 200                     | 2012 | 498                      |
| Taigemu - Baotou                           | CHINA   | 200                     | 2013 | 146                      |
| Nanjing South - Hangzhou East              | CHINA   | 350                     | 2013 | 254                      |
| Hangzhou South - Ningbo                    | CHINA   | 350                     | 2013 | 157                      |
| Panjin North - Yingxijiahe (block station) | CHINA   | 350                     | 2013 | 90                       |
| Nanchang West - Fuzhou                     | CHINA   | 200                     | 2013 | 547                      |
| Yongtai - Putian                           | CHINA   | 200                     | 2013 | 59                       |
| Jinhu (b.s.) - Longjiaying (b.s.)          | CHINA   | 350                     | 2013 | 288                      |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (III)

| LINE                              | COUNTRY     | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|-----------------------------------|-------------|-------------------------|------|--------------------------|
| Xi'an North - Baoji South         | CHINA       | 350                     | 2013 | 184                      |
| Xiamen North - Shenzhen North     | CHINA       | 250                     | 2013 | 513                      |
| Nanhu East - Xianning South       | CHINA       | 250                     | 2013 | 76                       |
| Liuzhou - Nanning                 | CHINA       | 250                     | 2013 | 223                      |
| Qinzhou North - Fangchenggang     | CHINA       | 250                     | 2013 | 62                       |
| Nanning East - Beihai             | CHINA       | 250                     | 2013 | 197                      |
| Pixian West - Pengzhou            | CHINA       | 200                     | 2013 | 21                       |
| Nanning - Guangzhou South         | CHINA       | 250                     | 2014 | 574                      |
| Xiaomayang (b.s.) - Daye North    | CHINA       | 250                     | 2014 | 91                       |
| Gedian South - Huanggangdong      | CHINA       | 250                     | 2014 | 36                       |
| Changfengjie (b.s.) - Xi'an North | CHINA       | 250                     | 2014 | 574                      |
| Hangzhou South - Changsha South   | CHINA       | 350                     | 2014 | 911                      |
| Changsha South - Xinhuang West    | CHINA       | 350                     | 2014 | 420                      |
| Jiangyou - Chengdu East           | CHINA       | 250                     | 2014 | 153                      |
| Chengdu East - Leshan             | CHINA       | 250                     | 2014 | 135                      |
| Leshan - Emeishan                 | CHINA       | 250                     | 2014 | 27                       |
| Lanzhou West - Ürümqi South       | CHINA       | 250                     | 2014 | 1,785                    |
| Jiayuguan South - Jiayuguan       | CHINA       | 200                     | 2014 | 7                        |
| Guizhou East - Guangzhou South    | CHINA       | 250                     | 2014 | 860                      |
| Qingdao - Rongcheng               | CHINA       | 250                     | 2014 | 301                      |
| Zhengzhou East - Songchenglu      | CHINA       | 200                     | 2014 | 50                       |
| Ximotang - Yantai                 | CHINA       | 250                     | 2015 | 19                       |
| Nanyangzhai - Jiaozuo             | CHINA       | 200                     | 2015 | 70                       |
| Xinhuang West - Guiyang North     | CHINA       | 350                     | 2015 | 286                      |
| Hefei North City - Fuzhou         | CHINA       | 350                     | 2015 | 850                      |
| Harbin North - Qiqihar South      | CHINA       | 250                     | 2015 | 264                      |
| Shenyang South - Dandong          | CHINA       | 250                     | 2015 | 208                      |
| Osong - Gwangju                   | SOUTH KOREA | 305                     | 2015 | 182                      |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (IV)

| LINE                                      | COUNTRY              | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|---|----------------------|-------------------------|------|--------------------------|
| Tianjin - Haibin                          | CHINA                | 350                     | 2015 | 43                       |
| Jilin - Hunchun                           | CHINA                | 250                     | 2015 | 361                      |
| Nanjing East - Anqing                     | CHINA                | 250                     | 2015 | 257                      |
| Nagano - Kanazawa (Hokuriku)              | JAPAN                | 260                     | 2015 | 228                      |
| Nanning - Yangxu                          | CHINA                | 250                     | 2015 | 257                      |
| Dandong - Dalian North                    | CHINA                | 200                     | 2015 | 293                      |
| Chengdu East - Shapingba                  | CHINA                | 250                     | 2015 | 300                      |
| Tangyasuo (block station) - Wenzhou South | CHINA                | 200                     | 2015 | 190                      |
| Ganxian - Longyan                         | CHINA                | 200                     | 2015 | 248                      |
| Tianjin West - Bazhou West                | CHINA                | 250                     | 2015 | 72                       |
| Bazhou West - Xushui                      | CHINA                | 200                     | 2015 | 65                       |
| Hainan West Circle (Haikou-Sanya)         | CHINA                | 200                     | 2015 | 345                      |
| Zhengzhou East - Xinzheng Airport         | CHINA                | 200                     | 2015 | 28                       |
| Taipei - Nangang                          | CHINA-CHINESE TAIPEI | 130                     | 2016 | 9                        |
| Foshan West - Zhaoqing                    | CHINA                | 200                     | 2016 | 81                       |
| Changping East - Xiaojinkou               | CHINA                | 200                     | 2016 | 53                       |
| Suseo - Pyoengtaek                        | SOUTH KOREA          | 305                     | 2016 | 61                       |
| Zhengzhou East - Xuzhou East              | CHINA                | 350                     | 2016 | 362                      |
| Chongqing North - Wanzhou North           | CHINA                | 250                     | 2016 | 246                      |
| Shin Aomori - Shin Hakodate (Hokkaido)    | JAPAN                | 260                     | 2016 | 149                      |
| Hankou - Xiaogan East                     | CHINA                | 200                     | 2016 | 61                       |
| Changsha - Zhuzhou South                  | CHINA                | 200                     | 2016 | 58                       |
| Muyun - Xiangtan                          | CHINA                | 200                     | 2016 | 24                       |
| Guiyang North - Kunming South             | CHINA                | 250                     | 2016 | 463                      |
| Yangxu - Kunming East                     | CHINA                | 250                     | 2016 | 452                      |
| Daye North - Yangxin                      | CHINA                | 250                     | 2017 | 37                       |
| Baoji South - Lanzhou West                | CHINA                | 250                     | 2017 | 353                      |
| Wulanchabu - Hohhot East                  | CHINA                | 250                     | 2017 | 128                      |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (V)

| LINE   | COUNTRY     | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|--|-------------|-------------------------|------|--------------------------|
| Yangxin - K23 block station                  | CHINA       | 250                     | 2017 | 82                       |
| Xi'an North - Jiangyou                       | CHINA       | 250                     | 2017 | 505                      |
| Huaibei North - Xiaoxian North               | CHINA       | 250                     | 2017 | 25                       |
| Seoul - Gangneung                            | SOUTH KOREA | 250                     | 2017 | 230                      |
| Shijiazhuang - Jinan West                    | CHINA       | 250                     | 2017 | 308                      |
| Quzhou - Jiujiang                            | CHINA       | 200                     | 2017 | 334                      |
| Dongguan - Changping East                    | CHINA       | 200                     | 2017 | 48                       |
| Changsha West - Changsha                     | CHINA       | 200                     | 2017 | 22                       |
| Tongjiayi (block station) - Guiyang          | CHINA       | 200                     | 2018 | 380                      |
| Jiangmen - Zhanjiang West                    | CHINA       | 200                     | 2018 | 355                      |
| Harbin - Jiamusi                             | CHINA       | 200                     | 2018 | 343                      |
| Fanjiazhuang (b.s.) - Changfengjie (b.s.)    | CHINA       | 200                     | 2018 | 122                      |
| Guangdong North - Dali                       | CHINA       | 200                     | 2018 | 175                      |
| Xinhui - Jiangmen                            | CHINA       | 200                     | 2018 | 3                        |
| Shenzhen North - Futian                      | CHINA       | 200                     | 2018 | 4                        |
| Harbin - Harbin North                        | CHINA       | 200                     | 2018 | 18                       |
| Hangzhou South - Huangshan North             | CHINA       | 250                     | 2018 | 272                      |
| Harbin - Mudanjiang                          | CHINA       | 250                     | 2018 | 300                      |
| Qingdao North - Ganyu North                  | CHINA       | 200                     | 2018 | 197                      |
| Ganyu North - Weiyang (block station)        | CHINA       | 200                     | 2018 | 234                      |
| Huaihua South - Hengyang East                | CHINA       | 200                     | 2018 | 319                      |
| Mayuan - Yanjialong                          | CHINA       | 200                     | 2018 | 5                        |
| Changtang (block station) - Hengyang North   | CHINA       | 200                     | 2018 | 5                        |
| Changtang (block station) - Chashan'ao       | CHINA       | 200                     | 2018 | 5                        |
| Qihe - Jinan West                            | CHINA       | 200                     | 2018 | 21                       |
| Dazhengzhuang (b.s.) - Damoliu (b.s.)        | CHINA       | 200                     | 2018 | 3                        |
| Beixindian (b.s.) - Wulitang (block station) | CHINA       | 200                     | 2018 | 21                       |
| Jinan East - Hongdao                         | CHINA       | 350                     | 2018 | 305                      |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (VI)

| LINE   | COUNTRY | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|--|---------|-------------------------|------|--------------------------|
| Tongren - Dazongping                             | CHINA   | 200                     | 2018 | 46                       |
| Chengdu West - Chaoyang Lake                     | CHINA   | 200                     | 2018 | 100                      |
| Yanping - Longyan                                | CHINA   | 200                     | 2018 | 247                      |
| Houling (b.s.) - Hongxing (b.s.)                 | CHINA   | 200                     | 2018 | 8                        |
| Huyi (block station) - Aibei (block station)     | CHINA   | 200                     | 2018 | 2                        |
| Chengde South - Pingquan North                   | CHINA   | 350                     | 2018 | 67                       |
| Pingquan North - Shenyang North                  | CHINA   | 350                     | 2018 | 435                      |
| Dingxiang Lake 2 (b.s.) - Da'erhuan 1 (b.s.)     | CHINA   | 200                     | 2018 | 2                        |
| Dingxiang Lake 1 (b.s.) - Da'erhuan 2 (b.s.)     | CHINA   | 200                     | 2018 | 2                        |
| Xinmin North - Tongliao                          | CHINA   | 250                     | 2018 | 197                      |
| Yaojiawopu (b.s.) - Tianjiawopu (b.s.)           | CHINA   | 200                     | 2018 | 6                        |
| Tuancun (block station) - Daguhe (block station) | CHINA   | 350                     | 2018 | 4                        |
| Leshan - Yibin West                              | CHINA   | 350                     | 2019 | 145                      |
| Liyang - Daxing Airport                          | CHINA   | 200                     | 2019 | 32                       |
| Meizhou West - Chaoshan                          | CHINA   | 200                     | 2019 | 121                      |
| Rizhao West - Dawangzhuang (b. s.)               | CHINA   | 350                     | 2019 | 226                      |
| Qufu East - Dawangzhuang (b. s.)                 | CHINA   | 200                     | 2019 | 10                       |
| Qufu East - Nanxiasong (b. s.)                   | CHINA   | 200                     | 2019 | 4                        |
| Xiaogan East - Yunmeng East                      | CHINA   | 250                     | 2019 | 21                       |
| Yunmeng East - Shiyang East                      | CHINA   | 350                     | 2019 | 377                      |
| Shangqiu - Hefei North City                      | CHINA   | 350                     | 2019 | 378                      |
| Zhengzhou East - Xiangyang East                  | CHINA   | 350                     | 2019 | 389                      |
| Zhengzhou South - Fuyang West                    | CHINA   | 350                     | 2019 | 280                      |
| Yinchuan - Zhongwei South                        | CHINA   | 250                     | 2019 | 207                      |
| Xintang South - Shenzhen Airport                 | CHINA   | 140                     | 2019 | 73                       |
| Xintang South - Xintang                          | CHINA   | 140                     | 2019 | 3                        |
| Xuzhou East (Xulan b.s.) - Yancheng (Xuyan b.s.) | CHINA   | 250                     | 2019 | 313                      |
| Dongji - Huai'an East                            | CHINA   | 250                     | 2019 | 105                      |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (VII)

| LINE  | COUNTRY | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|---|---------|-------------------------|------|--------------------------|
| Yibin West - Guiyang East                       | CHINA   | 250                     | 2019 | 368                      |
| Jianpo (block station) - Guiyang North          | CHINA   | 250                     | 2019 | 9                        |
| Hejia (b.s.) - Yangtaishan (b.s.)               | CHINA   | 350                     | 2019 | 385                      |
| Henggang - Hejia (block station)                | CHINA   | 200                     | 2019 | 11                       |
| Dongcun (block station) - Pushu (block station) | CHINA   | 200                     | 2019 | 5                        |
| Fanjia (block station) - Nanjie (block station) | CHINA   | 200                     | 2019 | 2                        |
| Ganxian North - Pingjiang (block station)       | CHINA   | 200                     | 2019 | 3                        |
| Qianjiang - Changde                             | CHINA   | 200                     | 2019 | 333                      |
| Beijing North - Zhangjiakou                     | CHINA   | 350                     | 2019 | 174                      |
| Zhangjiakou - Wulanchabu                        | CHINA   | 350                     | 2019 | 159                      |
| Xiahuayuan - Taizicheng (Chongli Railway)       | CHINA   | 250                     | 2019 | 52                       |
| Huai'an - Taishancun (block station)            | CHINA   | 250                     | 2019 | 136                      |
| Kazuo - Chifeng                                 | CHINA   | 250                     | 2020 | 156                      |
| Sunjiagou (b.s.) - Zhengzhangzi (b.s.)          | CHINA   | 200                     | 2020 | 5                        |
| Feidong - Huzhou                                | CHINA   | 350                     | 2020 | 309                      |
| Zhaodian - Huangdu                              | CHINA   | 200                     | 2020 | 143                      |
| Pingdong (b.s.) - Nantong West                  | CHINA   | 200                     | 2020 | 5                        |
| Anshun West - Shuicheng                         | CHINA   | 250                     | 2020 | 120                      |
| Guangzhou North - Qingyuan                      | CHINA   | 200                     | 2020 | 38                       |
| Weifang North - Laixi East                      | CHINA   | 350                     | 2020 | 124                      |
| Langjiazhuang (b.s.) - Pangjiatun (b.s.)        | CHINA   | 200                     | 2020 | 3                        |
| Huai'an East - Dantu                            | CHINA   | 250                     | 2020 | 199                      |
| Shaobo (b.s.) - Jiangdu                         | CHINA   | 200                     | 2020 | 4                        |
| Shaobo (b.s.) - Tai'anzen                       | CHINA   | 200                     | 2020 | 5                        |
| Hengshan (b.s.) - Zhenjiang (Intercity o.s.)    | CHINA   | 200                     | 2020 | 12                       |
| Jiaozuo - Changfengjie (b.s.)                   | CHINA   | 250                     | 2020 | 362                      |
| Feixi Jinggang (b.s.) - Shuangling (b.s.)       | CHINA   | 350                     | 2020 | 134                      |
| Shuangling (b.s.) - Longshan (b.s.)             | CHINA   | 200                     | 2020 | 4                        |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (VIII)

| LINE                                      | COUNTRY | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|---|---------|-------------------------|------|--------------------------|
| Longshan (b.s.) - Anqing                  | CHINA   | 200                     | 2020 | 22                       |
| Fuzhou - Pingtan                          | CHINA   | 200                     | 2020 | 88                       |
| Xi'an North - Wuzhong                     | CHINA   | 250                     | 2020 | 545                      |
| Huwang (b.s.) - Liqun South               | CHINA   | 200                     | 2020 | 6                        |
| Daxing Airport - Xiong'an                 | CHINA   | 350                     | 2020 | 59                       |
| Yancheng (Xuyan o.s.) - Nantong West      | CHINA   | 350                     | 2020 | 158                      |
| Guodaocun (b.s.) - Chenqiao (b.s.)        | CHINA   | 200                     | 2020 | 6                        |
| Jixianlu (b.s.) - Feixi Jinggang o.s.     | CHINA   | 200                     | 2020 | 10                       |
| Dafu - Xiantao                            | CHINA   | 200                     | 2020 | 17                       |
| Beijing Chaoyang - Chengde South          | CHINA   | 350                     | 2021 | 192                      |
| Xuzhou East - Houmazhuang                 | CHINA   | 350                     | 2021 | 185                      |
| Shenxu (b.s.) - Lianyungang (Xuzhou o.s.) | CHINA   | 200                     | 2021 | 5                        |
| Neijiang North - Luzhou                   | CHINA   | 250                     | 2021 | 129                      |
| Liaoning Chaoyang - Linghai South         | CHINA   | 350                     | 2021 | 107                      |
| Zhangjiajie West - Huaihua South          | CHINA   | 350                     | 2021 | 245                      |
| Zhangjiajie West - Shadi (b.s.)           | CHINA   | 200                     | 2021 | 3                        |
| Longxingcun (b.s.) - Huaihua South        | CHINA   | 200                     | 2021 | 4                        |
| Mudanjiang - Jiamusi                      | CHINA   | 250                     | 2021 | 372                      |
| Changbaishan - Dunhua South               | CHINA   | 250                     | 2021 | 99                       |
| Dunhua South - Dunhua                     | CHINA   | 200                     | 2021 | 12                       |
| Hejia (b.s.) - Yangtaishan (b.s.)         | CHINA   | 350                     | 2021 | 431                      |
| Shuangling (b.s.) - Lushan                | CHINA   | 350                     | 2021 | 176                      |
| Tangxia (b.s.) - Dongguan South           | CHINA   | 200                     | 2021 | 3                        |
| Dongguan South - Tangxia (b.s.)           | CHINA   | 200                     | 2021 | 2                        |
| Yangtaishan (b.s.) - Shenzhen North       | CHINA   | 200                     | 2021 | 8                        |
| Anqing West - Longshan (b.s.)             | CHINA   | 200                     | 2021 | 7                        |
| Dawangzhuang - Zhuangzhai                 | CHINA   | 350                     | 2021 | 199                      |
| Xiaobeishan (b.s.) - Nanxiasong (b.s.)    | CHINA   | 200                     | 2021 | 5                        |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (IX)

| LINE                                  | COUNTRY   | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|---------------------------------------|-----------|-------------------------|------|--------------------------|
| Takeo Onsen - Nagasaki (Nishi Kyushu) | JAPAN     | 260                     | 2022 | 66                       |
| Shaoxing North - Wenling              | CHINA     | 350                     | 2022 | 223                      |
| Shaoxing North - Jinghu (b.s.)        | CHINA     | 350                     | 2022 | 3                        |
| Webling North (b.s.) - Wenling        | CHINA     | 350                     | 2022 | 4                        |
| Bahe (b.s.) - Huangmei East           | CHINA     | 350                     | 2022 | 116                      |
| Huanggang East - Bahe (b.s.)          | CHINA     | 250                     | 2022 | 9                        |
| Puyang East - Zhengzhou East          | CHINA     | 350                     | 2022 | 195                      |
| Yangzhuang (b.s.) - Hongbao (b.s.)    | CHINA     | 250                     | 2022 | 3                        |
| Beijing Fengtai - Dujiakan (b.s.)     | CHINA     | 350                     | 2022 | 9                        |
| Xiangyang East - Wanzhou North        | CHINA     | 350                     | 2022 | 450                      |
| Huanglou (b.s.) - Gongxing (b.s.)     | CHINA     | 250                     | 2022 | 6                        |
| Yiyang South - Huangjinyuan (b.s.)    | CHINA     | 350                     | 2022 | 60                       |
| Huangjinyuan (b.s.) - Changsha West   | CHINA     | 350                     | 2022 | 3                        |
| Huzhou - Tonglu East                  | CHINA     | 350                     | 2022 | 129                      |
| Tonglu East - Tonglu                  | CHINA     | 350                     | 2022 | 9                        |
| Nanning South - Chongzuo              | CHINA     | 250                     | 2022 | 121                      |
| Mile - Honghe                         | CHINA     | 250                     | 2022 | 106                      |
| Changde - Yiyang South                | CHINA     | 350                     | 2022 | 97                       |
| Zhongwei South - Shuping              | CHINA     | 250                     | 2022 | 221                      |
| Dingjiagou (b.s.) - Lanzhou New Area  | CHINA     | 250                     | 2022 | 7                        |
| Baodi - Beichen                       | CHINA     | 250                     | 2022 | 54                       |
| Beiliugezhuang (b.s.) - Tangshan      | CHINA     | 350                     | 2022 | 141                      |
| Gaoxinzhuang - Beiliugezhuang (b.s.)  | CHINA     | 250                     | 2022 | 2                        |
| Tangshan West - Laozhuangzi (b.s.)    | CHINA     | 250                     | 2022 | 10                       |
| Jinan - Laiwu                         | CHINA     | 350                     | 2022 | 116                      |
| Jakarta - Bandung                     | INDONESIA | 300                     | 2023 | 142                      |
| Longli North - Libo                   | CHINA     | 350                     | 2023 | 176                      |
| Libo - Nanning East                   | CHINA     | 350                     | 2023 | 305                      |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (X)

| LINE  | COUNTRY | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|---|---------|-------------------------|------|--------------------------|
| Fengling North (b.s.) - Xiangzhu (b.s.)             | CHINA   | 250                     | 2023 | 3                        |
| Shanwei - Xintang                                   | CHINA   | 350                     | 2023 | 200                      |
| Huizhou North - Xiangzhu (b.s.)                     | CHINA   | 250                     | 2023 | 14                       |
| Madiling (b.s.) - Zhongkai                          | CHINA   | 250                     | 2023 | 11                       |
| Fuzhou Nanyong Square - Beixitou (b.s.)             | CHINA   | 350                     | 2023 | 267                      |
| Zhanglan (b.s.) - Fuzhou Nanyong Square             | CHINA   | 250                     | 2023 | 2                        |
| Heshan (b.s.) - Xiamen North (Hangshen o.s.)        | CHINA   | 250                     | 2023 | 4                        |
| Nanjing South Ning'an o.s. - Taicang Riverside o.s. | CHINA   | 350                     | 2023 | 275                      |
| Jiangning - Gaoxinyuan (b.s.)                       | CHINA   | 250                     | 2023 | 3                        |
| Taicang Riverside o.s. - Ludu (b.s.)                | CHINA   | 250                     | 2023 | 5                        |
| Qingbaijiang - Zhenjiangguan                        | CHINA   | 200                     | 2023 | 207                      |
| Qingbaijiang East - Sanxingdui                      | CHINA   | 200                     | 2023 | 5                        |
| Jinan West - Puyang East                            | CHINA   | 350                     | 2023 | 212                      |
| Damiaotun (b.s.) - Yufuhe (b.s.)                    | CHINA   | 250                     | 2023 | 4                        |
| Laixi - Rongcheng                                   | CHINA   | 350                     | 2023 | 193                      |
| Laixi - Laixi East (b.s.)                           | CHINA   | 250                     | 2023 | 3                        |
| Gu'an East - Shengfang                              | CHINA   | 250                     | 2023 | 49                       |
| Shantou South - Shanwei                             | CHINA   | 350                     | 2023 | 142                      |
| Chengdu East - Yibin East                           | CHINA   | 350                     | 2023 | 246                      |
| Yibin East - Yibin                                  | CHINA   | 350                     | 2023 | 17                       |
| Huaxingcun (b.s.) - Jinrui (b.s.)                   | CHINA   | 250                     | 2023 | 2                        |
| Yibin - Yibin West                                  | CHINA   | 250                     | 2023 | 2                        |
| Yibin - Zaojuebang (b.s.)                           | CHINA   | 250                     | 2023 | 2                        |
| Fangchenggang North - Dongxing City                 | CHINA   | 200                     | 2023 | 47                       |
| Longyan - Wuping                                    | CHINA   | 250                     | 2023 | 64                       |
| Huangshan North - Nanchang South                    | CHINA   | 350                     | 2023 | 304                      |
| Guangzhou North - Guangzhou Baiyun                  | CHINA   | 250                     | 2023 | 22                       |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Asia - Pacific (XI)

| LINE   | COUNTRY | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|--|---------|-------------------------|------|--------------------------|
| Kanazawa - Tsuruga (Hokuriku)                    | JAPAN   | 260                     | 2024 | 125                      |
| Yixian - Chizhou                                 | CHINA   | 350                     | 2024 | 123                      |
| Foshan West - Guangzhou South                    | CHINA   | 200                     | 2024 | 36                       |
| Guangzhou South - Wanghong                       | CHINA   | 200                     | 2024 | 37                       |
| Bazhong East - Qiangjiawan (b.s.)                | CHINA   | 250                     | 2024 | 145                      |
| Qiangjiawan (b.s.) - Nanchong North (Lanyu o.s.) | CHINA   | 200                     | 2024 | 2                        |
| Zhongchuan Airport - Wuwei South                 | CHINA   | 250                     | 2024 | 193                      |
| Zhuangzhai - Lankao South                        | CHINA   | 350                     | 2024 | 47                       |
| Zhenjianguan - Huangshengguan                    | CHINA   | 200                     | 2024 | 67                       |
| Tonglu East - Wenzhou North                      | CHINA   | 350                     | 2024 | 261                      |
| Yongjia (b.s.) - Wenzhou North                   | CHINA   | 200                     | 2024 | 3                        |
| Meizhou - Longchuan                              | CHINA   | 350                     | 2024 | 103                      |
| Jiulongpo - Yibin East                           | CHINA   | 350                     | 2024 | 192                      |
| Huinong South - Yinchuan                         | CHINA   | 250                     | 2024 | 96                       |
| Xuancheng - Jixi North                           | CHINA   | 350                     | 2024 | 115                      |
| Huazhen (b.s.) - Feixi (Jinggang o.s.)           | CHINA   | 200                     | 2024 | 3                        |
| Changyi - Zhifu                                  | CHINA   | 350                     | 2024 | 237                      |
| Ximu (b.s.) - Zhenshan (b.s.)                    | CHINA   | 200                     | 2024 | 2                        |
| Jingmen West - Jingzhou                          | CHINA   | 350                     | 2024 | 79                       |
| Shanghai Hongqiao - Huzhou                       | CHINA   | 350                     | 2024 | 164                      |
| Kangshan (b.s.) - Miaoxizhen (b.s.)              | CHINA   | 200                     | 2024 | 4                        |
| Langfang North - Daxing Airport                  | CHINA   | 200                     | 2024 | 28                       |
| Daxing Airport - Gu'an East                      | CHINA   | 250                     | 2024 | 18                       |
| Nanning - Yulin                                  | CHINA   | 350                     | 2024 | 190                      |
| Datong - Ulanqab                                 | CHINA   | 250                     | 2024 | 122                      |
| Huairan East - Fanjiazhuang (b.s.)               | CHINA   | 250                     | 2024 | 133                      |
| Huai'an - Huairan East                           | CHINA   | 250                     | 2024 | 14                       |

Source: compiled by authors based on International Union of Railways

## 1.2 HIGH-SPEED LINES IN COMMERCIAL OPERATION WORLDWIDE

### High-speed lines in Africa

| LINE             | COUNTRY | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|------------------|---------|-------------------------|------|--------------------------|
| Tanger - Kenitra | MOROCCO | 320                     | 2018 | 186                      |

### High-speed lines in North America

| LINE   | COUNTRY | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|--|---------|-------------------------|------|--------------------------|
| NE Corridor (Boston - New York - Washington) | USA     | 240                     | 2000 | 735                      |

### High-speed lines in Middle East

| LINE  | COUNTRY      | MAXIMUM SPEED<br>(km/h) | YEAR | DISTANCE<br>(KILOMETRES) |
|---|--------------|-------------------------|------|--------------------------|
| Ankara - Eskişehir                            | TÜRKIYE      | 250                     | 2009 | 245                      |
| (Ankara) Polatli - Konya                      | TÜRKIYE      | 250                     | 2011 | 212                      |
| Eskişehir - İzmit - Pendik (Istanbul)         | TÜRKIYE      | 250                     | 2014 | 257                      |
| Kayseri North Passage                         | TÜRKIYE      | 160                     | 2016 | 23                       |
| Medina - Jeddah - Mecca                       | SAUDI ARABIA | 300                     | 2018 | 449                      |
| Konya - Karaman                               | TÜRKIYE      | 200                     | 2022 | 102                      |
| (Ankara) Kayaş - Balıçeyh (Kırıkkale) - Sivas | TÜRKIYE      | 300                     | 2023 | 393                      |

Source: compiled by authors based on International Union of Railways



INTERNATIONAL UNION  
OF RAILWAYS

**1. GLOBAL HIGH - SPEED DATA**

## **2. EUROPE**

**3. ASIA - PACIFIC**

**4. AFRICA**

**5. NORTH AMERICA**

**6. MIDDLE EAST**

**7. LATIN AMERICA**

**INDEX OF COUNTRIES**

## 2.1 HIGH-SPEED RAIL NETWORK



**AUSTRIA**  
**SWITZERLAND**

### High-speed lines in commercial operation in Austria

| LINE                                | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-------------------------------------|----------------------|------|-----------------------|
| Linz - Wels                         | 200                  | 1990 | 24                    |
| St. Pölten - Ybbs                   | 200                  | 2001 | 44                    |
| Amstetten - St. Valentin            | 200                  | 2003 | 37                    |
| St. Valentin - Asten-St. Florian    | 230                  | 2007 | 16                    |
| Vienna Knot Hadersdorf - St. Pölten | 230                  | 2012 | 50                    |
| Radfeld Knot - Baumkirchen Knot     | 220                  | 2012 | 36                    |
| Wels - Attnang-Puchheim             | 230                  | 2012 | 30                    |
| Ybbs - Amstetten                    | 230                  | 2016 | 17                    |
|                                     |                      |      | <b>Total km = 254</b> |

### High-speed lines under construction in Austria

| LINE                                 | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--------------------------------------|----------------------|------|-----------------------|
| Vienna Stadlau - Slovakian border    | 200                  | 2025 | 38                    |
| Vienna Inzersdorf Ort - Wr. Neustadt | 200                  | 2025 | 47                    |
| Graz - Klagenfurt                    | 250                  | 2025 | 122                   |
| Gloggnitz - Mürzzuschlag             | 230                  | 2026 | 28                    |
| Volders-Baumkirchen - Italian border | 250                  | 2027 | 46                    |
|                                      |                      |      | <b>Total km = 281</b> |

### High-speed lines planned in Austria

| LINE                       | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|----------------------------|----------------------|------|-----------------------|
| Linz - Wels                | 230                  | 2026 | 24                    |
| Gänserndorf - Czech border | 200                  | 2028 | 47                    |
|                            |                      |      | <b>Total km = 71</b>  |

### High-speed lines in commercial operation in Switzerland

| LINE   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Mattstetten - Rothrist                             | 200                  | 2004 | 41.7                  |
| Solothurn - Wanzwil                                | 200                  | 2004 | 10.6                  |
| Frutigen - Visp (Lötschberg base tunnel)           | 200                  | 2007 | 38.4                  |
| Erstfeld - Biasca (Gotthard base tunnel)           | 200                  | 2016 | 67.1                  |
| Giubiasco/S. Antonino - Vezia (Ceneri base tunnel) | 200                  | 2020 | 18.1                  |
|  |                      |      | <b>Total km = 176</b> |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in Austria and Switzerland



Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK



### BELGIUM THE NETHERLANDS

#### High-speed lines in commercial operation in Belgium

| LINE                     | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--------------------------|----------------------|------|-----------------------|
| Brussels - French border | 300                  | 1997 | 72                    |
| Leuven - Liège           | 300                  | 2002 | 65                    |
| Liège - German border    | 260                  | 2009 | 36                    |
| Antwerp - Dutch border   | 300                  | 2009 | 36                    |
|                          |                      |      | <b>Total km = 209</b> |

#### High-speed lines in commercial operation in The Netherlands

| LINE                                   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Hoofddorp - Rotterdam West             | 300                  | 2006 | 44.3                  |
| Rotterdam Lombardijen - Belgian border | 300                  | 2006 | 45.4                  |
|  |                      |      | <b>Total km = 90</b>  |

*Note: There are several TSR's (temporary speed restriction) on north section, so that maximum speed has been reduced to 80-120 km/h until end of 2025/beginning of 2026*  
*Source: compiled by authors based on International Union of Railways*

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in Belgium and The Netherlands



Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK



### CZECH REPUBLIC

#### High-speed lines under construction in Czech Republic

| LINE          | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---------------|----------------------|------|-----------------------|
| Brno - Přerov | 200                  | 2033 | 77                    |
|               |                      |      | <b>Total km = 77</b>  |

#### High-speed lines planned in Czech Republic

| LINE  | MAXIMUM SPEED (km/h) | YEAR  | DISTANCE (KILOMETRES) |
|---|----------------------|-------|-----------------------|
| Plzeň - Domažlice - German border               | 200                  | 2031  | 65                    |
| Rakvice - Břeclav                               | 200                  | 2032  | 15                    |
| Modřice - Rakvice                               | 320                  | 2033  | 44                    |
| Brodek u Přerova - Ostrava                      | 320                  | 2034  | 91                    |
| Prague-Vršovice/Prague-Libeň - Prague-Běchovice | 270                  | 2035  | 20                    |
| Prague-Běchovice - Poříčany                     | 320                  | 2035  | 36                    |
| Prague - Litoměřice                             | 320                  | 2035  | 52                    |
| Poříčany - Světlá nad Sázavou                   | 320                  | 2035  | 65                    |
| Světlá nad Sázavou - Velká Bíteš                | 320                  | 2036  | 100                   |
| Velká Bíteš - Brno                              | 320                  | 2036  | 41                    |
| Prague - Beroun                                 | 200                  | 2039  | 25                    |
| Ústí nad Labem - Dresden (Germany)              | 200                  | 2040  | 23                    |
| Ostrava - Bohumín - Polish border               | 250                  | >2040 | 11                    |
| Jaroměř - Náchod - Polish border                | 160                  | >2040 | 65                    |
|   |                      |       | <b>Total km = 653</b> |

#### High-speed lines with long-term planning in Czech Republic

| LINE                                     | MAXIMUM SPEED (km/h) | YEAR  | DISTANCE (KILOMETRES) |
|--|----------------------|-------|-----------------------|
| Odb. Veltrusy - Most                     | 250                  | >2040 | 85                    |
| Brno - Brodek u Přerova                  | 320                  | >2040 | 79                    |
| Poříčany - Hradec Králové / Pardubice    | 320                  | >2040 | 70                    |
| Hradec Králové - Trutnov - Polish border | 250                  | >2040 | 45                    |
| Litoměřice - Ústí nad Labem              | 270                  | >2040 | 29                    |
|  |                      |       | <b>Total km = 308</b> |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines planned and long-term planning in Czech Republic



Note:

Beroun-Plzeň is not a high-speed line but a modernization of existing line up to 160 km/h

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK



DENMARK  
ESTONIA  
FINLAND  
LATVIA  
LITHUANIA  
NORWAY  
SWEDEN

### High-speed lines in commercial operation in Denmark

| LINE                  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-----------------------|----------------------|------|-----------------------|
| Copenhagen - Ringsted | 250                  | 2019 | 56                    |
|                       |                      |      | <b>Total km = 56</b>  |

### High-speed lines under construction in Denmark

| LINE   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Ny Bane over Vestfyn (Odense Vest - Kavslunde) | 250                  | 2029 | 35                    |
|  |                      |      | <b>Total km = 35</b>  |

### High-speed lines under construction in Estonia

| LINE                     | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--------------------------|----------------------|------|-----------------------|
| Tallinn - Latvian border | 249                  | 2030 | 213                   |
|                          |                      |      | <b>Total km = 213</b> |

### High-speed lines in commercial operation in Finland

| LINE                    | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|-------------------------|----------------------|------|-------------------------|
| Helsinki - Turku        | 200                  | 1995 | 156                     |
| Helsinki - Oulu         | 200                  | 2001 | 673                     |
| Jämsänkoski - Jyväskylä | 200                  | 2001 | 53                      |
| Kinni - Otava           | 200                  | 2006 | 44                      |
| Kerava - Lahti          | 220                  | 2006 | 63                      |
| Lahti - Luumäki         | 200                  | 2009 | 131                     |
|                         |                      |      | <b>Total km = 1,120</b> |

### High-speed lines planned in Finland

| LINE                                     | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Helsinki - Porvoo - Kouvola - Vainikkala | -                    | 2030 | 238                   |
| Helsinki - Turku                         | 300                  | 2031 | 156                   |
|  |                      |      | <b>Total km = 394</b> |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines under construction in Latvia

| LINE                                | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-------------------------------------|----------------------|------|-----------------------|
| Estonian border - Lithuanian border | 249                  | 2030 | 265                   |
|                                     |                      |      | <b>Total km = 265</b> |

### High-speed lines under construction in Lithuania

| LINE                           | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--------------------------------|----------------------|------|-----------------------|
| Latvian border - Polish Border | 249                  | 2030 | 252                   |
| Kaunas - Vilnius               | 249                  | 2032 | 109                   |
|                                |                      |      | <b>Total km = 361</b> |

### High-speed lines under construction in Norway

| LINE                 | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|----------------------|----------------------|------|-----------------------|
| Kleverud - Åkersvika | 250                  | -    | 30                    |
| Nykirke - Barkåker   | 250                  | -    | 14                    |
| Sandbukta - Såstad   | 250                  | -    | 10                    |
|                      |                      |      | <b>Total km = 54</b>  |

### High-speed lines with long-term planning in Norway

| LINE                | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---------------------|----------------------|------|-----------------------|
| Stokke - Sandefjord | 250                  | -    | 13                    |
|                     |                      |      | <b>Total km = 13</b>  |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in Sweden

| LINE                 | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|----------------------|----------------------|------|-----------------------|
| Stockholm - Örebro   | 200                  | 1999 | 187                   |
| Gothenburg - Lund    | 200                  | 2008 | 283                   |
| Nyland - Umeå        | 200                  | 2009 | 180                   |
| Sundsvall - Nyland   | 200                  | 2010 | 30                    |
| Gothenburg - Korsnäs | 200                  | 2012 | 180                   |
| Lund - Arlöv         | 200                  | 2023 | 11                    |
| Ängelholm - Maria    | 200                  | 2023 | 24                    |
|                      |                      |      | <b>Total km = 895</b> |

### High-speed lines under construction in Sweden

|                                  |     |      |                       |
|----------------------------------|-----|------|-----------------------|
| Umeå - Dävå                      | 250 | 2025 | 12                    |
| Varberg - Hamra (Varbergstunnel) | 200 | 2025 | 7                     |
| Järna - Linköping (East Link)    | 250 | 2035 | 160                   |
|                                  |     |      | <b>Total km = 179</b> |

### High-speed lines planned in Sweden

| LINE                | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---------------------|----------------------|------|-----------------------|
| Myrbacken - Uppsala | 200                  | 2029 | 30                    |
| Dävå - Skellefteå   | 250                  | 2033 | 120                   |
| Skellefteå - Luleå  | 250                  | 2045 | 140                   |
| Gothenburg - Borås  | 250                  | -    | 60                    |
|                     |                      |      | <b>Total km = 350</b> |

### High-speed lines long-term planning in Sweden

| LINE                  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-----------------------|----------------------|------|-----------------------|
| Dingersjö - Sundsvall | 250                  | 2028 | 14                    |
| Gävle - Kringlan      | 200                  | 2032 | 40                    |
|                       |                      |      | <b>Total km = 54</b>  |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in Denmark, Estonia, Finland, Latvia, Lithuania, Norway and Sweden



Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK



### FRANCE

#### High-speed lines in commercial operation in France

| LINE   | MAXIMUM SPEED (km/h) | YEAR        | DISTANCE (KILOMETRES)   |
|--|----------------------|-------------|-------------------------|
| LGV Paris Sud-Est                                  | 300                  | 1981 / 1983 | 425                     |
| LGV Atlantique                                     | 300                  | 1989 / 1990 | 292                     |
| LGV Rhône - Alpes (rail bypass of Lyon)            | 300                  | 1992 / 1994 | 122                     |
| Calais - Folkstone (Channel Tunnel French section) | 160                  | 1994        | 25                      |
| LGV Nord (inc. London - Brussels link)             | 300                  | 1994 / 1996 | 346                     |
| LGV Interconnexion Est IDF                         | 300                  | 1994 / 1996 | 105                     |
| LGV Méditerranée                                   | 300                  | 2001        | 259                     |
| LGV Est Europe (first phase)                       | 320                  | 2007        | 335                     |
| Perpignan - Spanish border (Figueres)              | 300                  | 2010        | 24                      |
| LGV Rhin-Rhône Branche Est (first phase)           | 320                  | 2011        | 146                     |
| LGV Est Europe (second phase)                      | 320                  | 2016        | 122                     |
| LGV Bretagne Pays de la Loire (BPL)                | 320                  | 2017        | 219                     |
| LGV Tours - Bordeaux (SEA)                         | 320                  | 2017        | 340                     |
|  |                      |             | <b>Total km = 2,760</b> |

#### High-speed lines under construction in France

| LINE                            | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---------------------------------|----------------------|------|-----------------------|
| Lyon - Italian Border - (Turin) | 300                  | 2032 | 189                   |
|                                 |                      |      | <b>Total km = 189</b> |

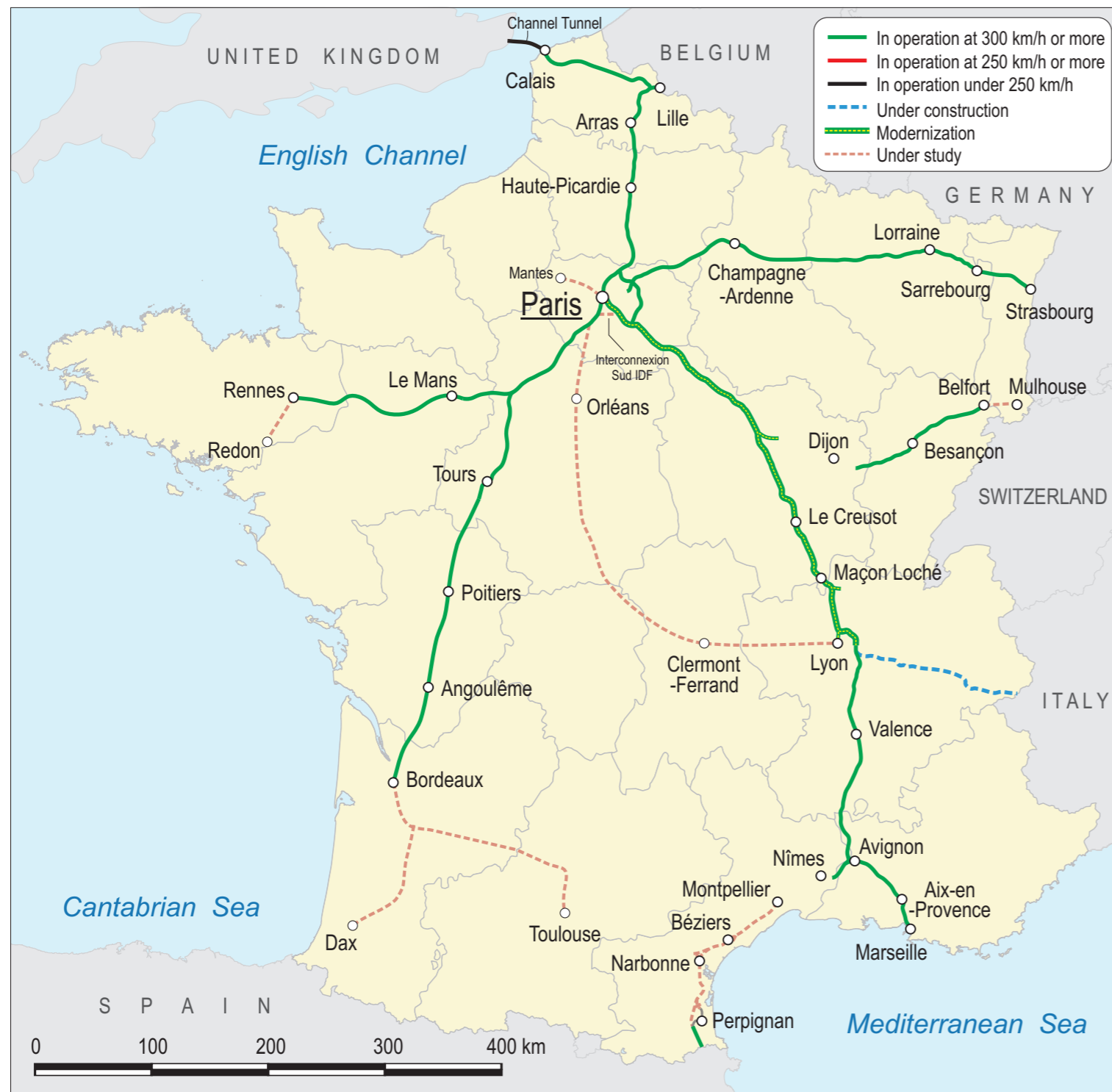
#### High-speed lines under study in France

| LINE  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|---|----------------------|------|-------------------------|
| Modernisation of HSL Paris-Lyon and Lyon bypass | 300                  | 2025 | 483                     |
| Paris - Normandie (LNPN) (first phase)          | 250                  | -    | 59                      |
| LGV Bordeaux - Toulouse / Dax (GPSO)            | 320                  | -    | 327                     |
| Interconnexion des LGV au sud de l'IDF          | 320                  | -    | 31                      |
| Paris - Orléans - Clermont-F. - Lyon (POCL)     | 320                  | -    | 540                     |
| Montpellier - Perpignan (LNMP)                  | 320                  | -    | 155                     |
| Ligne nouvelle Rennes-Redon                     | 300                  | -    | 80                      |
| LGV Rhin-Rhône Branche Est (second phase)       | 320                  | -    | 50                      |
|   |                      |      | <b>Total km = 1,242</b> |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in France



Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK



### GERMANY

#### High-speed lines in commercial operation in Germany

| LINE                                      | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|---|----------------------|------|-------------------------|
| Hannover - Würzburg                       | 250                  | 1991 | 327                     |
| Mannheim - Stuttgart                      | 250                  | 1991 | 99                      |
| Hannover - Berlin                         | 250                  | 1998 | 258                     |
| Cologne - Frankfurt                       | 300                  | 2002 | 177                     |
| Cologne - Aachen                          | 250                  | 2002 | 70                      |
| Hamburg - Berlin                          | 230                  | 2004 | 286                     |
| Karlsruhe - Basel (Switzerland)           | 230                  | 2004 | 182                     |
| Nuremberg - Ingolstadt                    | 300                  | 2006 | 89                      |
| Munich - Augsburg                         | 230                  | 2011 | 62                      |
| (Karlsruhe) - Katzenberg Tunnel - (Basel) | 250                  | 2012 | 18                      |
| Erfurt - Leipzig/Halle                    | 300                  | 2015 | 123                     |
| Ebensfeld - Erfurt                        | 300                  | 2017 | 107                     |
| Nuremberg - Ebensfeld                     | 230                  | 2017 | 83                      |
| Wendlingen - Ulm                          | 250                  | 2022 | 60                      |
|   |                      |      | <b>Total km = 1,941</b> |

#### High-speed lines under construction in Germany

| LINE                            | MAXIMUM SPEED (km/h) | YEAR  | DISTANCE (KILOMETRES) |
|---------------------------------|----------------------|-------|-----------------------|
| Stuttgart - Wendlingen          | 250                  | 2025  | 30                    |
| Frankfurt - Mannheim            | 300                  | 2030s | 60                    |
| Karlsruhe - Basel (Switzerland) | 250                  | 2030s | 182                   |
|                                 |                      |       | <b>Total km = 272</b> |

#### High-speed lines planned in Germany

| LINE                        | MAXIMUM SPEED (km/h) | YEAR  | DISTANCE (KILOMETRES) |
|-----------------------------|----------------------|-------|-----------------------|
| Fulda - Gerstungen          | 230                  | 2030s | 80                    |
| Ulm - Augsburg              | 250                  | 2030s | 70                    |
| Munich - Kufstein (Austria) | 230                  | 2030s | 60                    |
| Hannover - Bielefeld        | 300                  | 2040s | 70                    |
| Hamburg - Hannover          | 250                  | 2040s | 150                   |
| Gelnhausen - Fulda          | 300                  | 2040s | 45                    |
|                             |                      |       | <b>Total km = 475</b> |

Note: For HSL Hannover-Würzburg, the first sections Fulda-Würzburg and Edesheim-Nörten were put in service in 1988, but the complete line was put in service in 1991  
Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in Germany



Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK



**HUNGARY**  
**SERBIA**

### High-speed lines planned in Hungary

| LINE                      | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---------------------------|----------------------|------|-----------------------|
| Budapest - Serbian border | 200                  | -    | 164                   |
|                           |                      |      | <b>Total km = 164</b> |

### High-speed lines in operation in Serbia

| LINE                               | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|------------------------------------|----------------------|------|-----------------------|
| Belgrade - Stara Pazova - Novi Sad | 200                  | 2022 | 78                    |
|                                    |                      |      | <b>Total km = 78</b>  |

### High-speed lines under construction in Serbia

| LINE                                   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Novi Sad - Subotica - Hungarian border | 200                  | -    | 108                   |
|  |                      |      | <b>Total km = 108</b> |

### High-speed lines planned in Serbia

| LINE           | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|----------------|----------------------|------|-----------------------|
| Belgrade - Niš | 200                  | -    | 204                   |
|                |                      |      | <b>Total km = 204</b> |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in Hungary and Serbia



Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK



### ITALY

#### High-speed lines in commercial operation in Italy

| LINE                        | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|-----------------------------|----------------------|------|-------------------------|
| Rome - Florence             | 250                  | 1977 | 271                     |
| Turin - Milan               | 300                  | 2006 | 132                     |
| Padova - Venice             | 220                  | 2007 | 26                      |
| Milan - Bologna             | 300                  | 2008 | 238                     |
| Naples - Salerno            | 250                  | 2008 | 38                      |
| Rome - Naples               | 300                  | 2009 | 233                     |
| Florence - Bologna          | 300                  | 2009 | 91                      |
| Milan (Treviglio) - Brescia | 300                  | 2016 | 68                      |
|                             |                      |      | <b>Total km = 1,097</b> |

#### High-speed lines under construction in Italy

| LINE                           | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--------------------------------|----------------------|------|-----------------------|
| Turin - French Border - (Lyon) | 300                  | 2032 | 81                    |
| Genoa - Milan (Tortona)        | 250                  | -    | 53                    |
| Brescia - Verona               | 300                  | -    | 45                    |
| Naples - Bari                  | 200                  | -    | 145                   |
| Verona - Padova                | 300                  | -    | 79                    |
|                                |                      |      | <b>Total km = 403</b> |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in Italy



Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK



### POLAND

#### High-speed lines in commercial operation in Poland

| LINE                            | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---------------------------------|----------------------|------|-----------------------|
| Grodzisk Mazowiecki - Zawiercie | 200                  | 2015 | 224                   |
|                                 |                      |      | <b>Total km = 224</b> |

#### High-speed lines planned in Poland

| LINE                                   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Warsaw - Poznan / Wrocław              | 350                  | 2030 | 448                   |
| Warsaw - Białystok - Elk               | 200                  | 2030 | 277                   |
| Elk - Lithuanian border (Rail Baltica) | 250                  | 2030 | 80                    |
|  |                      |      | <b>Total km = 805</b> |

#### High-speed lines with long-term planning in Poland

| LINE                         | MAXIMUM SPEED (km/h) | YEAR  | DISTANCE (KILOMETRES) |
|------------------------------|----------------------|-------|-----------------------|
| Knapówka - Katowice / Kraków | 300                  | >2030 | 138                   |
| Wrocław - Czech border       | 350                  | >2030 | 148                   |
| Poznan - German border       | 350                  | >2030 | 171                   |
| Katowice - Czech border      | 300                  | >2030 | 61                    |
| Warsaw - Toruń - Gdańsk      | 350                  | >2030 | 357                   |
|                              |                      |       | <b>Total km = 875</b> |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in Poland



Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK



**PORTUGAL  
SPAIN**

### High-speed lines under construction in Portugal

| LINE         | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)  |
|--------------|----------------------|------|------------------------|
| Évora - Caia | 250                  | 2026 | 79.5                   |
|              |                      |      | <b>Total km = 79.5</b> |

### High-speed lines planned in Portugal

| LINE               | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--------------------|----------------------|------|-----------------------|
| Lisbon - Porto HS  | 300                  | 2030 | 306                   |
| Porto - Valença HS | 250                  | 2030 | 112                   |
| Lisbon - Évora     | 300                  | 2034 | 124                   |
|                    |                      |      | <b>Total km = 542</b> |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in Spain

| LINE                                      | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|---|----------------------|------|-------------------------|
| Madrid - Sevilla                          | 270                  | 1992 | 471                     |
| Madrid - Lleida                           | 300                  | 2003 | 467                     |
| Zaragoza - Huesca                         | 200                  | 2003 | 79                      |
| (Madrid -) La Sagra - Toledo              | 220                  | 2005 | 21                      |
| Córdoba - Antequera-Santa Ana             | 300                  | 2006 | 111                     |
| Lleida - Camp de Tarragona                | 300                  | 2006 | 96                      |
| Madrid - Segovia - Olmedo - Valladolid    | 300                  | 2007 | 178                     |
| Antequera-Santa Ana - Málaga              | 300                  | 2007 | 58                      |
| Camp de Tarragona - Barcelona             | 300                  | 2008 | 100                     |
| Bypass Madrid                             | 200                  | 2009 | 5                       |
| Santiago - A Coruña                       | 250                  | 2009 | 61                      |
| (Madrid -) Torrejón de Velasco - Valencia | 300                  | 2010 | 362                     |
| Bif. Albacete - Albacete                  | 300                  | 2010 | 73                      |
| Figueres - French border (- Perpignan)    | 300                  | 2010 | 20                      |
| Ourense - Santiago                        | 300                  | 2011 | 85                      |
| Bypass Yeles                              | 200                  | 2012 | 6                       |
| Barcelona - Figueres                      | 300                  | 2013 | 131                     |
| Albacete - Alicante/Alacant               | 300                  | 2013 | 165                     |
| Santiago - Vigo                           | 200                  | 2015 | 95                      |
| Sevilla - Cádiz                           | 250                  | 2015 | 153                     |
| Valladolid - León                         | 300                  | 2015 | 166                     |
| Olmedo - Zamora                           | 300                  | 2015 | 99                      |
| Valencia - Vandellós                      | 220                  | 2019 | 219                     |
| Antequera-Santa Ana - Granada             | 250                  | 2019 | 109                     |
| Vandellós - Tarragona                     | 200                  | 2020 | 47                      |
| Zamora - Pedralba                         | 300                  | 2020 | 110                     |
| Bif. Murcia - Orihuela - Beniel           | 240                  | 2021 | 54                      |
| Pedralba - Ourense                        | 300                  | 2021 | 119                     |
| Beniel - Murcia                           | 240                  | 2022 | 16                      |
| Venta de Baños - Burgos                   | 300                  | 2022 | 91                      |
| Plasencia - Badajoz                       | 200                  | 2022 | 142                     |
| Chamartín - Atocha new tunnel             | 120                  | 2022 | 7                       |
| León - Pola de Lena (Pajares New pass)    | 250                  | 2023 | 76                      |
|   |                      |      | <b>Total km = 3,993</b> |

Source: compiled by authors based on International Union of Railways and Spanish Ministry of Transport

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines under construction in Spain

| LINE                                     | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Talayuela - Navalmoral - Plasencia       | 300                  | 2025 | 69                    |
| Vitoria Gasteiz - Bilbao / San Sebastián | 250                  | 2028 | 175                   |
| Murcia - Almería                         | 300                  | -    | 188                   |
| Castejón - Pamplona                      | 300                  | -    | 75                    |
| La Encina - Valencia                     | 300                  | -    | 107                   |
| Palencia - Alar del Rey                  | 300                  | -    | 82                    |
|  |                      |      | <b>Total km = 696</b> |

### High-speed lines planned in Spain

| LINE                   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|------------------------|----------------------|------|-----------------------|
| Burgos - Vitoria       | 300                  | -    | 110                   |
| Madrid - Talayuela     | 300                  | -    | 223                   |
| Alar del Rey - Reinosa | 300                  | -    | 44                    |
| Sevilla - Huelva       | 300                  | -    | 102                   |
| Teruel - Zaragoza      | 250                  | -    | 166                   |
| Castejón - Logroño     | 220                  | -    | 76                    |
| Valencia - Castellón   | 300                  | -    | 68                    |
|                        |                      |      | <b>Total km = 789</b> |

Source: compiled by authors based on International Union of Railways and Spanish Ministry of Transport

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in Portugal and Spain



Source: compiled by authors based on International Union of Railways and Spanish Ministry of Transport

## 2.1 HIGH-SPEED RAIL NETWORK



**RUSSIA**

### *High-speed lines under study in Russia*

| LINE                    | MAXIMUM SPEED (km/h) | YEAR      | DISTANCE (KILOMETRES) |
|-------------------------|----------------------|-----------|-----------------------|
| Moscow - St. Petersburg | 350                  | 2027-2028 | 674                   |
|                         |                      |           | <b>Total km = 674</b> |

*Source: compiled by authors based on International Union of Railways*

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in Russia



Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK



### UNITED KINGDOM

#### High-speed lines in commercial operation in the United Kingdom

| LINE  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---|----------------------|------|-----------------------|
| Calais - Folkstone (Channel Tunnel British section) | 160                  | 1994 | 25                    |
| Fawkham Junction - Channel Tunnel                   | 300                  | 2003 | 74                    |
| London - Southfleet Junction                        | 230                  | 2007 | 39                    |
|   |                      |      | <b>Total km = 138</b> |

#### High-speed lines under construction in the United Kingdom

| LINE                | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---------------------|----------------------|------|-----------------------|
| London - Birmingham | 360                  | 2026 | 225                   |
|                     |                      |      | <b>Total km = 225</b> |

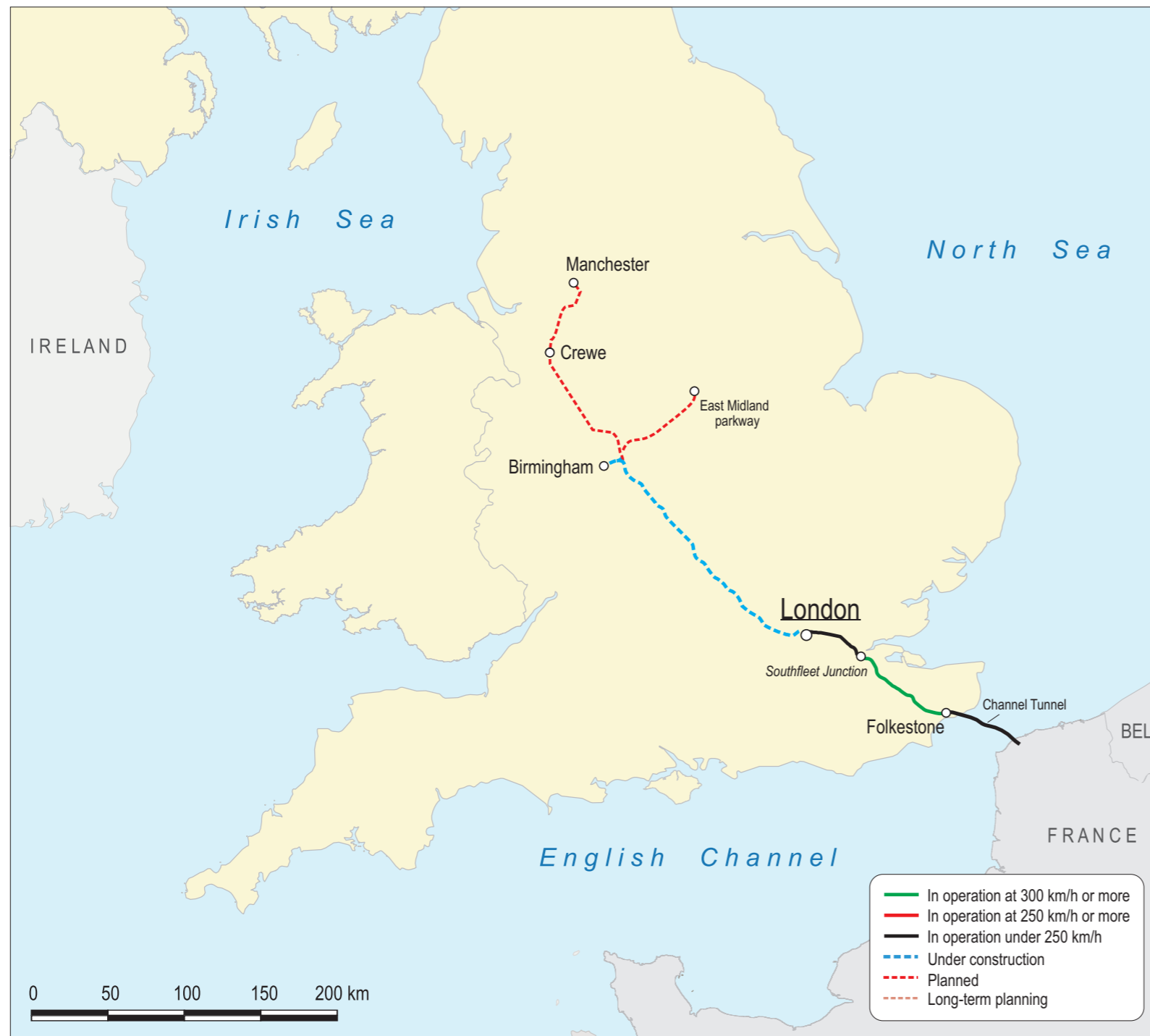
#### High-speed lines planned in the United Kingdom

| LINE                              | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-----------------------------------|----------------------|------|-----------------------|
| Birmingham - Crewe                | 300                  | 2029 | 60                    |
| Crewe - Manchester                | 300                  | 2035 | 43                    |
| Birmingham - East Midland parkway | -                    | 2040 | 65                    |
|                                   |                      |      | <b>Total km = 168</b> |

Source: compiled by authors based on International Union of Railways

## 2.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in the United Kingdom



Source: compiled by authors based on International Union of Railways and HS2 railway website ([www.hs2.org.uk](http://www.hs2.org.uk))

Note:

<sup>(1)</sup> HS2 is expected to be extended to the North (Scotland, via Crewe) and East (Leeds and Nottingham), but there is no further information up to now

## 2.2 GROWTH OF THE HIGH-SPEED NETWORK

### High-speed network development in Europe (2024)



Source: compiled by authors based on International Union of Railways

## 2.2 GROWTH OF THE HIGH-SPEED NETWORK

Detailed zoom of Paris



PARIS

Source: compiled by authors based on International Union of Railways

Detailed zoom of Berlin



BERLIN

Source: compiled by authors based on International Union of Railways

Detailed zoom of Madrid



MADRID

Source: compiled by authors based on International Union of Railways

Detailed zoom of Rome

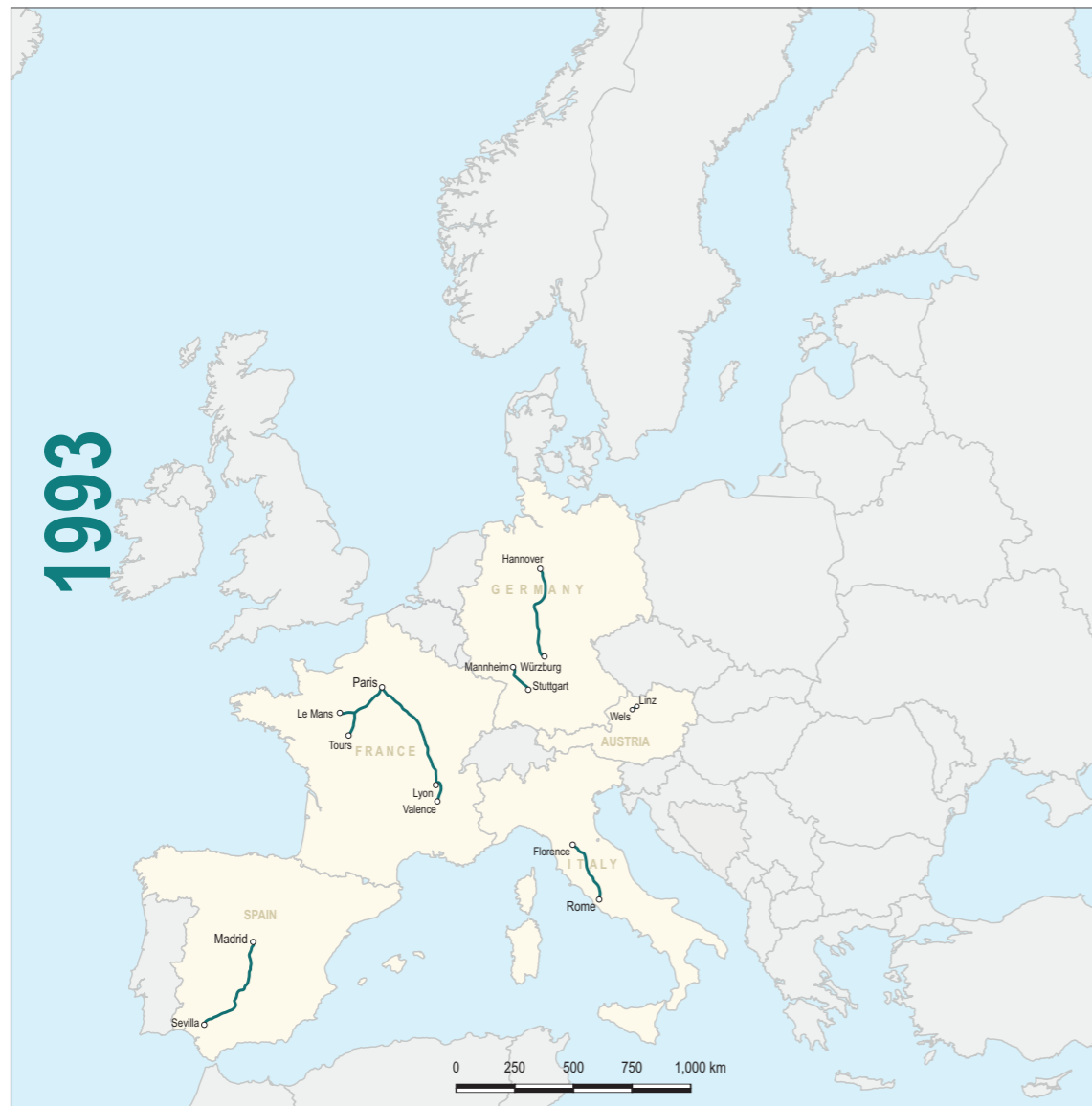


ROME

Source: compiled by authors based on International Union of Railways

## 2.2 GROWTH OF THE HIGH-SPEED NETWORK

Growth of the high-speed network in Europe: 1993, 2006, 2010 and 2024



Source: compiled by authors based on International Union of Railways

Countries with high-speed:

Italy, France, Austria, Germany, and Spain

2,031 kilometres



Source: compiled by authors based on International Union of Railways

Countries with high-speed:

Italy, France, Austria, Germany, Spain, Finland, Belgium, Sweden, United Kingdom, Switzerland and The Netherlands

6,369 kilometres



## 2.2 GROWTH OF THE HIGH-SPEED NETWORK

Growth of the high-speed network in Europe: 1993, 2006, 2010 and 2024



Source: compiled by authors based on International Union of Railways

### Countries with high-speed:

Italy, France, Austria, Germany, Spain, Finland, Belgium, Sweden, United Kingdom, Switzerland and The Netherlands

9,001 kilometres



Source: compiled by authors based on International Union of Railways

### Countries with high-speed:

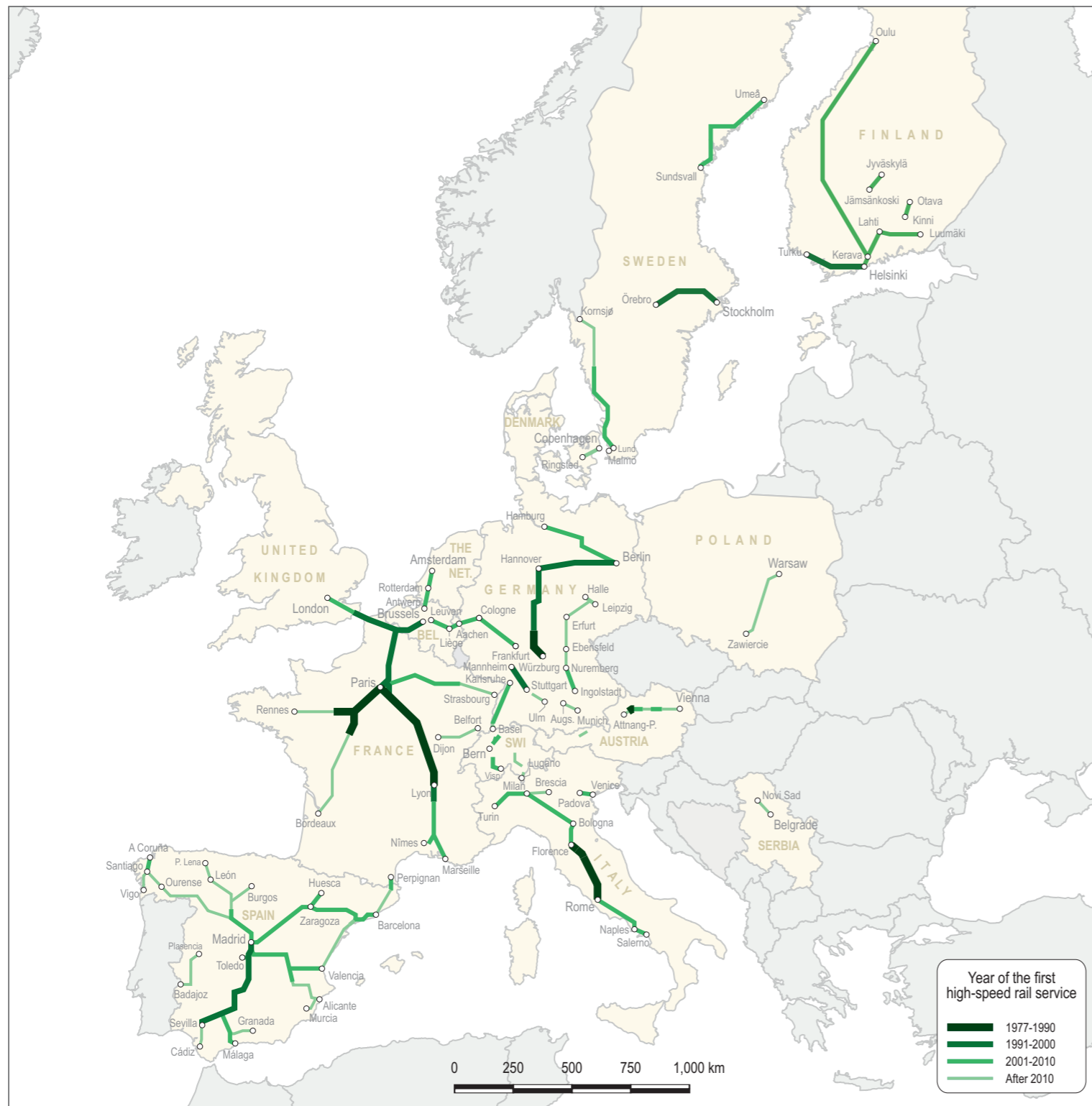
Italy, France, Austria, Germany, Spain, Finland, Belgium, Sweden, United Kingdom, Switzerland, The Netherlands, Poland, Denmark and Serbia

13,031 kilometres



## 2.2 GROWTH OF THE HIGH-SPEED NETWORK

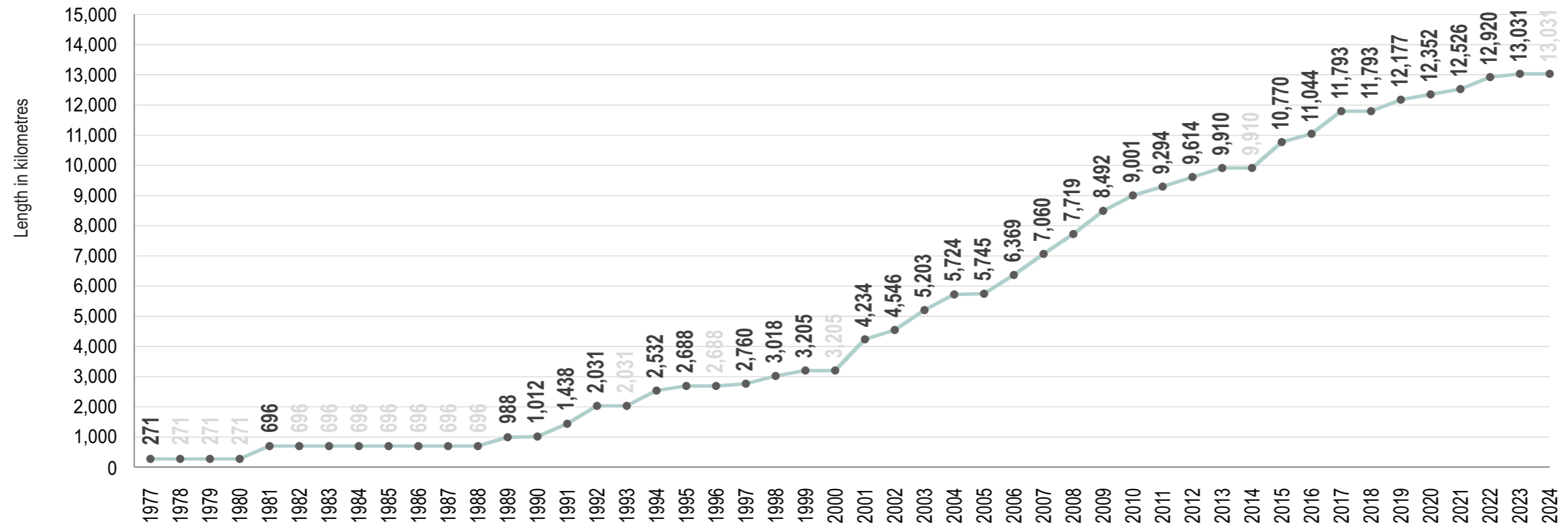
Chronological map of the high-speed rail network in Europe



Source: compiled by authors based on International Union of Railways

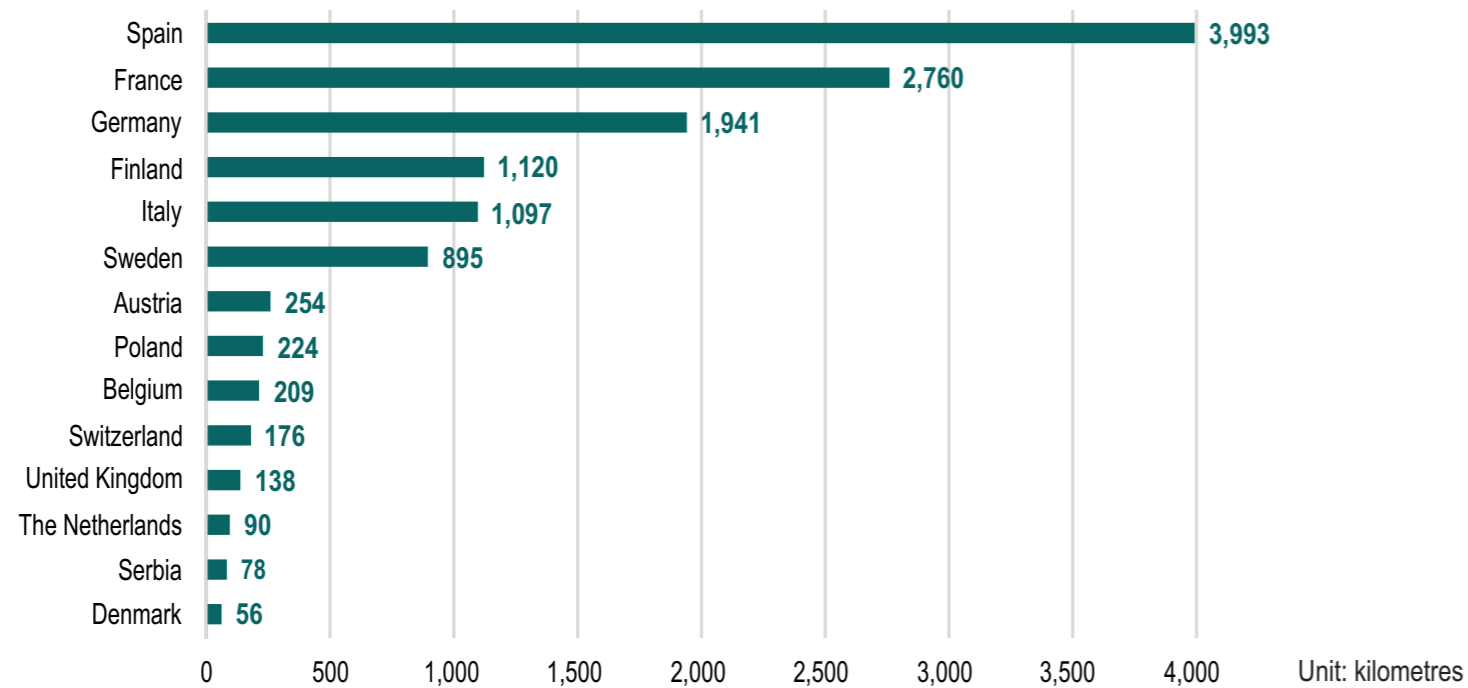
## 2.2 GROWTH OF THE HIGH-SPEED NETWORK

Length of the high-speed network in commercial operation in Europe (1977-2024)



Source: compiled by authors based on International Union of Railways

Length of the high-speed network in commercial operation in Europe by country (2024)



Source: compiled by authors based on International Union of Railways

## 2.3 CHARACTERISTICS AND EQUIPMENT

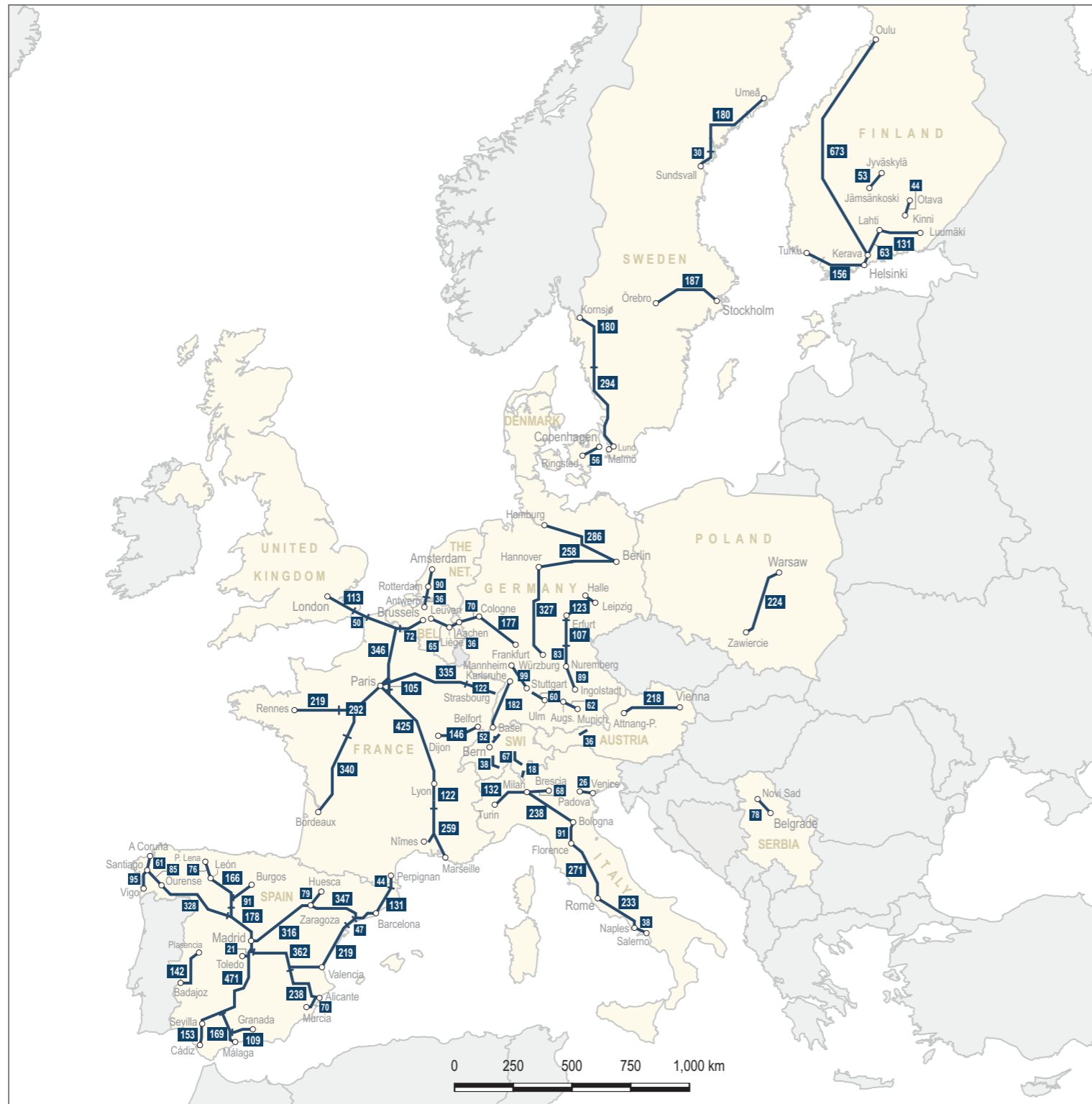
### Maximum commercial speed



Source: compiled by authors based on International Union of Railways

## 2.3 CHARACTERISTICS AND EQUIPMENT

### Distance (kilometres)



Source: compiled by authors based on International Union of Railways

## 2.3 CHARACTERISTICS AND EQUIPMENT

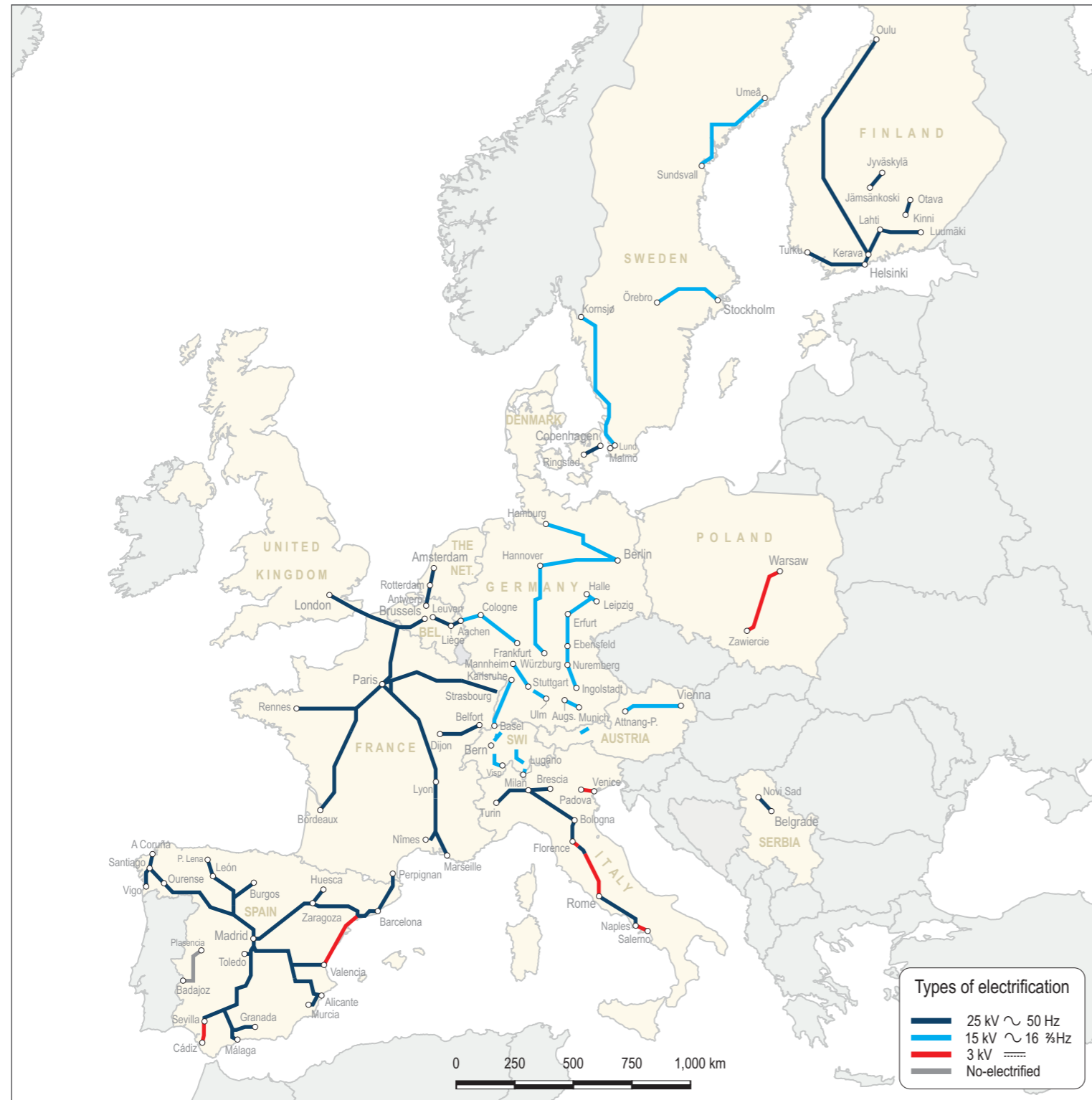
### Maximum slope (‰)



Source: compiled by authors based on International Union of Railways

## 2.3 CHARACTERISTICS AND EQUIPMENT

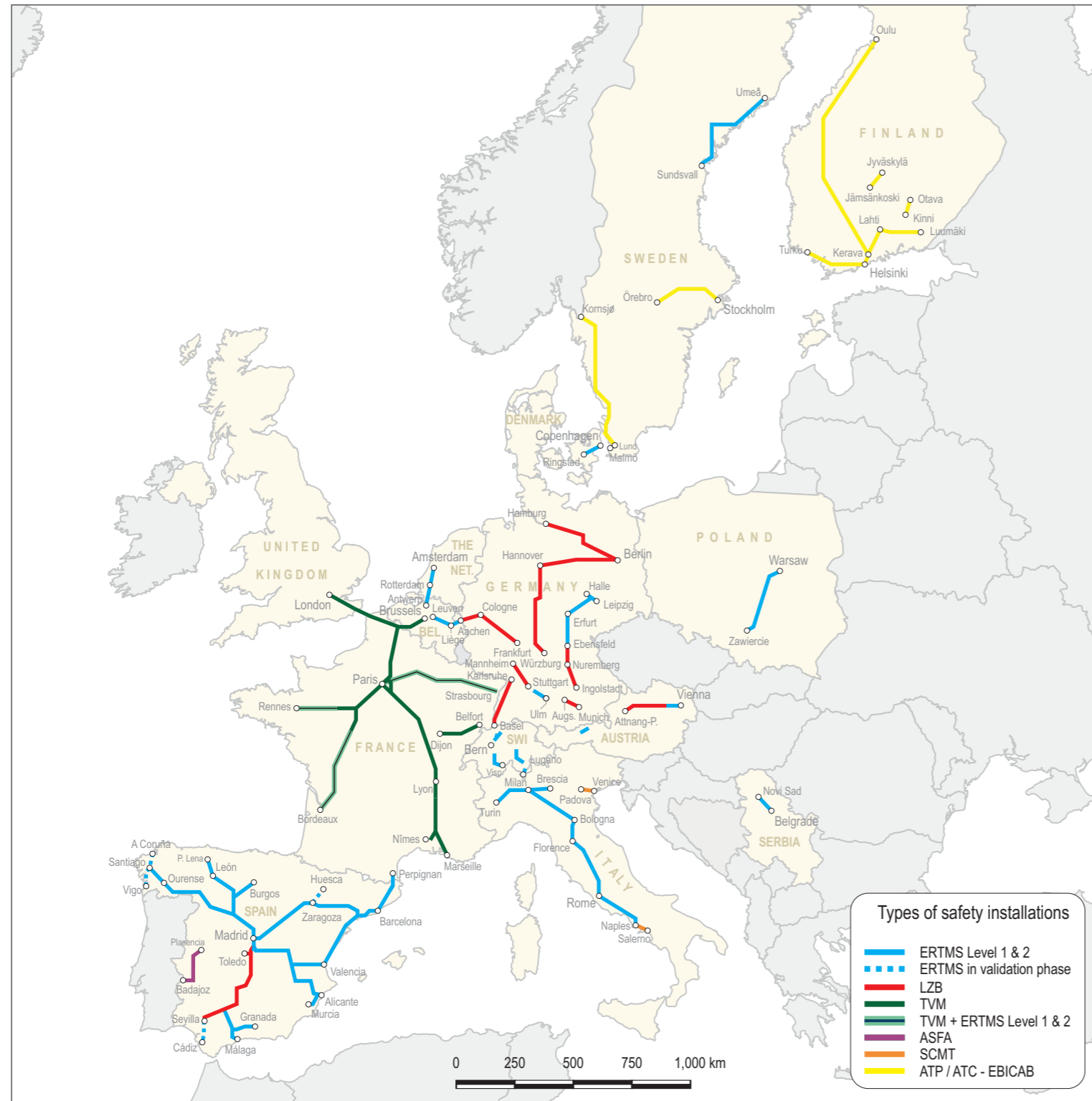
### Electrification



Source: compiled by authors based on International Union of Railways

## 2.3 CHARACTERISTICS AND EQUIPMENT

### Signalling



Source: compiled by authors based on International Union of Railways

## 2.3 CHARACTERISTICS AND EQUIPMENT

### Centralized Traffic Control (CTC)



Source: International Union of Railways. For United Kingdom, Austria and Denmark, miscellaneous data sources

Note: In Poland, CMK line does not have a centralized control traffic system. Traffic is controlled by local centers located in the frame existing stations.

