

# An Overview of Japan's High-Speed Railway : Shinkansen

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**January 13, 2012**

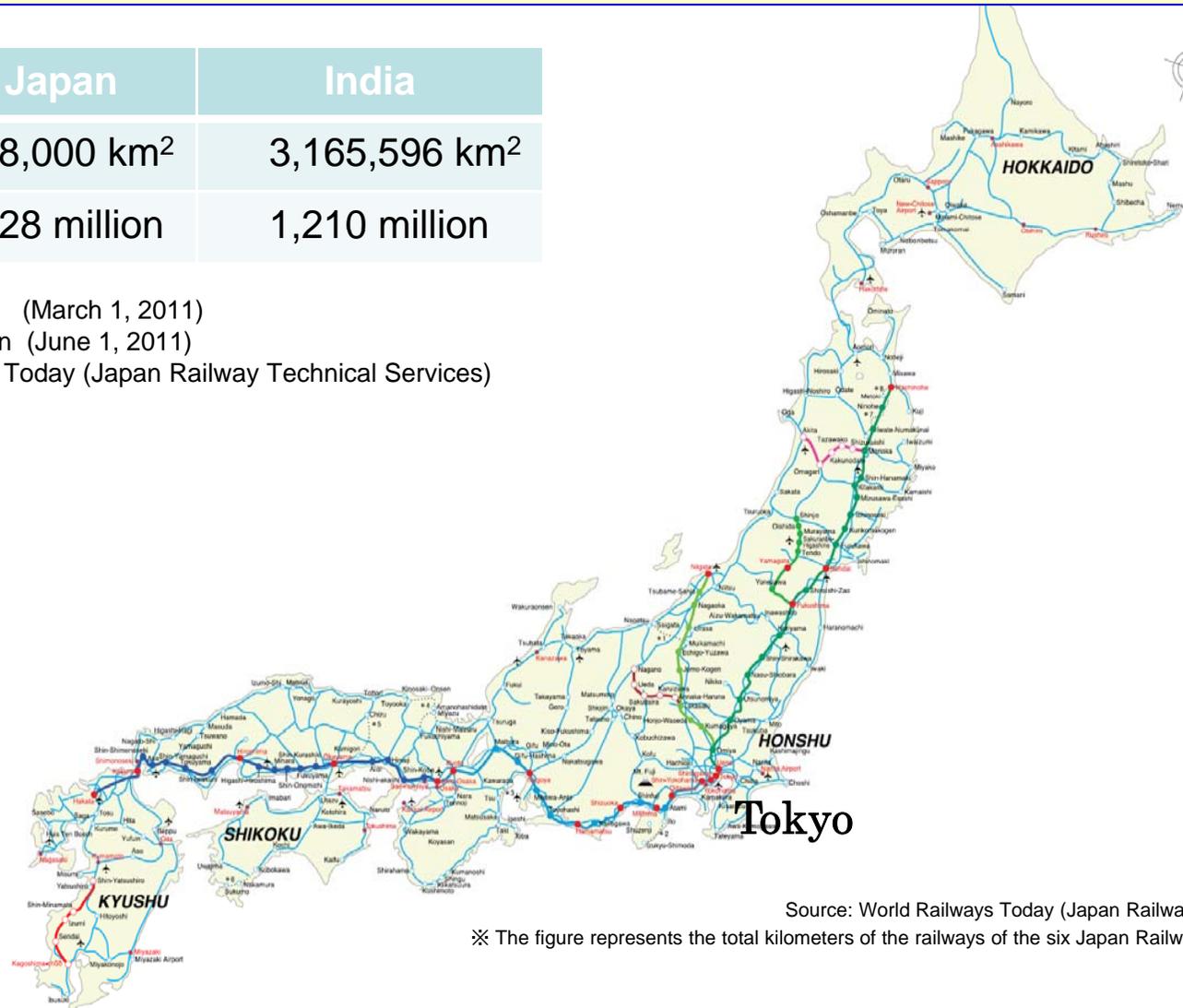
- 1. Japan's Current High Speed Rail Network**
- 2. The Main Features and the Advantages of the Shinkansen**
- 3. Toward the Introduction of High Speed Rails in India**
  - India : country with high potential for high speed rail**
  - construction scheme of the Shinkansen**
  - the benefits brought by the Shinkansen**

# Japan's Current Rail Network

Japan's railway network is approximately 20,000 km long.  
The network stretches through all parts of Japan.

