

TRANSPORTATION

Speed and efficiency through technological advancement

Railways

Passenger service began in 1872, with a steam locomotive that linked Shimbashi station, in Tokyo, to the nearby city of Yokohama, thereby setting the stage for what was to become a nationwide rail network. It took 17 more years to link by rail the main cities along the old Tokaido (Eastern Sea Route), so that in July 1889 one could travel the entire way from Tokyo to Osaka by train. A single departure per day made the 515-kilometer (320-mi) journey in 20 hours. The successive introduction of diesel and electric trains shortened the time on this heavily traveled route to under 7 hours, and the Shinkansen (bullet train) eventually reduced the journey to under 3 hours.

Until it was privatized and split into separate regional companies in 1987, the Japan National Railways (JNR) operated a nationwide passenger and freight rail network. Successors of JNR presently include the six passenger railway companies of the JR (Japan Railway) group, a freight railway company, and several affiliated companies.

The total rail system, including the JR group and other railway companies, comprises approximately 27,000 operation kilometers, of which JR companies operate 70 percent of the total. In 2002, the system transported 21.561 billion passengers and 56.592 million metric tons of freight.

Japan's four main islands were at last joined by railway in 1988 when the undersea Seikan Tunnel linked Honshu to the northern island of Hokkaido and the Seto Ohashi Bridge linked Honshu to the island of Shikoku.

Along with the development of automobile



and air transportation, important railway services have gradually shifted to long-distance intercity transport, such as the Shinkansen, and commuter lines. Commuter lines carry people from their homes in the suburbs back and forth to work and school. Because of high land prices, many people have moved to the suburbs in search of affordable housing. More than 70% of office workers now commute aboard trains, and those trains are often packed to overflowing, although the level of congestion at peak commuter hours on the principal lines in the Tokyo area has fallen to 180% of normal capacity since peaking in 1965.

Nine cities in Japan currently operate subway systems. The first to be constructed, a section of Tokyo's Ginza line, began operation in 1927. There are 13 subway lines in Tokyo, and they currently carry more than 7 million passengers per day. Many of the subway lines

Shinkansen

Shinkansen line 700 Series models like the one shown here were put into service in 1999.

© JR Tokai

also link up with commuter lines and extend their service to the suburbs.

Japan continues to recognize the many advantages of rail transport, including its convenience, energy efficiency, low pollution, and safety. In large metropolitan areas railways play a major transportation role and have an extremely large passenger population. Consequently, JR and the private railway companies continue to build new lines and increase capacity by adding tracks to existing lines. Railway system expansion is also being promoted through system diversification, with the addition of monorails and other types of railway technology. Railway companies are making a strong effort to increase the convenience of transfers and to improve station access for elderly and handicapped persons through the installation of elevators and escalators.

The Shinkansen

The Shinkansen is a high-speed railroad system consisting of six regular lines where the trains run only on special Shinkansen tracks, and two lines, usually referred to as "Mini-shinkansen" lines, where the trains run both on Shinkansen tracks and standard local tracks. The addition of several other Shinkansen lines has been planned since 1973, and construction continues on some sections of those lines.

The Tokaido Shinkansen serves the 500-kilometer (311-mi) Tokyo-Osaka corridor that has long been considered the main artery of Japan. This line runs at a maximum speed of 270 kilometers per hour (168 MPH), and the minimum trip time between Tokyo and Osaka is now 2 hours 30 minutes. Since it was inaugurated in 1964, the Shinkansen has had a remarkable record of high-speed operation, safety, volume of transport, and punctuality.

Development has also been proceeding on a new type of Shinkansen based on linear motor technology. This train levitates above its track using magnetic energy and is capable of reaching maximum speeds over 550 kilometers per hour (342 MPH). If completed sometime early in the twenty-first century, such "mag-lev" trains can be expected to make the journey between Tokyo and Osaka



A Tokyo subway station

On an average day, the Tokyo subway system transports 7.25 million passengers.
© Kodansha International

in approximately 1 hour, about the same time required by jet aircraft.

Motor Vehicles

In addition to 1,229,000 kilometers of ordinary roads, Japan operated a total of 8,017 kilometers of high-standard trunk roads and 641 kilometers of urban expressways at the end of fiscal 2001. It was in 1899 that Japan imported its first automobile. Motor vehicle production by Japanese manufacturers began in 1902. Although commercial vehicles and public transport crowded the nation's city streets following their introduction, it was not until the 1960s that private car ownership began to increase rapidly. Three factors made this possible: rapid growth in income brought on by economic development, the emergence of a domestic automotive industry geared to the specific needs of the local market (small-sized, fuel-efficient vehicles), and improvement in roads. Between 1960 and 2000, the number of registered motor vehicles grew from 1.9 million to over 52 million. Two-car families have become common, and the number of trucks in use by commercial transport and delivery services has continued to increase.