## 2.3 CHARACTERISTICS AND EQUIPMENT

### High-speed rolling stock workshops



Source: International Union of Railways. For United Kingdom, Belgium and Austria, miscellaneous data sources

## 2.3 CHARACTERISTICS AND EQUIPMENT

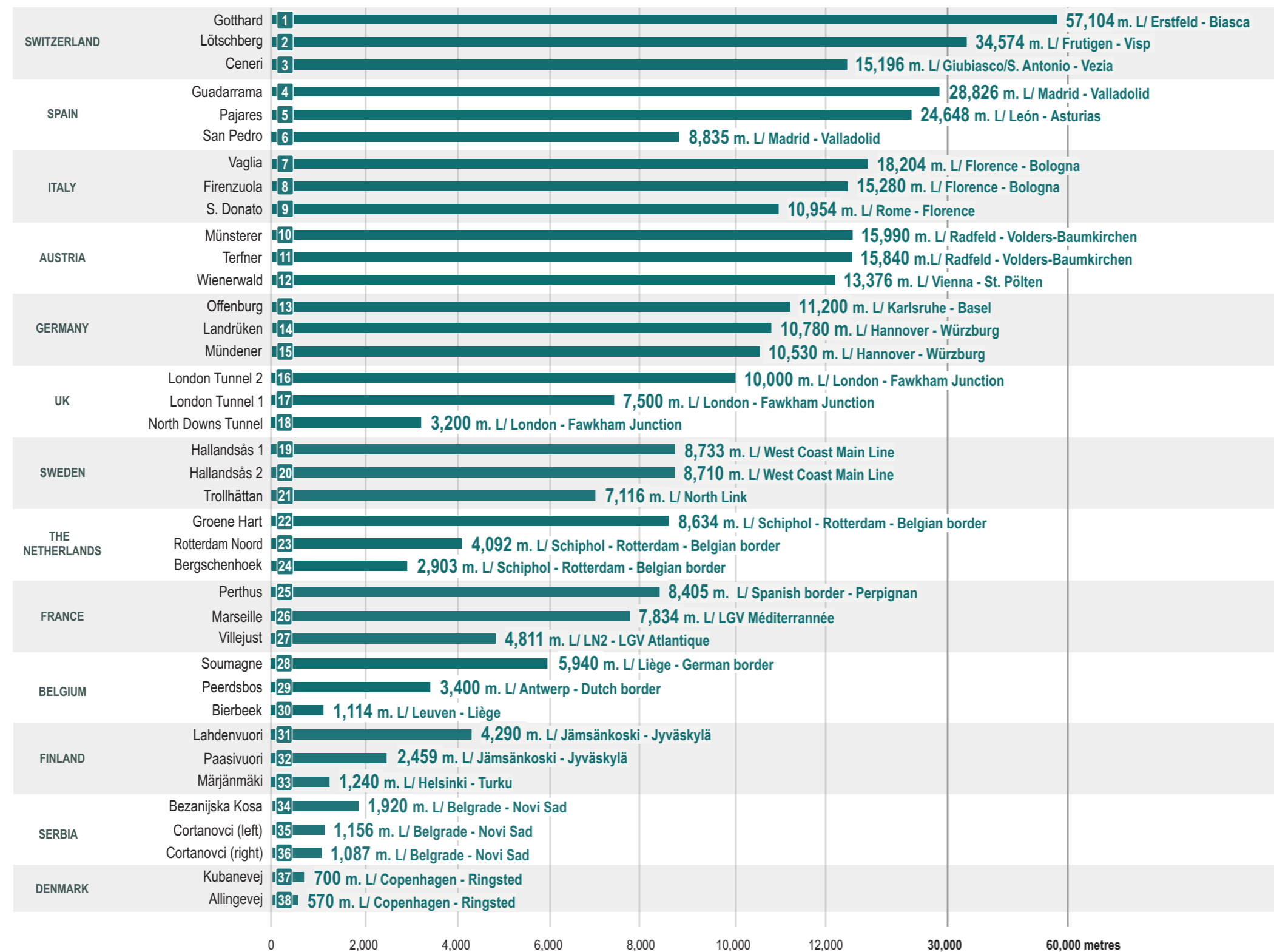
### High-speed rolling stock main factories



Source: International Union of Railways

## 2.3 CHARACTERISTICS AND EQUIPMENT

### Longest tunnels of the high-speed rail network in Europe



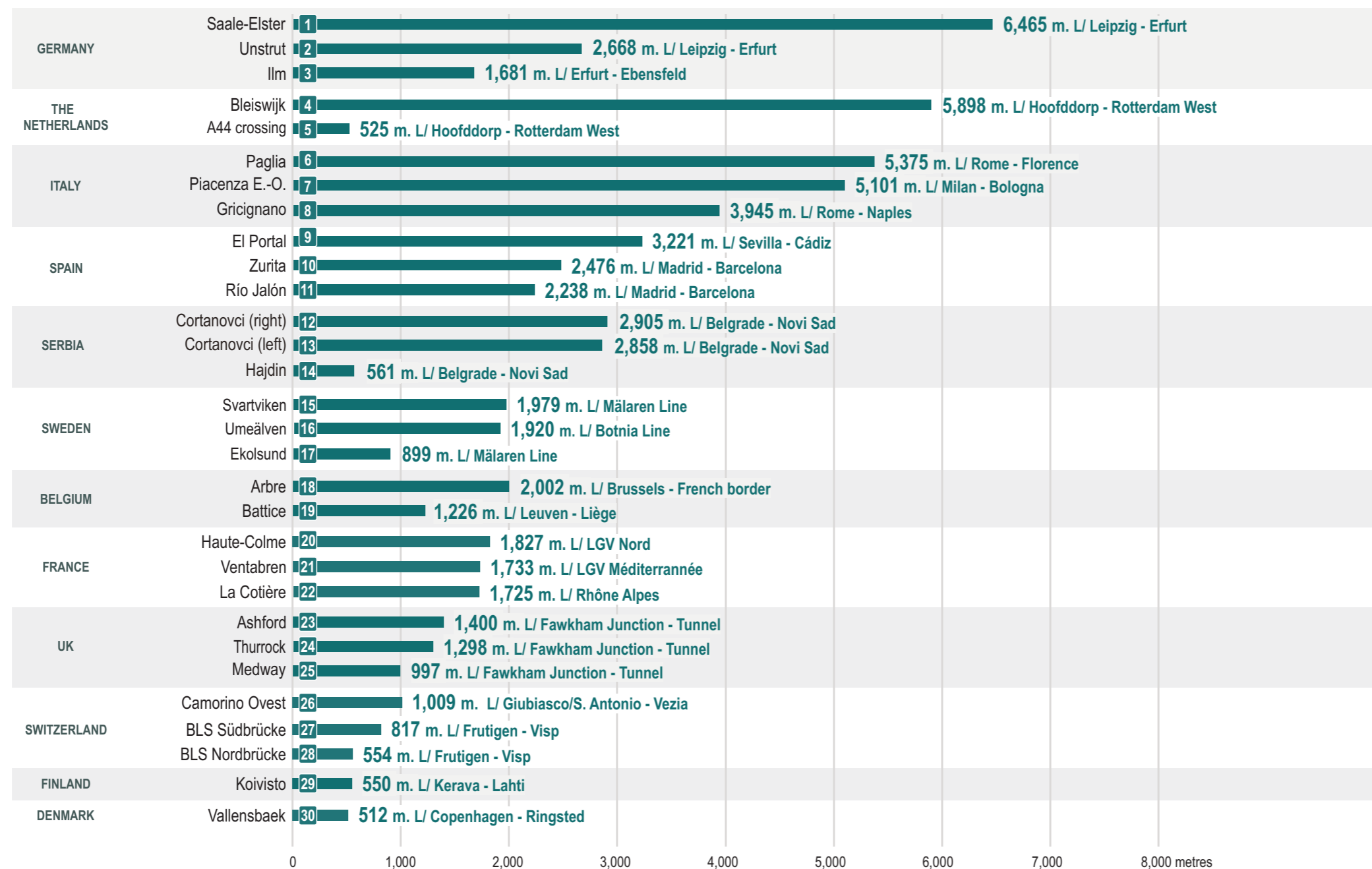
Source: International Union of Railways. For United Kingdom and Belgium, miscellaneous data sources

Note: Apart from domestic high-speed tunnels, Channel Tunnel Calais-Folkestone (50.450 km) is included in the map on page 83



## 2.3 CHARACTERISTICS AND EQUIPMENT

### Longest viaducts of the high-speed rail network in Europe



Note: There is another viaduct in Sweden to be considered: Igelsta (2,038 m; Södertälje, West Line, not currently identified as HSL)

Source: International Union of Railways. For United Kingdom and Belgium, miscellaneous data sources

## 2.3 CHARACTERISTICS AND EQUIPMENT

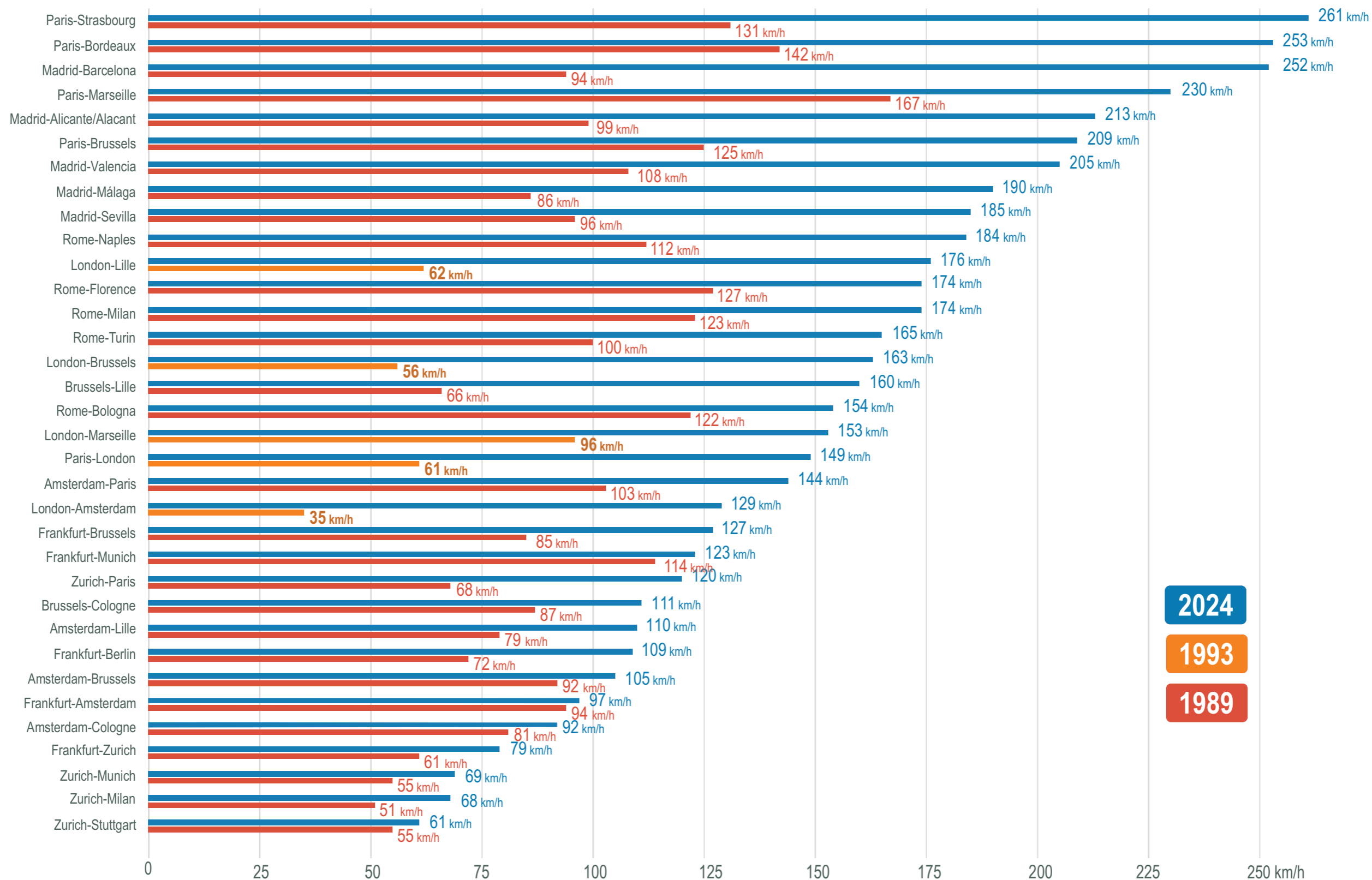
### Longest viaducts of the high-speed rail network in Europe



Source: International Union of Railways. For United Kingdom and Belgium, miscellaneous data sources

## 2.4 SPEED AND TRAVEL TIMES

Evolution of average speed on European high-speed lines

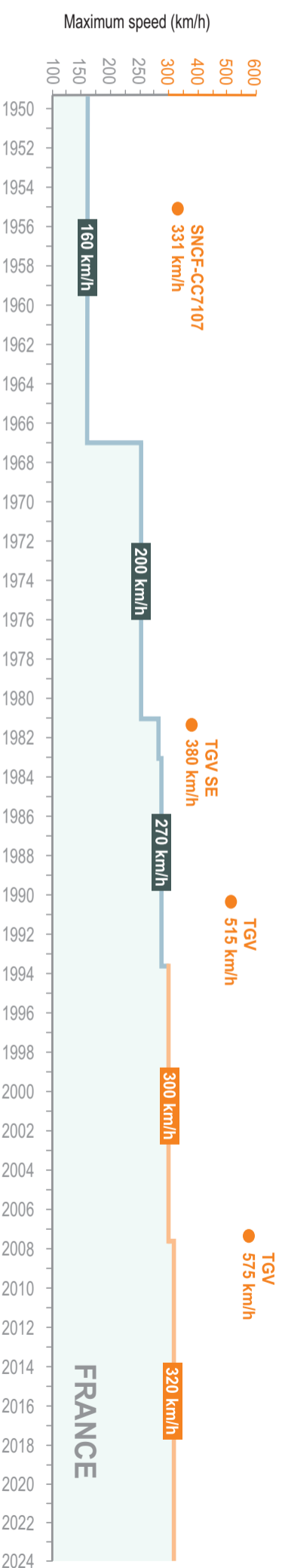


Source: compiled by authors based on "European Timetable" Thomas Cook Travel Guides 1989, Railway Operators websites, British Rail Timetable 1993 and Indicateur Horaires Ville à Ville SNCF 1993

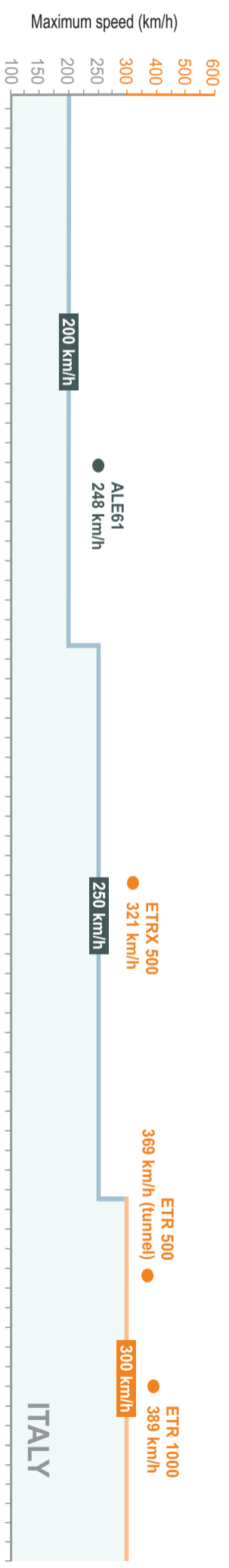
Note: before 1994, travel between London and France was carried out by Ferry or Hoverspeed with their corresponding journey times

## 2.4 SPEED AND TRAVEL TIMES

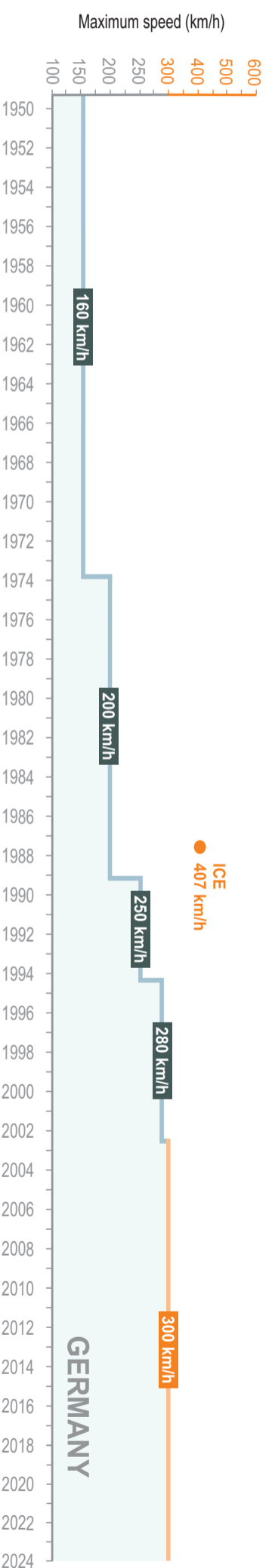
### Evolution of maximum speed in commercial services in France



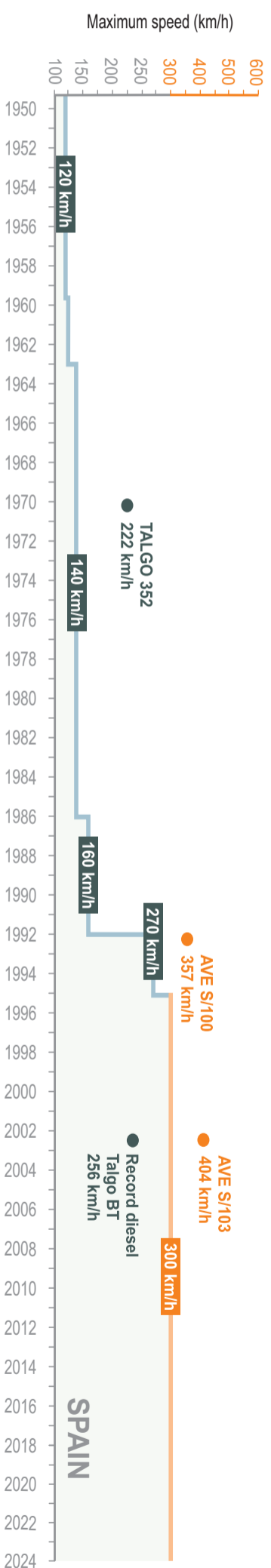
### Evolution of maximum speed in commercial services in Italy



### Evolution of maximum speed in commercial services in Germany



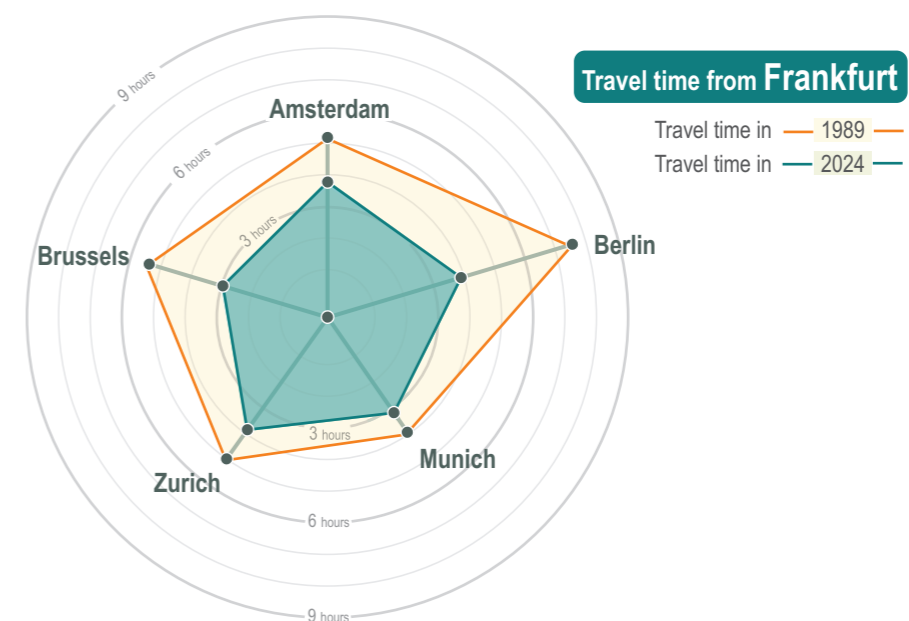
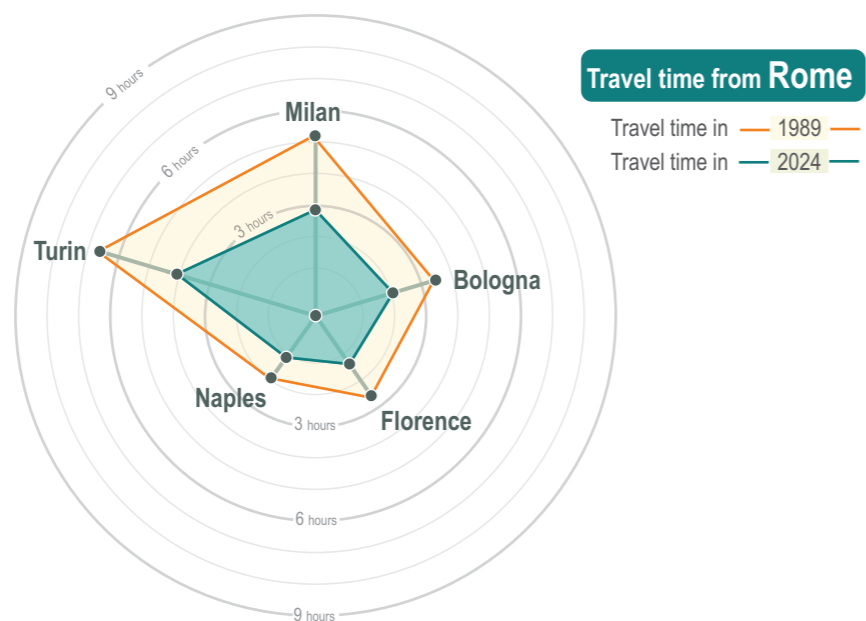
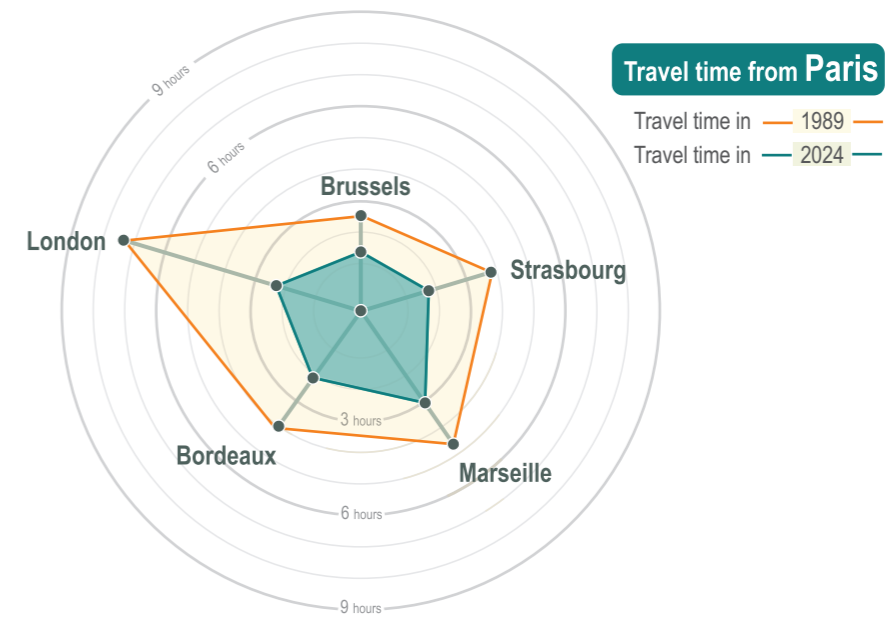
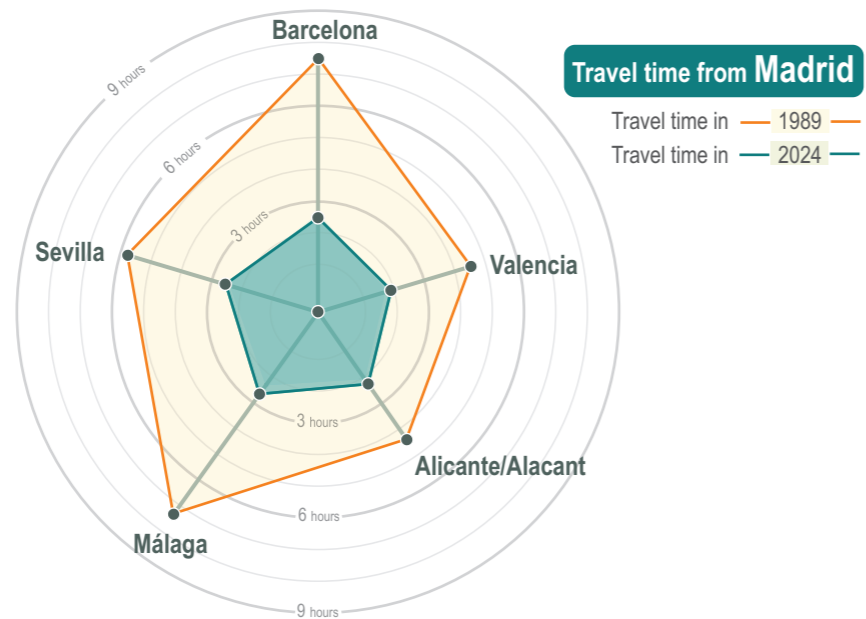
### Evolution of maximum speed in commercial services in Spain



Source: miscellaneous data sources  
 Note: speed records, signalled by dots in the graphics, were set in non-commercial operations. Representation of available data (non-exhaustive)

## 2.4 SPEED AND TRAVEL TIMES

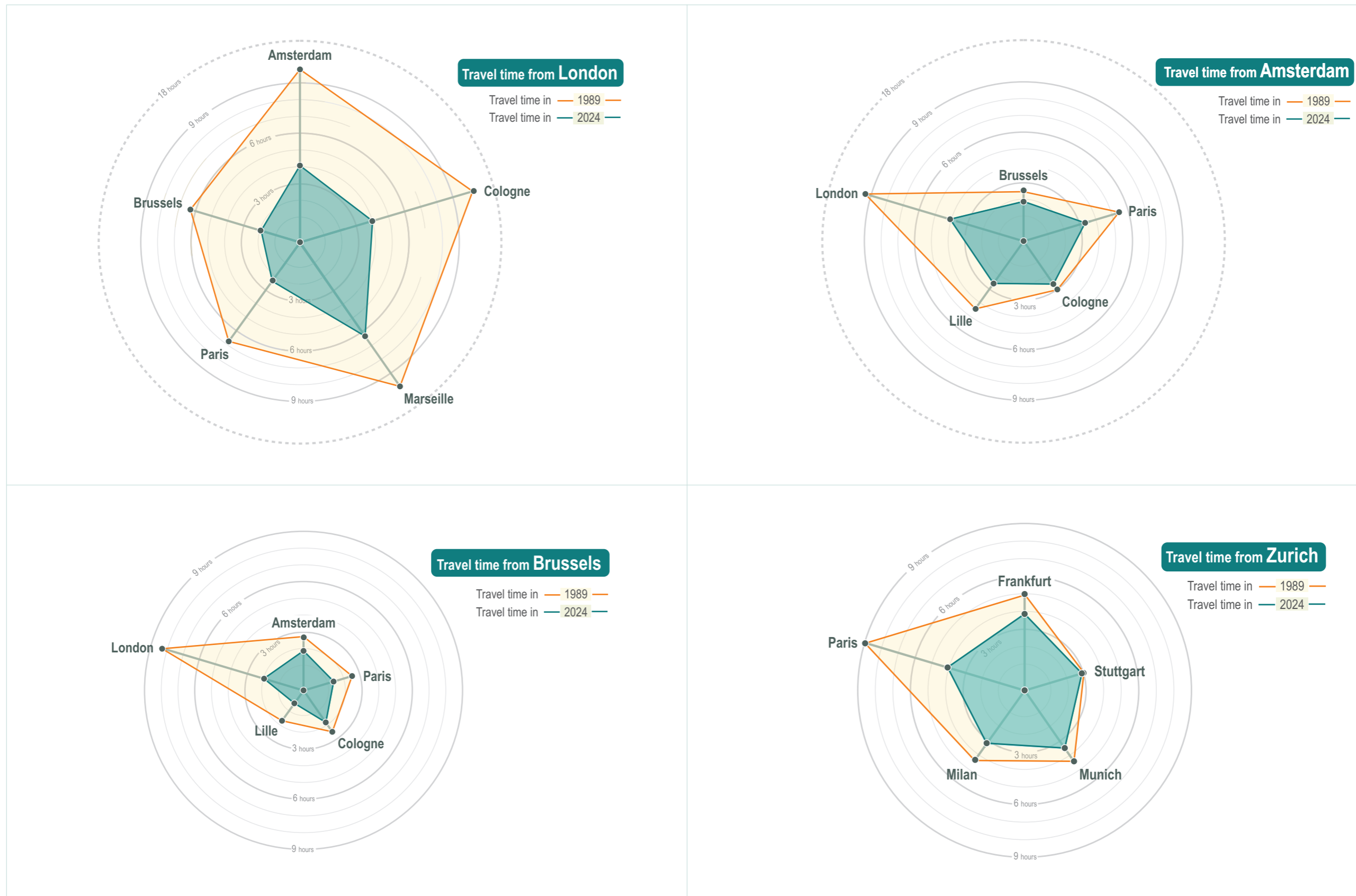
### Evolution of travel time from the main European cities



Source: compiled by authors based on "European Timetable" Thomas Cook Travel Guides 1989 and Railway Operators websites  
 Note: before 1994, travel between London and France was carried out by Ferry or Hoverspeed with their corresponding journey times

## 2.4 SPEED AND TRAVEL TIMES

### Evolution of travel time from the main European cities



Source: compiled by authors based on "European Timetable" Thomas Cook Travel Guides 1989, Railway Operators websites, British Rail Timetable 1993 and Indicateur Horaires Ville à Ville SNCF 1993  
 Note: before 1994, travel between London and France was carried out by Ferry or Hoverspeed with their corresponding journey times

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

| General characteristics                      |  |
|--|--|
| (1) Composition                              |  |
| Suppliers                                    |  |
| Owners or operators                          |  |
| Year in service                              |  |
| Articulated                                  |  |
| Track gauge (mm)                             |  |
| Electrification voltage (kV)                 |  |
| Maximum train speed / operation speed (km/h) |  |
| Power (kW)                                   |  |
| Traction                                     |  |
| Signalling                                   |  |
| Train sets currently used / planned          |  |
| Weight and dimensions                        |  |
| Unladen weight in running order (t)          |  |
| Maximum axle load (t)                        |  |
| Power weight ratio (kW/t)                    |  |
| Train length (m)                             |  |
| Train width (m)                              |  |
| Seats  |  |
| 1 <sup>st</sup> class seats*                 |  |
| 2 <sup>nd</sup> class seats                  |  |
| Total seats                                  |  |
| Observations                                 |  |

### "Railjet" Siemens Taurus (OBB 1216) + Siemens Viaggio (Austria)

| L+7T   |  |
|--|--|
| Siemens  |  |
| ÖBB  |  |
| 2008   |  |
| No   |  |
| 1,435  |  |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC /<br>3 kV DC (partially) |  |
| 230 / 230  |  |
| 6,400  |  |
| Concentrated traction                                      |  |
| LZB / PZB, ZUB, ETCS                                       |  |
| 60   |  |
| 446  |  |
| 22.5   |  |
| 13.4   |  |
| 206  |  |
| 2.825  |  |
| Seats  |  |
| 16+76 / 6+42 (partially)                                   |  |
| 316 / 394 (partially)                                      |  |
| 408 / 442 (partially)                                      |  |

Locomotive: Class 1116, partially 1216

### 4010 (Austria)

|                      |
|----------------------|
| M+4T+M               |
| Stadler              |
| WestBahn             |
| 2011                 |
| No                   |
| 1,435                |
| 15 kV 16.7 Hz AC     |
| 200 / 200            |
| 6,000                |
| Distributed traction |
| LZB / PZB, ZUB       |
| 7                    |
| 296                  |
| 12.3                 |
| 17.9                 |
| 150                  |
| 2.800                |
| 60                   |
| 441                  |
| 501                  |

### SM3 "Pendolino" (Finland)

|                      |
|----------------------|
| T+4M+T               |
| Alstom               |
| VR                   |
| 1995                 |
| No+Tilting           |
| 1,524                |
| 25 kV 50 Hz AC       |
| 220 / 220            |
| 4,000                |
| Distributed traction |
| EBICAB900            |
| 18                   |
| 328                  |
| 14.3                 |
| 11.5                 |
| 159                  |
| 3.200                |
| 47                   |
| 238 (+2 hp)          |
| 285 (+2 hp)          |

Broad gauge (1,524)

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 2.5 ROLLING STOCK



**SM6 "Allegro"**  
(Finland, Russia)

|                          |
|--------------------------|
| M+T+M+T+M+T+M            |
| Alstom                   |
| Karelian Railways        |
| 2010                     |
| No+Tilting               |
| 1,520 / 1,522            |
| 25 kV 50 Hz AC / 3 kV DC |
| 220 / 220                |
| 5,500                    |
| Distributed traction     |
| EBICAB900                |
| 4                        |

|              |
|--------------|
| 409 (loaded) |
| 17           |
| 13.4         |
| 184.8        |
| 3.200        |

|             |
|-------------|
| 48          |
| 304 (+2 hp) |
| 352 (+2 hp) |

Broad gauge (1,522 and 1,520)  
Operated by RZD and VR



**TGV Atlantique**  
(France)

|                            |
|----------------------------|
| L+10T+L                    |
| Alstom                     |
| SNCF                       |
| 1989                       |
| Yes (except for ends)      |
| 1,435                      |
| 25 kV 50 Hz AC / 1.5 kV DC |
| 300 / 300                  |
| 8,800                      |
| Concentrated traction      |
| TVM / KVB                  |
| 28                         |

|       |
|-------|
| 435   |
| 17    |
| 18.6  |
| 237   |
| 2.904 |

|     |
|-----|
| 105 |
| 354 |
| 459 |

No. 301-405  
Renovated to Lacroix 455 places (105+350)  
TVM430 is installed from No. 386 to No. 405



**Thalys PBA**  
(France / Belgium / The Netherlands)

|                                      |
|--------------------------------------|
| L+8T+L                               |
| Alstom                               |
| Thalys                               |
| 1996                                 |
| Yes (except for ends)                |
| 1,435                                |
| 25 kV 50 Hz AC / 3 kV DC / 1.5 kV DC |
| 320 / 300                            |
| 8,800                                |
| Concentrated traction                |
| TVM / KVB, TBL, ATB, ETCS            |
| 9                                    |

|       |
|-------|
| 385   |
| 17    |
| 21.2  |
| 200   |
| 2.904 |

|     |
|-----|
| 120 |
| 257 |
| 377 |

No. 4531-4540, owned by SNCF  
Same series as TGV Réseau (tric.)  
4531 (now 4551) is used for SNCF

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### Thalys PBKA (France / Belgium / The Netherlands)

|  |
|--|
| L+8T+L   |
| Alstom   |
| Thalys   |
| 1996   |
| Yes (except for ends)                                      |
| 1,435  |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC /<br>3 kV DC / 1.5 kV DC |
| 320 / 300  |
| 8,800  |
| Concentrated traction                                      |
| TVM/KVB, TBL, TBL2, ATB, PZB/LZB, ETCS                     |
| 17   |

|       |
|-------|
| 385   |
| 17    |
| 21.2  |
| 200   |
| 2.904 |

|     |
|-----|
| 120 |
| 257 |
| 377 |

No. 4301-4346  
SNCF 6 (No. 4341-4346)  
NS 4 (No. 4321-4322, 4331-4332)  
SNCB 7 (No. 4301-4307)  
No. 4321-4322 → DB → NS

### TGV Réseau (bicourant) (France)

|                            |
|----------------------------|
| L+8T+L                     |
| Alstom                     |
| SNCF                       |
| 1993                       |
| Yes (except for ends)      |
| 1,435                      |
| 25 kV 50 Hz AC / 1.5 kV DC |
| 320 / 320                  |
| 8,800                      |
| Concentrated traction      |
| TVM / KVB                  |
| 29                         |

|       |
|-------|
| 383   |
| 17    |
| 21.3  |
| 200   |
| 2.904 |

|     |
|-----|
| 111 |
| 250 |
| 361 |

### TGV Réseau (tricourant) (France)

|                                      |
|--------------------------------------|
| L+8T+L                               |
| Alstom                               |
| SNCF                                 |
| 1993                                 |
| Yes (except for ends)                |
| 1,435                                |
| 25 kV 50 Hz AC / 3 kV DC / 1.5 kV DC |
| 320 / 320                            |
| 8,800                                |
| Concentrated traction                |
| TVM / KVB, TBL, SCMT                 |
| 27                                   |

|       |
|-------|
| 383   |
| 17    |
| 21.3  |
| 200   |
| 2.904 |

|     |
|-----|
| 111 |
| 242 |
| 353 |

No. 4551 is ex-Thalys

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



**TGV Duplex**  
(France)

|                                       |
|---------------------------------------|
| L+8T+L                                |
| Alstom                                |
| SNCF                                  |
| 1996                                  |
| Yes (except for ends) + Double Decker |
| 1,435                                 |
| 25 kV 50 Hz AC / 1.5 kV DC            |
| 320 / 320                             |
| 8,800                                 |
| Concentrated traction                 |
| TVM / KVB                             |
| 88                                    |
| 390                                   |
| 17                                    |
| 20.4                                  |
| 200                                   |
| 2.896                                 |
| 181                                   |
| 328                                   |
| 509                                   |
| No. 201-289                           |



**TGV Réseau Duplex**  
(France)

|   |
|---|
| L+8T+L  |
| Alstom  |
| SNCF  |
| 2006  |
| Yes (except for ends) + Double Decker               |
| 1,435   |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC / 1.5 kV DC       |
| 320 / 320   |
| 8,800   |
| Concentrated traction                               |
| TVM / KVB   |
| 16  |
| 380   |
| 17  |
| 20.9  |
| 200   |
| 2.896   |
| 181   |
| 328   |
| 509   |
| No. 601-619<br>613-615: tri-voltage (15 kV 16.7 Hz) |



**TGV POS**  
(France)

|   |
|---|
| L+8T+L  |
| Alstom  |
| SNCF, SBB                                     |
| 2006  |
| Yes (except for ends) + Double Decker         |
| 1,435   |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC / 1.5 kV DC |
| 320 / 320                                     |
| 9,280   |
| Concentrated traction                         |
| TVM / KVB, PZB / LZB, SUB, ETCS               |
| 14  |
| 423   |
| 17  |
| 20.6  |
| 200   |
| 2.904   |
| 111   |
| 250   |
| 361   |
| No. 4401-4419                                 |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### TGV Dasye (France)

|                                       |
|---------------------------------------|
| L+8T+L                                |
| Alstom                                |
| SNCF                                  |
| 2009                                  |
| Yes (except for ends) + Double Decker |
| 1,435                                 |
| 25 kV 50 Hz AC / 1.5 kV DC            |
| 320 / 320                             |
| 9,280                                 |
| Concentrated traction                 |
| TVM / KVB, ETCS                       |
| 11                                    |

|       |
|-------|
| 390   |
| 17    |
| 21.5  |
| 200   |
| 2.896 |

|     |
|-----|
| 181 |
| 328 |
| 509 |

Initially No. 701-749  
Now 710-720

### TGV Euroduplex 3UA (France)

|   |
|---|
| L+8T+L  |
| Alstom  |
| SNCF  |
| 2011  |
| Yes (except for ends) + Double Decker         |
| 1,435   |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC / 1.5 kV DC |
| 320 / 320                                     |
| 9,280   |
| Concentrated traction                         |
| TVM / KVB, PZB / LZB, ETCS                    |
| 30  |

|       |
|-------|
| 390   |
| 17    |
| 21.5  |
| 200   |
| 2.896 |

|     |
|-----|
| 181 |
| 328 |
| 509 |

No. 4701-4730  
Used for Lyria and Alleo

### TGV Euroduplex 3UF / 3UH (France)

|                                       |
|---------------------------------------|
| L+8T+L                                |
| Alstom                                |
| SNCF                                  |
| 2013                                  |
| Yes (except for ends) + Double Decker |
| 1,435                                 |
| 25 kV 50 Hz AC / 1.5 kV DC            |
| 320 / 320                             |
| 9,280                                 |
| Concentrated traction                 |
| TVM / KVB, ETCS                       |
| 9                                     |

|       |
|-------|
| 390   |
| 17    |
| 21.5  |
| 200   |
| 2.896 |

|     |
|-----|
| 181 |
| 328 |
| 509 |

No. 801-825 for first 25 sets

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 2.5 ROLLING STOCK



**TGV Euroduplex 3UFC Océane**  
(France)

|                                       |
|---------------------------------------|
| L+8T+L                                |
| Alstom                                |
| SNCF                                  |
| 2016                                  |
| Yes (except for ends) + Double Decker |
| 1,435                                 |
| 25 kV 50 Hz AC / 1.5 kV DC            |
| 320 / 320                             |
| 9,280                                 |
| Concentrated traction                 |
| TVM, KVB, ETCS                        |
| 67                                    |
| 390                                   |
| 17                                    |
| 21.4                                  |
| 200                                   |
| 2.896                                 |
| 158                                   |
| 398                                   |
| 556                                   |



**TGV Duplex renov Océane**  
(France)

|                                       |
|---------------------------------------|
| L+8T+L                                |
| Alstom                                |
| SNCF                                  |
| 1996                                  |
| Yes (except for ends) + Double Decker |
| 1,435                                 |
| 25 kV 50 Hz AC / 1.5 kV DC            |
| 320 / 320                             |
| 8,800                                 |
| Concentrated traction                 |
| TVM, KVB, ETCS                        |
| 26                                    |
| 390                                   |
| 17                                    |
| 20.4                                  |
| 200                                   |
| 2.896                                 |
| 158                                   |
| 398                                   |
| 556                                   |



**TGV P-Duplex**  
(France)

|                                       |
|---------------------------------------|
| L+8T+L                                |
| Alstom                                |
| SNCF                                  |
| 2006                                  |
| Yes (except for ends) + Double Decker |
| 1,435                                 |
| 25 kV 50 Hz AC / 1.5 kV DC            |
| 320 / 320                             |
| 9,280                                 |
| Concentrated traction                 |
| TVM, KVB, ETCS                        |
| 3                                     |
| 390                                   |
| 17                                    |
| 20.4                                  |
| 200                                   |
| 2.896                                 |
| 158                                   |
| 398                                   |
| 556                                   |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### TGV Ouigo (France)

|                                       |
|---------------------------------------|
| L+8T+L                                |
| Alstom                                |
| SNCF                                  |
| 2009                                  |
| Yes (except for ends) + Double Decker |
| 1,435                                 |
| 25 kV 50 Hz AC / 1.5 kV DC            |
| 320 / 320                             |
| 9,280                                 |
| Concentrated traction                 |
| TVM, KVB, ETCS                        |
| 38                                    |

|       |
|-------|
| 390   |
| 17    |
| 21.5  |
| 200   |
| 2.896 |

|     |
|-----|
| -   |
| -   |
| 634 |

### TGV-TMST 373 e300 (France / UK / Belgium)

|                                      |
|--------------------------------------|
| L+18T+L (+2MB)                       |
| Alstom                               |
| Eurostar                             |
| 1993                                 |
| Yes (except for ends)                |
| 1,435                                |
| 25 kV 50 Hz AC / 3 kV DC / 1.5 kV DC |
| 300 / 300                            |
| 12,200                               |
| Concentrated traction                |
| TVM / KVB, TBL 1+, AWS / TPWS        |
| 8                                    |

|       |
|-------|
| 752   |
| 17    |
| 15    |
| 394   |
| 2.814 |

|     |
|-----|
| 206 |
| 540 |
| 746 |

### 401 (ICE 1) (Germany)

|                       |
|-----------------------|
| L+12T+L               |
| Siemens               |
| DB AG                 |
| 1991                  |
| No                    |
| 1,435                 |
| 15 kV 16.7 Hz AC      |
| 280 / 280             |
| 9,600                 |
| Concentrated traction |
| ETCS, LZB / PZB, ZUB  |
| 53                    |

|       |
|-------|
| 782   |
| 19.5  |
| 11.5  |
| 358   |
| 3.020 |

|     |
|-----|
| 197 |
| 506 |
| 703 |

Sets have 197/506 seats after modernisation (which is completed now)  
1 was abandoned by Eschede accident  
19 sets also suited for traffic to Switzerland (ZUB installed)

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 2.5 ROLLING STOCK



**402 (ICE 2)**  
(Germany)

|   |
|---|
| L+7T  |
| Siemens   |
| DB AG   |
| 1996  |
| No  |
| 1,435   |
| 15 kV 16.7 Hz AC  |
| 280 / 280   |
| 4,800   |
| Concentrated traction                                   |
| LZB / PZB   |
| 44  |
| 418   |
| 19.5  |
| 10.7  |
| 205   |
| 3.020   |
| 106   |
| 275   |
| 381   |
| Passenger car consists of 6 coaches and driving trailer |



**403 (ICE 3)**  
(Germany)

|  |
|--|
| M+T+M+T+T+M+T+M                                  |
| Siemens  |
| DB AG  |
| 2000   |
| No   |
| 1,435  |
| 15 kV 16.7 Hz AC                                 |
| 330 / 300  |
| 8,000  |
| Distributed traction                             |
| ETCS, LZB / PZB                                  |
| 50   |
| 409  |
| 16   |
| 18   |
| 200  |
| 2.950  |
| 101  |
| 349  |
| 450  |
| Last 13 delivered since 2005 (with 98/344 seats) |