	Japan	India
Area	378,000 km <sup>2</sup>	3,165,596 km <sup>2</sup>
Population	128 million	1,210 million

Sources: Census of India (March 1, 2011)  
Census of Japan (June 1, 2011)  
World Railways Today (Japan Railway Technical Services)

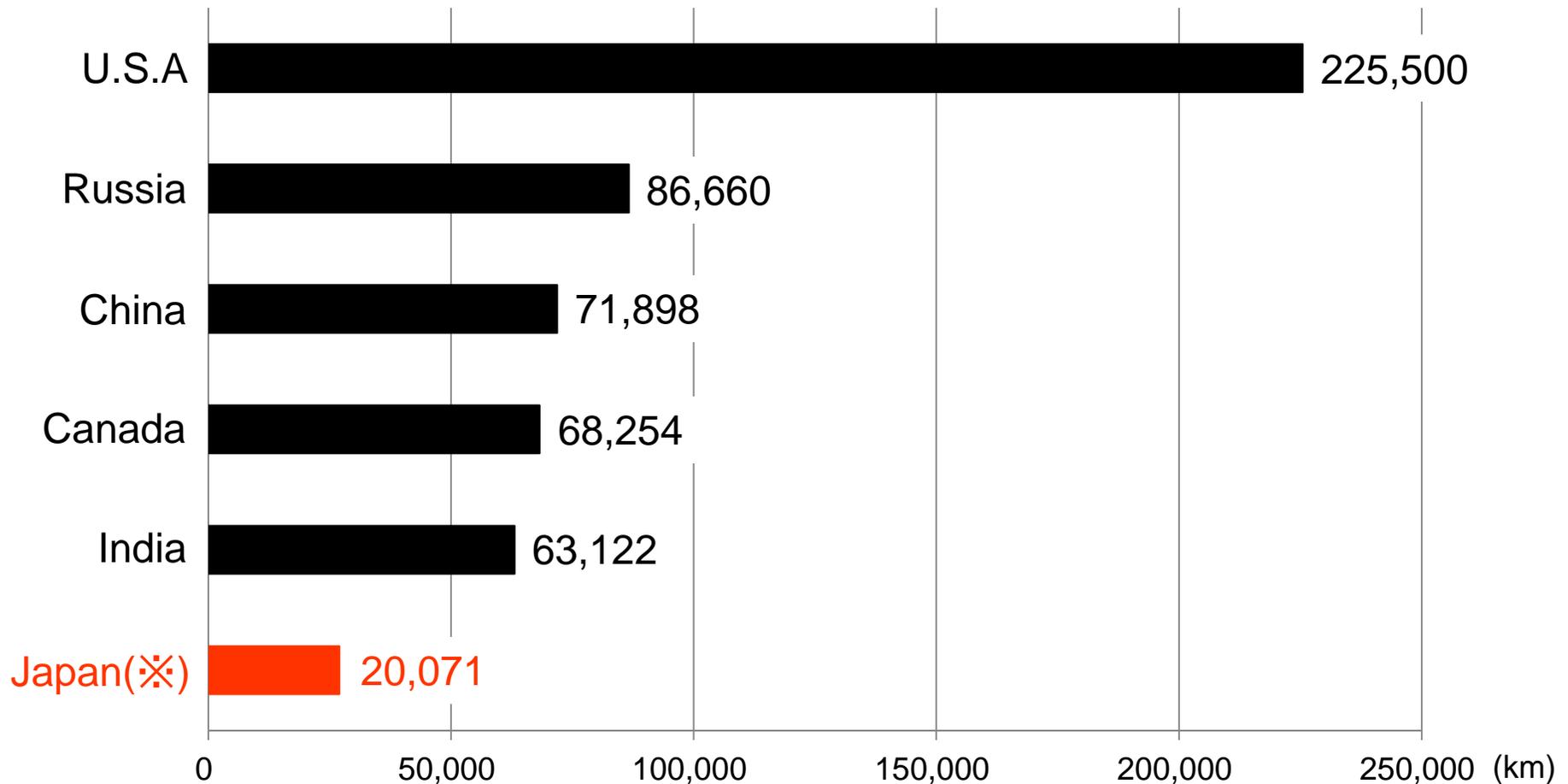


Source: World Railways Today (Japan Railway Technical Service)

※ The figure represents the total kilometers of the railways of the six Japan Railway Companies (JRs).