Construction of expressways (toll roads) began in the 1960s. The first to be completed was the Meishin Expressway, linking Nagoya to Kobe, in 1965. It was soon linked to Tokyo via the Tomei Expressway. The Kan'etsu, Tohoku, Joban, and other long-distance expressways have followed over the past several decades. Tokyo and other major urban areas maintain a comprehensive and ever-expanding network of expressways linking downtown areas to the suburbs. They are administered by the Japan Highway Public Corporation and several other highway corporations. As part of a program of reform aimed at reducing government size

and increasing efficiency, efforts are underway to privatize the operations of these highway corporations by fiscal 2005.

Expressway construction in Japan has faced many challenges: the nature of the terrain, high concentrations of factories and housing, high land prices along the routes, and added reinforcement needed to withstand earthquakes. Construction costs are the world's highest, and for this reason expressway tolls are proportionately high. Nevertheless, expressways are in extensive use. During fiscal 2002, the average traffic between Tokyo and Komaki (near Nagoya in Aichi Prefecture), was 414,840 automobiles a day.

The frequent traffic jams on metropolitan roads are a major problem. In Tokyo, an extensive system of expressways and roads radiates out from the center of the city, but delays in the building of loop lines have contributed to chronic traffic congestion.

Traffic safety has been a national issue since the 1960s. In 1970, the year the Traffic Safety Act went into effect, more than 16,000 people died in road-traffic accidents, but in recent years the number of annual traffic fatalities has been under 10,000.

Air pollution from motor vehicle emissions,

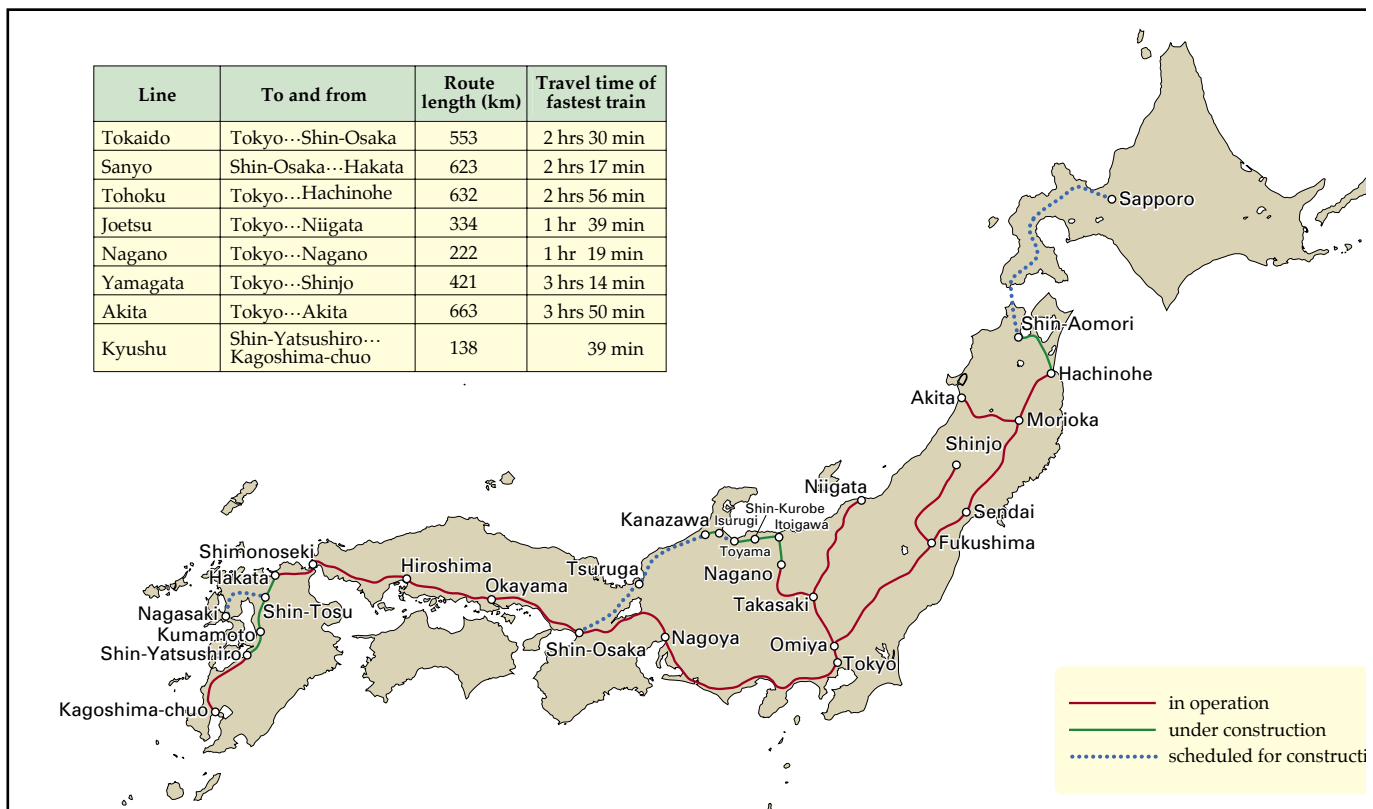


Tomei Expressway
An aerial view of the Yokohama-Machida interchange in Kanagawa Prefecture.
© Japan Highway Public Corporation