**406 (ICE 3M)**  
(Germany / The Netherlands)

|  |
|--|
| M+T+M+T+T+M+T+M  |
| Siemens  |
| DB AG, NS (46 ICE3M)   |
| 2000   |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC<br>/ 3 kV DC / 1.5 kV DC   |
| 330-220 (DC) / 300   |
| 8,000  |
| Distributed traction   |
| ETCS, LZB / PZB, ATB, TBL  |
| 16 / 5   |
| 435  |
| 16   |
| 17.1   |
| 200  |
| 2.950  |
| 93   |
| 326  |
| 419  |
| 4 sets belong to NS, 4 sets belong to NS<br>for Frankfurt-Brussels/Amsterdam and Basel-Amsterdam<br>3,500 kW and 220 km/h under DC |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

Source: International Union of Railways

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### 407 (ICE 3) (Germany)

|  |
|--|
| M+T+M+T+T+M+T+M  |
| Siemens  |
| DB AG  |
| 2013   |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC<br>/ 3 kV DC / 1.5 kV DC |
| 320 / 320  |
| 8,000  |
| Distributed traction                                       |
| LZB / PZB, TVM / KVB, ETCS                                 |
| 17   |

|       |
|-------|
| 454   |
| 14.2  |
| 16.3  |
| 201   |
| 2.950 |

|     |
|-----|
| 111 |
| 333 |
| 444 |

Several trainsets for Frankfurt-Paris (2015)

### 408 (ICE 3neo) (Germany)

|  |
|--|
| M+T+M+T+T+M+T+M                                  |
| Siemens  |
| DB AG  |
| 2022   |
| No   |
| 1,435  |
| 1.5 kV, 3 kV / 15 kV 16.7 Hz AC<br>/ 25 kV 50 Hz |
| 320 / 320  |
| 8,000  |
| Distributed traction                             |
| LZB/PZB, ATB, TBL, ETCS                          |
| 24/73  |

|       |
|-------|
| 454   |
| 14.2  |
| 16.3  |
| 200   |
| 2.950 |

|     |
|-----|
| 99  |
| 340 |
| 439 |

### 411 (ICE-T) (Germany)

|                      |
|----------------------|
| M+T+M+T+M+T+M        |
| Siemens-Alstom       |
| DB AG                |
| 2000                 |
| No + Tilting         |
| 1,435                |
| 15 kV 16.7 Hz AC     |
| 230 / 230            |
| 4,000                |
| Distributed traction |
| LZB / PZB, ETCS      |
| 31                   |

|       |
|-------|
| 350   |
| 15    |
| 10.6  |
| 185   |
| 2.850 |

|     |
|-----|
| 55  |
| 304 |
| 359 |

3 were sold from DB to ÖBB (class 4011)  
5 sets with ZUB are suited for operation in Switzerland

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



**411 (ICE-T2)**  
(Germany)

|  |
|--|
| M+T+M+T+M+T+M  |
| Siemens-Alstom   |
| DB AG  |
| 2004   |
| No + Tilting   |
| 1,435  |
| 15 kV 16.7 Hz AC   |
| 230 / 230  |
| 4,000  |
| Distributed traction   |
| LZB / PZB, ETCS  |
| 28   |
| 350  |
| 15   |
| 10.5   |
| 185  |
| 2.850  |
| 55   |
| 321  |
| 376  |
| Additional ICE-T trainsets (named ICE-T2) with more seating capacity |



**415 (ICE-T)**  
(Germany)

|   |
|---|
| T+M+M+M+T   |
| Siemens-Alstom  |
| DB AG   |
| 1999  |
| No + Tilting  |
| 1,435   |
| 15 kV 16.7 Hz AC  |
| 230 / 230   |
| 3,000   |
| Distributed traction  |
| LZB / PZB, ETCS   |
| 11  |
| 273   |
| 15  |
| 10.2  |
| 133   |
| 2.850   |
| 41  |
| 209   |
| 250   |
| Similar to class 411<br>5 are suited for operation in Switzerland |



**412 (ICE 4 - 7 car)**  
(Germany)

|  |
|--|
| T+M+T+2M+2T  |
| Siemens-Alstom   |
| DB AG  |
| 2017   |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC<br>/ 3 kV DC / 1.5 kV DC |
| 250 / 250  |
| 4,950  |
| Distributed traction                                       |
| LZB / PZB, ETCS  |
| 37   |
| 455  |
| <18  |
| 10.1   |
| 200  |
| 2.852  |
| 77   |
| 379  |
| 456  |
| ICE 4  |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### 412 (ICE 4 - 12 car) (Germany)

|                      |
|----------------------|
| T+2M+T+2M+T+M+T+M+2T |
| Siemens-Alstom       |
| DB AG                |
| 2017                 |
| No                   |
| 1,435                |
| 15 kV 16.7 Hz AC     |
| 265 / 250            |
| 9,900                |
| Distributed traction |
| LZB / PZB, ETCS      |
| 50                   |

|       |
|-------|
| 659   |
| <18   |
| 13.6  |
| 346   |
| 2.852 |

|     |
|-----|
| 205 |
| 625 |
| 830 |

3 new trainsets were put in service in 2024

### 605 (ICE TD) (Germany)

|                      |
|----------------------|
| 4M                   |
| Siemens-Alstom       |
| DB AG                |
| 2001                 |
| No + Tilting         |
| 1,435                |
| Diesel               |
| 200 / 200            |
| 2,240                |
| Distributed traction |
| LZB / PZB, ZUB       |
| 2                    |

|       |
|-------|
| 216   |
| 14.5  |
| 9.7   |
| 106   |
| 2.850 |

|     |
|-----|
| 41  |
| 154 |
| 195 |

6 were transferred from DB to DSB and are equipped with Danish signalling system and radio for international services. 14 is out of service  
Tilting system is not used  
All trainsets decommissioned except for 2 trainsets

### ETR 450 (Italy)

|                      |
|----------------------|
| 4M+T+4M              |
| Alstom               |
| Trenitalia           |
| 1988-2015            |
| No + Tilting         |
| 1,435                |
| 3 kV DC              |
| 250 / 250            |
| 5,000                |
| Distributed traction |
| SCMT / BACC          |
| 0                    |

|                 |
|-----------------|
| 435             |
| 12.5 (unloaded) |
| 10.7            |
| 233.9           |
| 2.750           |

|     |
|-----|
| 170 |
| 220 |
| 390 |

15 trainsets were produced

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 2.5 ROLLING STOCK



**ETR 460**  
(Italy)

2M+2T+2M+T+2M  
Alstom  
Trenitalia  
1995  
No + Tilting  
1,435  
3 kV DC  
250 / 250  
5,880  
Distributed traction  
SCMT / BACC  
5

445  
13.5 (unloaded)  
12.2  
237  
2.800

139  
341  
480

10 trainsets were produced



**ETR 470**  
(Italy / Switzerland)

2M+2T+2M+T+2M  
Alstom  
Trenitalia, SBB  
1996-2017  
No + Tilting  
1,435  
15 kV 16.7 Hz AC / 3 kV DC  
200 / 200  
5,880  
Distributed traction  
SCMT / BACC, ZUB  
0

460  
15.1  
11.8  
236.6  
2.800

151  
324  
475

Trenitalia: 5 sets  
SBB: 0 sets  
Out of service in both countries from 2017, but 5 trainsets operate in Greece from 2022



**ETR 480/485**  
(Italy)

2M+2T+2M+T+2M  
Alstom  
Trenitalia  
1997  
No + Tilting  
1,435  
25 kV 50 Hz AC / 3 kV DC  
280 / 250  
5,880  
Distributed traction  
SCMT / BACC  
14

422  
13.5 (unloaded)  
12.8  
237  
2.800

139  
341  
480

AC electric equipment was installed to ETR 480 and renumbered as ETR 485

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition  
Suppliers  
Owners or operators  
Year in service  
Articulated  
Track gauge (mm)  
Electrification voltage (kV)  
Maximum train speed / operation speed (km/h)  
Power (kW)  
Traction  
Signalling  
Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)  
Maximum axle load (t)  
Power weight ratio (kW/t)  
Train length (m)  
Train width (m)

### Seats

1<sup>st</sup> class seats\*  
2<sup>nd</sup> class seats  
Total seats

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### ETR 500 (Italy)

|                          |
|--------------------------|
| L+11T+L                  |
| AnsaldoBreda-Alstom      |
| Trenitalia               |
| 1995                     |
| No                       |
| 1,435                    |
| 25 kV 50 Hz AC / 3 kV DC |
| 360 / 300                |
| 8,800                    |
| Concentrated traction    |
| SCMT / BACC, ETCS        |
| 58                       |

|              |
|--------------|
| 640 (loaded) |
| 17           |
| 13.8         |
| 354          |
| 2.860        |

|     |
|-----|
| -   |
| -   |
| 574 |

Figures are for 3-class  
4-class are introduced since 2012

### ETR 600 (Italy)

|                          |
|--------------------------|
| M+T+M+T+M+T+M            |
| Alstom                   |
| Trenitalia               |
| 2008                     |
| No + Tilting             |
| 1,435                    |
| 25 kV 50 Hz AC / 3 kV DC |
| 280 / 250                |
| 5,600                    |
| Distributed traction     |
| SCMT / BACC, ETCS        |
| 12                       |

|              |
|--------------|
| 443 (loaded) |
| 17           |
| 12.6         |
| 187.4        |
| 2.830        |

|     |
|-----|
| 126 |
| 306 |
| 432 |

### ETR 610 (Italy / Switzerland)

|  |
|--|
| M+T+M+T+M+T+M                                  |
| Alstom   |
| Trenitalia, SBB                                |
| 2009   |
| No + Tilting                                   |
| 1,435  |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC<br>/ 3 kV DC |
| 250 / 250                                      |
| 5,500  |
| Distributed traction                           |
| SCMT / BACC, LZB / PZB, ZUB, ETCS              |
| 26   |

|       |
|-------|
| 466   |
| 17    |
| 12.2  |
| 187.4 |
| 2.830 |

|                             |
|-----------------------------|
| 108+18                      |
| 304 (Trenitalia), 296 (SBB) |
| 430 (Trenitalia), 422 (SBB) |

Trenitalia: 7 sets  
SBB: 19 sets (RABe 503 Astoro)

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 2.5 ROLLING STOCK



**ETR 700**  
(Italy)

|  |
|--|
| M+T+M+T+T+M+T+M  |
| AnsaldoBreda   |
| Trenitalia   |
| 2019   |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 3 kV DC / 1.5 kV DC                           |
| 250 / 250  |
| 5,500  |
| Distributed traction   |
| ATB, TBL, LZB, ETCS  |
| 16   |
| 423  |
| 17   |
| 11.8   |
| 200.9  |
| 2.870  |
| 52+148   |
| 300  |
| 500  |
| Trenitalia: 17 sets since jun. 2019<br>Former V250 series (NS) |



**ETR 1000**  
(Italy-France)

|  |
|--|
| M+T+M+2T+M+T+M   |
| Alstom-Hitachi   |
| Trenitalia   |
| 2015   |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC<br>/ 3 kV DC / 1.5 kV DC                     |
| 400 / 300  |
| 9,800  |
| Distributed traction   |
| ETCS   |
| 57   |
| 500 (loaded)   |
| 17   |
| 19.6   |
| 202  |
| 2.924  |
| 10+71+76   |
| 300  |
| 457  |
| Operation since 2015 in 300 km/h<br>9 trainsets modified for service in France |



**AGV 575**  
(Italy)

|                          |
|--------------------------|
| EMU-11 (5MB+7TB)         |
| Alstom                   |
| NTV                      |
| 2012                     |
| Yes                      |
| 1,435                    |
| 25 kV 50 Hz AC / 3 kV DC |
| 300 / 300                |
| 7,500                    |
| Distributed traction     |
| SCMT / BACC, ETCS        |
| 25                       |
| 398                      |
| 17                       |
| 15                       |
| 201                      |
| 3.000                    |
| 19+143                   |
| 288                      |
| 450                      |
| 3-class                  |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### "Evo Pendolino" (Italy)

|                          |
|--------------------------|
| M+T+M+T+M+T+M            |
| Alstom                   |
| NTV                      |
| 2018                     |
| Yes                      |
| 1,435                    |
| 25 kV 50 Hz AC / 3 kV DC |
| 250 / 250                |
| 5,500                    |
| Distributed traction     |
| SCMT / BACC, ETCS        |
| 26                       |

|       |
|-------|
| 407   |
| 25    |
| 13.5  |
| 187.3 |
| 2.950 |
| -     |
| -     |
| 472   |

Pendolino Design

### ED250 (Poland)

|  |
|--|
| 2M+3T+2M                                     |
| Alstom                                       |
| PKP Intercity                                |
| 2014   |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC<br>3 kV DC |
| 250 / 250                                    |
| 5,500  |
| Distributed traction                         |
| SHP, Mirel, LZB / PZB, ETCS                  |
| 20   |

|       |
|-------|
| 395.5 |
| 17    |
| 14.2  |
| 187.4 |
| 2.830 |
| 57    |
| 345   |
| 402   |

### S100 (bicourant) (Spain)

|                          |
|--------------------------|
| L+8T+L                   |
| Alstom                   |
| Renfe Operadora          |
| 1992                     |
| Yes (except for ends)    |
| 1,435                    |
| 25 kV 50 Hz AC / 3 kV DC |
| 300 / 300                |
| 8,800                    |
| Concentrated traction    |
| ASFA / LZB, ETCS         |
| 14                       |

|                   |
|-------------------|
| 392               |
| 17.2              |
| 21                |
| 200.15            |
| 2.904             |
| 80 <sup>(1)</sup> |
| 265 (+2 hp)       |
| 345 (+2 hp)       |

AVE "3 classes"  
(1) Includes 8 places in club room

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



**S100 F (bicourant)**  
(Spain)

|   |
|---|
| L+8T+L  |
| Alstom  |
| Renfe Operadora   |
| 1992  |
| Yes (except for ends)                                     |
| 1,435   |
| 25 kV 50 Hz AC / 1.5 kV DC                                |
| 300 / 300   |
| 8,800   |
| Concentrated traction                                     |
| ASFA / LZB, TVM / KVB / RPS, ETCS                         |
| 10  |
| 392   |
| 17.2  |
| 21  |
| 200.15  |
| 2.904   |
| 80 <sup>(1)</sup>   |
| 265 (+2 hp)   |
| 345 (+2 hp)   |
| AVE "3 classes"   |
| 10 sets are tri-current and operable in France since 2013 |
| (1) Includes 8 places in club room                        |



**S102 R**  
(Spain)

|  |
|--|
| L+12T+L                                      |
| Talgo-Alstom                                 |
| Renfe Operadora                              |
| 2005   |
| Yes, by independent wheels (except for ends) |
| + Tilting                                    |
| 1,435  |
| 25 kV 50 Hz AC                               |
| 330 / 300                                    |
| 8,000  |
| Concentrated traction                        |
| ASFA / LZB, ETCS                             |
| 16   |
| 322  |
| 17   |
| 24.7   |
| 200.24                                       |
| 2.960  |
| 71 <sup>(1)</sup>                            |
| 261 (+2 hp)                                  |
| 332 (+2 hp)                                  |
| AVE "3 classes"                              |
| (1) Includes 8 places in club room           |



**S103 R**  
(Spain)

|                                    |
|------------------------------------|
| M+T+M+2T+M+T+M                     |
| Siemens                            |
| Renfe Operadora                    |
| 2007                               |
| No                                 |
| 1,435                              |
| 25 kV 50 Hz AC                     |
| 350 / 300                          |
| 8,800                              |
| Distributed traction               |
| ASFA / LZB / ETCS                  |
| 26                                 |
| 425                                |
| 15                                 |
| 20.7                               |
| 200                                |
| 2.950                              |
| 88 <sup>(1)</sup>                  |
| 332 (+2 hp)                        |
| 420 (+2 hp)                        |
| AVE "3 classes"                    |
| (1) Includes 8 places in club room |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Track gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### S104 (Spain)

|                      |
|----------------------|
| 4M                   |
| CAF-Alstom           |
| Renfe Operadora      |
| 2004                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 270 / 250            |
| 4,000                |
| Distributed traction |
| ASFA / LZB / ETCS    |
| 20                   |

|       |
|-------|
| 221.5 |
| 17    |
| 18.1  |
| 107.1 |
| 2.920 |

|             |
|-------------|
| 30          |
| 206 (+1 hp) |
| 236 (+1 hp) |

"Avant"

### S106/106.5 (Spain)

|   |
|---|
| M+12T+M   |
| Talgo-Alstom  |
| Renfe Operadora   |
| 2024  |
| Yes, by independent wheels (except for ends)<br>+ Tilting |
| 1,435   |
| 25 kV 50 Hz AC / 3 kV DC / 1.5 kV DC                      |
| 330 / 300   |
| 8,000 (25 kV) / 6,500 (3 kV) / 4,300 (1.5 kV)             |
| Concentrated traction                                     |
| ASFA / ETCS / TVM430 / KVB / RPS                          |
| 30  |

|       |
|-------|
| 317.0 |
| 17    |
| 23.4  |
| 201.9 |
| 3.200 |

|             |
|-------------|
| 76 (+2 hp)  |
| 429         |
| 505 (+2 hp) |

Standard (1,435) or dual gauge (1,435 - 1,668) trainsets  
10 trainsets for international use,  
include TVM-430, KVB, RPS

S106 Avlo: 581 seats

### S108 (Spain)

|                                       |
|---------------------------------------|
| L+8T+L                                |
| Alstom                                |
| SNCF (Ouigo)                          |
| 2021                                  |
| Yes (except for ends) + Double Decker |
| 1,435                                 |
| 25 kV 50 Hz AC / 1.5 kV DC            |
| 320 / 320                             |
| 9,280                                 |
| Concentrated traction                 |
| EQS (ETCS/ASFA)                       |
| 15                                    |

|       |
|-------|
| 390   |
| 17    |
| 21.5  |
| 200   |
| 2.896 |

|     |
|-----|
| 181 |
| 328 |
| 509 |

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways and miscellaneous data sources

## 2.5 ROLLING STOCK



**S109**  
(Spain)

|  |
|--|
| M+T+M+2T+M+T+M                                     |
| Alstom-Hitachi                                     |
| Trenitalia   |
| 2022   |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 16.7 Hz AC<br>3 kV DC / 1.5 kV DC |
| 400 / 300  |
| 9,800  |
| Distributed traction                               |
| ETCS   |
| 23   |
| 500 (loaded)                                       |
| 17   |
| 19.6   |
| 202  |
| 2.924  |
| -  |
| -  |
| 459 (+2 hp)  |
| "Iryo"   |



**S112**  
(Spain)

|   |
|---|
| L+12T+L   |
| Talgo-Alstom  |
| Renfe Operadora   |
| 2010  |
| Yes, by independent wheels (except for ends)<br>+ Tilting |
| 1,435   |
| 25 kV 50 Hz AC  |
| 330 / 300   |
| 8,000   |
| Concentrated traction                                     |
| ASFA / LZB / ETCS   |
| 25  |
| 322   |
| 17  |
| 24.7  |
| 200.24  |
| 2.960   |
| 71  |
| 292 (+2 hp)   |
| 363 (+2 hp)   |
| Similar to S102 but capacity is increased                 |



**S112 M**  
(Spain)

|   |
|---|
| L+12T+L   |
| Talgo-Alstom  |
| Renfe Operadora   |
| 2021  |
| Yes, by independent wheels (except for ends)<br>+ Tilting |
| 1,435   |
| 25 kV 50 Hz AC  |
| 330 / 300   |
| 8,000   |
| Concentrated traction                                     |
| ASFA / LZB / ETCS   |
| 5   |
| 322   |
| 17  |
| 24.7  |
| 200.24  |
| 2.960   |
| -   |
| 436 (+2 hp)   |
| 436 (+2 hp)   |
| "Avlo"  |
| Similar to S112 but capacity is increased                 |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### S114 (Spain)

|                      |
|----------------------|
| 4M                   |
| CAF-Alstom           |
| Renfe Operadora      |
| 2011                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 270 / 250            |
| 4,000                |
| Distributed traction |
| ASFA / LZB / ETCS    |
| 12                   |

|       |
|-------|
| 221.5 |
| 17    |
| 18.1  |
| 107.1 |
| 2.920 |

|             |
|-------------|
| -           |
| 236 (+2 hp) |
| 236 (+2 hp) |

"Avant"

### S120 (Spain)

|                            |
|----------------------------|
| 4M                         |
| CAF-Alstom                 |
| Renfe Operadora            |
| 2006                       |
| No                         |
| 1,435 / 1,668              |
| 25 kV 50 Hz AC / 3 kV DC   |
| 250 (25 kV)-220 (3 kV)     |
| 4,000 (25 kV)-2,500 (3 kV) |
| Distributed traction       |
| ASFA / LZB / ETCS / EBICAB |
| 12                         |

|       |
|-------|
| 233   |
| 16.2  |
| 17.2  |
| 107.4 |
| 2.920 |

|             |
|-------------|
| 81          |
| 156 (+1 hp) |
| 237 (+1 hp) |

"Alvia"  
Dual gauge track (1,435 - 1,668)

### S120.5 (Spain)

|                            |
|----------------------------|
| 4M                         |
| CAF-Alstom                 |
| Renfe Operadora            |
| 2006                       |
| No                         |
| 1,435 / 1,668              |
| 25 kV 50 Hz AC / 3 kV DC   |
| 250 (25 kV)-220 (3 kV)     |
| 4,000 (25 kV)-2,500 (3 kV) |
| Distributed traction       |
| ASFA / LZB / ETCS          |
| 15                         |

|       |
|-------|
| 232   |
| 16.2  |
| 17.2  |
| 107.4 |
| 2.920 |

|             |
|-------------|
| 74 (+1 hp)  |
| 148         |
| 222 (+1 hp) |

"Alvia"  
Dual gauge track (1,435 - 1,668)

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 2.5 ROLLING STOCK



**S121**  
(Spain)

|                                  |
|----------------------------------|
| 4M                               |
| CAF-Alstom                       |
| Renfe Operadora                  |
| 2008                             |
| No                               |
| 1,435 / 1,668                    |
| 25 kV 50 Hz AC / 3 kV DC         |
| 250 (25 kV)-220 (3 kV)           |
| 4,000 (25 kV)-2,500 (3 kV)       |
| Distributed traction             |
| ASFA / LZB / ETCS                |
| 29                               |
| 225                              |
| 15.75                            |
| 17.8                             |
| 107.4                            |
| 2.920                            |
| -                                |
| -                                |
| 280 (+2 hp)                      |
| "Avant"                          |
| Dual gauge track (1,435 - 1,668) |



**S130**  
(Spain)

|  |
|--|
| L+11T+L  |
| Talgo-Alstom   |
| Renfe Operadora  |
| 2007   |
| Yes, by independent wheels (except for ends)<br>+ Tilting              |
| 1,435 / 1,668  |
| 25 kV 50 Hz AC / 3 kV DC   |
| 250 (25 kV)-220 (3 kV)   |
| 4,800 (25 kV) / 4,000 (3 kV)   |
| Concentrated traction  |
| ASFA / LZB / EBICAB / ETCS   |
| 30   |
| 312  |
| 18   |
| 15.4   |
| 184.2  |
| 2.960  |
| 62 (+1 hp)   |
| 236  |
| 298 (+1 hp)  |
| "Alvia"  |
| Dual gauge track (1,435 - 1,668)<br>15 sets will be converted to S130H |



**S730**  
(Spain)

|   |
|---|
| M+9T+M  |
| Talgo-Alstom  |
| Renfe Operadora   |
| 2012  |
| Yes, by independent wheels (except for ends)<br>+ Tilting   |
| 1,435 / 1,668   |
| 25 kV 50 Hz AC / 3 kV DC / diesel   |
| 250 (25 kV)-220 (3 kV)-180 (diesel) / 250 (25 kV)-<br>220 (3 kV)-180 (diesel)   |
| 4,800 (25 kV) / 4,000 (3 kV) / 3,600 (diesel)   |
| Concentrated traction   |
| ASFA / LZB / EBICAB / ETCS  |
| 14  |
| 384   |
| 18  |
| 12.5  |
| 186   |
| 2.960   |
| 47 (+1 hp)  |
| 216   |
| 261 (+1 hp)   |
| Diesel hybrid version of S130<br>Diesel engines are installed on 2 end cars<br>next to the locomotive<br>15 sets are converted from S130<br>Dual gauge track (1,435 - 1,668)<br>No. 12 abandoned after the accident at Santiago |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Track gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### X55 (SJ 3000) (Sweden)

|                      |
|----------------------|
| EMU-4 (4M)           |
| Alstom               |
| SJ                   |
| 2012                 |
| No                   |
| 1,435                |
| 15 kV 16.7 Hz AC     |
| 250 / 200            |
| 3,180                |
| Distributed traction |
| EBICAB700, ETCS      |
| 20                   |

|       |
|-------|
| 274   |
| -     |
| 10.8  |
| 107   |
| 3.430 |

|     |
|-----|
| 64  |
| 181 |
| 245 |

### Snabbtåg (Sweden)

|                                   |
|-----------------------------------|
| (6)                               |
| Alstom                            |
| SJ                                |
| (2026-)                           |
| No                                |
| 1,435                             |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC |
| 250 / 250                         |
| -                                 |
| Distributed traction              |
| -                                 |
| 0 / 25                            |

|   |
|---|
| - |
| - |
| - |
| - |
| - |

|     |
|-----|
| -   |
| -   |
| 363 |

"Zefiro Express"

### RABDe500 (ICN) (Switzerland)

|                      |
|----------------------|
| 2M+3T+2M             |
| Alstom               |
| SBB                  |
| 2000                 |
| No + Tilting         |
| 1,435                |
| 15 kV 16.7 Hz AC     |
| 220 / 200            |
| 5,200                |
| Distributed traction |
| ZUB                  |
| 44                   |

|       |
|-------|
| 355   |
| 12    |
| 13.3  |
| 188   |
| 2.830 |

|     |
|-----|
| 125 |
| 326 |
| 451 |

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 2.5 ROLLING STOCK



**RABe501 (EC250)**  
(Switzerland)

|                                      |
|--------------------------------------|
| TB+2MB+4TB+2MB+3TB                   |
| Stadler                              |
| SBB                                  |
| 2020                                 |
| Yes                                  |
| 1,435                                |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC    |
| 3 kV DC                              |
| 250 / 250                            |
| 6,000                                |
| Distributed traction                 |
| SCMT / BACC / LZB / PZB / ZUB / ETCS |
| 31                                   |
| 380                                  |
| 17.3                                 |
| 15.8                                 |
| 202                                  |
| 2.900                                |
| 117                                  |
| 288                                  |
| 405                                  |
| SBB "Giruno"<br>Stadler "SMILE"      |



**IC125**  
(United Kingdom)

|  |
|--|
| L+7T+L - L+8T+L  |
| BREL   |
| CC, EC, EM, FGW, GC, V   |
| 1976   |
| No   |
| 1,435  |
| Diesel   |
| 200 / 200  |
| 3,360  |
| Concentrated traction  |
| AWS / TPWS   |
| 80   |
| 383 (L+7+L)  |
| 10.7   |
| 8.8  |
| 197 (L+7T+L) - 220 (L+8T+L)  |
| 2.740  |
| -  |
| -  |
| 472  |
| CC: Cross Country<br>EC: East Coast<br>EM: East Midlands<br>FGW: First Great Western<br>GC: Grand Central<br>V: Virgin |



**IC225**  
(United Kingdom)

|                       |
|-----------------------|
| L+9T                  |
| BREL, Alstom          |
| East Coast            |
| 1989                  |
| No                    |
| 1,435                 |
| 25 kV 50 Hz AC        |
| 225 / 200             |
| 4,350                 |
| Concentrated traction |
| AWS / TPWS            |
| 30                    |
| 476                   |
| 11.9                  |
| 9.1                   |
| 226                   |
| 2.740                 |
| 112                   |
| 368                   |
| 480                   |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |  |
|--|--|
| (1) Composition                              |  |
| Suppliers                                    |  |
| Owners or operators                          |  |
| Year in service                              |  |
| Articulated                                  |  |
| Track gauge (mm)                             |  |
| Electrification voltage (kV)                 |  |
| Maximum train speed / operation speed (km/h) |  |
| Power (kW)                                   |  |
| Traction                                     |  |
| Signalling                                   |  |
| Train sets currently used / planned          |  |

### Weight and dimensions

|                                     |  |
|-------------------------------------|--|
| Unladen weight in running order (t) |  |
| Maximum axle load (t)               |  |
| Power weight ratio (kW/t)           |  |
| Train length (m)                    |  |
| Train width (m)                     |  |

### Seats

|                              |  |
|------------------------------|--|
| 1 <sup>st</sup> class seats* |  |
| 2 <sup>nd</sup> class seats  |  |
| Total seats                  |  |

### Observations

### 180 (United Kingdom)

|                      |
|----------------------|
| 5M                   |
| Alstom               |
| EC, GC, HT, NR       |
| 2000                 |
| No                   |
| 1,435                |
| Diesel               |
| 200 / 200            |
| 2,800                |
| Distributed traction |
| AWS / TPWS           |
| 14                   |

|       |
|-------|
| 252.5 |
| 12.6  |
| 10.2  |
| 116.5 |
| 2.730 |

|     |
|-----|
| 42  |
| 226 |
| 268 |

"Adelante"  
EC: East Coast,  
GC: Grand Central,  
HT: Hull Trains,  
NR: Northern Rail

### 220 (United Kingdom)

|                      |
|----------------------|
| 4M                   |
| Alstom               |
| Cross Country        |
| 2001                 |
| No                   |
| 1,435                |
| Diesel               |
| 200 / 200            |
| 2,200                |
| Distributed traction |
| AWS / TPWS           |
| 34                   |

|       |
|-------|
| 185.6 |
| 11.6  |
| 11    |
| 93.34 |
| 2.730 |

|     |
|-----|
| 26  |
| 162 |
| 188 |

"Voyager"

### 221 (United Kingdom)

|                         |
|-------------------------|
| 4M - 5M                 |
| Alstom                  |
| Cross Country, Virgin   |
| 2002                    |
| No + Tilting            |
| 1,435                   |
| Diesel                  |
| 200 / 200               |
| 2,240 (4M) - 2,800 (5M) |
| Distributed traction    |
| AWS / TPWS              |
| 4 (4M) - 40 (5M)        |

|                        |
|------------------------|
| 227 (4M) - 282.8 (5M)  |
| 14.1                   |
| 9.2                    |
| 93.3 (4M) - 116.2 (5M) |
| 2.730                  |

|                     |
|---------------------|
| 26                  |
| 162 (4M) - 224 (5M) |
| 188 (4M) - 250 (5M) |

"Super Voyager"

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 2.5 ROLLING STOCK



**222**  
(United Kingdom)

|                                      |
|--------------------------------------|
| 4M - 5M - 7M                         |
| Alstom                               |
| East Midlands                        |
| 2004                                 |
| No                                   |
| 1,435                                |
| Diesel                               |
| 200 / 200                            |
| 2,240 (4M) - 2,800 (5M) - 3,920 (7M) |
| Distributed traction                 |
| AWS / TPWS                           |
| 4 (4M) - 7 (5M) - 6 (7M)             |
| 227 (4M) - 282.5 (5M) - 395.5 (7M)   |
| 14.1                                 |
| 9.9                                  |
| 93.3 (4M) - 116.2 (5M) - 161.8 (7M)  |
| 2.730                                |
| 33 (4M) - 50 (5M) - 106 (7M)         |
| 132 (4M) - 192 (5M) - 236 (7M)       |
| 165 (4M) - 242 (5M) - 342 (7M)       |
| "Meridian"                           |



**374 e320**  
(UK / France / Belgium / The Netherlands)

|  |
|--|
| M+T+M+T+M+T+M+M+T+M+T+M+T+M                                |
| Siemens  |
| Eurostar   |
| 2015   |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 15 kV 16.7 Hz AC /<br>3 kV DC / 1.5 kV DC |
| 320 / 300  |
| 16,000   |
| Distributed traction                                       |
| TVM / KVB, TBL, ATB, ETCS                                  |
| 17   |
| 878  |
| 17   |
| 18.2   |
| 400  |
| 2.950  |
| 222  |
| 672  |
| 894  |
| No. 4001-4034<br>Siemens Velaro D series                   |



**390**  
(United Kingdom)

|  |
|--|
| 2M+T+M+T+M+T+2M  |
| Alstom   |
| Virgin   |
| 2002   |
| No + Tilting   |
| 1,435  |
| 25 kV 50 Hz AC   |
| 225 / 200  |
| 5,500  |
| Distributed traction   |
| AWS / TPWS   |
| 56   |
| 458 (loaded)   |
| 16.1   |
| 12   |
| 217  |
| 2.730  |
| 145  |
| 294  |
| 439  |
| Decided to increasing train length to 11 car for 31 train sets and<br>creation of 4 new 11 car trainsets |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 2.5 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### 395 (United Kingdom)

|                             |
|-----------------------------|
| T+4M+T                      |
| Hitachi                     |
| Southeastern                |
| 2009                        |
| No                          |
| 1,435                       |
| 25 kV 50 Hz AC / 0.75 kV DC |
| 225 / 225                   |
| 3,360                       |
| Distributed traction        |
| TVM / KVB, AWS / TPWS       |
| 29                          |

|                    |
|--------------------|
| 265                |
| 11 (unloaded avg.) |
| 12.7               |
| 121.8              |
| 2.810              |

|     |
|-----|
| -   |
| 348 |
| 348 |

### 800 (United Kingdom)

|   |
|---|
| T+3M+T / T+2M+T+M+T+2M+T                  |
| Hitachi-Hitachi Rail Europe (UK)          |
| IEP (Great Western, East Coast main line) |
| 2017                                      |
| No  |
| 1,435                                     |
| 25 kV 50 Hz AC + Diesel (Bi-mode)         |
| 225 / 200                                 |
| 2,100 - 3,500                             |
| Distributed traction                      |
| AWS / TPWS                                |
| 46 (3M 2T) / 13 (5M 4T)                   |

|              |
|--------------|
| 300 - 540    |
| 18.4         |
| -            |
| 93.7 - 208.7 |
| 2.730        |

|           |
|-----------|
| 45-101    |
| 270 - 526 |
| 315 - 627 |

Agility Trains  
Bi-mode is possible to be propelled by both electricity and diesel engine  
5-cars: 46 sets; 36 (Great Western Main Line), 10 (East Coast Main Line)  
9-cars: 34 sets; 21 (Great Western Main Line), 13 (East Coast Main Line)

### 801 (United Kingdom)

|                                   |
|-----------------------------------|
| T+3M+T / T+2M+T+M+T+2M+T          |
| Hitachi-Hitachi Rail Europe (UK)  |
| IEP (East Coast main line)        |
| 2018                              |
| No                                |
| 1,435                             |
| 25 kV 50 Hz AC + Diesel (Bi-mode) |
| 225 / 200                         |
| 2,100 - 3,500                     |
| Distributed traction              |
| AWS / TPWS                        |
| 12 (3M 2T) / 30 (5M 4T)           |

|              |
|--------------|
| 300 - 540    |
| 18.4         |
| -            |
| 93.7 - 208.7 |
| 2.730        |

|           |
|-----------|
| 45-101    |
| 270 - 526 |
| 315 - 627 |

Agility Trains,  
5-cars: 12 sets (East Coast Main Line)  
9-cars: 30 sets (East Coast Main Line)

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 2.5 ROLLING STOCK



### 802 (United Kingdom)

|   |
|---|
| T+3M+T / T+2M+T+M+T+2M+T  |
| Hitachi-Hitachi Rail Europe (UK)  |
| Great Western   |
| 2018  |
| No  |
| 1,435   |
| 25 kV 50 Hz AC + Diesel (Bi-mode)   |
| 225 / 200   |
| 2,100 - 3,500   |
| Distributed traction  |
| AWS / TPWS  |
| 22 (3M 2T) / 14 (5M 4T)   |
| 300 - 540   |
| 18.4  |
| -   |
| 130 - 234   |
| 2.730   |
| -   |
| -   |
| 326 - 655   |
| Bi-mode, AT300  |
| Bi-mode is possible to be propelled by both electricity and diesel engine who provide electricity to motors |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

#### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

#### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

#### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

#### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways



INTERNATIONAL UNION  
OF RAILWAYS

1. GLOBAL HIGH - SPEED DATA

2. EUROPE

**3. ASIA - PACIFIC**

4. AFRICA

5. NORTH AMERICA

6. MIDDLE EAST

7. LATIN AMERICA

INDEX OF COUNTRIES

## 3.1 HIGH-SPEED RAIL NETWORK



*High-speed lines in commercial operation in China (I)*

| LINE                               | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|------------------------------------|----------------------|------|-----------------------|
| Qinhuangdao - Shenyang North       | 250                  | 2003 | 405                   |
| Taipei - Kaohsiung                 | 300                  | 2007 | 345                   |
| Nanjing South - Hefei              | 250                  | 2008 | 148                   |
| Beijing South - Tianjin            | 350                  | 2008 | 118                   |
| Qingdao - Jinan                    | 200                  | 2009 | 393                   |
| Hefei East - Hankou                | 250                  | 2009 | 380                   |
| Shijiazhuang North - Taiyuan       | 250                  | 2009 | 228                   |
| Chongqing North - Liangwu          | 200                  | 2009 | 263                   |
| Ningbo - Cangnan                   | 250                  | 2009 | 351                   |
| Wuhan - Guangzhou South            | 350                  | 2009 | 1,079                 |
| Zhengzhou East - Xi'an North       | 350                  | 2010 | 553                   |
| Cangnan - Fuzhou                   | 250                  | 2010 | 211                   |
| Fuzhou - Xiamen North              | 250                  | 2010 | 234                   |
| Chengdu - Qingchengshan            | 200                  | 2010 | 65                    |
| Shanghai - Nanjing                 | 350                  | 2010 | 323                   |
| Jiujiang - Nanchang West           | 250                  | 2010 | 138                   |
| Shanghai Hongqiao - Hangzhou South | 350                  | 2010 | 174                   |
| Haikou - Sanya                     | 250                  | 2010 | 308                   |
| Guangzhou South - Zhuhai           | 200                  | 2011 | 143                   |
| Changchun - Jilin                  | 250                  | 2011 | 111                   |
| Beijing South - Shanghai Hongqiao  | 350                  | 2011 | 1,318                 |
| Guangzhou South - Shenzhen North   | 250                  | 2011 | 111                   |
| Longyan - Beixitou (block station) | 200                  | 2012 | 119                   |
| Hankou - Yichang East              | 200                  | 2012 | 292                   |
| Zhengzhou East - Wuhan             | 350                  | 2012 | 526                   |
| Bengbu South - Hefei               | 350                  | 2012 | 131                   |
| Dalian North - Shenyang North      | 350                  | 2012 | 383                   |
| Shenyang North - Harbin            | 350                  | 2012 | 546                   |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in China (II)

| LINE  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---|----------------------|------|-----------------------|
| Suining - Chengdu East                      | 200                  | 2012 | 151                   |
| Beijing West - Zhengzhou East               | 350                  | 2012 | 676                   |
| Taishansuo (block station) - Liuzhou        | 200                  | 2012 | 498                   |
| Taigemu - Baotou                            | 200                  | 2013 | 146                   |
| Nanjing South - Hangzhou East               | 350                  | 2013 | 254                   |
| Hangzhou South - Ningbo                     | 350                  | 2013 | 157                   |
| Panjin North - Yingxiajiahe (block station) | 350                  | 2013 | 90                    |
| Nanchang West - Fuzhou                      | 200                  | 2013 | 547                   |
| Yongtai - Putian                            | 200                  | 2013 | 59                    |
| Jinhu (b.s.) - Longjiaying (b.s.)           | 350                  | 2013 | 288                   |
| Xi'an North - Baoji South                   | 350                  | 2013 | 184                   |
| Xiamen North - Shenzhen North               | 250                  | 2013 | 513                   |
| Nanhu East - Xianning South                 | 250                  | 2013 | 76                    |
| Liuzhou - Nanning                           | 250                  | 2013 | 223                   |
| Qinzhou North - Fangchenggang               | 250                  | 2013 | 62                    |
| Nanning East - Beihai                       | 250                  | 2013 | 197                   |
| Pixian West - Pengzhou                      | 200                  | 2013 | 21                    |
| Nanning - Guangzhou South                   | 250                  | 2014 | 574                   |
| Xiaomayang (block station) - Daye North     | 250                  | 2014 | 91                    |
| Gedian South - Huanggangdong                | 250                  | 2014 | 36                    |
| Changfengjie (block station) - Xi'an North  | 250                  | 2014 | 574                   |
| Hangzhou South - Changsha South             | 350                  | 2014 | 911                   |
| Changsha South - Xinhuang West              | 350                  | 2014 | 420                   |
| Jiangyou - Chengdu East                     | 250                  | 2014 | 153                   |
| Chengdu East - Leshan                       | 250                  | 2014 | 135                   |
| Leshan - Emeishan                           | 250                  | 2014 | 27                    |
| Lanzhou West - Ürümqi South                 | 250                  | 2014 | 1,785                 |
| Jiayuguan South - Jiayuguan                 | 250                  | 2014 | 7                     |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in China (III)

| LINE                                      | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---|----------------------|------|-----------------------|
| Guizhou East - Guangzhou South            | 250                  | 2014 | 860                   |
| Qingdao - Rongcheng                       | 250                  | 2014 | 301                   |
| Zhengzhou East - Songchenglu              | 200                  | 2014 | 50                    |
| Ximotang - Yantai                         | 250                  | 2015 | 19                    |
| Nanyangzhai - Jiaozuo                     | 200                  | 2015 | 70                    |
| Xinhuang West - Guiyang North             | 350                  | 2015 | 286                   |
| Hefei North City - Fuzhou                 | 350                  | 2015 | 850                   |
| Harbin North - Qiqihar South              | 250                  | 2015 | 264                   |
| Shenyang South - Dandong                  | 250                  | 2015 | 208                   |
| Tianjin - Haibin                          | 350                  | 2015 | 43                    |
| Jilin - Hunchun                           | 250                  | 2015 | 361                   |
| Nanjing South - Anqing                    | 250                  | 2015 | 257                   |
| Nanning - Yangxu                          | 250                  | 2015 | 257                   |
| Dandong - Dalian North                    | 200                  | 2015 | 293                   |
| Chengdu East - Shapingba                  | 250                  | 2015 | 300                   |
| Tangyasuo (block station) - Wenzhou South | 200                  | 2015 | 190                   |
| Ganxian - Longyan                         | 200                  | 2015 | 248                   |
| Tianjin West - Bazhou West                | 250                  | 2015 | 72                    |
| Bazhou West - Xushui                      | 200                  | 2015 | 65                    |
| Hainan West Circle (Haikou-Sanya)         | 200                  | 2015 | 345                   |
| Zhengzhou East - Xinzheng Airport         | 200                  | 2015 | 28                    |
| Taipei - Nangang                          | 130                  | 2016 | 9                     |
| Foshan West - Zhaoqing                    | 200                  | 2016 | 81                    |
| Changping East - Xiaojinkou               | 200                  | 2016 | 53                    |
| Zhengzhou East- Xuzhou East               | 350                  | 2016 | 362                   |
| Chongqing North - Wanzhou North           | 250                  | 2016 | 246                   |
| Hankou - Xiaogan East                     | 200                  | 2016 | 61                    |
| Changsha - Zhuzhou South                  | 200                  | 2016 | 58                    |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in China (IV)

| LINE                                       | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Muyun - Xiangtan                           | 200                  | 2016 | 24                    |
| Guiyang North - Kunming South              | 250                  | 2016 | 463                   |
| Yangxu - Kunming East                      | 250                  | 2016 | 452                   |
| Daye North - Yangxin                       | 250                  | 2017 | 37                    |
| Baoji South - Lanzhou West                 | 250                  | 2017 | 353                   |
| Wulanchabu - Hohhot East                   | 250                  | 2017 | 128                   |
| Yangxin - K23 block station                | 250                  | 2017 | 82                    |
| Xi'an North - Jiangyou                     | 250                  | 2017 | 505                   |
| Huaibei North - Xiaoxian North             | 250                  | 2017 | 25                    |
| Shijiazhuang - Jinan East                  | 250                  | 2017 | 308                   |
| Quzhou - Jiujiang                          | 200                  | 2017 | 334                   |
| Dongguan - Changping East                  | 200                  | 2017 | 48                    |
| Changsha West - Changsha                   | 200                  | 2017 | 22                    |
| Tongjiayi (block station) - Guiyang        | 200                  | 2018 | 380                   |
| Jiangmen - Zhanjiang West                  | 200                  | 2018 | 355                   |
| Harbin - Jiamusi                           | 200                  | 2018 | 343                   |
| Fanjiazhuang (b.s.) - Changfengjie (b.s.)  | 200                  | 2018 | 122                   |
| Guangtong North - Dali                     | 200                  | 2018 | 175                   |
| Xinhui - Jiangmen                          | 200                  | 2018 | 3                     |
| Shenzhen North - Futian                    | 200                  | 2018 | 4                     |
| Harbin - Harbin North                      | 200                  | 2018 | 18                    |
| Hangzhou South - Huangshan North           | 250                  | 2018 | 272                   |
| Harbin - Mudanjiang                        | 250                  | 2018 | 300                   |
| Qingdao North - Ganyu North                | 200                  | 2018 | 197                   |
| Ganyu North - Weiyang (block station)      | 200                  | 2018 | 234                   |
| Huaihua South - Hengyang East              | 200                  | 2018 | 319                   |
| Mayuan - Yanjialong                        | 200                  | 2018 | 5                     |
| Changtang (block station) - Hengyang North | 200                  | 2018 | 5                     |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in China (V)