The total length of Japan's railways is one eleventh the length of US railways.

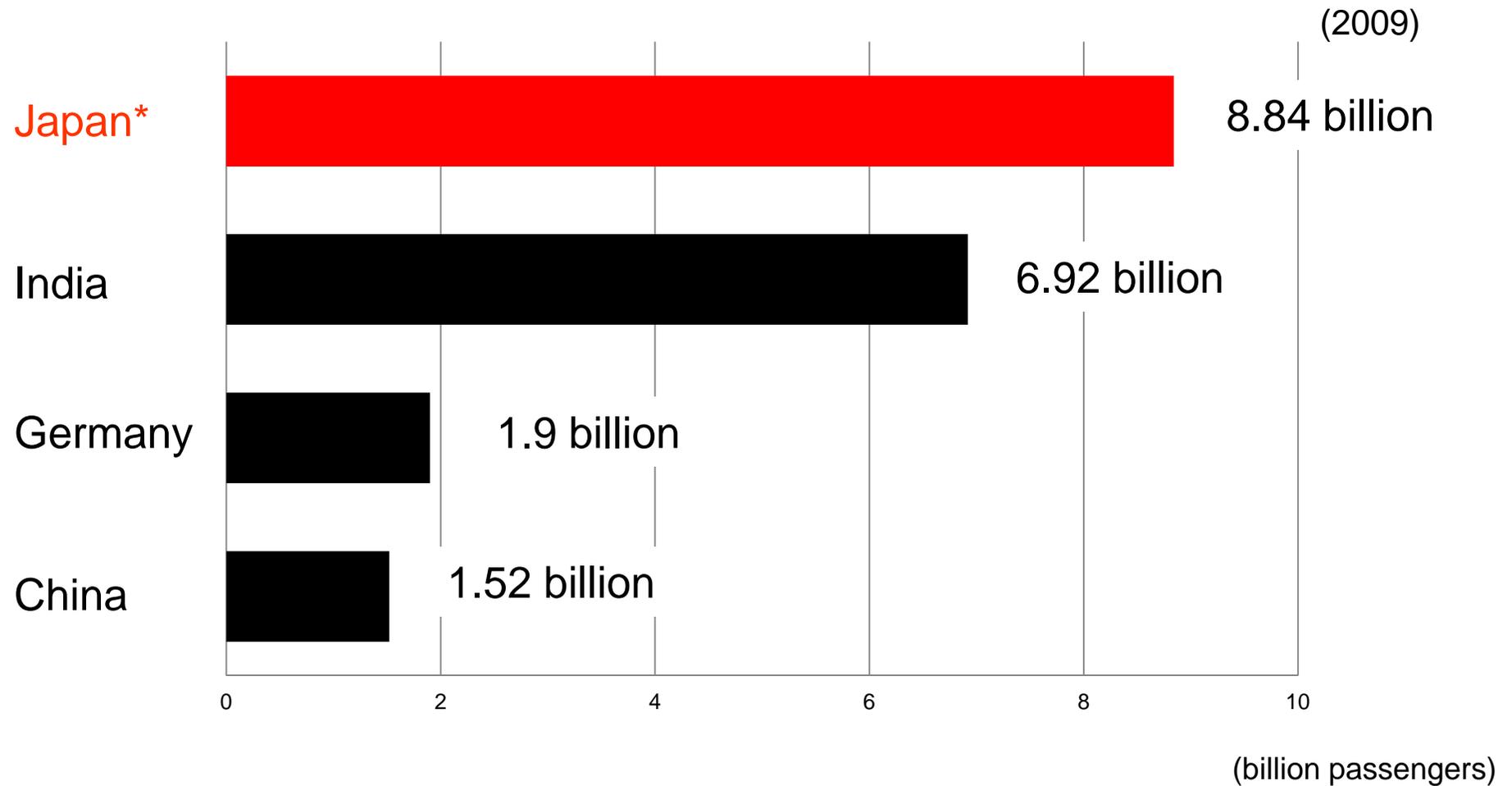
○ International comparison of total railway lengths (FY2003)



Source: World Railways Today (Japan Railway Technical Service) 4

※ The figure represents the total number of kilometers of railways under the six Japan Railway Companies (JRs).