including both exhaust gasses (nitrogen oxide, etc.) and the particulate matter emitted by diesel engines, is a serious problem in large metropolitan areas. Consequently, the government has placed strict legal controls on vehicle emissions and the sulfur content of fuels. In 2005 even stricter regulations will be applied to diesel particulate matter, which has been identified as a cause of cancer. The development and use of low-pollution vehicles—such as those powered by natural gas, electricity, and electric-gas hybrid systems—are being promoted by tax incentives and other policies, and some hybrid models have already proved popular with consumers.

The Shinkansen Railroad System

Line	To and from	Route length (km)	Travel time of fastest train
Tokaido	Tokyo...Shin-Osaka	553	2 hrs 30 min
Sanyo	Shin-Osaka...Hakata	623	2 hrs 17 min
Tohoku	Tokyo...Hachinohe	632	2 hrs 56 min
Joetsu	Tokyo...Niigata	334	1 hr 39 min
Nagano	Tokyo...Nagano	222	1 hr 19 min
Yamagata	Tokyo...Shinjo	421	3 hrs 14 min
Akita	Tokyo...Akita	663	3 hrs 50 min
Kyushu	Shin-Yatsushiro...Kagoshima-chuo	138	39 min





Kyushu Shinkansen
On the new Kyushu Shinkansen line, 800 Series "Tsubame" models like this one travel the 126-kilometer distance between Shin-Yatsushiro and Kagoshima-chuo in 35 minutes.
© JR Kyushu

Air Transportation

From the end of World War II until 1951, the Japanese government was deprived of its authority to permit passenger airlines by SCAP (Supreme Commander of the Allied Powers). International and domestic airlines, therefore, didn't start until 1953.

Between 1980 and 2002, the number of Japanese domestic airline passengers more than doubled, going from 40 million to 97 million. The most heavily traveled domestic route is between Tokyo and Sapporo, with 9.6 million passengers. The Tokyo-Fukuoka route comes next, with 8.4 million passengers. In the same period, international air passenger transport grew more than threefold, from 5 million to 18 million. As of March 2003, Japan had 8 scheduled international carriers, 23 scheduled domestic carriers, and 45 unscheduled air service companies.

Airports have been expanded to meet growing demand. Commercial airports are classified into three categories by the government based on size and use. Of 94 commercial and semi-commercial airports in Japan, 60 have facilities for jet passenger aircraft. The four largest airports in terms of passenger load serve the nation's two most populous areas (the Kanto and Kinki regions): Tokyo International Airport, New Tokyo International Airport, Osaka International Airport, and Kansai International Airport. With a 2005 opening projected, the Central Japan International Airport is now under construction near Nagoya in Aichi Prefecture.

Tokyo International Airport is commonly referred to as Haneda Airport. Haneda, opened in 1931, was Japan's first commercial airport and served both as a domestic and international airport until the opening of New Tokyo International Airport in 1978. The government has plans to build new runways at Haneda and also restore scheduled international flights to the airport sometime in

the next decade.

New Tokyo International Airport, also known as Narita Airport, is located some 66 kilometers (41 mi) east of Tokyo. As of October 2003, 68 airlines from 41 countries and territories utilized the airport, with approximately 470 landings and departures daily. As Japan's largest airport, it annually handles some 30 million passengers and 2 million metric tons of air freight. The number of passengers is the eighth largest and the volume of freight is the second largest of all the airports in the world. The government is proceeding with plans to privatize Narita Airport operations.

Osaka International Airport is also called Itami Airport. It handled most domestic and all international flights to the Kansai region until the opening of Kansai International Airport in September 1994. It is now used mainly for domestic flights.

Kansai International Airport is on an artificial island in Osaka Bay. In addition to providing expanded service and access by a greater number of international carriers, this airport is Japan's first 24-hour facility. The number of landings and departures amounted to 108,366 in 2002.

Maritime Transportation

Surrounded by water, Japan's exports and imports have depended on maritime transport. Total tonnage handled by Japanese ports grew at an annual rate of 15% from 1980 to 1990.

The oil crises of the 1970s, increasing wages, and the continuing high value of the yen since 1985 have made Japanese shipping firms less competitive in the international market, while Japanese-owned vessels operating under flags of convenience have been on the rise. By 1995, the total gross tonnage of vessels flying the Japanese flag had fallen to about half of the 1980 peak of 39 million metric tons.