| LINE   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Changtang (block station) - Chashan'ao             | 200                  | 2018 | 5                     |
| Qihe - Jinan West                                  | 200                  | 2018 | 21                    |
| Dazhengzhuang (b.s.) - Damoliu (b.s.)              | 200                  | 2018 | 3                     |
| Beixindian (b.s.) - Wulitang (b.s.)                | 200                  | 2018 | 21                    |
| Jinan East - Hongdao                               | 350                  | 2018 | 305                   |
| Tongren - Dazongping                               | 200                  | 2018 | 46                    |
| Chengdu West - Chaoyang Lake                       | 200                  | 2018 | 100                   |
| Yanping - Longyan                                  | 200                  | 2018 | 247                   |
| Houling (block station) - Hongxing (block station) | 200                  | 2018 | 8                     |
| Huyi (block station) - Aibei (block station)       | 200                  | 2018 | 2                     |
| Chengde South - Pingquan North                     | 350                  | 2018 | 67                    |
| Pingquan North - Shenyang North                    | 350                  | 2018 | 435                   |
| Dingxiang Lake 2 (b.s.) - Da'erhuan 1 (b.s.)       | 200                  | 2018 | 2                     |
| Dingxiang Lake 1 (b.s.) - Da'erhuan 2 (b.s.)       | 200                  | 2018 | 2                     |
| Xinmin North - Tongliao                            | 250                  | 2018 | 197                   |
| Yaojiawopu (block station) - Tianjiawopu (b.s.)    | 200                  | 2018 | 6                     |
| Tuancun (block station) - Daguhe (block station)   | 350                  | 2018 | 4                     |
| Leshan - Yibin West                                | 350                  | 2019 | 145                   |
| Liyang - Daxing Airport                            | 200                  | 2019 | 32                    |
| Meizhou West - Chaoshan                            | 200                  | 2019 | 121                   |
| Rizhao West - Dawangzhuang (block station)         | 350                  | 2019 | 226                   |
| Qufu East - Dawangzhuang (block station)           | 200                  | 2019 | 10                    |
| Qufu East - Nanxiasong (block station)             | 200                  | 2019 | 4                     |
| Xiaogan East - Yunmeng East                        | 250                  | 2019 | 21                    |
| Yunmeng East - Shiyan East                         | 350                  | 2019 | 377                   |
| Shangqiu - Hefei North City                        | 350                  | 2019 | 378                   |
| Zhengzhou East - Xiangyang East                    | 350                  | 2019 | 389                   |
| Zhengzhou South - Fuyang West                      | 350                  | 2019 | 280                   |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in China (VI)

| LINE   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Yinchuan - Zhongwei South                        | 250                  | 2019 | 207                   |
| Xintang South - Shenzhen Airport                 | 140                  | 2019 | 73                    |
| Xintang South - Xintang                          | 140                  | 2019 | 3                     |
| Xuzhou East (Xulan o.s.) - Yancheng (Xuyan o.s.) | 250                  | 2019 | 313                   |
| Dongji - Huai'an East                            | 250                  | 2019 | 105                   |
| Yibin West - Guiyang East                        | 250                  | 2019 | 368                   |
| Jianpo (block station) - Guiyang North           | 250                  | 2019 | 9                     |
| Hejia (block station) - Yangtaishan (b.s.)       | 350                  | 2019 | 385                   |
| Henggang - Hejia (block station)                 | 200                  | 2019 | 11                    |
| Dongcun (block station) - Pushu (block station)  | 200                  | 2019 | 5                     |
| Fanjia (block station) - Nanjie (block station)  | 200                  | 2019 | 2                     |
| Ganxian North - Pingjiang (block station)        | 200                  | 2019 | 3                     |
| Qianjiang - Changde                              | 200                  | 2019 | 333                   |
| Beijing North - Zhangjiakou                      | 350                  | 2019 | 174                   |
| Zhangjiakou - Wulanchabu                         | 350                  | 2019 | 159                   |
| Xiahuayuan - Taizicheng                          | 250                  | 2019 | 52                    |
| Huai'an - Taishancun (block station)             | 250                  | 2019 | 136                   |
| Kazuo - Chifeng                                  | 250                  | 2020 | 156                   |
| Sunjiaogou (b.s.) - Zhengzhangzi (b.s.)          | 200                  | 2020 | 5                     |
| Feidong - Huzhou                                 | 350                  | 2020 | 309                   |
| Zhaodian - Huangdu                               | 200                  | 2020 | 143                   |
| Pingdong (b.s.) - Nantong West                   | 200                  | 2020 | 5                     |
| Anshun West - Shuicheng                          | 250                  | 2020 | 120                   |
| Guangzhou North - Qingyuan                       | 200                  | 2020 | 38                    |
| Weifang North - Laixi East                       | 350                  | 2020 | 124                   |
| Langjiazhuang (b.s.) - Pangjiatun (b.s.)         | 200                  | 2020 | 3                     |
| Huai'an East - Dantu                             | 250                  | 2020 | 199                   |
| Shaobo (b.s.) - Jiangdu                          | 200                  | 2020 | 4                     |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in China (VII)

| LINE   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Shaobo (b.s.) - Tai'anzen                    | 200                  | 2020 | 5                     |
| Hengshan (b.s.) - Zhenjiang (Intercity o.s.) | 200                  | 2020 | 12                    |
| Jiaozuo - Changfengjie (b.s.)                | 250                  | 2020 | 362                   |
| Feixi Jinggang (b.s.) - Shuangling (b.s.)    | 350                  | 2020 | 134                   |
| Shuangling (b.s.) - Longshan (b.s.)          | 200                  | 2020 | 4                     |
| Longshan (b.s.) - Anqing                     | 200                  | 2020 | 22                    |
| Fuzhou - Pingtan                             | 200                  | 2020 | 88                    |
| Xi'an North - Wuzhong                        | 250                  | 2020 | 545                   |
| Huwang (b.s.) - Liquan South                 | 200                  | 2020 | 6                     |
| Daxing Airport - Xiong'an                    | 350                  | 2020 | 59                    |
| Yancheng (Xuyan o.s.) - Nantong West         | 350                  | 2020 | 158                   |
| Guodaocun (b.s.) - Chenqiao (b.s.)           | 200                  | 2020 | 6                     |
| Jixianlu (b.s.) - Feixi Jinggang o.s.        | 200                  | 2020 | 10                    |
| Dafu - Xiantao                               | 200                  | 2020 | 17                    |
| Beijing Chaoyang - Chengde South             | 350                  | 2021 | 192                   |
| Xuzhou East - Houmazhuang                    | 350                  | 2021 | 185                   |
| Shenxu (b.s.) - Lianyungang (Xuzhou o.s.)    | 200                  | 2021 | 5                     |
| Neijiang North - Luzhou                      | 250                  | 2021 | 129                   |
| Liaoning Chaoyang - Linghai South            | 350                  | 2021 | 107                   |
| Zhangjiajie West - Huaihua South             | 350                  | 2021 | 245                   |
| Zhangjiajie West - Shadi (b.s.)              | 200                  | 2021 | 3                     |
| Longxingcun (b.s.) - Huaihua South           | 200                  | 2021 | 4                     |
| Mudanjiang - Jiamusi                         | 250                  | 2021 | 372                   |
| Changbaishan - Dunhua South                  | 250                  | 2021 | 99                    |
| Dunhua - Dunhua South                        | 200                  | 2021 | 12                    |
| Hejia (b.s.) - Yangtaishan (b.s.)            | 350                  | 2021 | 431                   |
| Shuangling (b.s.) - Lushan                   | 350                  | 2021 | 176                   |
| Tangxia (b.s.) - Dongguan South              | 200                  | 2021 | 3                     |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in China (VIII)

| LINE                                   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Dongguan South - Tangxia (b.s.)        | 200                  | 2021 | 2                     |
| Yangtaishan (b.s.) - Shenzhen North    | 200                  | 2021 | 8                     |
| Anqing West - Longshan (b.s.)          | 200                  | 2021 | 7                     |
| Dawangzhuang - Zhuangzhai              | 350                  | 2021 | 199                   |
| Xiaobeishan (b.s.) - Nanxiasong (b.s.) | 200                  | 2021 | 5                     |
| Shaoxing North - Wenling               | 350                  | 2022 | 223                   |
| Shaoxing North - Jinghu (b.s.)         | 350                  | 2022 | 3                     |
| Webling North (b.s.) - Wenling         | 350                  | 2022 | 4                     |
| Bahe (b.s.) - Huangmei East            | 350                  | 2022 | 116                   |
| Huanggang East - Bahe (b.s.)           | 250                  | 2022 | 9                     |
| Puyang East - Zhengzhou East           | 350                  | 2022 | 195                   |
| Yangzhuang (b.s.) - Hongbao (b.s.)     | 250                  | 2022 | 3                     |
| Beijing Fengtai - Dujiakan (b.s.)      | 350                  | 2022 | 9                     |
| Xiangyang East - Wanzhou North         | 350                  | 2022 | 450                   |
| Huanglou (b.s.) - Gongxing (b.s.)      | 250                  | 2022 | 6                     |
| Yiyang South - Huangjinyuan (b.s.)     | 350                  | 2022 | 60                    |
| Huangjinyuan (b.s.) - Changsha West    | 350                  | 2022 | 3                     |
| Huzhou - Tonglu East                   | 350                  | 2022 | 129                   |
| Tonglu East - Tonglu                   | 350                  | 2022 | 9                     |
| Nanning South - Chongzuo               | 250                  | 2022 | 121                   |
| Mile - Honghe                          | 250                  | 2022 | 106                   |
| Changde - Yiyang South                 | 350                  | 2022 | 97                    |
| Zhongwei South - Shuping               | 250                  | 2022 | 221                   |
| Dingjiagou (b.s.) - Lanzhou New Area   | 250                  | 2022 | 7                     |
| Baodi - Beichen                        | 250                  | 2022 | 54                    |
| Beiliugezhuang (b.s.) - Tangshan       | 350                  | 2022 | 141                   |
| Gaoxinzhuang - Beiliugezhuang (b.s.)   | 250                  | 2022 | 2                     |
| Tangshan West - Laozhuangzi (b.s.)     | 250                  | 2022 | 10                    |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in China (IX)

| LINE  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---|----------------------|------|-----------------------|
| Jinan - Laiwu                                       | 350                  | 2022 | 116                   |
| Longli North - Libo                                 | 350                  | 2023 | 176                   |
| Libo - Nanning East                                 | 350                  | 2023 | 305                   |
| Fengling North (b.s.) - Xiangzhu (b.s.)             | 250                  | 2023 | 3                     |
| Shanwei - Xintang                                   | 350                  | 2023 | 200                   |
| Huizhou North - Xiangzhu (b.s.)                     | 250                  | 2023 | 14                    |
| Madiling (b.s.) - Zhongkai                          | 250                  | 2023 | 11                    |
| Fuzhou Nanyong Square - Beixitou (b.s.)             | 350                  | 2023 | 267                   |
| Zhanglan (b.s.) - Fuzhou Nanyong Square             | 250                  | 2023 | 2                     |
| Heshan (b.s.) - Xiamen North (Hangshen o.s.)        | 250                  | 2023 | 4                     |
| Nanjing South Ning'an o.s. - Taicang Riverside o.s. | 350                  | 2023 | 275                   |
| Jiangning - Gaoxinyuan (b.s.)                       | 250                  | 2023 | 3                     |
| Taicang Riverside o.s. - Ludu (b.s.)                | 250                  | 2023 | 5                     |
| Qingbaijiang - Zhenjiangguan                        | 200                  | 2023 | 207                   |
| Qingbaijiang East - Sanxingdui                      | 200                  | 2023 | 5                     |
| Jinan West - Puyang East                            | 350                  | 2023 | 212                   |
| Damiaotun (b.s.) - Yufuhe (b.s.)                    | 250                  | 2023 | 4                     |
| Laixi - Rongcheng                                   | 350                  | 2023 | 193                   |
| Laixi - Laixi East (b.s.)                           | 250                  | 2023 | 3                     |
| Gu'an East - Shengfang                              | 250                  | 2023 | 49                    |
| Shantou South - Shanwei                             | 350                  | 2023 | 142                   |
| Chengdu East - Yibin East                           | 350                  | 2023 | 246                   |
| Yibin East - Yibin                                  | 350                  | 2023 | 17                    |
| Huaxingcun (b.s.) - Jinrui (b.s.)                   | 250                  | 2023 | 2                     |
| Yibin - Yibin West                                  | 250                  | 2023 | 2                     |
| Yibin - Zaojuebang (b.s.)                           | 250                  | 2023 | 2                     |
| Fangchenggang North - Dongxing City                 | 200                  | 2023 | 47                    |
| Longyan - Wuping                                    | 250                  | 2023 | 64                    |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in China (X)

| LINE   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)    |
|--|----------------------|------|--------------------------|
| Huangshan North - Nanchang South                 | 350                  | 2023 | 304                      |
| Guangzhou North - Guangzhou Baiyun               | 250                  | 2023 | 22                       |
| Yixian - Chizhou                                 | 350                  | 2024 | 123                      |
| Foshan West - Guangzhou South                    | 200                  | 2024 | 36                       |
| Guangzhou South - Wanghong                       | 200                  | 2024 | 37                       |
| Bazhong East - Qiangjiawan (b.s.)                | 250                  | 2024 | 145                      |
| Qiangjiawan (b.s.) - Nanchong North (Lanyu o.s.) | 200                  | 2024 | 2                        |
| Zhongchuan Airport - Wuwei South                 | 250                  | 2024 | 193                      |
| Zhuangzhai - Lankao South                        | 350                  | 2024 | 47                       |
| Zhenjiangguan - Huangshengguan                   | 200                  | 2024 | 67                       |
| Tonglu East - Wenzhou North                      | 350                  | 2024 | 261                      |
| Yongjia (b.s.) - Wenzhou North                   | 200                  | 2024 | 3                        |
| Meizhou - Longchuan                              | 350                  | 2024 | 103                      |
| Jiulongpo - Yibin East                           | 350                  | 2024 | 192                      |
| Huinong South - Yinchuan                         | 250                  | 2024 | 96                       |
| Xuancheng - Jixi North                           | 350                  | 2024 | 115                      |
| Huazhen (b.s.) - Feixi (Jinggang o.s.)           | 200                  | 2024 | 3                        |
| Changyi - Zhifu                                  | 350                  | 2024 | 237                      |
| Ximu (b.s.) - Zhenshan (b.s.)                    | 200                  | 2024 | 2                        |
| Jingmen West - Jingzhou                          | 350                  | 2024 | 79                       |
| Shanghai Hongqiao - Huzhou                       | 350                  | 2024 | 164                      |
| Kangshan (b.s.) - Miaoxizhen (b.s.)              | 200                  | 2024 | 4                        |
| Langfang North - Daxing Airport                  | 200                  | 2024 | 28                       |
| Daxing Airport - Gu'an East                      | 250                  | 2024 | 18                       |
| Nanning - Yulin                                  | 350                  | 2024 | 190                      |
| Datong - Ulanqab                                 | 250                  | 2024 | 122                      |
| Huairan East - Fanjiazhuang (b.s.)               | 250                  | 2024 | 133                      |
| Huai'an - Huairan East                           | 250                  | 2024 | 14                       |
|  |                      |      | <b>Total km = 47,803</b> |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines under construction in China

| LINE  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|---|----------------------|------|-------------------------|
| Xi'an - Hancheng (intercity railway)          | 250                  | 2025 | 176                     |
| Panxian - Xingyi                              | 250                  | 2025 | 98                      |
| Chongqing - Qianjiang                         | 350                  | 2025 | 265                     |
| Tieli - Yichun                                | 250                  | 2025 | 112                     |
| Hefei - Xinyi                                 | 350                  | 2025 | 208                     |
| Shijiazhuang - Hengshui - Cangzhou (i.r.)     | 350                  | 2025 | 224                     |
| Yulin - Cenxi                                 | 350                  | 2025 | 111                     |
| Chongzuo - Pingxiang                          | 250                  | 2025 | 81                      |
| Guangzhou - Zhanjiang                         | 350                  | 2025 | 400                     |
| Xi'an - Yan'an                                | 350                  | 2025 | 292                     |
| Yichang - Zhengwan HS (tie line)              | 350                  | 2025 | 109                     |
| Chongqing - Fuling                            | 350                  | 2025 | 69                      |
| Shenyang - Baihe                              | 350                  | 2025 | 429                     |
| Yibin East - Kunming                          | 350                  | 2025 | 507                     |
| Huaibei - Fuyang                              | 350                  | 2026 | 230                     |
| Chaohu - Ma'anshan (intercity railway)        | 250                  | 2026 | 75                      |
| Huaibei - Suzhou - Bengbu (intercity railway) | 350                  | 2026 | 160                     |
| Fuling - Wanzhou                              | 350                  | 2026 | 183                     |
| Lu'an - Anqing                                | 250                  | 2026 | 168                     |
| Lanzhou - Hezuo                               | 200                  | 2026 | 184                     |
| Xi'an - Shiyan                                | 350                  | 2026 | 256                     |
| Nanjing - Huai'an (intercity railway)         | 350                  | 2027 | 201                     |
| Taicang - Situan                              | 200                  | 2027 | 112                     |
| Chengdu - Dazhou - Wanzhou                    | 350                  | 2027 | 488                     |
| Shenzhen - Jiangmen                           | 250                  | 2027 | 116                     |
| Tianjin - Weifang                             | 350                  | 2027 | 350                     |
| Hepu - Zhanjiang                              | 350                  | 2028 | 137                     |
| Xining - Huangshengguan                       | 200                  | 2028 | 502                     |
|   |                      |      | <b>Total km = 6,243</b> |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines planned in China

| LINE                      | MAXIMUM SPEED (km/h) | YEAR       | DISTANCE (KILOMETRES)   |
|---------------------------|----------------------|------------|-------------------------|
| Shanghai - Hangzhou       | 350                  | After 2025 | 193                     |
| Zhangzhou - Shantou       | 350                  | After 2025 | 167                     |
| Shenzhen - Shanwei        | 350                  | After 2025 | 126                     |
| Xiong'an - Shangqiu       | 350                  | After 2025 | 638                     |
| Jiujiang - Nanchang       | 350                  | After 2025 | 137                     |
| Xiangyang - Jingmen       | 350                  | After 2025 | 117                     |
| Shaoyang - Yongzhou       | 250                  | After 2025 | 91                      |
| Xiong'an - Xinzhou        | 350                  | After 2025 | 343                     |
| Baotou - Huinong          | 250                  | After 2025 | 440                     |
| Wuhan - Hefei             | 350                  | After 2025 | 332                     |
| Wuhan - Jingmen - Yichang | 350                  | After 2025 | 296                     |
| Wuhan hub through line    | 350                  | After 2025 | 121                     |
| Changsha - Zhangzhou      | 350                  | After 2025 | 421                     |
| Harbin - Suihua - Tieli   | 250                  | After 2025 | 190                     |
| Nanjing - Ma'anshan       | 250                  | After 2025 | 65                      |
| Nangang - Yilan           | -                    | 2030       | 77                      |
|                           |                      |            | <b>Total km = 3,754</b> |

Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK

### High-speed lines with long-term planning in China

| LINE   | MAXIMUM SPEED (km/h) | YEAR       | DISTANCE (KILOMETRES)   |
|--|----------------------|------------|-------------------------|
| Wenzhou - Fuzhou                                   | 350                  | After 2025 | 290                     |
| Weifang - Suqian                                   | 350                  | After 2025 | 342                     |
| Fuyang - Macheng - Huanggang                       | 350                  | After 2025 | 325                     |
| Guangzhou - Zhuhai - Macao (& Guig. - Nang. t. l.) | 350                  | After 2025 | 358                     |
| Yichang - Changde                                  | 350                  | After 2025 | 212                     |
| Yiyang - Loudi                                     | 250                  | After 2025 | 109                     |
| Xi'an - Ankang                                     | 350                  | After 2025 | 170                     |
| Chongqing - Ankang                                 | 350                  | After 2025 | 540                     |
| Baotou - Ordos                                     | 350                  | After 2025 | 130                     |
| Ordos - Yan'an                                     | 350                  | After 2025 | 390                     |
| Taiyuan - Suide                                    | 350                  | After 2025 | 270                     |
| Hefei - Nanjing - Shanghai                         | 350                  | After 2025 | 532                     |
| Fuling - Yichang                                   | 350                  | After 2025 | 430                     |
| Chengdu - Chongqing (midline)                      | 350                  | After 2025 | 275                     |
| Dunhua - Mudanjiang                                | 250                  | After 2025 | 190                     |
| Nantong - Suzhou - Jiaxing                         | 350                  | After 2025 | 208                     |
| Jiaxing - Ningbo (cross-sea project)               | 350                  | After 2025 | 90                      |
| Wuwei - Zhangye                                    | 250                  | After 2025 | 244                     |
| Tianjin - Chengde (intercity railway)              | 350                  | After 2025 | 234                     |
| Yancheng - Taizhou - Wuxi - Changz. - Yixing       | 250                  | After 2025 | 358                     |
| Zhenjiang - Xuancheng                              | 250                  | After 2025 | 173                     |
| Nanjing - Shangyuanmen (cross. Yangzi river)       | 250                  | After 2025 | 17                      |
| Nanjing - Chuzhou - Bengbu (intercity railway)     | 250                  | After 2025 | 197                     |
| Jinhua - Yiwu (intercity railway)                  | 350                  | After 2025 | 52                      |
| Guangzhou - Zhongshan - Zhujiang - Macao (i. r.)   | 350                  | After 2025 | 85                      |
| Mianyang - Suining - Neijiang (i. r.)              | 250                  | After 2025 | 257                     |
| Changchun - Liaoyuan - Tonghua                     | 250                  | After 2025 | 255                     |
| Jinan - Binzhou                                    | 350                  | After 2025 | 146                     |
| Jiaozuo - Luoyang - Pingdingshan                   | 350                  | After 2025 | 255                     |
|  |                      |            | <b>Total km = 7,134</b> |

Source: compiled by authors based on International Union of Railways

# 3.1 HIGH-SPEED RAIL NETWORK

## High-speed lines in China



Source: compiled by authors based on International Union of Railways

### 3.1 HIGH-SPEED RAIL NETWORK



INDIA

#### High-speed lines under construction in India

| LINE               | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--------------------|----------------------|------|-----------------------|
| Mumbai - Ahmedabad | 320                  | -    | 508                   |
|                    |                      |      | <b>Total km = 508</b> |

#### High-speed lines with long-term planning in India

| LINE                          | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|-------------------------------|----------------------|------|-------------------------|
| Delhi - Varanasi              | -                    | -    | 855                     |
| Varanasi - Patna              | -                    | -    | 250                     |
| Patna - Kolkata               | -                    | -    | 530                     |
| Delhi - Udaipur - Ahmedabad   | -                    | -    | 886                     |
| Hyderabad - Bangalore         | -                    | -    | 618                     |
| Nagpur - Varanasi             | -                    | -    | 855                     |
| Mumbai - Nagpur               | -                    | -    | 789                     |
| Mumbai - Hyderabad            | -                    | -    | 709                     |
| Patna - Guwahati              | -                    | -    | 850                     |
| Delhi - Chandigarh - Amritsar | -                    | -    | 485                     |
| Amritsar - Pathankot - Jammu  | -                    | -    | 190                     |
| Chennai - Bangalore - Mysuru  | -                    | -    | 462                     |
|                               |                      |      | <b>Total km = 7,479</b> |

Source: compiled by authors based on International Union of Railways

# 3.1 HIGH-SPEED RAIL NETWORK

## High-speed lines in India



Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK



INDONESIA  
MALAYSIA  
SINGAPORE  
THAILAND  
VIETNAM

### High-speed lines in operation in Indonesia

| LINE              | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-------------------|----------------------|------|-----------------------|
| Jakarta - Bandung | 300                  | 2023 | 142                   |
|                   |                      |      | <b>Total km = 142</b> |

### High-speed lines long-term planning in Indonesia

| LINE               | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--------------------|----------------------|------|-----------------------|
| Bandung - Surabaya | -                    | -    | 570                   |
|                    |                      |      | <b>Total km = 570</b> |

### High-speed lines long-term planning in Malaysia and Singapore

| LINE                                   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Kuala Lumpur - Johor Bahru - Singapore | 320                  | -    | 350                   |
|  |                      |      | <b>Total km = 350</b> |

### High speed lines under construction in Thailand

| LINE                        | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-----------------------------|----------------------|------|-----------------------|
| Bangkok - Nakhon Ratchasima | 250                  | 2027 | 253                   |
| 3 Airports Link             | 250                  | 2029 | 220                   |
|                             |                      |      | <b>Total km = 473</b> |

### High-speed lines with long-term planning in Thailand

| LINE                                 | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|--------------------------------------|----------------------|------|-------------------------|
| Nakhon Ratchasima - Vientiane (Laos) | 250                  | -    | 355                     |
| Bangkok - Phitsanulok - Chiang Mai   | 300                  | -    | 668                     |
| Bangkok - Hua Hin - Padang Besar     | 250                  | -    | 976                     |
| U Tapao - Rayong - Trat              | -                    | -    | 170                     |
|                                      |                      |      | <b>Total km = 2,169</b> |

### High-speed lines planned in Vietnam

| LINE                    | MAXIMUM SPEED (km/h) | YEAR  | DISTANCE (KILOMETRES)   |
|-------------------------|----------------------|-------|-------------------------|
| Hanoi - Ha Long         | 350                  | 2028  | 121                     |
| Hô Chi Minh - Can Gio   | 350                  | 2028  | 54                      |
| Hanoi - Vinh            | 320                  | 2032  | 285                     |
| Nha Trang - Hô Chi Minh | 320                  | 2032  | 264                     |
| Vinh - Nha Trang        | 320                  | >2050 | 996                     |
|                         |                      |       | <b>Total km = 1,720</b> |

Source: compiled by authors based on International Union of Railways

# 3.1 HIGH-SPEED RAIL NETWORK

## High-speed lines in Indonesia, Malaysia and Singapore, Thailand and Vietnam



Source: compiled by authors based on International Union of Railways

## 3.1 HIGH-SPEED RAIL NETWORK



### High-speed lines in commercial operation in Japan

| LINE                                      | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|---|----------------------|------|-------------------------|
| Tokyo - Shin Osaka (Tokaido)              | 285                  | 1964 | 515                     |
| Shin Osaka - Okayama (San-yo)             | 300                  | 1972 | 161                     |
| Okayama - Hakata (San-yo)                 | 300                  | 1975 | 393                     |
| Omiya - Utsunomiya (Tohoku)               | 275                  | 1982 | 79                      |
| Utsunomiya - Morioka (Tohoku)             | 320                  | 1982 | 426                     |
| Omiya - Niigata (Joetsu)                  | 275                  | 1982 | 270                     |
| Ueno - Omiya (Tohoku)                     | 130                  | 1985 | 28                      |
| Tokyo - Ueno (Tohoku)                     | 110                  | 1991 | 4                       |
| Fukushima - Yamagata (Yamagata)           | 130                  | 1992 | 87                      |
| Morioka - Akita (Akita)                   | 130                  | 1997 | 127                     |
| Takasaki - Nagano (Hokuriku)              | 260                  | 1997 | 117                     |
| Yamagata - Shinjo (Yamagata)              | 130                  | 1999 | 62                      |
| Morioka - Hachinohe (Tohoku)              | 260                  | 2002 | 97                      |
| Shin Yatsushiro - Kagoshima Chuo (Kyushu) | 260                  | 2004 | 127                     |
| Hachinohe - Shin Aomori (Tohoku)          | 260                  | 2010 | 82                      |
| Hakata - Shin Yatsushiro (Kyushu)         | 260                  | 2011 | 130                     |
| Nagano - Kanazawa (Hokuriku)              | 260                  | 2015 | 228                     |
| Shin Aomori - Shin Hakodate (Hokkaido)    | 260                  | 2016 | 149                     |
| Takeo Onsen - Nagasaki (Nishi Kyushu)     | 260                  | 2022 | 66                      |
| Kanazawa - Tsuruga (Hokuriku)             | 260                  | 2024 | 125                     |
|   |                      |      | <b>Total km = 3,272</b> |

### High-speed lines under construction in Japan

| LINE                               | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|------------------------------------|----------------------|------|-----------------------|
| Shin Hakodate - Sapporo (Hokkaido) | 320                  | -    | 212                   |
|                                    |                      |      | <b>Total km = 212</b> |

### High-speed lines planned in Japan

| LINE                                   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--|----------------------|------|-----------------------|
| Tsuruga - Shin Osaka (Hokuriku)        | -                    | -    | 143                   |
| Shin Tosu - Takeo Onsen (Nishi Kyushu) | -                    | -    | 51                    |
|  |                      |      | <b>Total km = 194</b> |

Source: compiled by authors based on International Union of Railways

### 3.1 HIGH-SPEED RAIL NETWORK

#### High-speed lines in Japan



Source: compiled by authors based on International Union of Railways

### 3.1 HIGH-SPEED RAIL NETWORK



## SOUTH KOREA

#### High-speed lines in commercial operation in South Korea

| LINE                             | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|----------------------------------|----------------------|------|-----------------------|
| Geumcheon-gu (Seoul) - Dongdaegu | 305                  | 2004 | 269                   |
| Dongdaegu - Busan                | 305                  | 2010 | 131                   |
| Osong - Gwangju                  | 305                  | 2015 | 182                   |
| Suseo - Pyeongtaek               | 305                  | 2016 | 61                    |
| Seoul - Gangneung                | 250                  | 2017 | 230                   |
|                                  |                      |      | <b>Total km = 873</b> |

#### High-speed lines under construction in South Korea

| LINE                  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-----------------------|----------------------|------|-----------------------|
| Gwangju - Mokpo       | 230                  | 2025 | 60                    |
| Gomagwon - Imseong-ri | 230                  | 2025 | 44                    |
|                       |                      |      | <b>Total km = 104</b> |

Source: compiled by authors based on International Union of Railways

# 3.1 HIGH-SPEED RAIL NETWORK

## High-speed lines in South Korea



Source: compiled by authors based on International Union of Railways

### 3.1 HIGH-SPEED RAIL NETWORK



AUSTRALIA

#### High-speed lines planned in Australia

| LINE  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---|----------------------|------|-----------------------|
| Newcastle - Sydney - Western Sydney Airport | 320                  | 2042 | 194                   |
|   |                      |      | <b>Total km = 194</b> |

#### High-speed lines with long-term planning in Australia

| LINE                              | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|-----------------------------------|----------------------|------|-------------------------|
| Western Sydney Airport - Canberra | 320                  | -    | 250                     |
| Canberra - Melbourne              | 320                  | -    | 650                     |
| Newcastle - Brisbane              | 320                  | -    | 700                     |
|                                   |                      |      | <b>Total km = 1,600</b> |

Source: compiled by authors based on International Union of Railways

### 3.1 HIGH-SPEED RAIL NETWORK

#### High-speed lines in Australia



Source: compiled by authors based on International Union of Railways

## 3.2 CHARACTERISTICS AND EQUIPMENT

### Maximum commercial speed

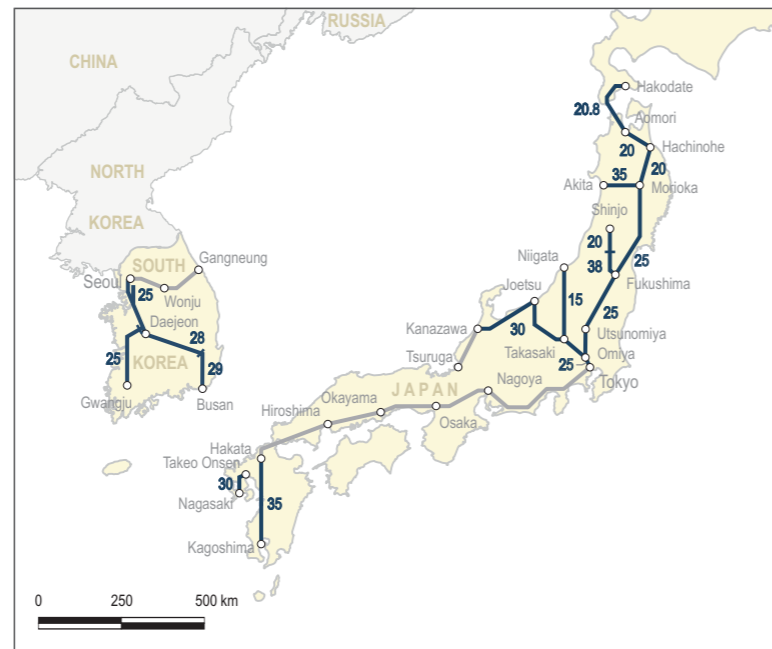


Source: compiled by authors based on International Union of Railways

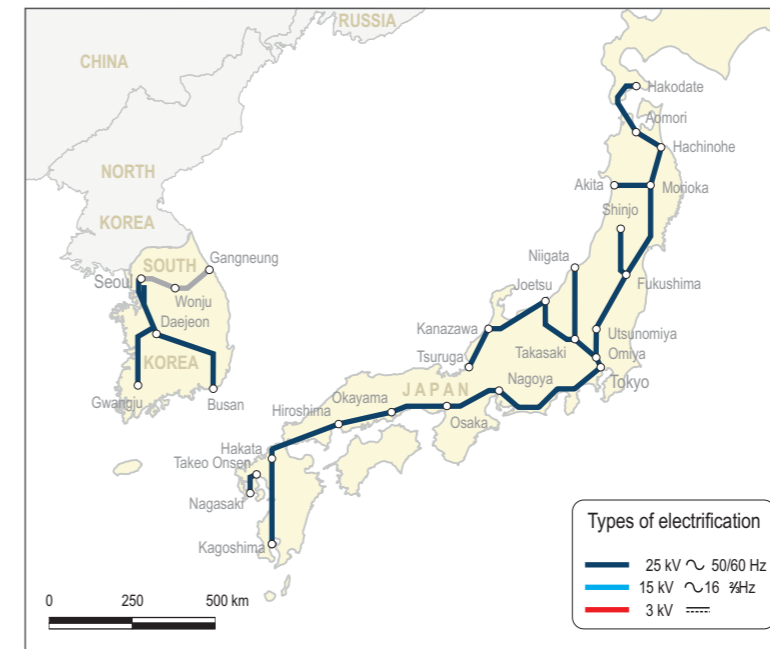


## 3.2 CHARACTERISTICS AND EQUIPMENT (Japan / South Korea)

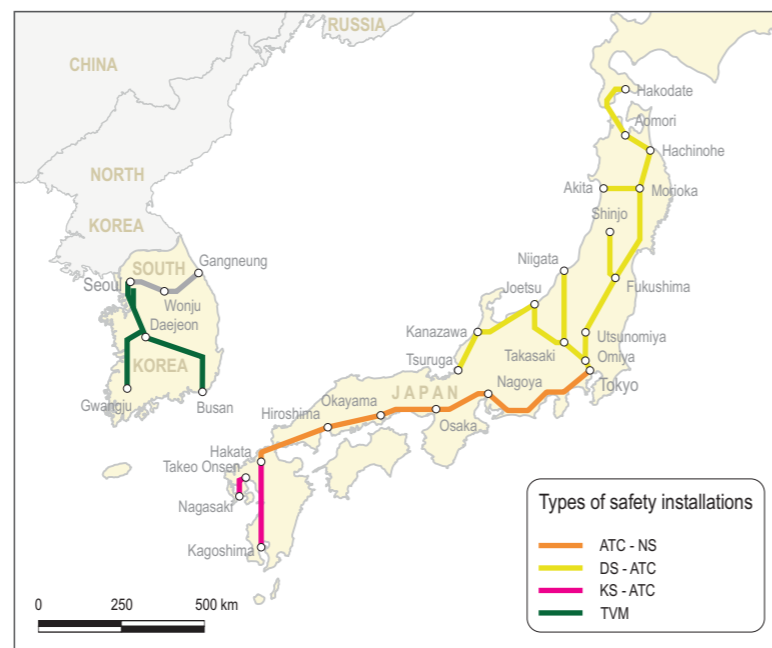
Maximum slope (‰)



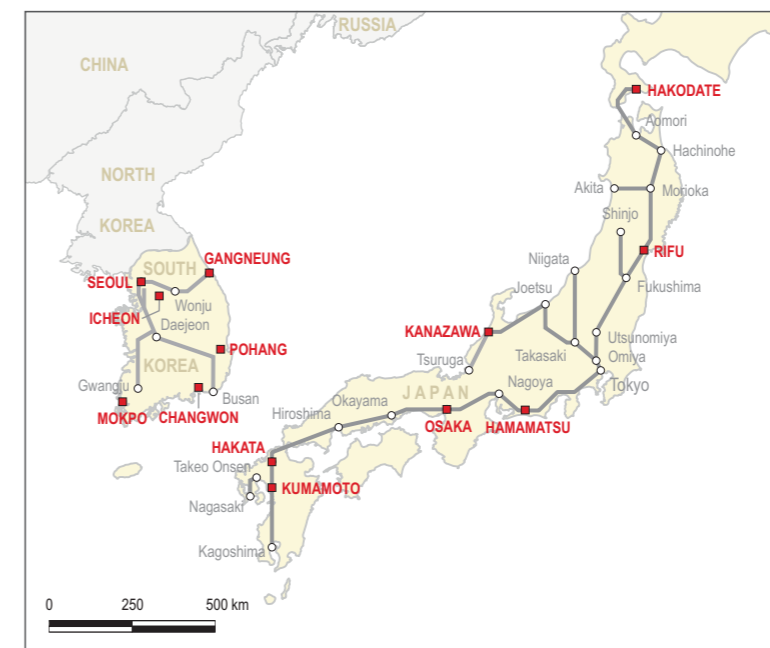
Electrification



Signalling



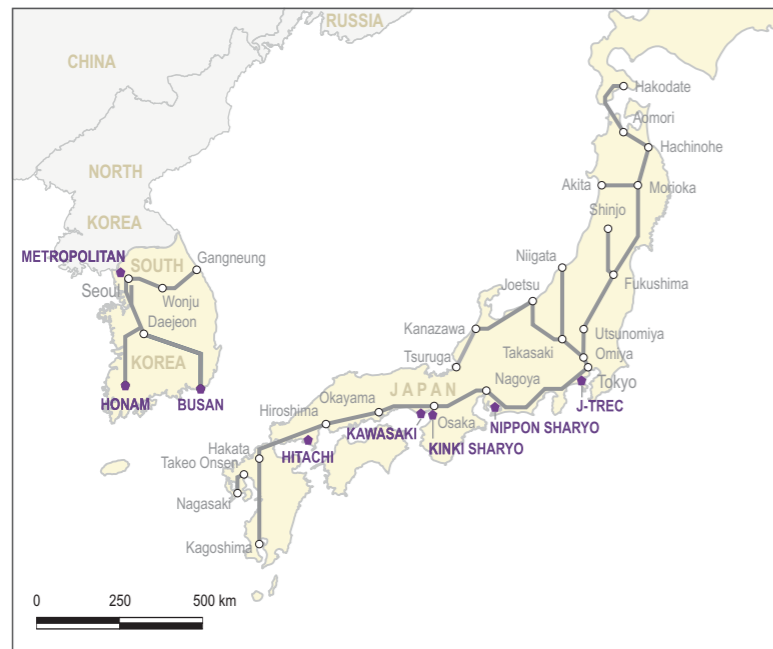
High-speed rolling stock main workshops



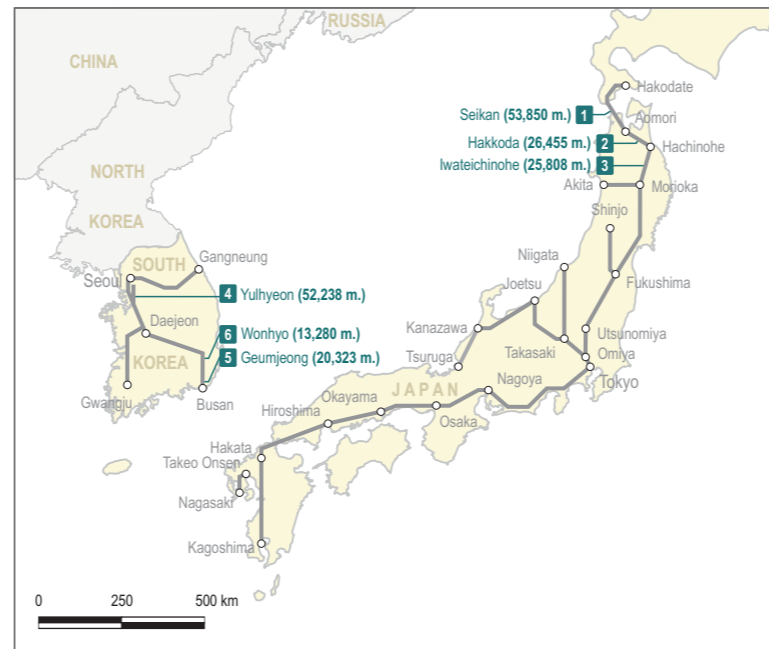
Source: compiled by authors based on International Union of Railways

## 3.2 CHARACTERISTICS AND EQUIPMENT (Japan / South Korea)

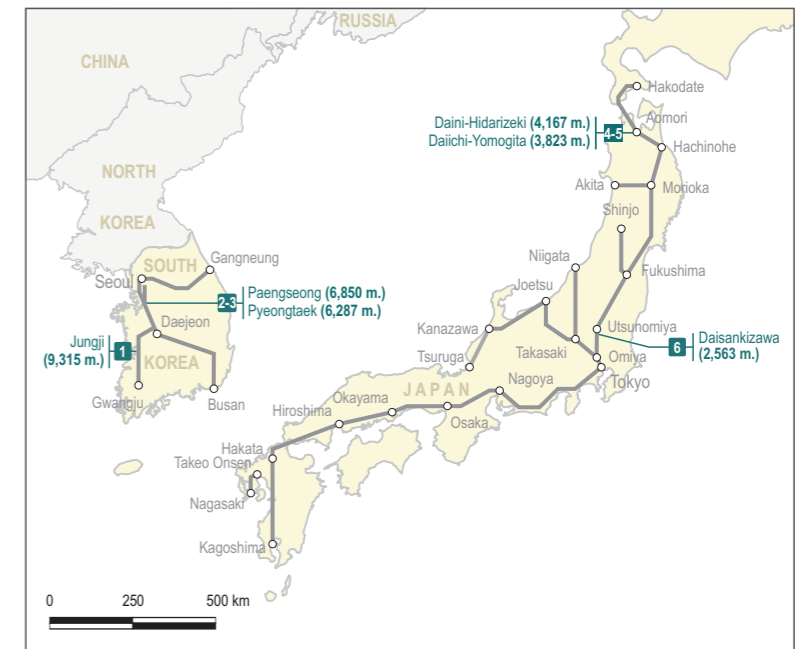
### High-speed rolling stock main factories