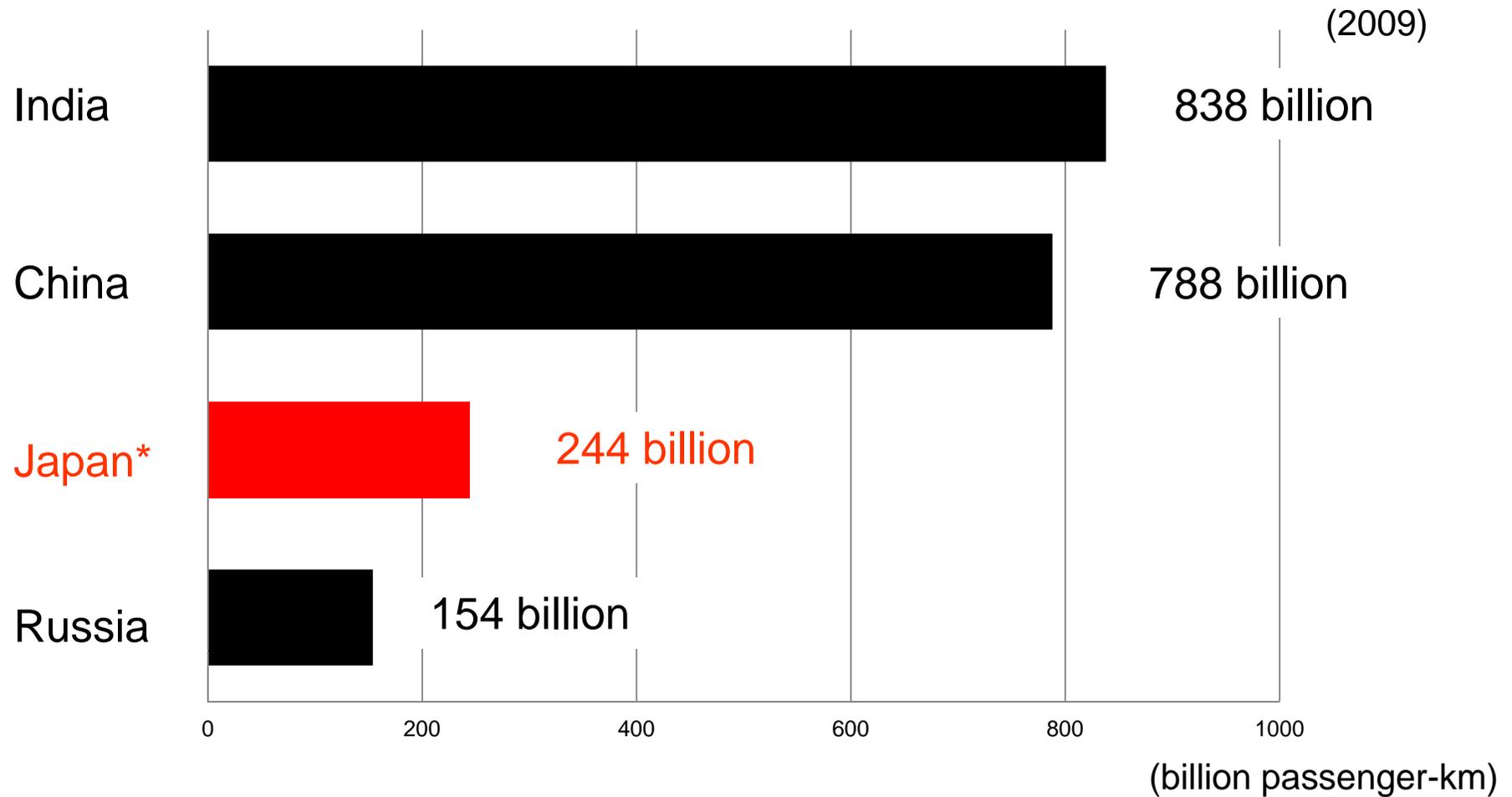
The annual number of Japan's railway passengers is ranked among the world's largest.