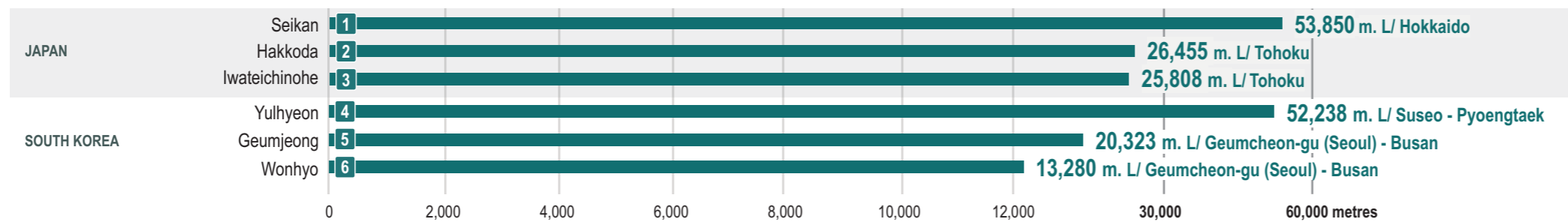
### Longest tunnels



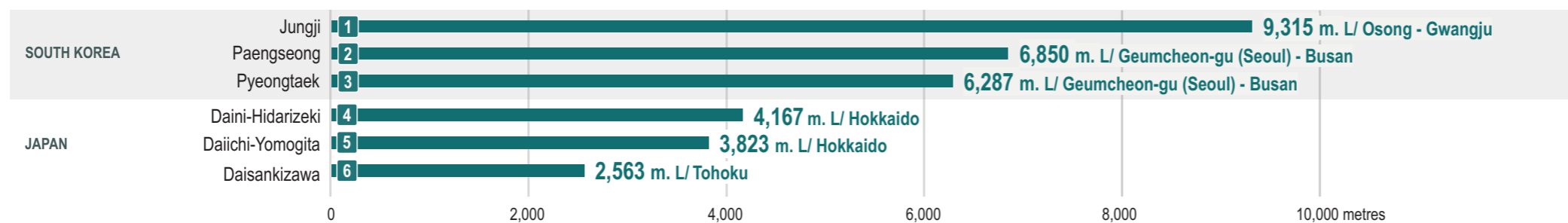
### Longest viaducts



### Longest tunnels of the high-speed rail network in Japan / South Korea



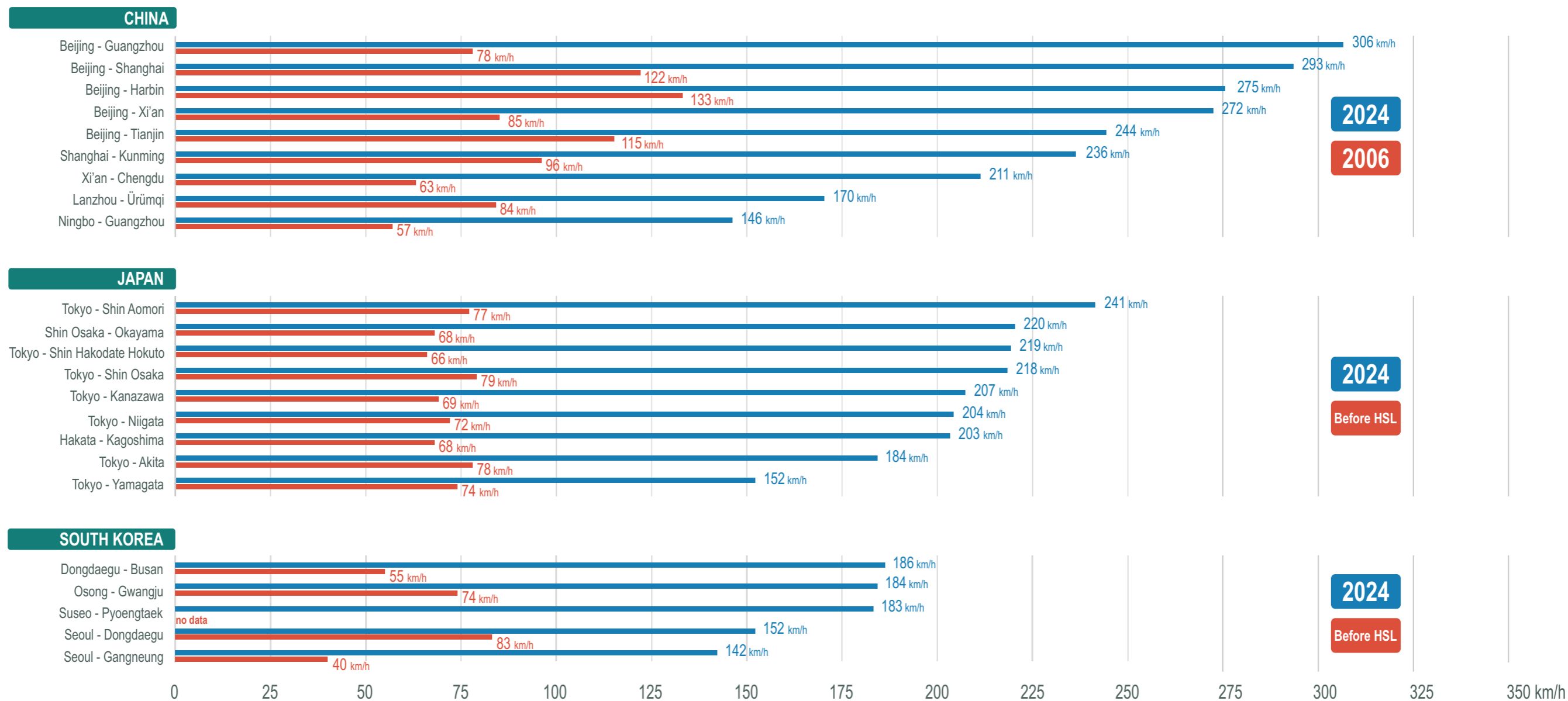
### Longest viaducts of the high-speed rail network in Japan / South Korea



Source: compiled by authors based on International Union of Railways

### 3.3 SPEED AND TRAVEL TIMES

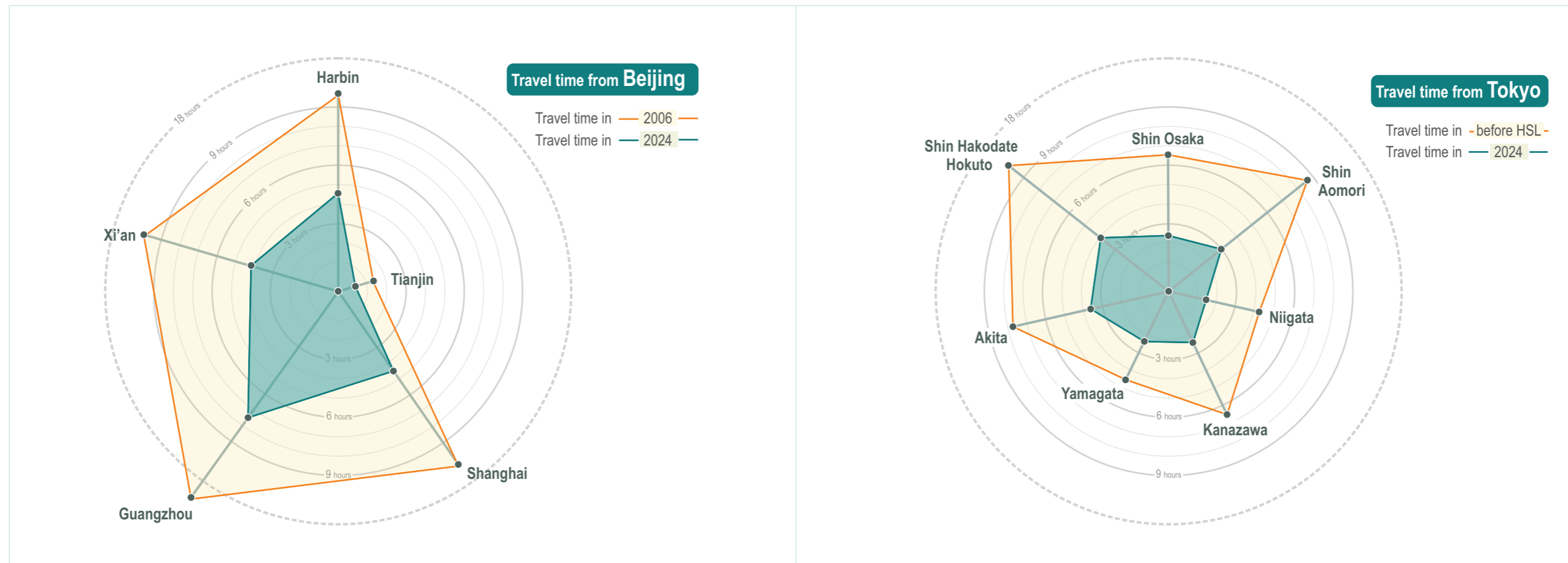
Evolution of average speed on Asia-Pacific high-speed lines



Source: International Union of Railways

### 3.3 SPEED AND TRAVEL TIMES

#### Evolution of travel time from the main chinese and japanese cities



Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |  |
|--|--|
| (1) Composition                              |  |
| Suppliers                                    |  |
| Owners or operators                          |  |
| Year in service                              |  |
| Articulated                                  |  |
| Track gauge (mm)                             |  |
| Electrification voltage (kV)                 |  |
| Maximum train speed / operation speed (km/h) |  |
| Power (kW)                                   |  |
| Traction                                     |  |
| Signalling                                   |  |
| Train sets currently used / planned          |  |

### Weight and dimensions

|                                     |  |
|-------------------------------------|--|
| Unladen weight in running order (t) |  |
| Maximum axle load (t)               |  |
| Power weight ratio (kW/t)           |  |
| Train length (m)                    |  |
| Train width (m)                     |  |

### Seats

|                              |  |
|------------------------------|--|
| 1 <sup>st</sup> class seats* |  |
| 2 <sup>nd</sup> class seats  |  |
| Total seats                  |  |

### Observations

### CRH1A (China)

|                      |
|----------------------|
| M+T+2M+T+M+T+M       |
| CSR-Alstom           |
| CR                   |
| 2006                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 250 / 200            |
| 5,500                |
| Distributed traction |
| CTCS 2               |
| 128                  |

|       |
|-------|
| 435   |
| 16.5  |
| 11.3  |
| 213.5 |
| 3.328 |

|           |
|-----------|
| 144 (128) |
| 524 (483) |
| 668 (611) |

As for the number of seats, outside the parenthesis is for the fixed seats, inside the parenthesis is for the rotatable seats  
No. 46 was abandoned after the accident in Wenzhou

### CRH1A-A (China)

|                      |
|----------------------|
| M+T+2M+T+M+T+M       |
| CSR-Alstom           |
| CR                   |
| 2016                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 250 / 200            |
| 5,500                |
| Distributed traction |
| CTCS 2               |
| 87                   |

|       |
|-------|
| 435   |
| 16.5  |
| 11.3  |
| 213.5 |
| 3.328 |

|     |
|-----|
| 40  |
| 565 |
| 605 |

### CRH1B (China)

|                              |
|------------------------------|
| M+T+2M+T+M+T+2M+T+M+T+2M+T+M |
| CSR-Alstom                   |
| CR                           |
| 2008                         |
| No                           |
| 1,435                        |
| 25 kV 50 Hz AC               |
| 250 / 200                    |
| 11,000                       |
| Distributed traction         |
| CTCS 2                       |
| 24                           |

|       |
|-------|
| 850   |
| 16.5  |
| 11.5  |
| 426.3 |
| 3.328 |

|          |
|----------|
| 208      |
| 1,091    |
| 1,299+56 |

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



**CRH1E**  
(China)

|   |
|---|
| M+T+2M+T+M+T+2M+T+M+T+2M+T+M  |
| CSR-Alstom  |
| CR  |
| 2009  |
| No  |
| 1,435   |
| 25 kV 50 Hz AC  |
| 250 / 200   |
| 11,000  |
| Distributed traction  |
| CTCS 2  |
| 20  |
| 890   |
| 16.5  |
| 11.7  |
| 428.9   |
| 3.328   |
| 16+480 (sleeping car)   |
| 122   |
| 618+58  |
| 13 cars are class sleeping cars (1 car is special 1 <sup>st</sup> class sleeping) |
| 2 cars are 2 <sup>nd</sup> class seating cars                                     |
| 1 car is a dining car   |



**CRH2A**  
(China)

|   |
|---|
| T+2M+2T+2M+T                            |
| Kawasaki Heavy Industries, CSR-Sifang   |
| CR                                      |
| 2008                                    |
| No                                      |
| 1,435                                   |
| 25 kV 50 Hz AC                          |
| 250 / 200                               |
| 4,800                                   |
| Distributed traction                    |
| CTCS 2                                  |
| 491                                     |
| 359.7                                   |
| 14                                      |
| 11.8                                    |
| 201.4                                   |
| 3.380                                   |
| 51                                      |
| 559                                     |
| 610                                     |
| 1 car is 1 <sup>st</sup> seating car    |
| 7 cars are 2 <sup>nd</sup> seating cars |
| 1 set is used as the inspection car     |



**CRH2B**  
(China)

|  |
|--|
| T+2M+2T+2M+2T+2M+2T+2M+T   |
| CSR-Sifang   |
| CR   |
| 2008   |
| No   |
| 1,435  |
| 25 kV 50 Hz AC   |
| 250 / 200  |
| 9,600  |
| Distributed traction   |
| CTCS 2   |
| 27   |
| 758.8  |
| 14   |
| 11.8   |
| 401.4  |
| 3.380  |
| 155  |
| 1,075  |
| 1,230+32   |
| 3 cars are 1 <sup>st</sup> seating cars, 12 cars are 2 <sup>nd</sup> seating cars, 1 car is dining car |

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### CRH2C (China)

|                      |
|----------------------|
| T+6M+T               |
| CSR-Sifang           |
| CR                   |
| 2008                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 350 / 300            |
| 8,760                |
| Distributed traction |
| CTCS 2,3             |
| 49                   |

|       |
|-------|
| 370.8 |
| 14    |
| 19.5  |
| 201.4 |
| 3.380 |

|     |
|-----|
| 51  |
| 559 |
| 610 |

1 car is 1<sup>st</sup> seating car  
6 cars are 2<sup>nd</sup> seating cars  
1 car is 2<sup>nd</sup> seating/dining car  
1 set is used as the inspection car

### CRH2C2 (China)

|                      |
|----------------------|
| T+6M+T               |
| CSR-Sifang           |
| CR                   |
| 2008                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 350 / 300            |
| 8,760                |
| Distributed traction |
| CTCS 2,3             |
| 11                   |

|       |
|-------|
| 370.8 |
| 15    |
| 19.5  |
| 201.4 |
| 3.380 |

|     |
|-----|
| 51  |
| 559 |
| 610 |

1 car is 1<sup>st</sup> seating car  
6 cars are 2<sup>nd</sup> seating cars  
1 car is 2<sup>nd</sup> seating/dining car  
1 set is used as the inspection car

### CRH2E (China)

|                          |
|--------------------------|
| T+2M+2T+2M+2T+2M+2T+2M+T |
| CSR-Sifang               |
| CR                       |
| 2009                     |
| No                       |
| 1,435                    |
| 25 kV 50 Hz AC           |
| 250 / 200                |
| 9,600                    |
| Distributed traction     |
| CTCS 2                   |
| 24                       |

|       |
|-------|
| 778.9 |
| 14    |
| 11.6  |
| 401   |
| 3.380 |

|                    |
|--------------------|
| 520 (Sleeping car) |
| 100                |
| 620                |

13 cars are 1<sup>st</sup> sleeping cars  
2 cars are 2<sup>nd</sup> seating cars  
1 car is 2<sup>nd</sup> seating/dining car

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



**CRH2G**  
(China)

|                      |
|----------------------|
| T+2M+2T+2M+T         |
| CSR-Sifang           |
| CR                   |
| 2015                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 250 / 250            |
| 9,280                |
| Distributed traction |
| CTCS 2               |
| 29                   |
| 494.4                |
| 15.45                |
| 18.8                 |
| 201.4                |
| 3.380                |
| 48                   |
| 565                  |
| 613                  |



**CRH3A**  
(China)

|                      |
|----------------------|
| T+2M+2T+2M+T         |
| CNR-Tangshan         |
| CR                   |
| 2017                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 250 / 250            |
| 5,120                |
| Distributed traction |
| CTCS 2               |
| 61                   |
| -                    |
| -                    |
| -                    |
| -                    |
| 3.300                |
| 48                   |
| 565                  |
| 613                  |



**CRH3C**  
(China)

|   |
|---|
| M+T+M+2T+M+T+M                              |
| Siemens, CNR-Tangshan                       |
| CR  |
| 2008  |
| No  |
| 1,435                                       |
| 25 kV 50 Hz AC                              |
| 350 / 300                                   |
| 8,800                                       |
| Distributed traction                        |
| CTCS 2.3                                    |
| 80  |
| 425   |
| 17  |
| 18.7  |
| 200   |
| 3.260                                       |
| 66  |
| 490   |
| 556+1                                       |
| 1 car is 1 <sup>st</sup> seating car        |
| 6 cars are 2 <sup>nd</sup> seating cars     |
| 1 car is 2 <sup>nd</sup> seating/dining car |

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |  |
|--|--|
| (1) Composition                              |  |
| Suppliers                                    |  |
| Owners or operators                          |  |
| Year in service                              |  |
| Articulated                                  |  |
| Track gauge (mm)                             |  |
| Electrification voltage (kV)                 |  |
| Maximum train speed / operation speed (km/h) |  |
| Power (kW)                                   |  |
| Traction                                     |  |
| Signalling                                   |  |
| Train sets currently used / planned          |  |

### Weight and dimensions

|                                     |  |
|-------------------------------------|--|
| Unladen weight in running order (t) |  |
| Maximum axle load (t)               |  |
| Power weight ratio (kW/t)           |  |
| Train length (m)                    |  |
| Train width (m)                     |  |

### Seats

|                              |  |
|------------------------------|--|
| 1 <sup>st</sup> class seats* |  |
| 2 <sup>nd</sup> class seats  |  |
| Total seats                  |  |

### Observations

### CRH5A (China)

|  |                       |
|--|-----------------------|
| (1) Composition                              | 2M+T+M+2T+2M          |
| Suppliers                                    | Alstom, CNR-Changchun |
| Owners or operators                          | CR                    |
| Year in service                              | 2007                  |
| Articulated                                  | No                    |
| Track gauge (mm)                             | 1,435                 |
| Electrification voltage (kV)                 | 25 kV 50 Hz AC        |
| Maximum train speed / operation speed (km/h) | 250 / 200             |
| Power (kW)                                   | 5,500                 |
| Traction                                     | Distributed traction  |
| Signalling                                   | CTCS 2                |
| Train sets currently used / planned          | 142                   |

|                                     |       |
|-------------------------------------|-------|
| Unladen weight in running order (t) | 451   |
| Maximum axle load (t)               | <17   |
| Power weight ratio (kW/t)           | 11    |
| Train length (m)                    | 211.5 |
| Train width (m)                     | 3.200 |

|                              |           |
|------------------------------|-----------|
| 1 <sup>st</sup> class seats* | 60 (112)  |
| 2 <sup>nd</sup> class seats  | 562 (474) |
| Total seats                  | 622 (586) |

As for the seat's number, the figure outside the parenthesis is for the fixed seats  
Inside the parenthesis is for the rotatable seats

### CRH5G (China)

|  |                       |
|--|-----------------------|
| (1) Composition                              | 2M+T+M+2T+2M          |
| Suppliers                                    | Alstom, CNR-Changchun |
| Owners or operators                          | CR                    |
| Year in service                              | 2007                  |
| Articulated                                  | No                    |
| Track gauge (mm)                             | 1,435                 |
| Electrification voltage (kV)                 | 25 kV 50 Hz AC        |
| Maximum train speed / operation speed (km/h) | 250 / 200             |
| Power (kW)                                   | 5,500                 |
| Traction                                     | Distributed traction  |
| Signalling                                   | CTCS 2                |
| Train sets currently used / planned          | 84                    |

|                                     |       |
|-------------------------------------|-------|
| Unladen weight in running order (t) | 451   |
| Maximum axle load (t)               | <17   |
| Power weight ratio (kW/t)           | 11    |
| Train length (m)                    | 211.5 |
| Train width (m)                     | 3.200 |

|                              |           |
|------------------------------|-----------|
| 1 <sup>st</sup> class seats* | 60 (112)  |
| 2 <sup>nd</sup> class seats  | 562 (474) |
| Total seats                  | 622 (586) |

As for the seat's number, the figure outside the parenthesis is for the fixed seats  
Inside the parenthesis is for the rotatable seats

### CRH6A (China)

|  |                                   |
|--|-----------------------------------|
| (1) Composition                              | T+2M+2T+2M+T                      |
| Suppliers                                    | CSR-Puzhen Rolling stock Co. Lit. |
| Owners or operators                          | CR                                |
| Year in service                              | 2013                              |
| Articulated                                  | No                                |
| Track gauge (mm)                             | 1,435                             |
| Electrification voltage (kV)                 | 25 kV 50 Hz AC                    |
| Maximum train speed / operation speed (km/h) | 220 / 200                         |
| Power (kW)                                   | 5,520                             |
| Traction                                     | Distributed traction              |
| Signalling                                   | CTCS 2,3                          |
| Train sets currently used / planned          | 27                                |

|                                     |       |
|-------------------------------------|-------|
| Unladen weight in running order (t) | 496   |
| Maximum axle load (t)               | 15.5  |
| Power weight ratio (kW/t)           | 0,0   |
| Train length (m)                    | 201.4 |
| Train width (m)                     | 3.300 |

|                              |     |
|------------------------------|-----|
| 1 <sup>st</sup> class seats* | -   |
| 2 <sup>nd</sup> class seats  | 549 |
| Total seats                  | 549 |

CRH6A will be existed. Operating speed is under 200 km/h

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



**CRH380A**  
(China)

|                      |
|----------------------|
| T+6M+T               |
| CSR-Sifang           |
| CR                   |
| 2010                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 350 / 300            |
| 9,600                |
| Distributed traction |
| CTCS 2.3             |
| 320                  |
| 480                  |
| <15                  |
| 20                   |
| 203                  |
| 3.380                |
| 12+95                |
| 373                  |
| 480                  |

12 seats: "sightseeing"  
There are other 14 seats for dining car



**CRH380AL**  
(China)

|                      |
|----------------------|
| T+14M+T              |
| CSR-Sifang           |
| CR                   |
| 2011                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 350 / 300            |
| 21,560               |
| Distributed traction |
| CTCS 2.3             |
| 113                  |
| 960                  |
| <15                  |
| 22.5                 |
| 403                  |
| 3.380                |
| 56+6+76              |
| 923                  |
| 1,061                |

56 seats: business class  
6 seats: "sightseeing"



**CRH380B**  
(China)

|                      |
|----------------------|
| M+T+M+2T+M+T+M       |
| CNR-Changchun        |
| CR                   |
| 2011                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 350 / 300            |
| 9,200                |
| Distributed traction |
| CTCS 2.3             |
| 353                  |
| 544                  |
| <17                  |
| 16.9                 |
| 200                  |
| 3.260                |
| 72                   |
| 528                  |
| 600+1                |

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |  |
|--|--|
| (1) Composition                              |  |
| Suppliers                                    |  |
| Owners or operators                          |  |
| Year in service                              |  |
| Articulated                                  |  |
| Track gauge (mm)                             |  |
| Electrification voltage (kV)                 |  |
| Maximum train speed / operation speed (km/h) |  |
| Power (kW)                                   |  |
| Traction                                     |  |
| Signalling                                   |  |
| Train sets currently used / planned          |  |

### Weight and dimensions

|                                     |  |
|-------------------------------------|--|
| Unladen weight in running order (t) |  |
| Maximum axle load (t)               |  |
| Power weight ratio (kW/t)           |  |
| Train length (m)                    |  |
| Train width (m)                     |  |

### Seats

|                              |  |
|------------------------------|--|
| 1 <sup>st</sup> class seats* |  |
| 2 <sup>nd</sup> class seats  |  |
| Total seats                  |  |

### Observations

### CRH380BL (China)

|                              |
|------------------------------|
| M+T+M+2T+M+T+2M+T+M+2T+M+T+M |
| CNR-Tanshang, CNR-Changchun  |
| CR                           |
| 2011                         |
| No                           |
| 1,435                        |
| 25 kV 50 Hz AC               |
| 350 / 300                    |
| 18,400                       |
| Distributed traction         |
| CTCS 2.3                     |
| 149                          |

1,088

<17

16.9

400

3.260

24+190

791

1,005

24 seats: business

### CRH380BG (China)

|                      |
|----------------------|
| M+T+M+2T+M+T+M       |
| CNR-Changchun        |
| CR                   |
| 2011                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 350 / 300            |
| 9,200                |
| Distributed traction |
| CTCS 2.3             |
| 157                  |

544

<17

16.9

200

3.260

72

528

600

### CRH380CL (China)

|                              |
|------------------------------|
| M+T+M+2T+M+T+2M+T+M+2T+M+T+M |
| CNR-Changchun                |
| CR                           |
| 2011                         |
| No                           |
| 1,435                        |
| 25 kV 50 Hz AC               |
| 350 / 300                    |
| 18,400                       |
| Distributed traction         |
| CTCS 2.3                     |
| 25                           |

1,088

<17

16.9

428

3.358

118

897

977+38

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



**CRH380D**  
(China)

|                      |
|----------------------|
| M+T+M+2T+M+T+M       |
| CSR-Alstom           |
| CR                   |
| 2012                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 350 / 300            |
| 10,000               |
| Distributed traction |
| CTCS 2,3             |
| 85                   |
| 462                  |
| 17                   |
| 17.6                 |
| 251.3                |
| 3.358                |
| 52+126               |
| 835                  |
| 1,013                |
| VIP class: 52 seats  |



**CR300AF**  
(China)

|                                  |
|----------------------------------|
| T+M+T+2M+T+M+T                   |
| CRRC-Sifang, CRRC-Nanjing Puzhen |
| CR                               |
| 2020                             |
| No                               |
| 1,435                            |
| 25 kV 50 Hz AC                   |
| 300 / 250                        |
| 5,460                            |
| Distributed traction             |
| CTCS 2,3                         |
| 67                               |
| 417                              |
| <17                              |
| 13.1                             |
| 208.95                           |
| 3.360                            |
| 48                               |
| 565                              |
| 613                              |



**CR300BF**  
(China)

|                      |
|----------------------|
| T+M+T+3M+T+M+T       |
| CRRC-Tangshan        |
| CR                   |
| 2020                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 300 / 250            |
| 5,460                |
| Distributed traction |
| CTCS 2,3             |
| 70                   |
| 417                  |
| <17                  |
| 13.1                 |
| 208.95               |
| 3.360                |
| 48                   |
| 565                  |
| 613                  |

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Track gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

### Observations

### CR400AF (China)

M+T+M+2T+M+T+M

CRRG-Sigang, CRRG-Changchun

CRRG-Tangshan

CR

2017

No

1,435

25 kV 50 Hz AC

400 / 350

< 9,600

Distributed traction

CTCS 3

181

544

<17

17.6

209

3.360

10+28

518

556

Business class: 10 seats  
First class: 28 seats

### CR400AF-A (China)

M+T+M+2T+M+T+2M+T+M+2T+M+T+M

CRRG-Sigang, CRRG-Changchun

CRRG-Tangshan

CR

2018

No

1,435

25 kV 50 Hz AC

400 / 350

19,500

Distributed traction

CTCS 3

77

1,088

<17

17.6

414.15

3.360

148

1,045

1,193

### CR400BF (China)

M+T+M+2T+M+T+M

CRRG-Sigang, CRRG-Changchun

CRRG-Tangshan

CR

2017

No

1,435

25 kV 50 Hz AC

400 / 350

< 9,600

Distributed traction

CTCS 3

145

-

< 17

-

209

3.360

10+28

518

556

Business class: 10 seats  
First class: 28 seats

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



**CR400BF-A**  
(China)

|                              |
|------------------------------|
| M+T+M+2T+M+T+2M+T+M+2T+M+T+M |
| CRRC Tagshan                 |
| CR                           |
| 2018                         |
| No                           |
| 1,435                        |
| 25 kV 50 Hz AC               |
| 400 / 350                    |
| 20,280                       |
| Distributed traction         |
| CTCS 3                       |
| 74                           |
| -                            |
| <17                          |
| -                            |
| 414.26                       |
| 3.360                        |
| 148                          |
| 1,045                        |
| 1,193                        |



**CR400BF-GZ**  
(China)

|                      |
|----------------------|
| M+T+M+2T+M+T+M       |
| CRRC-Changchun       |
| CR                   |
| 2021                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 400 / 350            |
| 10,140               |
| Distributed traction |
| CTCS 3               |
| 6                    |
| -                    |
| <17                  |
| -                    |
| 211.31               |
| 3.360                |
| 34                   |
| 544                  |
| 578                  |



**MTR CRH380A**  
(China)

|                      |
|----------------------|
| T+6M+T               |
| CRRC                 |
| MTR                  |
| 2018                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 350 / 300            |
| 9,600                |
| Distributed traction |
| CTCS 2.3             |
| 9                    |
| 408                  |
| < 15                 |
| 23.5                 |
| 203                  |
| 3.380                |
| 68                   |
| 511                  |
| 579 (+2 hp)          |

For Guangzhou, Shenzhen and Hong Kong link

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Gauge (mm)                                   |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Track gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

### Observations

### 700T (China)

T+3M+T+6M+T

Hitachi-Kawasaki Heavy Industries-  
Nippon Sharyo

THSRC

2007

No

1,435

25 kV 60 Hz AC

300 / 300

10,260

Distributed traction

ATP

46

503

10.5

17.6

304

3.380

66

923

989

Used in Chinese Taipei, not in the mainland of China

### 0 (Japan)

16 M

Hitachi-Kawasaki Heavy Ind.-Kinki Sharyo-  
Nippon Sharyo-Tokyu Car Corp.-Kisha Seizo

JNR

1964-2008

No

1,435

25 kV 60 Hz AC

220 / 220

11,840

Distributed traction

ATC

0

970

16

12.2

400.3

3.380

68

1,323

1,391

First HS train in the world  
Information data of original 16 cars train set  
Initially 210 km/h maximum speed  
Various train exists (16, 12, 6 and 4 cars)  
Operation finished in 11/2008  
3,216 cars were produced

### 100 (Japan)

12M + 4T

Hitachi-Kawasaki Heavy Industries-Kinki Sharyo-  
Nippon Sharyo-Tokyu Car Corporation

JNR

1985-2012

No

1,435

25 kV 60 Hz AC

220 / 220

11,840

Distributed traction

ATC

0

925

15

11.9

402.1

3.380

168

1,153

1,321

Maximum speed was 230 km/h for V sets owned by JWR

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



### 200 (Japan)

|   |
|---|
| 10M   |
| Hitachi-Kawasaki Heavy Industries-Kinki Sharyo-<br>Nippon Sharyo-Tokyu Car Corporation                  |
| JRE   |
| 1982-2013   |
| No  |
| 1,435   |
| 25 kV 50 Hz AC  |
| 240 / 240   |
| 9,200   |
| Distributed traction  |
| ATC / DS-ATC  |
| 0   |
| 583   |
| 16.4  |
| 14.6  |
| 250   |
| 3.380   |
| 52  |
| 710   |
| 762   |
| It was 12 cars when introduced<br>A trainset was abandoned after the derailment at Chetsu<br>earthquake |

### 300 (Japan)

|  |
|--|
| T+M+T+2M+T+2M+T+2M+T+2M+T+M                                      |
| Hitachi-Kawasaki Heavy Industries-Kinki Sharyo-<br>Nippon Sharyo |
| JRC / JRW  |
| 1992-2012  |
| No   |
| 1,435  |
| 25 kV 60 Hz AC   |
| 270 / 270  |
| 12,000   |
| Distributed traction   |
| ATC / ATC-NS   |
| 0  |
| 711  |
| 12   |
| 16.9   |
| 402.1  |
| 3.380  |
| 200  |
| 1,123  |
| 1,323  |

### 400 (Japan)

|  |
|--|
| 4M+T+2M  |
| Kawasaki Heavy Industries-Tokyu Car Corporation  |
| JRE  |
| 1992-2010  |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 20 kV 50 Hz AC  |
| 240 / 240  |
| 5,040  |
| Distributed traction   |
| ATC / DS-ATC / ATS-P   |
| 0  |
| 318  |
| 12.9   |
| 14.7   |
| 149  |
| 2.947  |
| 20   |
| 379  |
| 399  |
| For through operation b/w Shinkansen line and improved<br>classical line (Yamagata line)<br>All 12 sets were replaced by E2-2000 |

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

#### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Track gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

#### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

#### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

#### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |  |
|--|--|
| (1) Composition                              |  |
| Suppliers                                    |  |
| Owners or operators                          |  |
| Year in service                              |  |
| Articulated                                  |  |
| Track gauge (mm)                             |  |
| Electrification voltage (kV)                 |  |
| Maximum train speed / operation speed (km/h) |  |
| Power (kW)                                   |  |
| Traction                                     |  |
| Signalling                                   |  |
| Train sets currently used / planned          |  |

### Weight and dimensions

|                                     |  |
|-------------------------------------|--|
| Unladen weight in running order (t) |  |
| Maximum axle load (t)               |  |
| Power weight ratio (kW/t)           |  |
| Train length (m)                    |  |
| Train width (m)                     |  |

### Seats

|                              |  |
|------------------------------|--|
| 1 <sup>st</sup> class seats* |  |
| 2 <sup>nd</sup> class seats  |  |
| Total seats                  |  |

### Observations

### 500 (Japan)

|  |
|--|
| 16M  |
| Hitachi-Kawasaki Heavy Industries-<br>Kinki Sharyo-Nippon Sharyo |
| JRW  |
| 1996-2010  |
| No   |
| 1,435  |
| 25 kV 60 Hz AC   |
| 300 / 300  |
| 18,240 or 17,600   |
| Distributed traction   |
| ATC / ATC-NS   |
| 0  |

|              |
|--------------|
| 688 (loaded) |
| 11.7         |
| 26.5         |
| 404          |
| 3.380        |

|       |
|-------|
| 200   |
| 1,124 |
| 1,324 |

9 sets had existed

### 500-7000 (Japan)

|  |
|--|
| 8M   |
| Hitachi-Kawasaki Heavy Industries-<br>Kinki Sharyo-Nippon Sharyo |
| JRW  |
| 2008   |
| No   |
| 1,435  |
| 25 kV 60 Hz AC   |
| 285 / 285  |
| 8,800  |
| Distributed traction   |
| ATC-NS   |
| 6  |

|              |
|--------------|
| 344 (loaded) |
| 11           |
| 25.6         |
| 204          |
| 3.380        |

|     |
|-----|
| -   |
| -   |
| 557 |

8 sets were renovated from 16-car 500

### 700 / 700-3000 (Japan)

|  |
|--|
| T+6M+2T+6M+T   |
| Hitachi-Kawasaki Heavy Industries-<br>Kinki Sharyo-Nippon Sharyo |
| JRC / JRW  |
| 1999   |
| No   |
| 1,435  |
| 25 kV 60 Hz AC   |
| 285 / 285  |
| 13,200   |
| Distributed traction   |
| ATC / ATC-NS   |
| 0  |

|       |
|-------|
| 708   |
| 11.4  |
| 18.6  |
| 404.7 |
| 3.380 |

|       |
|-------|
| 200   |
| 1,123 |
| 1,323 |

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

## 3.4 ROLLING STOCK



**700-7000**  
(Japan)

|  |
|--|
| T+6M+T   |
| Hitachi-Kawasaki Heavy Industries-<br>Kinki Sharyo-Nippon Sharyo |
| JRW  |
| 2000   |
| No   |
| 1,435  |
| 25 kV 60 Hz AC   |
| 285 / 285  |
| 6,600  |
| Distributed traction   |
| ATC-NS   |
| 16   |
| 356 (loaded)   |
| 11.4   |
| 18.5   |
| 204.7  |
| 3.380  |
| -  |
| -  |
| 571  |



**N700 / N700A / N700-5000 / N700A-4000**  
(Japan)

|   |
|---|
| T+14M+T   |
| Hitachi-Kawasaki Heavy Industries-<br>Kinki Sharyo-Nippon Sharyo                |
| JRC / JRW   |
| 2007  |
| No + Tilting  |
| 1,435   |
| 25 kV 60 Hz AC  |
| 300 / 300   |
| 17,080  |
| Distributed traction  |
| ATC-NS  |
| 126   |
| 715 (loaded)  |
| 11.4  |
| 23.9  |
| 404.7   |
| 3.360   |
| 200   |
| 1,123   |
| 1,323   |
| JRC: N700 35 sets / N700A 51 sets<br>JRW: N700A-5000 16 sets N700A-4000 24 sets |



**N700-7000 / N700-8000**  
(Japan)

|  |
|--|
| 8M   |
| Hitachi-Kawasaki Heavy Industries-<br>Kinki Sharyo-Nippon Sharyo |
| JRW / JRK  |
| 2011   |
| No + Tilting   |
| 1,435  |
| 25 kV 60 Hz AC   |
| 300 / 300  |
| 9,760  |
| Distributed traction   |
| ATC-NS / KS-ATC  |
| 19 (JRW) - 11 (JRK)  |
| 344 (loaded)   |
| -  |
| 28.4   |
| 204.7  |
| 3.360  |
| 24   |
| 522  |
| 546  |
| JRW (N700-7000) 19 sets<br>JRK (N700-8000) 11 sets               |

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Track gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### N700S (Japan)

|                       |
|-----------------------|
| 14M + 2T              |
| Hitachi-Nippon Sharyo |
| JRC-JRW-JRK           |
| 2020                  |
| No + Tilting          |
| 1,435                 |
| 25 kV 60 Hz AC        |
| 300 / 300             |
| 17,080                |
| Distributed traction  |
| ATC-NS                |
| 46 (JRC)              |

### N700S (Japan)

|                      |
|----------------------|
| 6M                   |
| Hitachi              |
| JRK                  |
| 2022                 |
| No + Tilting         |
| 1,435                |
| 25 kV 60 Hz AC       |
| 260 / 260            |
| 7,320                |
| Distributed traction |
| ATC / KS-ATC         |
| 5                    |

### 800 (Japan)

|                      |
|----------------------|
| 6M                   |
| Hitachi              |
| JRK                  |
| 2004                 |
| No                   |
| 1,435                |
| 25 kV 60 Hz AC       |
| 260 / 260            |
| 6,600                |
| Distributed traction |
| ATC / KS-ATC         |
| 5                    |

|              |
|--------------|
| 276 (loaded) |
| 11.4         |
| 23.9         |
| 154.7        |
| 3.380        |

|       |
|-------|
| 200   |
| 1,123 |
| 1,323 |

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



**800-1000 / 800-2000**  
(Japan)

|   |
|---|
| 6M  |
| Hitachi   |
| JRK   |
| 2009  |
| No  |
| 1,435   |
| 25 kV 60 Hz AC  |
| 260 / 260   |
| 6,600   |
| Distributed traction  |
| ATC / KS-ATC  |
| 3   |
| 276 (loaded)  |
| 11.4  |
| 23.9  |
| 154.7   |
| 3.380   |
| -   |
| 378   |
| 378   |
| 2 sets: 800-1000, track inspection is capable<br>1 set: 800-2000, catenary, signalling and communication inspection are capable |



**E1**  
(Japan)

|                                   |
|-----------------------------------|
| T+2M+2T+2M+2T+2M+T                |
| Hitachi-Kawasaki Heavy Industries |
| JRE                               |
| 1994-2012                         |
| No+Double Decker                  |
| 1,435                             |
| 25 kV 50 Hz AC                    |
| 240 / 240                         |
| 9,840                             |
| Distributed traction              |
| ATC / DS-ATC                      |
| 0                                 |
| 693                               |
| 17                                |
| 12.8                              |
| 302                               |
| 3.380                             |
| 102                               |
| 1,133                             |
| 1,235                             |



**E2**  
(Japan)

|   |
|---|
| T+6M+T  |
| Hitachi-Kawasaki Heavy Industries-Nippon Sharyo-Tokyu Car Corporation |
| JRE   |
| 1997  |
| No  |
| 1,435   |
| 25 kV 50 Hz AC / 25 kV 60 Hz AC                                       |
| 275 / 275   |
| 7,200   |
| Distributed traction  |
| DS-ATC  |
| 0   |
| 349   |
| 13  |
| 18.6  |
| 201.4   |
| 3.380   |
| 51  |
| 579   |
| 630   |

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Track gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

### Observations

### E2-1000 (Japan)

T+8M+T

Hitachi-Kawasaki Heavy Industries  
Nippon Sharyo-Tokyu Car Corporation

JRE

2002

No

1,435

25 kV 50 Hz AC

275 / 275

9,600

Distributed traction

DS-ATC

10

442

13

19.6

251.4

3.380

51

763

814

For Tohoku and Joetsu line

### E3 (Japan)

2M+2T+2M

Kawasaki Heavy Industries  
Tokyu Car Corporation

JRE

1997

No

1,435

25 kV 50 Hz AC / 20 kV 50 Hz AC

275 / 275

4,800

Distributed traction

ATC / DS-ATC / ATS-P

0

258

12.3

17.2

128.2

2.945

23

315

338

For Tohoku line, converted from through operation b/w Akita  
Shinkansen in 2014

### E3-700 (Japan)

T+6M+T

Kawasaki Heavy Industries

JRE

2014

No

1,435

25 kV 50 Hz AC / 20 kV 50 Hz AC

275 / 275

4,800

Distributed traction

ATC / DS-ATC / ATS-P

0

258

12.3

18

128.2

2.945

-

-

143

A luxury train for tourist-oriented services, "Toreiyu", on  
Yamagata-Shinkansen line (the regauged section)  
It was converted from E3 on 2014

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



**E3-700**  
(Japan)

|                                 |
|---------------------------------|
| T+6M+T                          |
| Kawasaki Heavy Industries       |
| JRE                             |
| 2016-2020                       |
| No                              |
| 1,435                           |
| 25 kV 50 Hz AC / 20 kV 50 Hz AC |
| 275 / 275                       |
| 4,800                           |
| Distributed traction            |
| ATC / DS-ATC / ATS-P            |
| 0                               |
| 258                             |
| 12.3                            |
| 18                              |
| 128.2                           |
| 2.945                           |
| -                               |
| -                               |
| 143                             |

A luxury train for tourist-oriented services, "Genbi-Shinkansen", on Joetsu-Shinkansen line  
It was converted from E3 on 2015  
2020: End of operation



**E3-1000**  
(Japan)

|  |
|--|
| 2M+T+M+T+2M  |
| Kawasaki Heavy Industries<br>Tokyu Car Corporation |
| JRE  |
| 1999-2014  |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 20 kV 50 Hz AC                    |
| 275 / 275  |
| 6,000  |
| Distributed traction                               |
| ATC / DS-ATC / ATS-P                               |
| 3  |
| 311  |
| 12.2   |
| 17.9   |
| 148.7  |
| 2.945  |
| 23   |
| 379  |
| 402  |

For through operation b/w Shinkansen line and improved classical line (Yamagata Shinkansen line)  
1 additional train set was converted from E3 of 2 train sets on 2014



**E3-2000**  
(Japan)

|  |
|--|
| 2M+T+M+T+2M  |
| Kawasaki Heavy Industries<br>Tokyu Car Corporation |
| JRE  |
| 2008   |
| No   |
| 1,435  |
| 25 kV 50 Hz AC / 20 kV 50 Hz AC                    |
| 275 / 275  |
| 6,000  |
| Distributed traction                               |
| ATC / DS-ATC / ATS-P                               |
| 12   |
| 307  |
| 12.5   |
| 18.1   |
| 148.7  |
| 2.945  |
| 23   |
| 371  |
| 394  |

All sets had replaced Series 400

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Track gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |  |
|--|--|
| (1) Composition                              |  |
| Suppliers                                    |  |
| Owners or operators                          |  |
| Year in service                              |  |
| Articulated                                  |  |
| Gauge (mm)                                   |  |
| Electrification voltage (kV)                 |  |
| Maximum train speed / operation speed (km/h) |  |
| Power (kW)                                   |  |
| Traction                                     |  |
| Signalling                                   |  |
| Train sets currently used / planned          |  |

### Weight and dimensions

|                                     |  |
|-------------------------------------|--|
| Unladen weight in running order (t) |  |
| Maximum axle load (t)               |  |
| Power weight ratio (kW/t)           |  |
| Train length (m)                    |  |
| Train width (m)                     |  |

### Seats

|                              |  |
|------------------------------|--|
| 1 <sup>st</sup> class seats* |  |
| 2 <sup>nd</sup> class seats  |  |
| Total seats                  |  |

### Observations

### E4 (Japan)

|  |                                   |
|--|-----------------------------------|
| (1) Composition                              | T+2M+2T+2M+T                      |
| Suppliers                                    | Hitachi-Kawasaki Heavy Industries |
| Owners or operators                          | JRE                               |
| Year in service                              | 1997                              |
| Articulated                                  | No+Double Decker                  |
| Gauge (mm)                                   | 1,435                             |
| Electrification voltage (kV)                 | 25 kV 50 Hz AC                    |
| Maximum train speed / operation speed (km/h) | 240 / 240                         |
| Power (kW)                                   | 6,720                             |
| Traction                                     | Distributed traction              |
| Signalling                                   | DS-ATC                            |
| Train sets currently used / planned          | 0                                 |

|                                     |       |
|-------------------------------------|-------|
| Unladen weight in running order (t) | 428   |
| Maximum axle load (t)               | 16    |
| Power weight ratio (kW/t)           | 14.1  |
| Train length (m)                    | 201.4 |
| Train width (m)                     | 3.380 |

|                              |     |
|------------------------------|-----|
| 1 <sup>st</sup> class seats* | 54  |
| 2 <sup>nd</sup> class seats  | 763 |
| Total seats                  | 817 |

### E5 (Japan)

|  |                                   |
|--|-----------------------------------|
| (1) Composition                              | T+6M+T                            |
| Suppliers                                    | Hitachi-Kawasaki Heavy Industries |
| Owners or operators                          | JRE                               |
| Year in service                              | 2011                              |
| Articulated                                  | No+Tilting                        |
| Gauge (mm)                                   | 1,435                             |
| Electrification voltage (kV)                 | 25 kV 50 Hz AC                    |
| Maximum train speed / operation speed (km/h) | 320 / 320 (300 until 2012)        |
| Power (kW)                                   | 9,600                             |
| Traction                                     | Distributed traction              |
| Signalling                                   | DS-ATC                            |
| Train sets currently used / planned          | 51                                |

|                                     |       |
|-------------------------------------|-------|
| Unladen weight in running order (t) | 453.5 |
| Maximum axle load (t)               | 13    |
| Power weight ratio (kW/t)           | 19.3  |
| Train length (m)                    | 253   |
| Train width (m)                     | 3.350 |

|                              |         |
|------------------------------|---------|
| 1 <sup>st</sup> class seats* | 18 / 55 |
| 2 <sup>nd</sup> class seats  | 650     |
| Total seats                  | 723     |

3 classes, for Hokkaido-Shinkansen, through operation between JR East and JR Hokkaido

### H5 (Japan)

|  |                                   |
|--|-----------------------------------|
| (1) Composition                              | T+6M+T                            |
| Suppliers                                    | Hitachi-Kawasaki Heavy Industries |
| Owners or operators                          | JRH                               |
| Year in service                              | 2016                              |
| Articulated                                  | No+Tilting                        |
| Gauge (mm)                                   | 1,435                             |
| Electrification voltage (kV)                 | 25 kV 50 Hz AC                    |
| Maximum train speed / operation speed (km/h) | 320 / 320                         |
| Power (kW)                                   | 9,600                             |
| Traction                                     | Distributed traction              |
| Signalling                                   | DS-ATC                            |
| Train sets currently used / planned          | 4                                 |

|                                     |       |
|-------------------------------------|-------|
| Unladen weight in running order (t) | 453.5 |
| Maximum axle load (t)               | 13    |
| Power weight ratio (kW/t)           | 19.3  |
| Train length (m)                    | 253   |
| Train width (m)                     | 3.350 |

|                              |         |
|------------------------------|---------|
| 1 <sup>st</sup> class seats* | 18 / 55 |
| 2 <sup>nd</sup> class seats  | 650     |
| Total seats                  | 723     |