Source: The UIC Statistics Database

\*The figure represents the annual number of railway passengers carried by the six Japan Railway Companies (JRs).

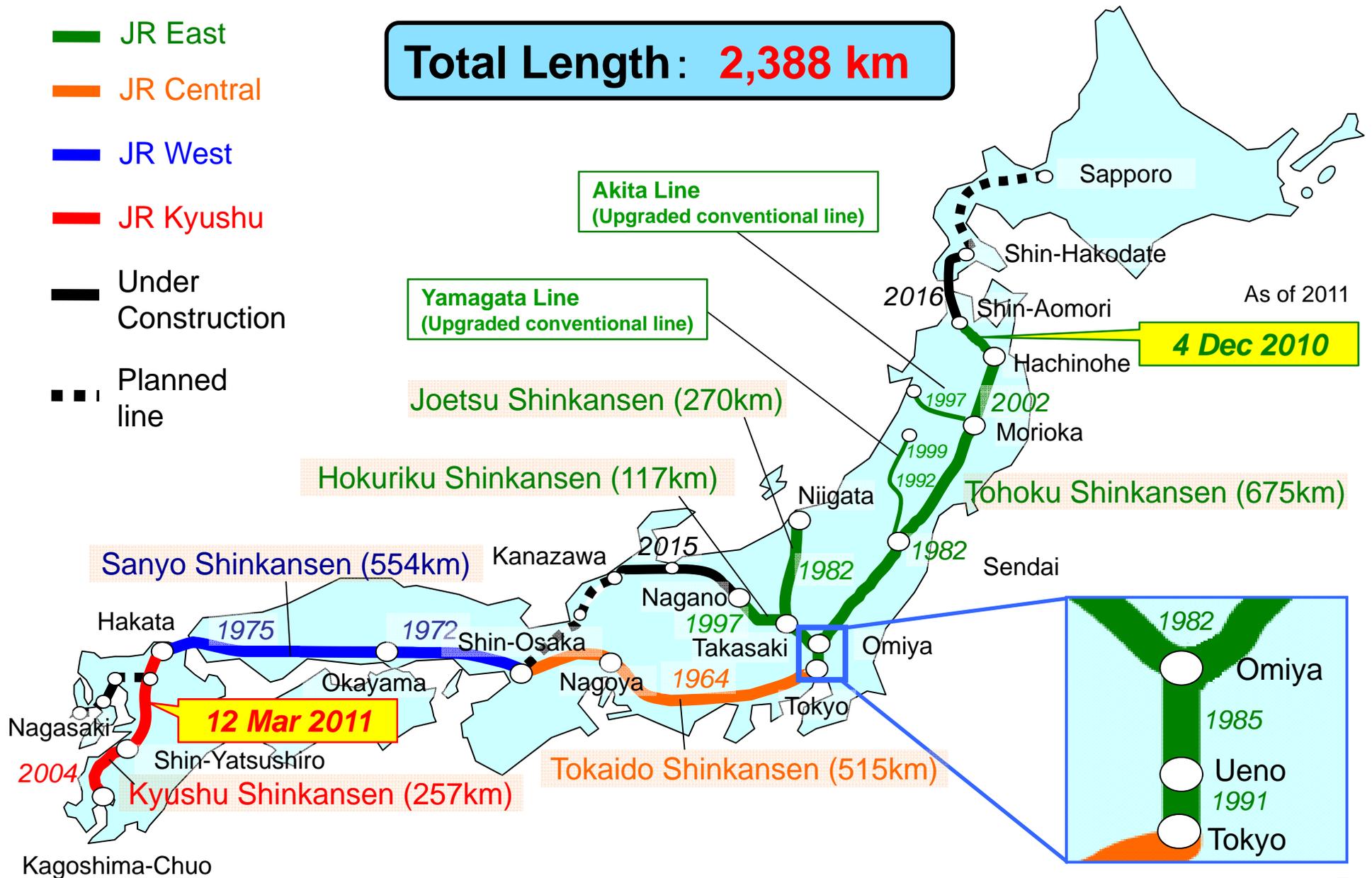
Japan is the third in the world next to India and China in the number of railway passenger-kilometers.