3 classes, for Hokkaido-Shinkansen, through operation between JR East and JR Hokkaido

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



**E6**  
(Japan)

|                                   |
|-----------------------------------|
| M+T+3M+T+M                        |
| Hitachi-Kawasaki Heavy Industries |
| JRE                               |
| 2013                              |
| No+Tilting                        |
| 1,435                             |
| 25 kV 50 Hz AC / 20 kV 50 Hz AC   |
| 320 / 320 (300 until 2012)        |
| 6,000                             |
| Distributed traction              |
| DS-ATC / ATS-P                    |
| 23                                |
| 306.5                             |
| 10.9                              |
| 18.4                              |
| 148.7                             |
| 2.945                             |
| 22                                |
| 310                               |
| 332                               |

For through operation b/w Shinkansen line and improved classical line (Akita Shinkansen line)



**E7 / W7**  
(Japan)

|   |
|---|
| T+10M+T   |
| Hitachi-Kawasaki Heavy Industries-Kinki Sharyo-J-TREC |
| JRE / JRW   |
| 2014  |
| No  |
| 1,435   |
| 25 kV 50 Hz AC / 25 kV 60 Hz AC                       |
| 275 / 260   |
| 12,000  |
| Distributed traction                                  |
| DS-ATC  |
| 39 (JRE) - 22 (JRW)                                   |
| 540   |
| 11.3  |
| 20.1  |
| 302   |
| 3.380   |
| 18 / 63   |
| 831   |
| 912   |

3 classes, JRE (E7) 33 sets, JRW (W7) 14 sets for Hokuriku-Shinkansen, operating from 2014



**E8**  
(Japan)

|                                   |
|-----------------------------------|
| T+5M+T                            |
| Hitachi-Kawasaki Heavy Industries |
| JRE                               |
| 2024                              |
| No                                |
| 1,435                             |
| 20 kV 50 Hz AC / 25 kV 50 Hz AC   |
| 300                               |
| 6,000                             |
| Distributed traction              |
| DS-ATC, ATS-P                     |
| 9 (2024) / 15 (2025)              |
| -                                 |
| -                                 |
| -                                 |
| 148.7                             |
| 2.945                             |
| 26                                |
| 329                               |
| 355                               |

Yamagata-Shinkansen Tokyo-Shinjo

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Gauge (mm)                                   |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |  |
|--|--|
| (1) Composition                              |  |
| Suppliers                                    |  |
| Owners or operators                          |  |
| Year in service                              |  |
| Articulated                                  |  |
| Track gauge (mm)                             |  |
| Electrification voltage (kV)                 |  |
| Maximum train speed / operation speed (km/h) |  |
| Power (kW)                                   |  |
| Traction                                     |  |
| Signalling                                   |  |
| Train sets currently used / planned          |  |

### Weight and dimensions

|                                     |  |
|-------------------------------------|--|
| Unladen weight in running order (t) |  |
| Maximum axle load (t)               |  |
| Power weight ratio (kW/t)           |  |
| Train length (m)                    |  |
| Train width (m)                     |  |

### Seats

|                              |  |
|------------------------------|--|
| 1 <sup>st</sup> class seats* |  |
| 2 <sup>nd</sup> class seats  |  |
| Total seats                  |  |

### Observations

### KTX (South Korea)

|  |                       |
|--|-----------------------|
| (1) Composition                              | L+18T+L (+2MB)        |
| Suppliers                                    | Alstom-Hyundai Rotem  |
| Owners or operators                          | KORAIL                |
| Year in service                              | 2004                  |
| Articulated                                  | Yes                   |
| Track gauge (mm)                             | 1,435                 |
| Electrification voltage (kV)                 | 25 kV 60 Hz AC        |
| Maximum train speed / operation speed (km/h) | 300 / 300             |
| Power (kW)                                   | 13,560                |
| Traction                                     | Concentrated traction |
| Signalling                                   | ATC (TVM) / ATS       |
| Train sets currently used / planned          | 46                    |

|                                     |       |
|-------------------------------------|-------|
| Unladen weight in running order (t) | 701   |
| Maximum axle load (t)               | 17    |
| Power weight ratio (kW/t)           | 17.5  |
| Train length (m)                    | 388   |
| Train width (m)                     | 2.904 |

|                              |     |
|------------------------------|-----|
| 1 <sup>st</sup> class seats* | 127 |
| 2 <sup>nd</sup> class seats  | 808 |
| Total seats                  | 935 |

### KTX-Sancheon (South Korea)

|  |                       |
|--|-----------------------|
| (1) Composition                              | L+8T+L                |
| Suppliers                                    | Hyundai Rotem         |
| Owners or operators                          | KORAIL                |
| Year in service                              | 2010                  |
| Articulated                                  | Yes                   |
| Track gauge (mm)                             | 1,435                 |
| Electrification voltage (kV)                 | 25 kV 60 Hz AC        |
| Maximum train speed / operation speed (km/h) | 330 / 300             |
| Power (kW)                                   | 8,800                 |
| Traction                                     | Concentrated traction |
| Signalling                                   | ATC (TVM) / ATS / ATP |
| Train sets currently used / planned          | 24                    |

|                                     |       |
|-------------------------------------|-------|
| Unladen weight in running order (t) | 434   |
| Maximum axle load (t)               | 25.5  |
| Power weight ratio (kW/t)           | 19    |
| Train length (m)                    | 201   |
| Train width (m)                     | 2.970 |

|                              |     |
|------------------------------|-----|
| 1 <sup>st</sup> class seats* | 30  |
| 2 <sup>nd</sup> class seats  | 333 |
| Total seats                  | 363 |

"Sancheon"

### KTX-Sancheon 2 (South Korea)

|  |                       |
|--|-----------------------|
| (1) Composition                              | L+8T+L                |
| Suppliers                                    | Hyundai Rotem         |
| Owners or operators                          | KORAIL                |
| Year in service                              | 2017                  |
| Articulated                                  | Yes                   |
| Track gauge (mm)                             | 1,435                 |
| Electrification voltage (kV)                 | 25 kV 60 Hz AC        |
| Maximum train speed / operation speed (km/h) | 330 / 300             |
| Power (kW)                                   | 8,800                 |
| Traction                                     | Concentrated traction |
| Signalling                                   | ATC (TVM) / ATS / ATP |
| Train sets currently used / planned          | 15                    |

|                                     |       |
|-------------------------------------|-------|
| Unladen weight in running order (t) | 434   |
| Maximum axle load (t)               | 25.5  |
| Power weight ratio (kW/t)           | 20.3  |
| Train length (m)                    | 201   |
| Train width (m)                     | 2.970 |

|                              |     |
|------------------------------|-----|
| 1 <sup>st</sup> class seats* | 33  |
| 2 <sup>nd</sup> class seats  | 377 |
| Total seats                  | 410 |

"Wongang"  
For Wonju - Gangneung

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways

## 3.4 ROLLING STOCK



**KTX-EUM**  
(South Korea)

|                              |
|------------------------------|
| T+4M+T                       |
| Hyundai Rotem                |
| KORAIL                       |
| 2021                         |
| Yes                          |
| 1,435                        |
| 25 kV 60 Hz AC               |
| 286 / 260                    |
| -                            |
| Distributed traction         |
| ATC (TVM) / ATS / ATP / ETCS |
| 19                           |
| 318                          |
| 15                           |
| -                            |
| 150.5                        |
| 3.150                        |
| 46                           |
| 335                          |
| 381                          |

84 cars are operating in Gangneung and Joongang lines



**SRT-Suseo**  
(South Korea)

|                       |
|-----------------------|
| L+8T+L                |
| Hyundai Rotem         |
| SR                    |
| 2016                  |
| Yes                   |
| 1,435                 |
| 25 kV 60 Hz AC        |
| 330 / 300             |
| 8,800                 |
| Concentrated traction |
| ATC (TVM) / ATS / ATP |
| 12                    |
| 434                   |
| 25.5                  |
| 18.9                  |
| 201                   |
| 2.970                 |
| 33                    |
| 377                   |
| 410                   |

"Suseo"  
SR is on of the High Speed train operation company in South Korea

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways



INTERNATIONAL UNION  
OF RAILWAYS

**1. GLOBAL HIGH - SPEED DATA**

**2. EUROPE**

**3. ASIA - PACIFIC**

**4. AFRICA**

**5. NORTH AMERICA**

**6. MIDDLE EAST**

**7. LATIN AMERICA**

**INDEX OF COUNTRIES**

## 4.1 HIGH-SPEED RAIL NETWORK



**EGYPT**

### High-speed lines under construction in Egypt

| LINE                       | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|----------------------------|----------------------|------|-------------------------|
| El Alamein - Marsa Matrouh | 250                  | 2027 | 200                     |
| El Alamein - Ain Sokhna    | 250                  | 2027 | 410                     |
| Borg El Arab - Alexandria  | 250                  | 2027 | 50                      |
| October Gardens - Qena     | 250                  | -    | 573                     |
| Qena - Luxor               | 250                  | -    | 61                      |
| Luxor - Aswan - Abu Simbel | 250                  | -    | 472                     |
|                            |                      |      | <b>Total km = 1,766</b> |

### High-speed lines planned in Egypt

| LINE              | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-------------------|----------------------|------|-----------------------|
| Qena - Hurghada   | 250                  | -    | 220                   |
| Hurghada - Safaga | 250                  | -    | 62                    |
|                   |                      |      | <b>Total km = 282</b> |

Source: compiled by authors based on International Union of Railways

# 4.1 HIGH-SPEED RAIL NETWORK

## High-speed lines in Egypt



Source: compiled by authors based on International Union of Railways

## 4.1 HIGH-SPEED RAIL NETWORK



**MOROCCO**

### High-speed lines in commercial operation in Morocco

| LINE             | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|------------------|----------------------|------|-----------------------|
| Tanger - Kenitra | 320                  | 2018 | 186                   |
|                  |                      |      | <b>Total km = 186</b> |

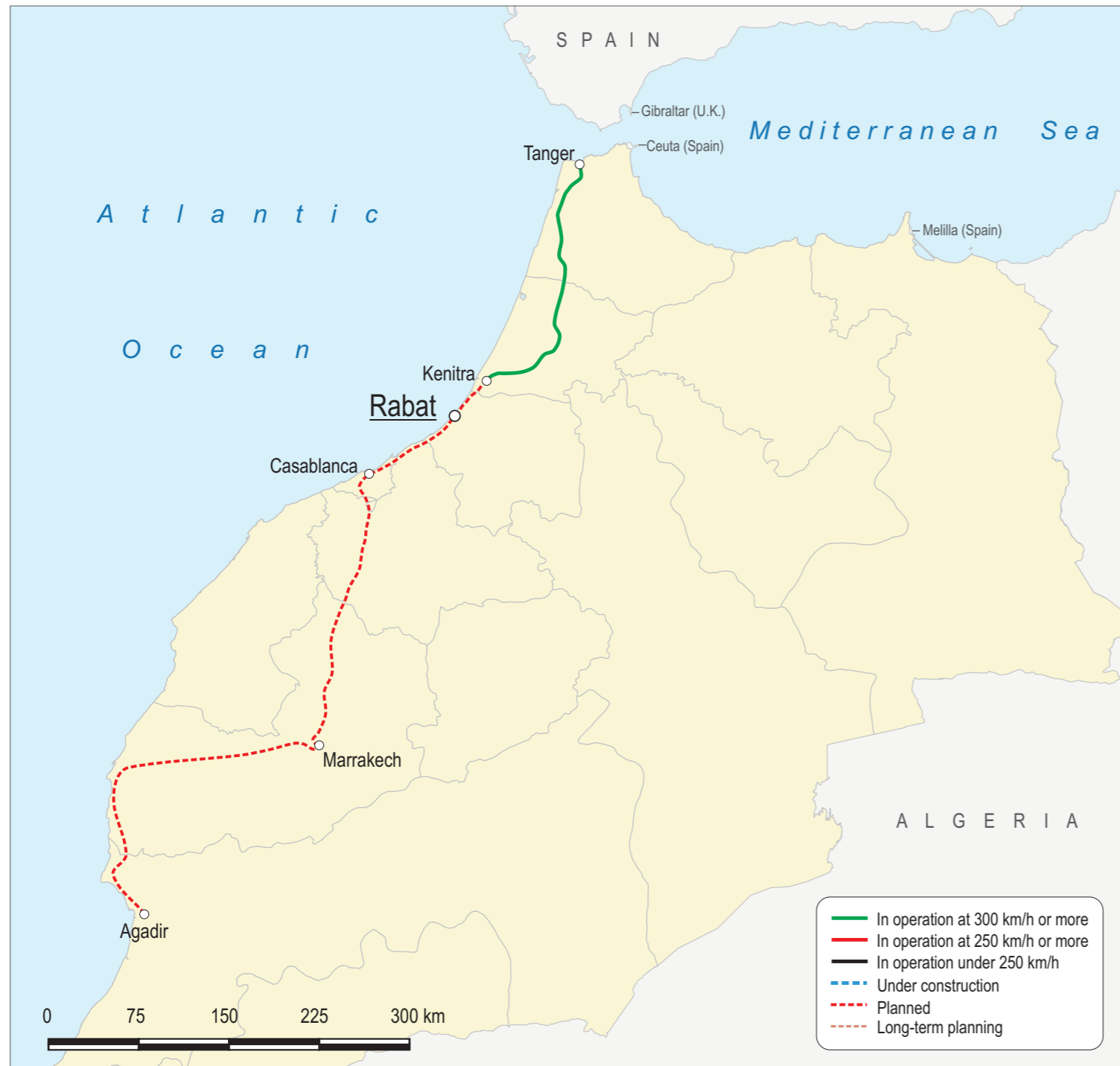
### High-speed lines planned in Morocco

| LINE                   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|------------------------|----------------------|------|-----------------------|
| Kenitra - Rabat        | 320                  | 2027 | 55                    |
| Casablanca - Marrakech | 320                  | 2028 | 240                   |
| Rabat - Casablanca     | 320                  | 2029 | 105                   |
| Marrakech - Agadir     | 250                  | -    | 240                   |
|                        |                      |      | <b>Total km = 640</b> |

Source: compiled by authors based on International Union of Railways

# 4.1 HIGH-SPEED RAIL NETWORK

## High-speed lines in Morocco



Source: compiled by authors based on International Union of Railways

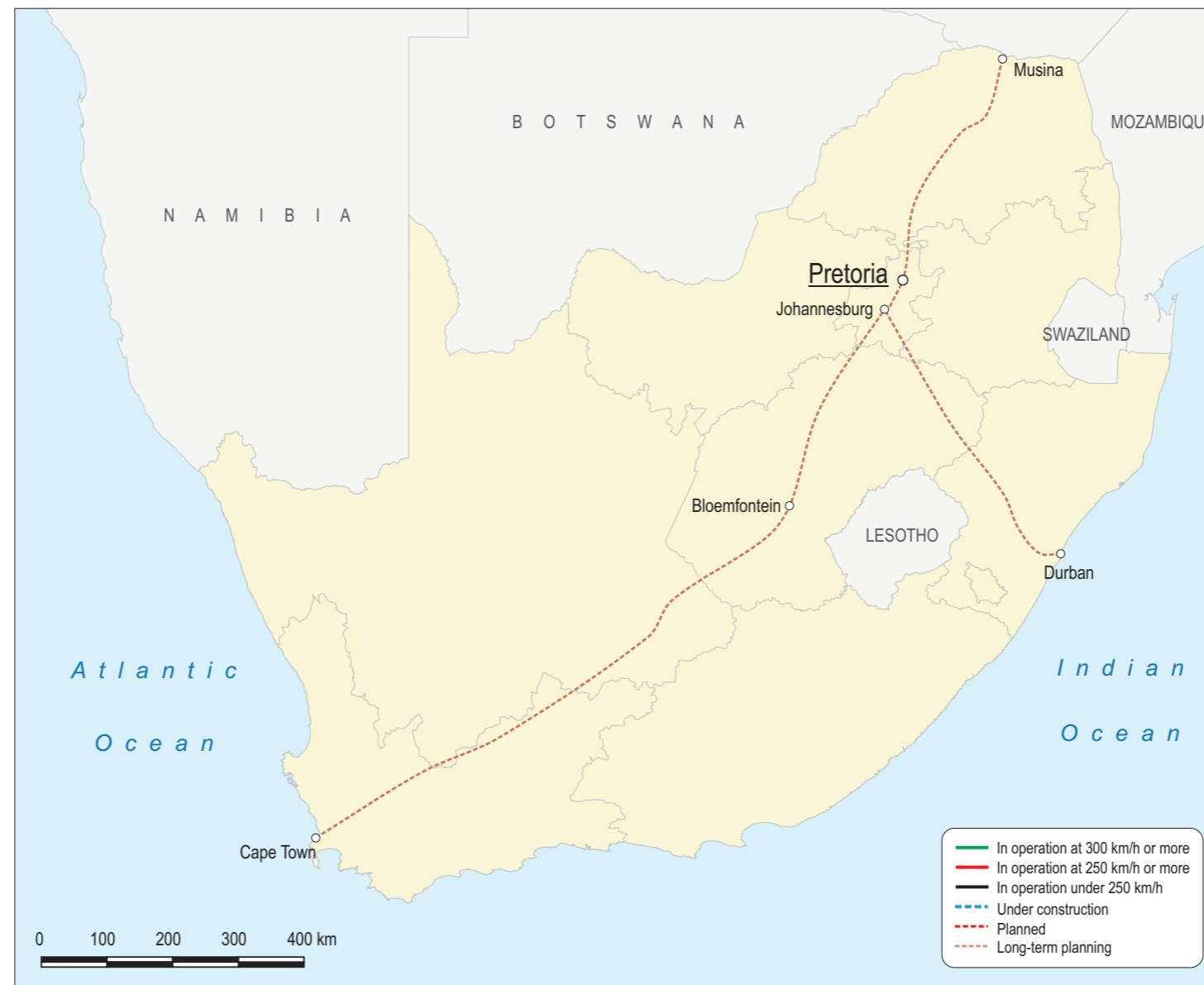
## 4.1 HIGH-SPEED RAIL NETWORK



### SOUTH AFRICA

#### High-speed lines with long-term planning in South Africa

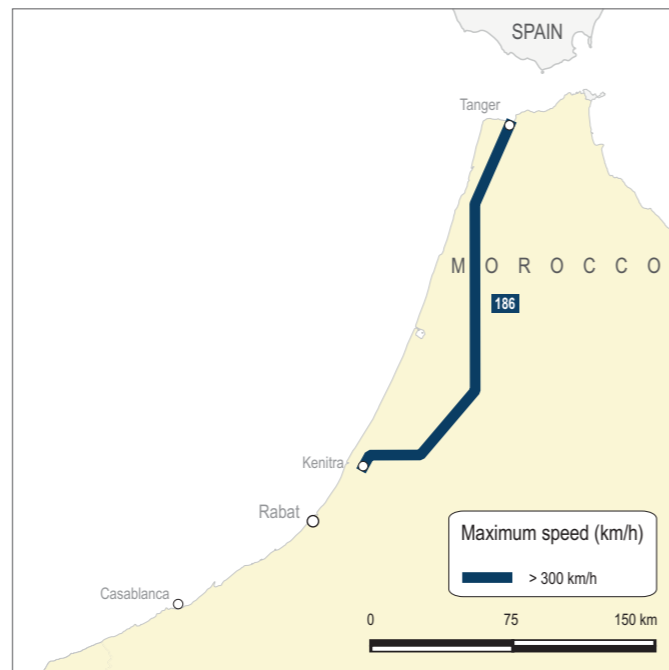
| LINE                     | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|--------------------------|----------------------|------|-------------------------|
| Johannesburg - Durban    | 300                  | -    | 610                     |
| Johannesburg - Musina    | 300                  | -    | 480                     |
| Johannesburg - Cape Town | 300                  | -    | 1,300                   |
|                          |                      |      | <b>Total km = 2,390</b> |



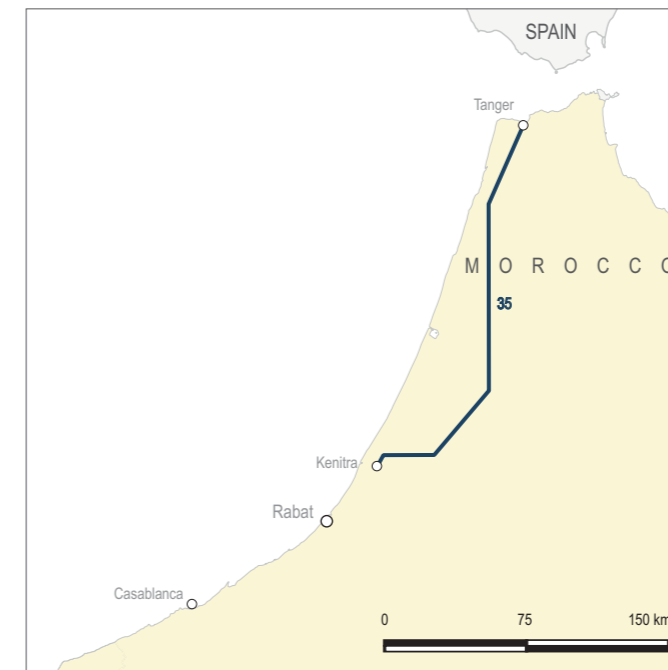
Source: compiled by authors based on International Union of Railways

## 4.2 CHARACTERISTICS AND EQUIPMENT

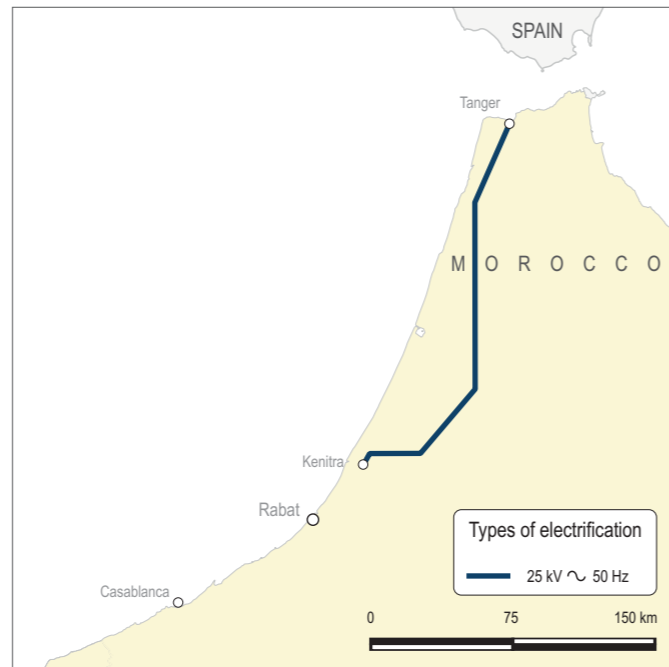
Maximum com. speed and distance (km)



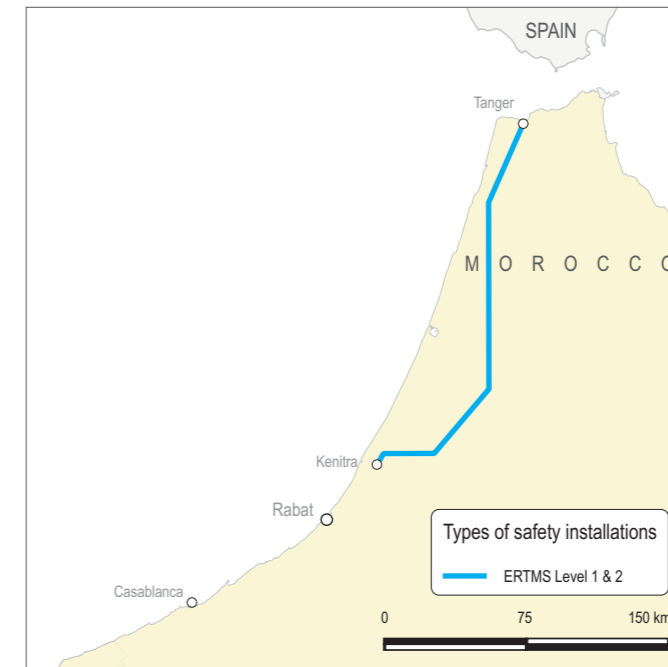
Maximum slope (%)



Electrification



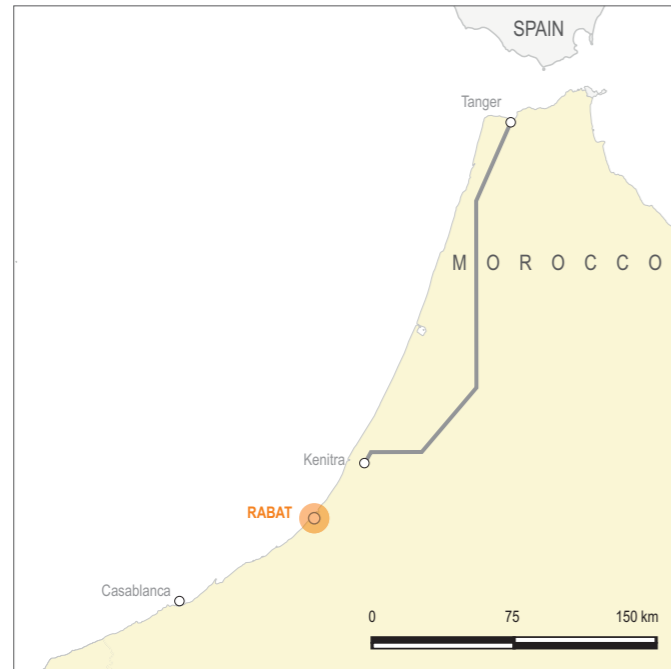
Signalling



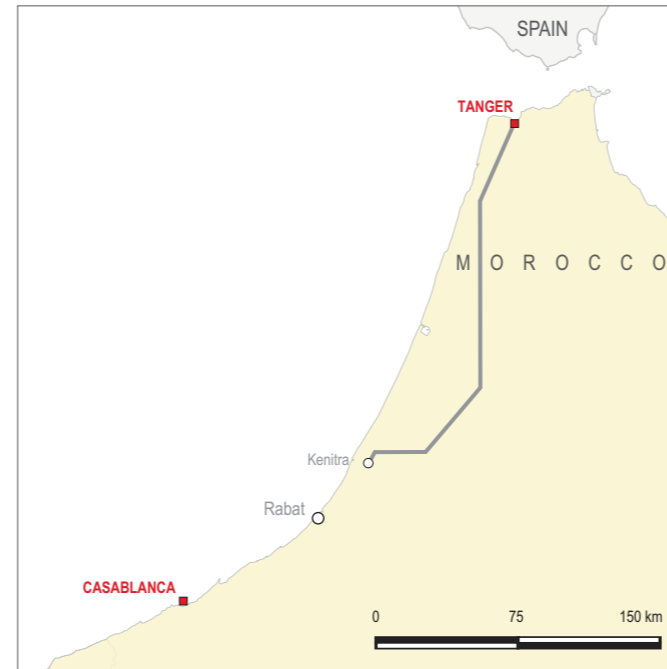
Source: compiled by authors based on International Union of Railways

## 4.2 CHARACTERISTICS AND EQUIPMENT

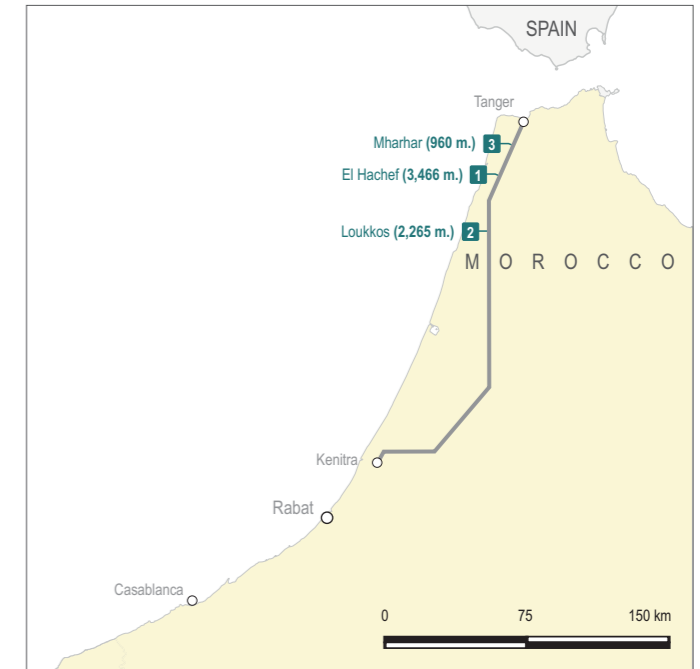
**Centralized Traffic Control (CTC)**



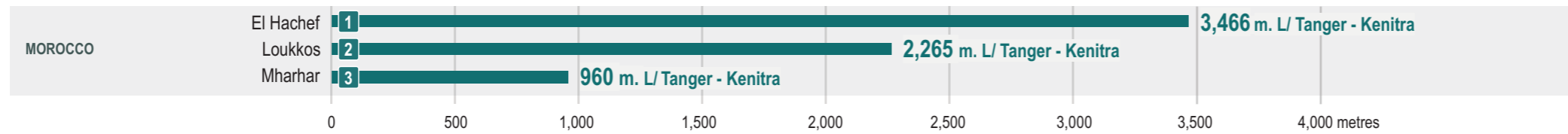
**High-speed rolling stock workshops**



**Longest viaducts**



**Longest viaducts of the high-speed rail network in Africa**



Source: compiled by authors based on International Union of Railways

## 4.3 ROLLING STOCK



### RGV-M (Morocco)

|                          |
|--------------------------|
| L+8T+L                   |
| Alstom                   |
| ONCF                     |
| 2018                     |
| Yes + Double Decker      |
| 1,435                    |
| 25 kV 50 Hz AC / 3 kV DC |
| 320 / 300                |
| -                        |
| Concentrated traction    |
| ETCS                     |
| 12                       |
| -                        |
| -                        |
| -                        |
| 200                      |
| 2.896                    |
| -                        |
| -                        |
| 533                      |
| No. 1201-1212            |

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

#### General characteristics

(1) Composition  
Suppliers  
Owners or operators  
Year in service  
Articulated  
Track gauge (mm)  
Electrification voltage (kV)  
Maximum train speed / operation speed (km/h)  
Power (kW)  
Traction  
Signalling  
Train sets currently used / planned

#### Weight and dimensions

Unladen weight in running order (t)  
Maximum axle load (t)  
Power weight ratio (kW/t)  
Train length (m)  
Train width (m)

#### Seats

1<sup>st</sup> class seats\*  
2<sup>nd</sup> class seats  
Total seats

#### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways



INTERNATIONAL UNION  
OF RAILWAYS

**1. GLOBAL HIGH - SPEED DATA**

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**4. AFRICA**

**5. NORTH AMERICA**

**6. MIDDLE EAST**

**7. LATIN AMERICA**

**INDEX OF COUNTRIES**

## 5.1 HIGH-SPEED RAIL NETWORK



CANADA  
MEXICO  
USA

### High-speed lines planned in Canada

| LINE             | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|------------------|----------------------|------|-------------------------|
| Quebec - Toronto | 300                  | -    | 1,000                   |
|                  |                      |      | <b>Total km = 1,000</b> |

### High-speed lines with long-term planning in Canada

| LINE               | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--------------------|----------------------|------|-----------------------|
| Calgary - Edmonton | 300                  | -    | 294                   |
|                    |                      |      | <b>Total km = 294</b> |

### High-speed lines planned in Mexico

| LINE                    | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-------------------------|----------------------|------|-----------------------|
| Mexico D.F. - Querétaro | 300                  | -    | 210                   |
|                         |                      |      | <b>Total km = 210</b> |

Source: compiled by authors based on International Union of Railways

## 5.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in USA

| LINE  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---|----------------------|------|-----------------------|
| NE Corridor (Boston - New York - Washington DC) | 240                  | 2000 | 735                   |
|   |                      |      | <b>Total km = 735</b> |

### High-speed lines under construction in USA

| LINE                 | MAXIMUM SPEED (km/h) | YEAR      | DISTANCE (KILOMETRES) |
|----------------------|----------------------|-----------|-----------------------|
| Merced - Bakersfield | 350                  | 2030-2033 | 275                   |
|                      |                      |           | <b>Total km = 275</b> |

### High-speed lines planned in USA

| LINE                         | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|------------------------------|----------------------|------|-----------------------|
| Las Vegas - Rancho Cucamonga | 322                  | 2028 | 420                   |
| San Francisco - Merced       | 350                  | -    | 265                   |
| Bakersfield - Anaheim        | 350                  | -    | 269                   |
|                              |                      |      | <b>Total km = 954</b> |

### High-speed lines with long-term planning in USA

| LINE   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|--|----------------------|------|-------------------------|
| NEC Future (Boston - New York - Washington DC) | 350                  | 2040 | 735                     |
| Merced - Sacramento                            | -                    | -    | 180                     |
| Los Angeles - San Diego                        | -                    | -    | 269                     |
| Orlando - Tampa                                | -                    | -    | 137                     |
| Vancouver (Canada) - Seattle - Portland        | -                    | -    | 509                     |
| Palmdale - Apple Valley                        | -                    | -    | 87                      |
|  |                      |      | <b>Total km = 1,917</b> |

Source: compiled by authors based on International Union of Railways

# 5.1 HIGH-SPEED RAIL NETWORK

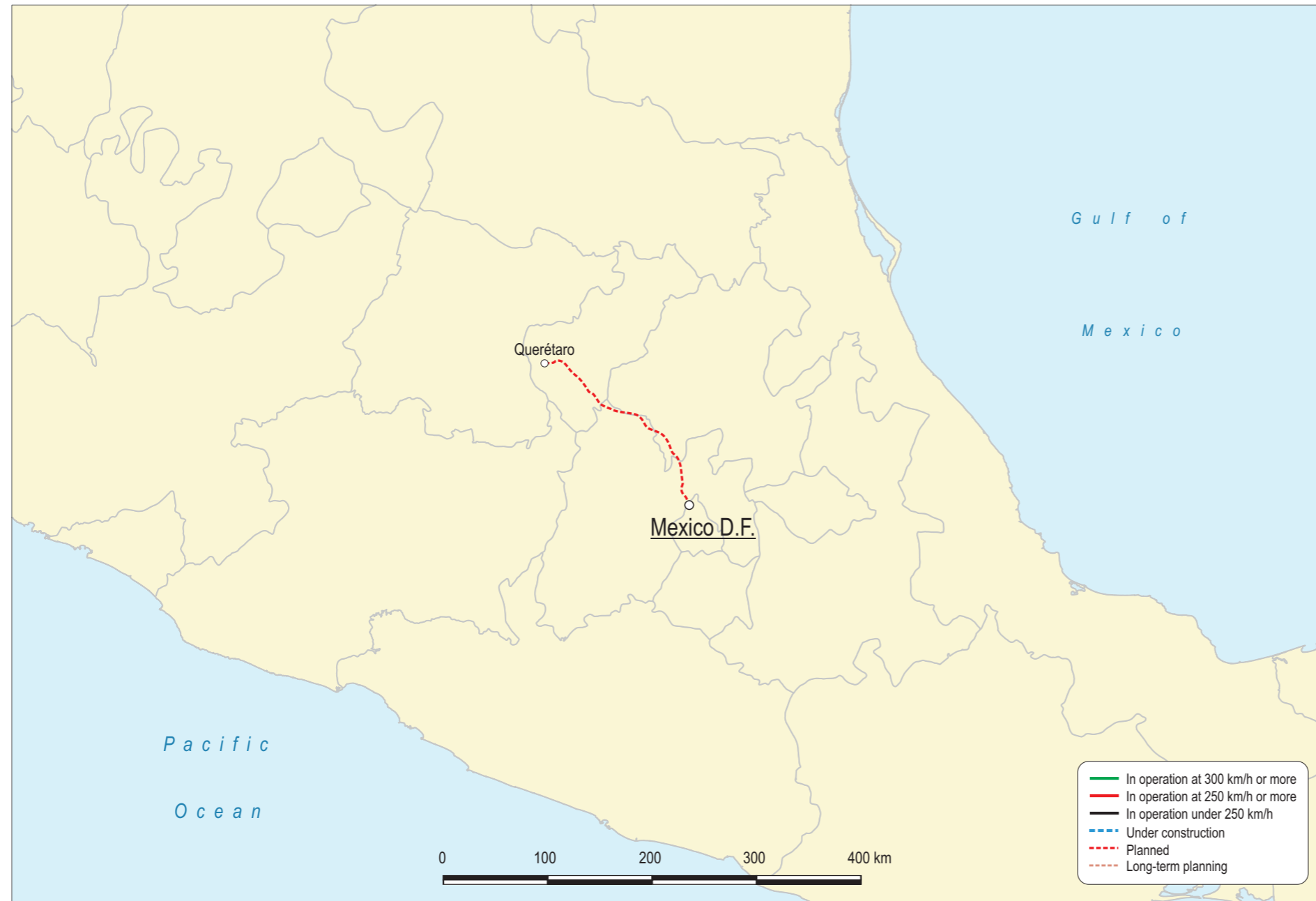
## High-speed lines in Canada and USA



Source: compiled by authors based on International Union of Railways

# 5.1 HIGH-SPEED RAIL NETWORK

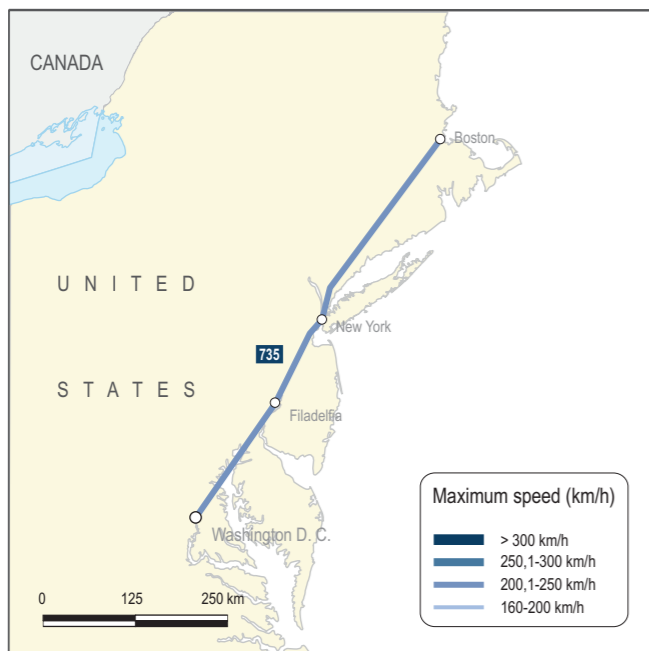
## High-speed lines in Mexico



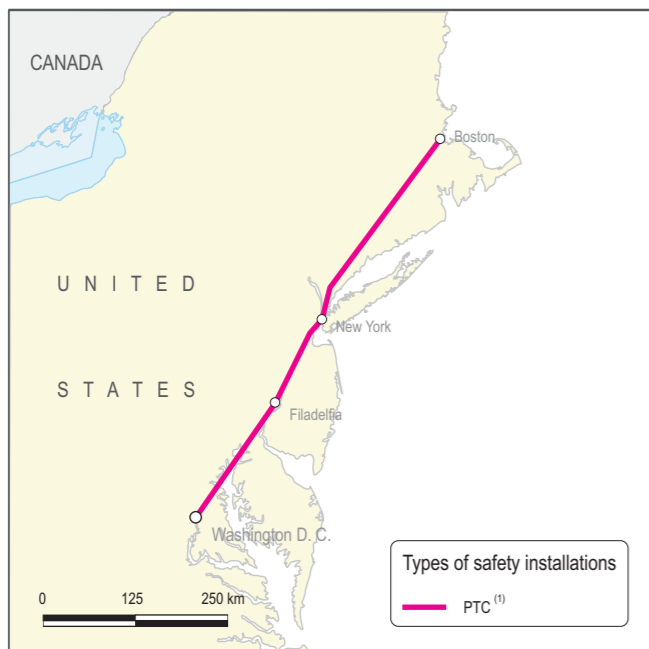
Source: compiled by authors based on International Union of Railways

# 5.2 CHARACTERISTICS AND EQUIPMENT

Maximum com. speed and distance (km)



Signalling



Note:  
(1): Positive Train Control

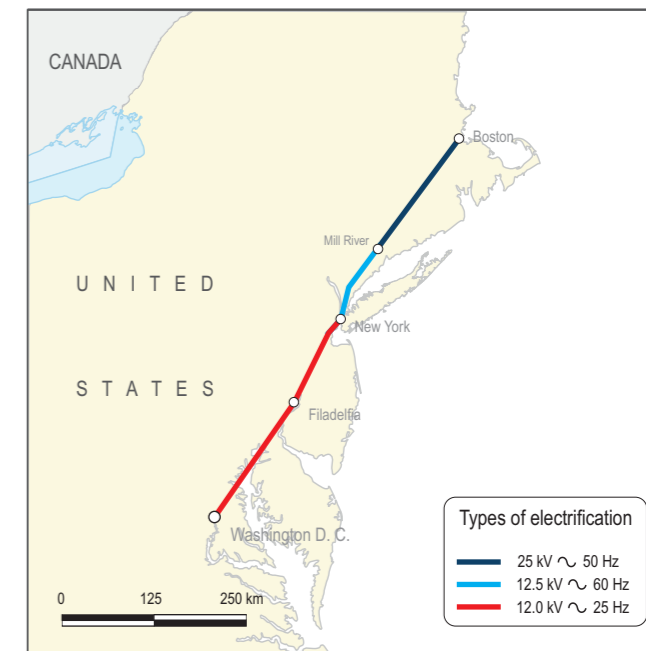
Maximum slope (‰)



Centralized Traffic Control (CTC)



Electrification



High-speed rolling stock workshops



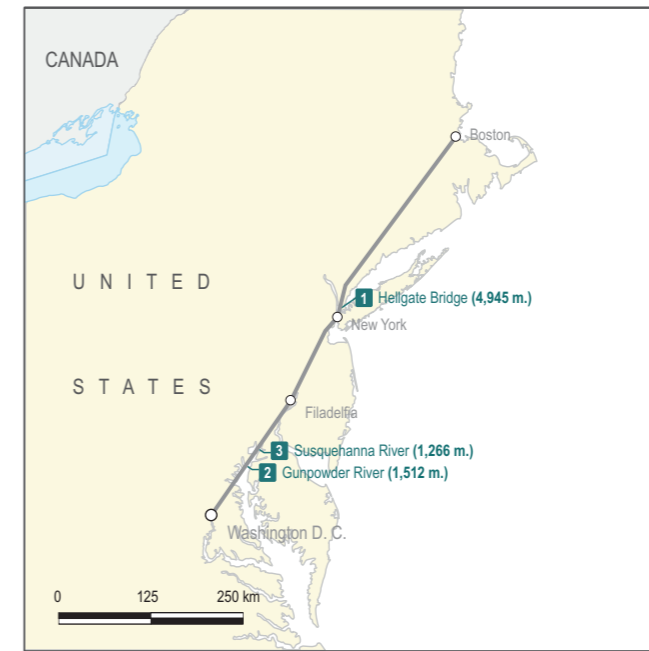
Source: compiled by authors based on International Union of Railways

## 5.2 CHARACTERISTICS AND EQUIPMENT

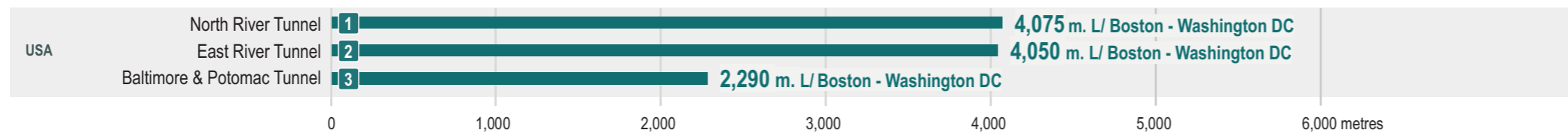
**Longest tunnels**



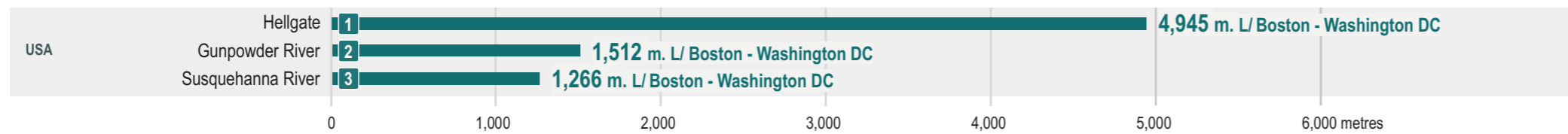
**Longest viaducts**



**Longest tunnels of the high-speed rail network in North America**



**Longest viaducts of the high-speed rail network in North America**



Source: compiled by authors based on International Union of Railways

## 5.3 SPEED AND TRAVEL TIMES

### Evolution of average speed on American high-speed lines



Source: International Union of Railways

## 5.4 ROLLING STOCK



**Acela**  
(USA)

|  |
|--|
| L+6T+L   |
| Bombardier-Alstom                                  |
| Amtrak   |
| 2000   |
| No   |
| 1,435  |
| 25 kV 60 Hz AC / 12.5 kV 60 Hz AC / 12 kV 25 Hz AC |
| 241 / 241  |
| 9,200  |
| Concentrated traction                              |
| ATP  |
| 20   |
| 566  |
| 23   |
| 15.6   |
| 203  |
| 3.175  |
| 44   |
| 260  |
| 304  |

**Acela II**  
(USA)

|  |
|--|
| L+10T+L  |
| Alstom   |
| Amtrak   |
| 2021-2022  |
| No + Tilting                                       |
| 1,435  |
| 25 kV 60 Hz AC / 12.5 kV 60 Hz AC / 12 kV 25 Hz AC |
| 300 / 257  |
| 7,000  |
| Concentrated traction                              |
| ATP  |
| 0 / 28   |
| -  |
| -  |
| -  |
| 212  |
| -  |
| -  |
| -  |
| 512  |

(1) M-Motor coach • T-Trailer coach • L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

(1) Composition

Suppliers

Owners or operators

Year in service

Articulated

Track gauge (mm)

Electrification voltage (kV)

Maximum train speed / operation speed (km/h)

Power (kW)

Traction

Signalling

Train sets currently used / planned

### Weight and dimensions

Unladen weight in running order (t)

Maximum axle load (t)

Power weight ratio (kW/t)

Train length (m)

Train width (m)

### Seats

1<sup>st</sup> class seats\*

2<sup>nd</sup> class seats

Total seats

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways



INTERNATIONAL UNION  
OF RAILWAYS

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## 6.1 HIGH-SPEED RAIL NETWORK



**BAHRAIN AND QATAR**  
**IRAN**  
**IRAQ**  
**ISRAEL**  
**SAUDI ARABIA**  
**TÜRKIYE**

### High-speed lines with long-term planning in Bahrain and Qatar

| LINE          | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---------------|----------------------|------|-----------------------|
| Doha - Manama | 350                  | -    | 180                   |
|               |                      |      | <b>Total km = 180</b> |

### High-speed lines under construction in Iran

| LINE                   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|------------------------|----------------------|------|-----------------------|
| Tehran - Qom - Esfahan | 250                  | 2025 | 410                   |
|                        |                      |      | <b>Total km = 410</b> |

### High-speed lines planned in Iran

| LINE             | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|------------------|----------------------|------|-------------------------|
| Tehran - Mashhad | 200                  | 2025 | 926                     |
| Qom - Arak       | 250                  | 2025 | 117                     |
|                  |                      |      | <b>Total km = 1,043</b> |

### High-speed lines with long-term planning in Iran

| LINE                     | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|--------------------------|----------------------|------|-------------------------|
| Tehran - Hamedan         | -                    | -    | 284                     |
| Tehran - Zanjan - Tabriz | -                    | -    | 613                     |
| Esfahan - Shiraz         | -                    | -    | 470                     |
| Esfahan - Yazd           | -                    | -    | 284                     |
|                          |                      |      | <b>Total km = 1,651</b> |

Source: compiled by authors based on International Union of Railways

## 6.1 HIGH-SPEED RAIL NETWORK

### High-speed lines under construction in Iraq

| LINE   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|--|----------------------|------|-------------------------|
| Al Faw Port - Turkish border / Syrian border | -                    | -    | 1,200                   |
|  |                      |      | <b>Total km = 1,200</b> |

### High-speed lines under construction in Israel

| LINE              | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-------------------|----------------------|------|-----------------------|
| Shefayeem - Haifa | 250                  | -    | 64                    |
|                   |                      |      | <b>Total km = 64</b>  |

### High-speed lines planned in Israel

| LINE                 | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|----------------------|----------------------|------|-----------------------|
| Tel Aviv - Shefayeem | 250                  | -    | 15                    |
| Na'an - Beer Sheva   | 250                  | -    | 70                    |
|                      |                      |      | <b>Total km = 85</b>  |

### High-speed lines in commercial operation in Saudi Arabia

| LINE                    | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-------------------------|----------------------|------|-----------------------|
| Medina - Jeddah - Mecca | 300                  | 2018 | 449                   |
|                         |                      |      | <b>Total km = 449</b> |

Source: compiled by authors based on International Union of Railways

## 6.1 HIGH-SPEED RAIL NETWORK

### High-speed lines in commercial operation in Türkiye

| LINE   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|--|----------------------|------|-------------------------|
| Ankara - Eskişehir                             | 250                  | 2009 | 245                     |
| (Ankara) Polatlı - Konya                       | 250                  | 2011 | 212                     |
| Eskişehir - İzmit - Pendik (Istanbul)          | 250                  | 2014 | 257                     |
| Kayseri North Passage                          | 160                  | 2016 | 23                      |
| Konya - Karaman                                | 200                  | 2022 | 102                     |
| (Ankara) Kayaş - Balıışeyh (Kırıkkale) - Sivas | 300                  | 2023 | 393                     |
|  |                      |      | <b>Total km = 1,232</b> |

### High-speed lines under construction in Türkiye

| LINE   | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|--|----------------------|------|-------------------------|
| Mersin - Adana - Gaziantep                       | 200                  | 2025 | 313                     |
| Halkalı - Ispartakule                            | 200                  | 2025 | 9                       |
| Bandırma - Bursa - Yenişehir - Osmaneli          | 200                  | 2025 | 201                     |
| Çerkezköy - Kapıkule (Bulgarian border)          | 200                  | 2026 | 153                     |
| Karaman - Ulukışla                               | 200                  | 2027 | 135                     |
| (Ankara) Polatlı - Menemen (Izmir)               | 250                  | 2027 | 508                     |
| Tunnel T26                                       | 250                  | 2027 | 8                       |
| Ispartakule - Çerkezköy                          | 200                  | 2028 | 67                      |
| Yerköy - Kayseri                                 | 250                  | 2028 | 142                     |
| Doğançay Relocation 2 (Sapanca-Geyve)            | 250                  | 2028 | 12                      |
| Sivas - Zara (Sivas City Crossing and Section 1) | 200                  | 2028 | 33                      |
| Aksaray - Ulukışla - Yenice                      | 200                  | 2029 | 192                     |
| Delice (Kırıkkale) - Çorum                       | 200                  | 2029 | 120                     |
|  |                      |      | <b>Total km = 1,893</b> |

Source: compiled by authors based on International Union of Railways

## 6.1 HIGH-SPEED RAIL NETWORK

### High-speed lines planned in Türkiye

| LINE                                 | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES)   |
|--------------------------------------|----------------------|------|-------------------------|
| Nurdağ - Kahramanmaraş               | 200                  | 2029 | 49                      |
| Nusaybin - Cizre - Silopi Ovaköy     | 200                  | 2030 | 127                     |
| Gaziantep - Şanlıurfa                | 200                  | 2030 | 136                     |
| Şanlıurfa - Mardin                   | 200                  | 2031 | 180                     |
| Çorum-Samsun                         | 200                  | 2032 | 173                     |
| Sivas - Çetinkaya - Malatya          | 200                  | 2032 | 224                     |
| Eskişehir - Afyonkarahisar - Antalya | 200                  | 2035 | 500                     |
| Zara (Sivas) - Erzincan              | 200                  | 2035 | 228                     |
| Kayseri - Antalya                    | 200                  | 2035 | 541                     |
| Delice - Kırşehir                    | 200                  | 2035 | 108                     |
| Erzincan - Erzurum                   | 200                  | 2035 | 173                     |
| Elazığ - Diyarbakır                  | 200                  | 2035 | 127                     |
| Mürşitpınar - Şanlıurfa              | 200                  | 2036 | 63                      |
| Tokat - Turhal                       | 200                  | 2037 | 44                      |
| Gölbaşı - Adıyaman - Kahta           | 200                  | 2037 | 88                      |
|                                      |                      |      | <b>Total km = 2,761</b> |

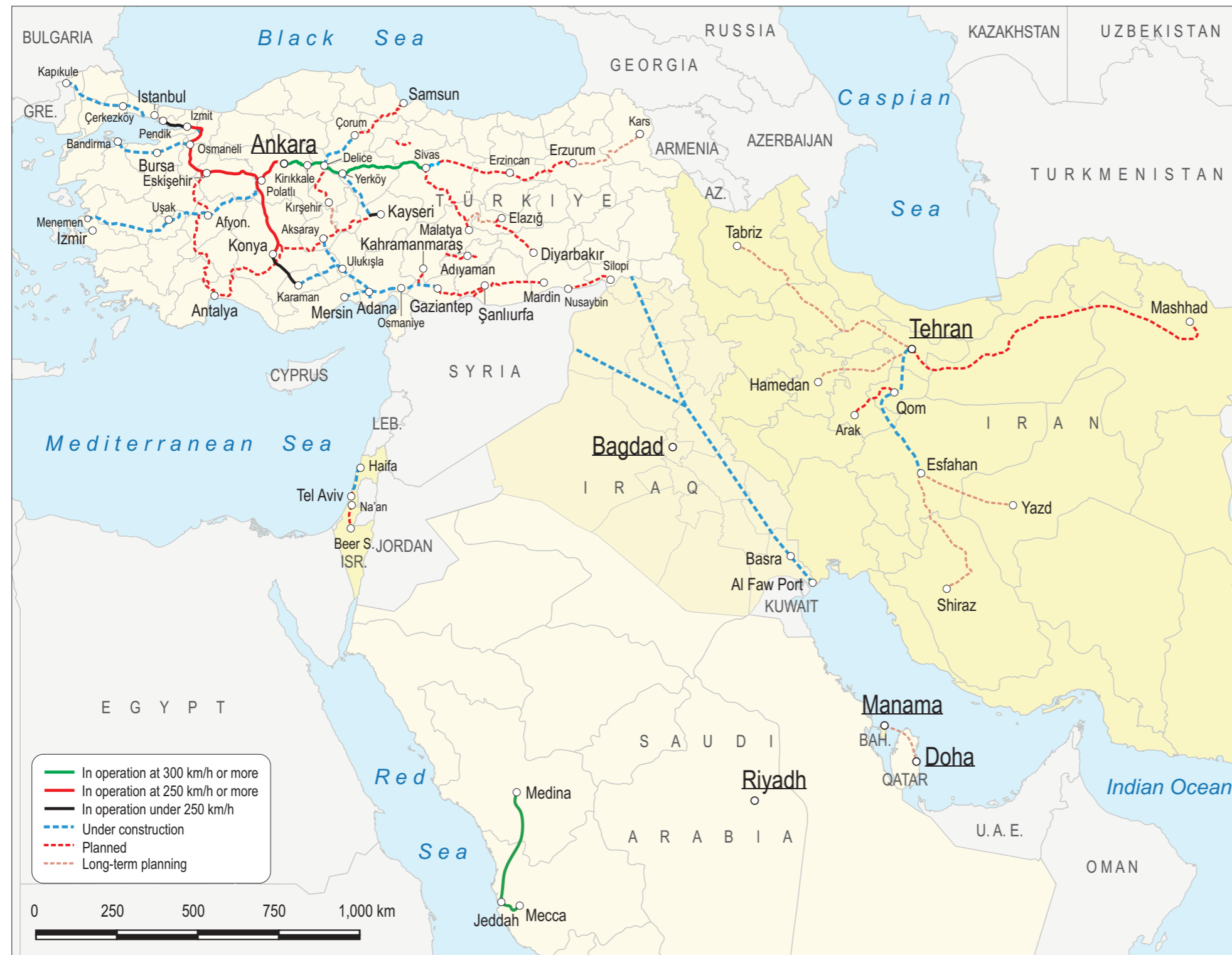
### High-speed lines with long-term planning in Türkiye

| LINE               | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|--------------------|----------------------|------|-----------------------|
| Kırşehir - Aksaray | 200                  | 2035 | 74                    |
| Erzurum - Kars     | 200                  | 2035 | 206                   |
| Malatya - Elazığ   | 200                  | 2035 | 126                   |
|                    |                      |      | <b>Total km = 406</b> |

Source: compiled by authors based on International Union of Railways

# 6.1 HIGH-SPEED RAIL NETWORK

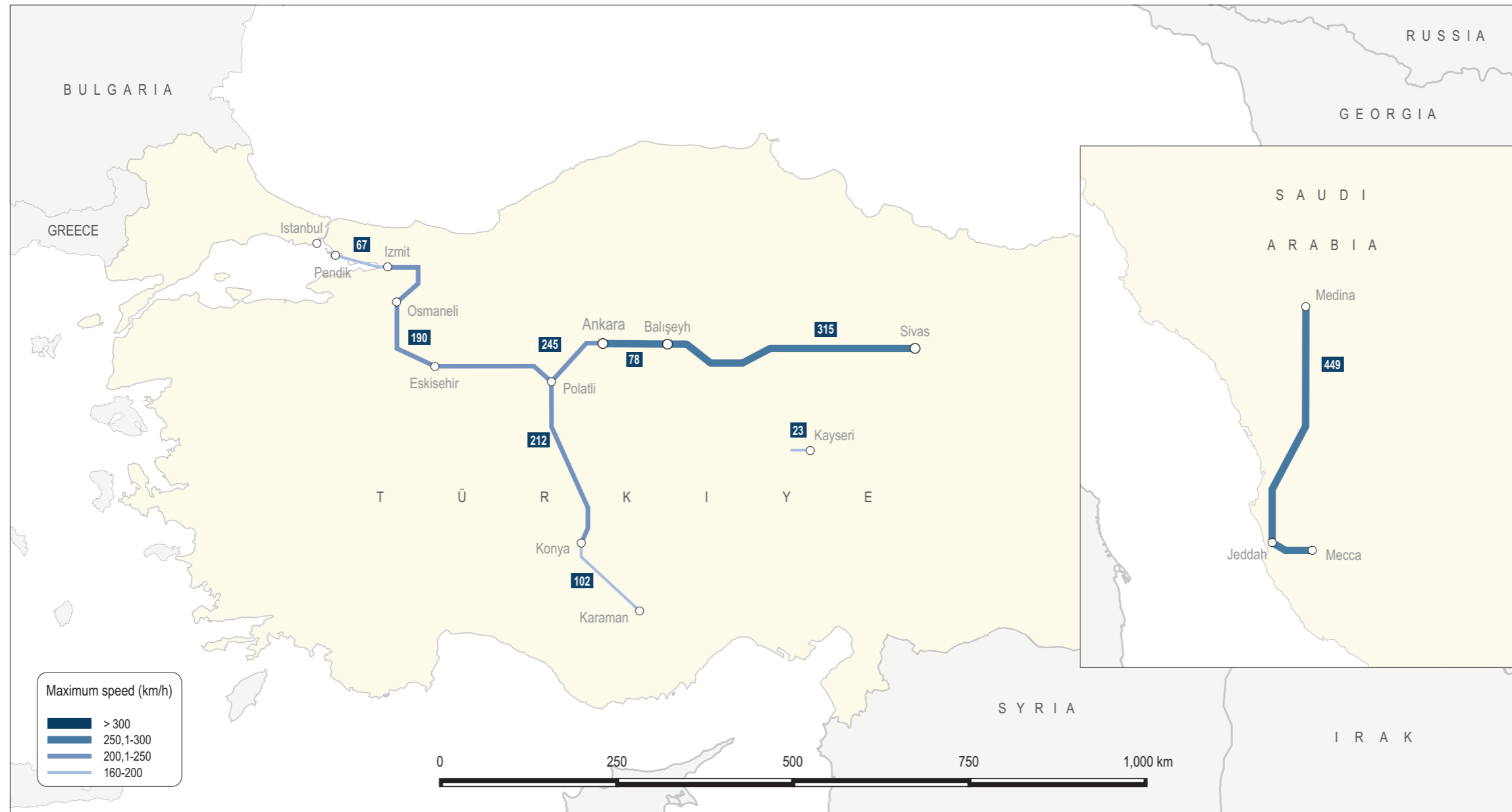
## High-speed lines in Middle East



Source: compiled by authors based on International Union of Railways

## 6.2 CHARACTERISTICS AND EQUIPMENT

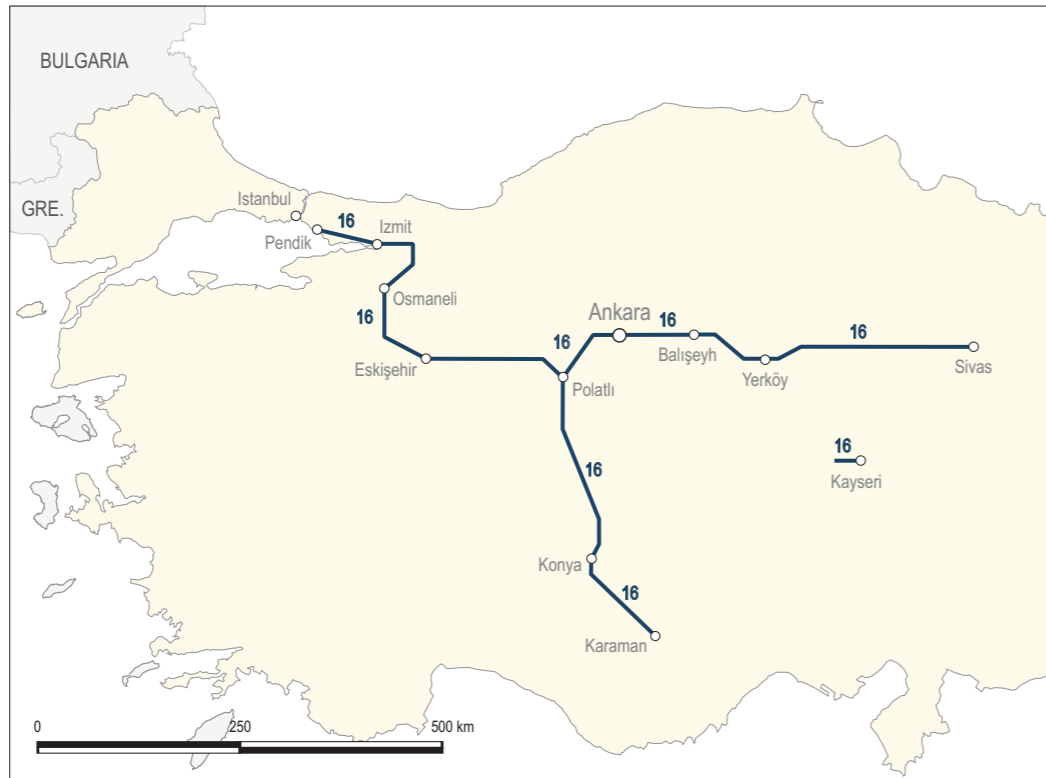
### Maximum commercial speed and Distances (km)



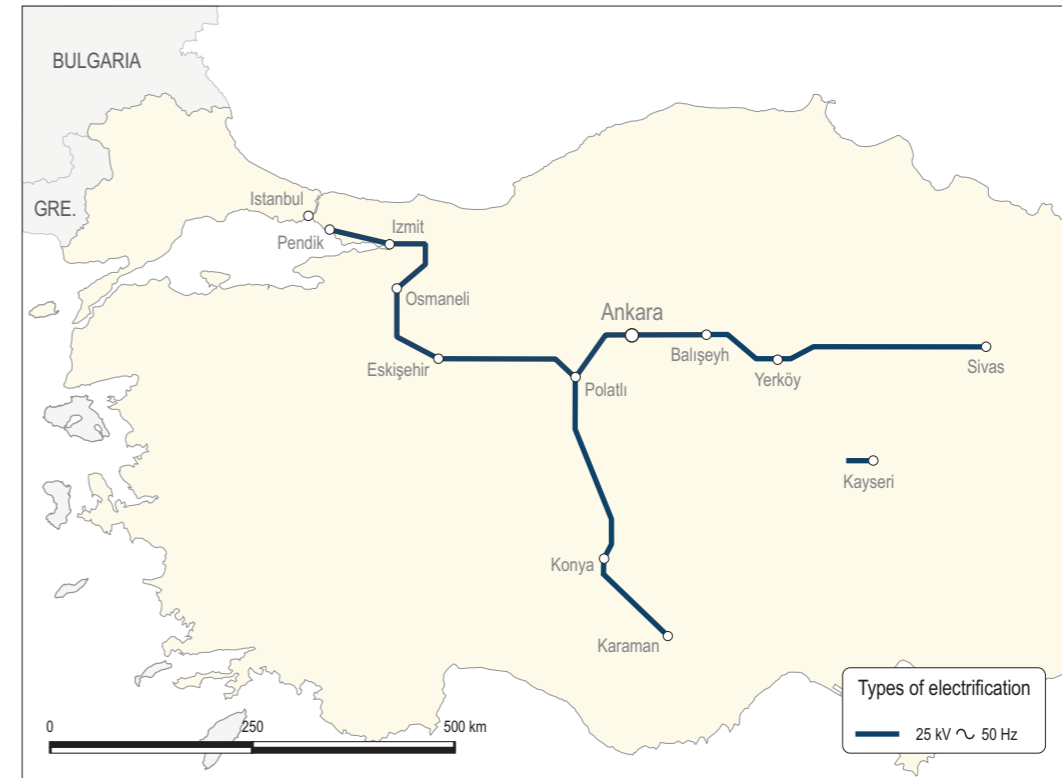
Source: compiled by authors based on International Union of Railways

# 6.2 CHARACTERISTICS AND EQUIPMENT (Türkiye)

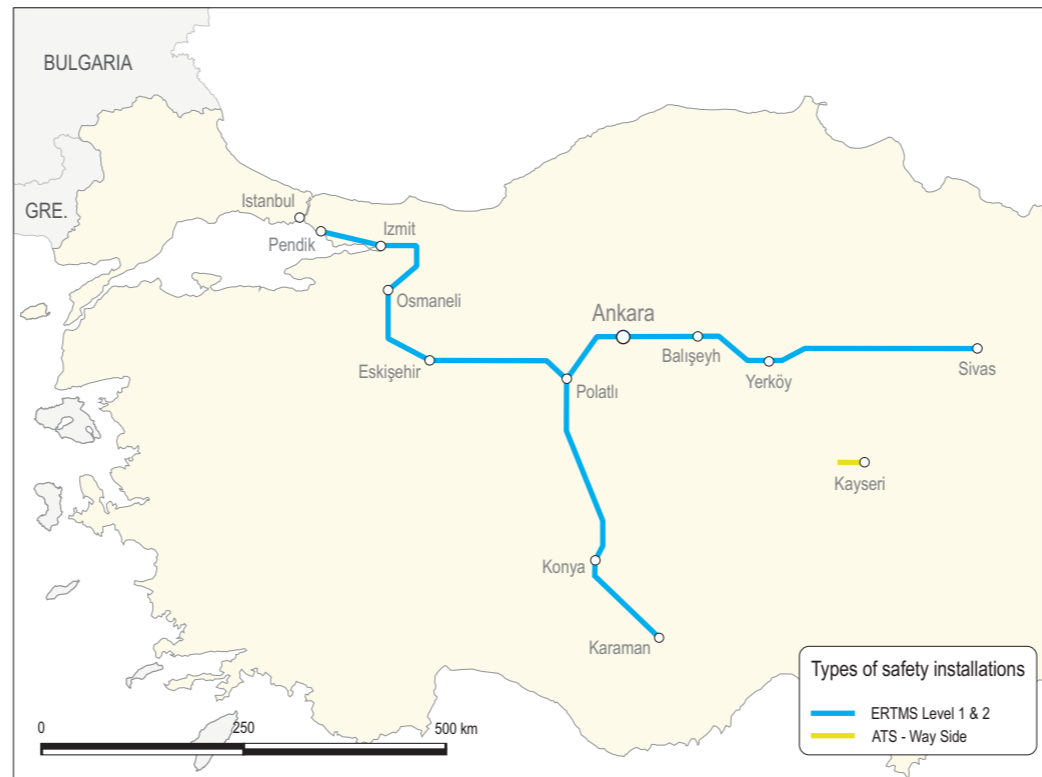
Maximum slope (‰)



Electrification



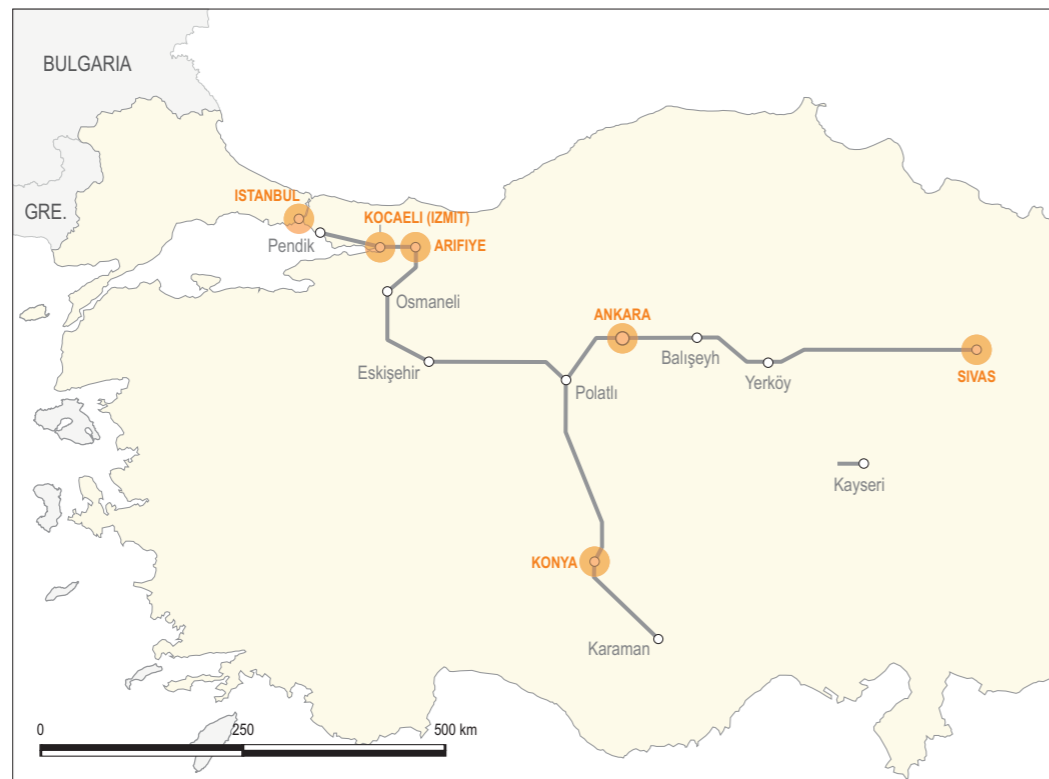
Signalling



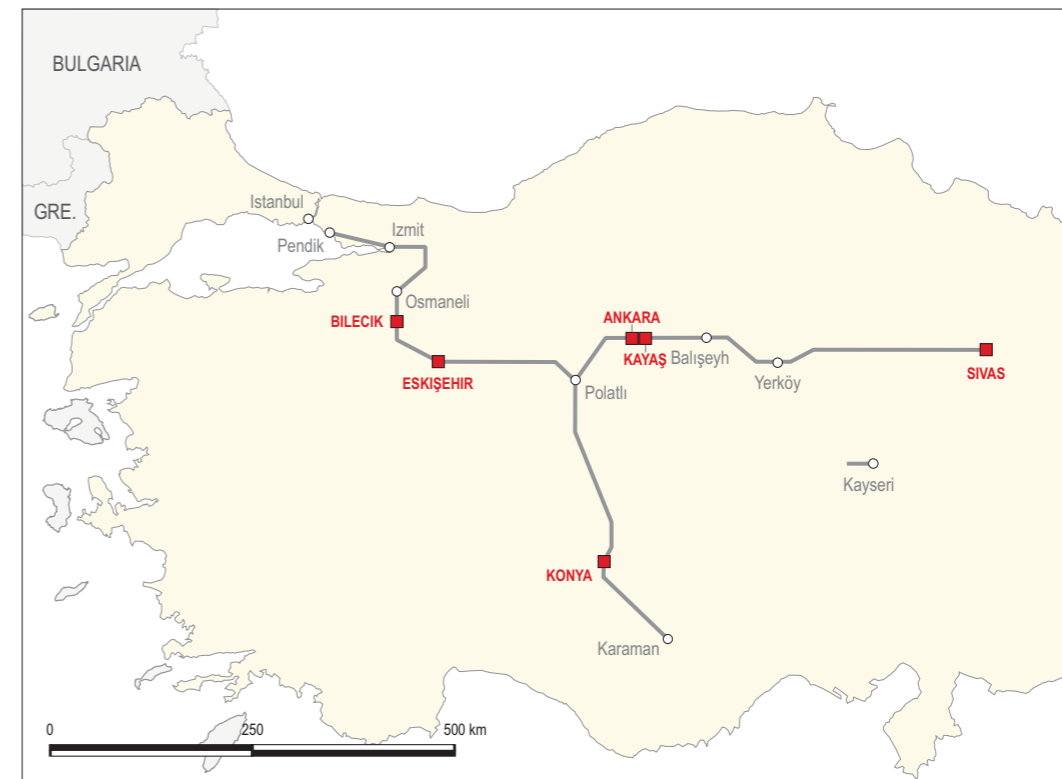
Source: compiled by authors based on International Union of Railways

## 6.2 CHARACTERISTICS AND EQUIPMENT (Türkiye)

**Centralized Traffic Control (CTC)**



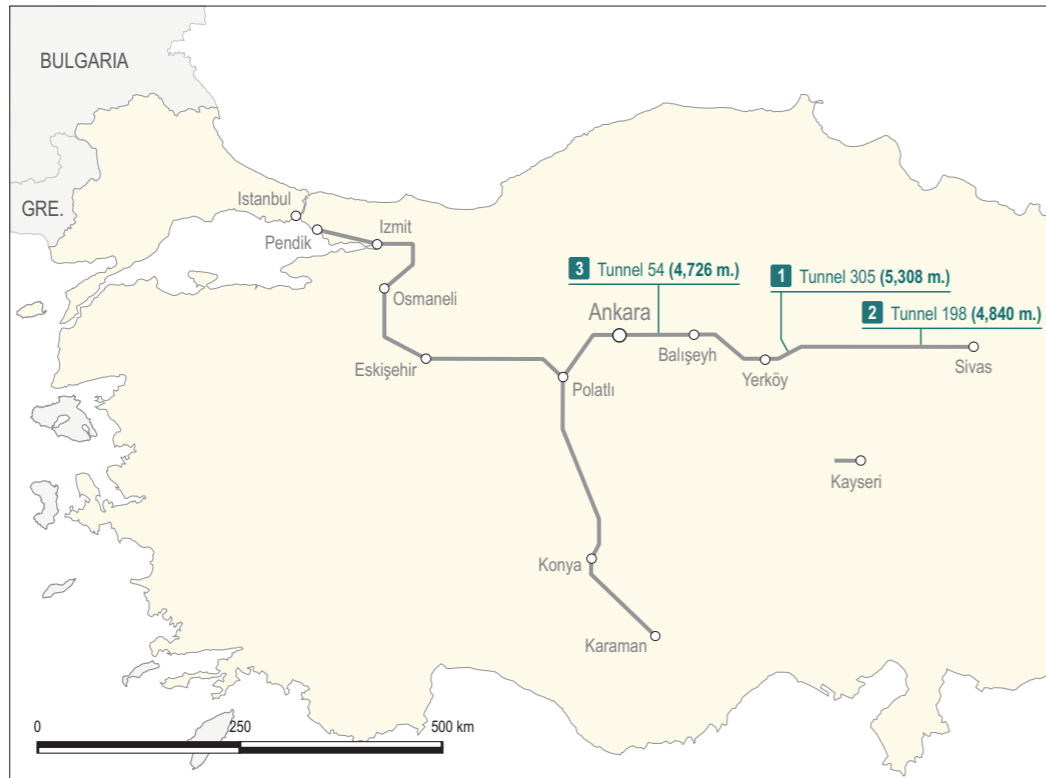
**High-speed rolling stock workshops**



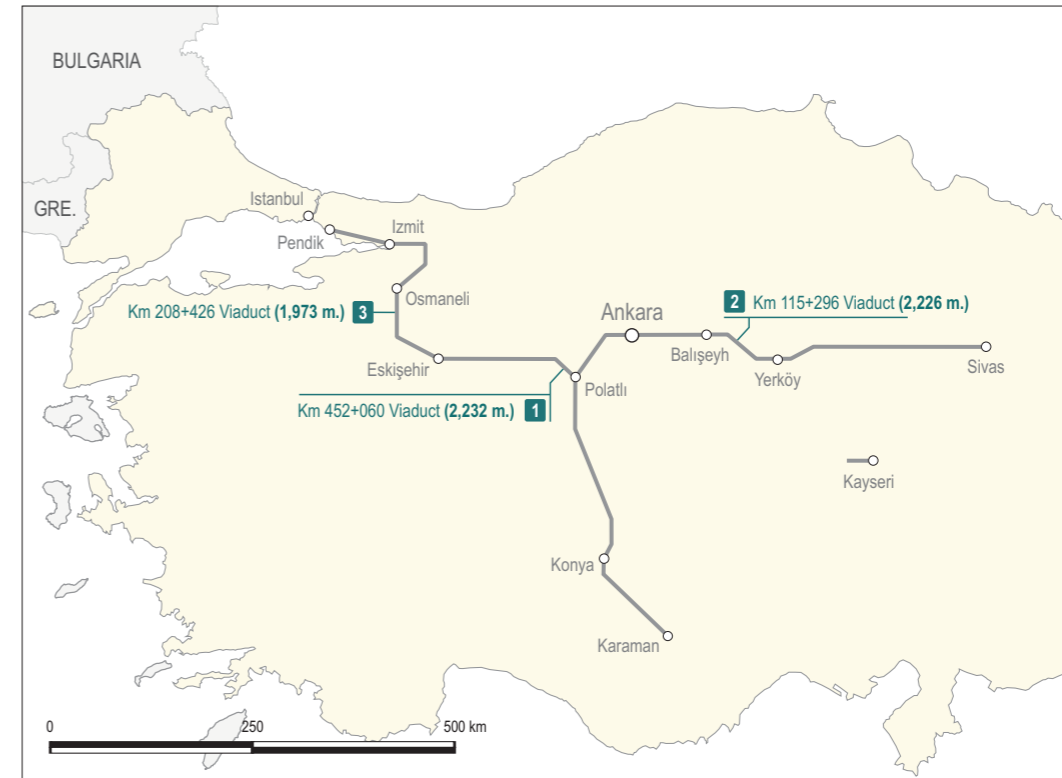
Source: compiled by authors based on International Union of Railways

## 6.2 CHARACTERISTICS AND EQUIPMENT (Türkiye)

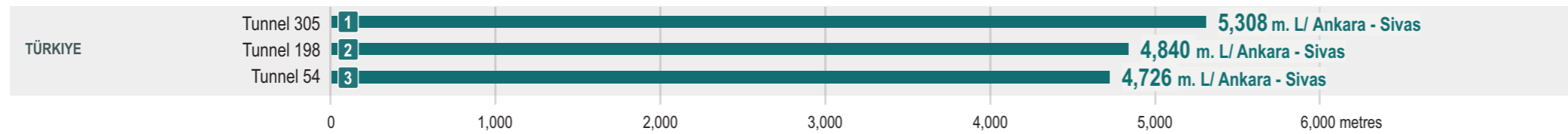
Longest tunnels



Longest viaducts



Longest tunnels of the high-speed rail network in Türkiye



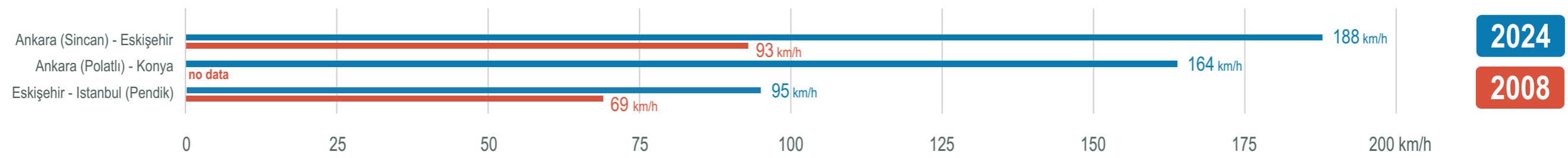
Longest viaducts of the high-speed rail network in Türkiye



Source: compiled by authors based on International Union of Railways

## 6.3 SPEED AND TRAVEL TIME

### Evolution of average speed on Turkish high-speed lines



Source: compiled by authors based on International Union of Railways

## 6.4 ROLLING STOCK

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current



### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

### HT65000 (Türkiye)

|                      |
|----------------------|
| T+4M+T               |
| CAF                  |
| TCDD Transportation  |
| 2009                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 250 / 250            |
| 4,800                |
| Distributed traction |
| ETCS / ATS           |
| 12                   |

|        |
|--------|
| 297.25 |
| <17    |
| 12.7   |
| 158.9  |
| 2.920  |

|                       |
|-----------------------|
| 55                    |
| 364 (8 bistro + 2 hp) |
| 419                   |

### Velaro TR (Türkiye)

|                      |
|----------------------|
| M+T+M+2T+M+T+M       |
| Siemens              |
| TCDD Transportation  |
| 2015                 |
| No                   |
| 1,435                |
| 25 kV 50 Hz AC       |
| 320 / 300            |
| 8,000                |
| Distributed traction |
| ETCS / ATS           |
| 19                   |

|        |
|--------|
| 456.47 |
| <17    |
| 14.7   |
| 200.7  |
| 2.924  |

|                        |
|------------------------|
| 45                     |
| 462 (28 bistro + 8 hp) |
| 507                    |

Siemens Velaro D series

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways and miscellaneous data sources

## 6.4 ROLLING STOCK



**Talgo 350**  
(Saudi Arabia)

|                                |
|--------------------------------|
| L+13T+L                        |
| Talgo-Alstom                   |
| Haramain HSR                   |
| 2017                           |
| Yes                            |
| 1,435                          |
| 25 kV 60 Hz AC                 |
| 350 / 300                      |
| 8,000                          |
| Concentrated traction          |
| ETCS                           |
| 8 / 36                         |
| 373.9                          |
| 16.9                           |
| 21.4                           |
| 215                            |
| 2.960 (locom.) / 2.942 (coach) |
| 100                            |
| 304                            |
| 404                            |

(1) M-Motor coach • T-Trailer coach• L-Locomotive  
MB-Motor Bogie

AC – alternating current  
DC – direct current

### General characteristics

|  |
|--|
| (1) Composition                              |
| Suppliers                                    |
| Owners or operators                          |
| Year in service                              |
| Articulated                                  |
| Track Gauge (mm)                             |
| Electrification voltage (kV)                 |
| Maximum train speed / operation speed (km/h) |
| Power (kW)                                   |
| Traction                                     |
| Signalling                                   |
| Train sets currently used / planned          |

### Weight and dimensions

|                                     |
|-------------------------------------|
| Unladen weight in running order (t) |
| Maximum axle load (t)               |
| Power weight ratio (kW/t)           |
| Train length (m)                    |
| Train width (m)                     |

### Seats

|                              |
|------------------------------|
| 1 <sup>st</sup> class seats* |
| 2 <sup>nd</sup> class seats  |
| Total seats                  |

### Observations

\* For 3 classes train, 1<sup>st</sup> and 2<sup>nd</sup> classes are included in 1<sup>st</sup> class

Source: International Union of Railways



INTERNATIONAL UNION  
OF RAILWAYS

**1. GLOBAL HIGH - SPEED DATA**

**2. EUROPE**

**3. ASIA - PACIFIC**

**4. AFRICA**

**5. NORTH AMERICA**

**6. MIDDLE EAST**

**7. LATIN AMERICA**

**INDEX OF COUNTRIES**

## 7.1 HIGH-SPEED RAIL NETWORK



**BRAZIL**

### *High-speed lines with long-term planning in Brazil*

| LINE                                  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|---------------------------------------|----------------------|------|-----------------------|
| Rio de Janeiro - São Paulo - Campinas | 300                  | -    | 511                   |
|                                       |                      |      | <b>Total km = 511</b> |

*Source: miscellaneous data sources*

# 7.1 HIGH-SPEED RAIL NETWORK

## High-speed lines with long-term planning in Brazil



Source: miscellaneous data sources

## 7.1 HIGH-SPEED RAIL NETWORK



**CHILE**

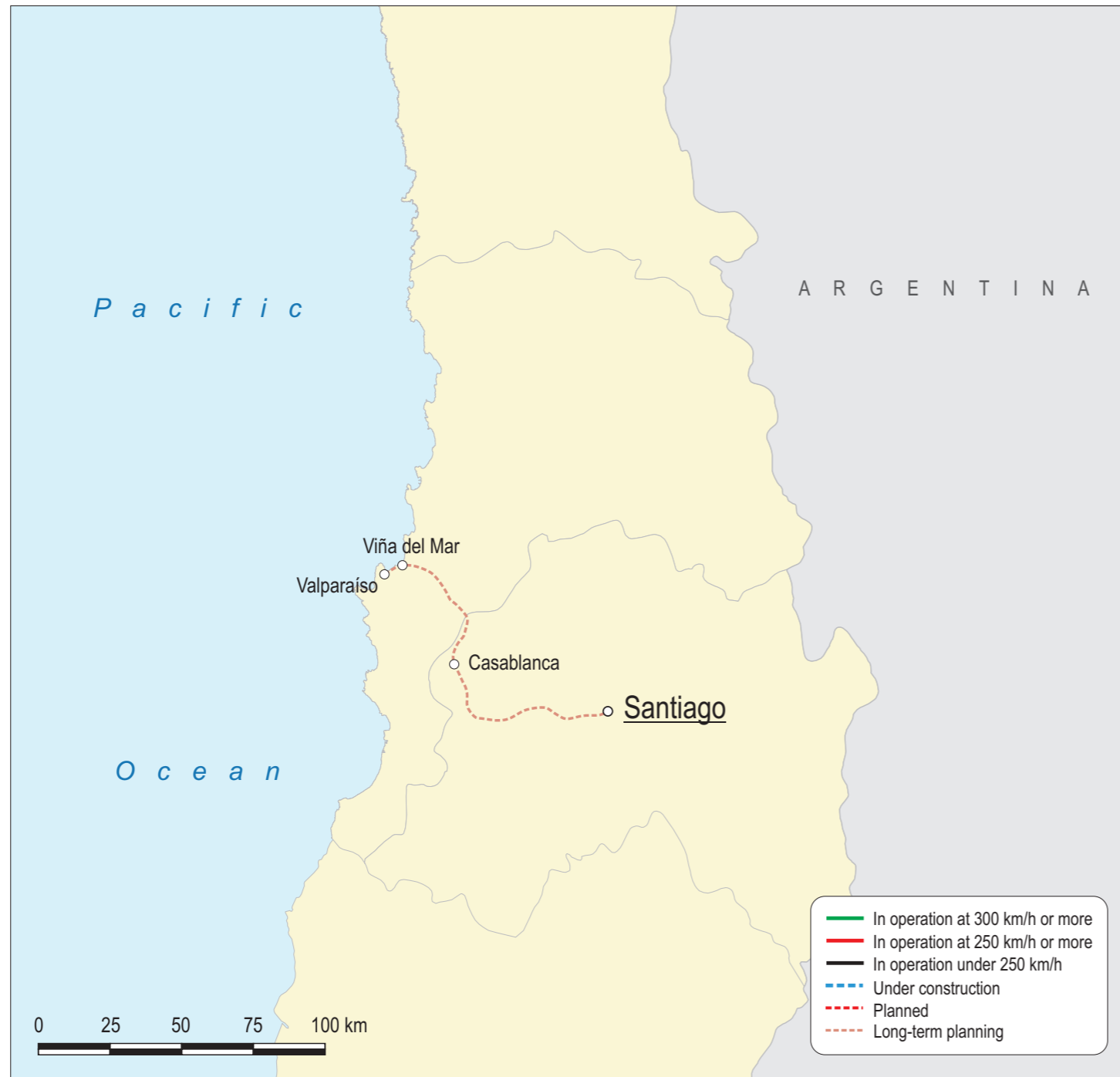
### *High-speed lines with long-term planning in Chile*

| LINE                  | MAXIMUM SPEED (km/h) | YEAR | DISTANCE (KILOMETRES) |
|-----------------------|----------------------|------|-----------------------|
| Santiago - Valparaíso | 220                  | -    | 127                   |
|                       |                      |      | <b>Total km = 127</b> |

*Source: miscellaneous data sources*

# 7.1 HIGH-SPEED RAIL NETWORK

## High-speed lines with long-term planning in Chile



Source: miscellaneous data sources



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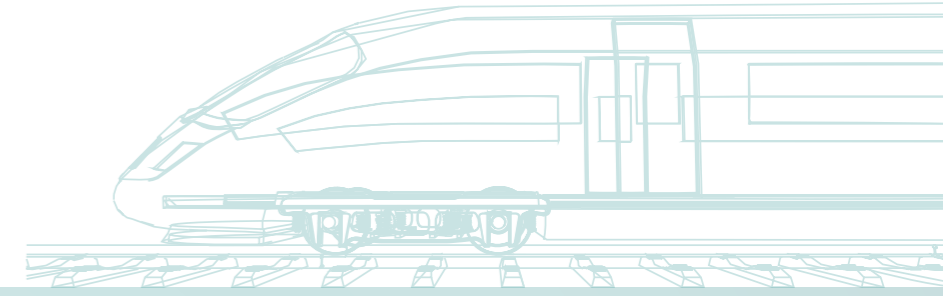
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