Source: The UIC Statistics Database

\*The figure represents the annual number of railway passengers carried by the six Japan Railway Companies (JRs).

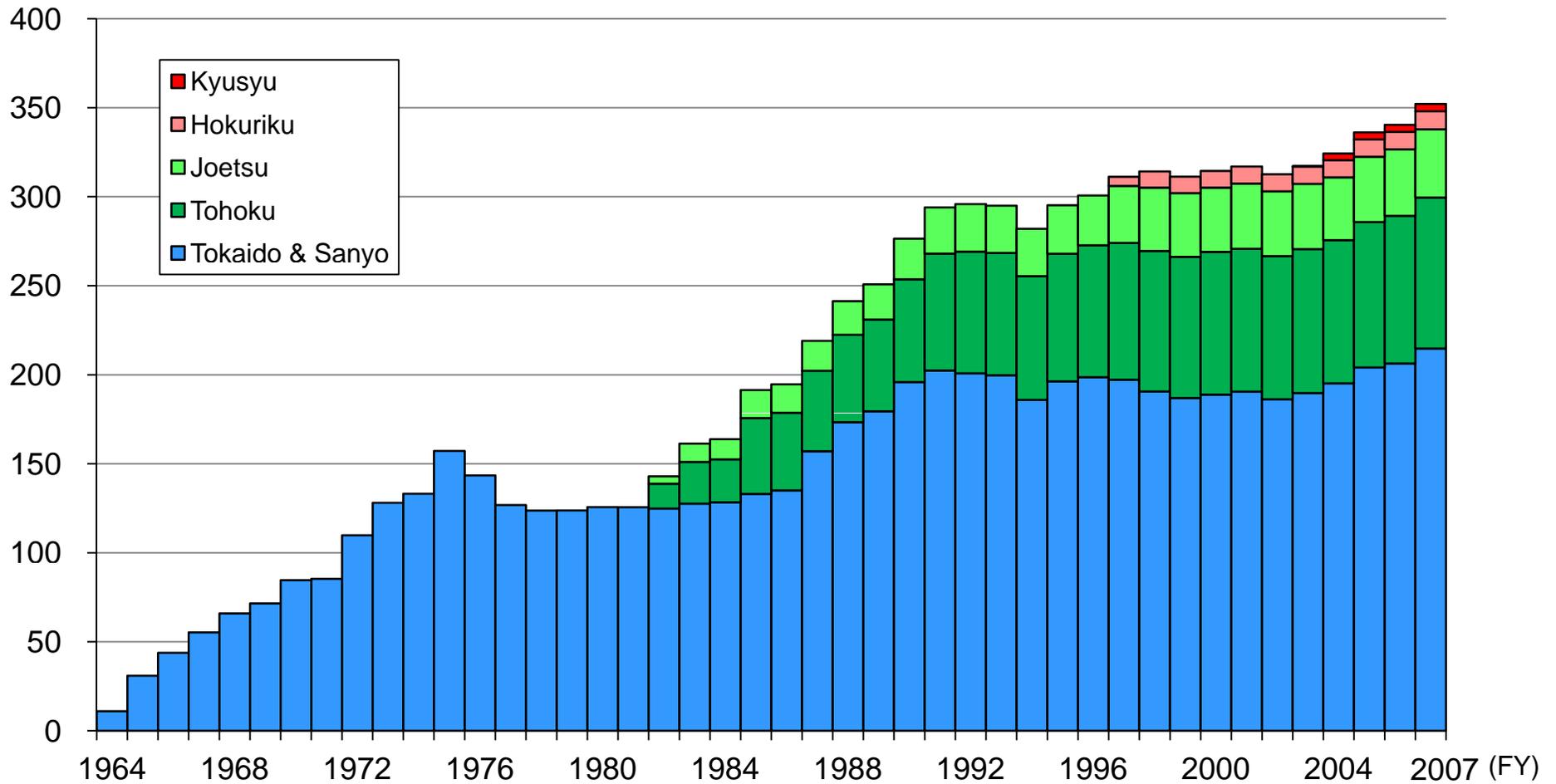
# Current High Speed Rail (Shinkansen) Network



The number of Shinkansen passengers has been steadily increasing since the start of operations in 1964.

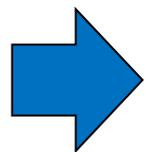
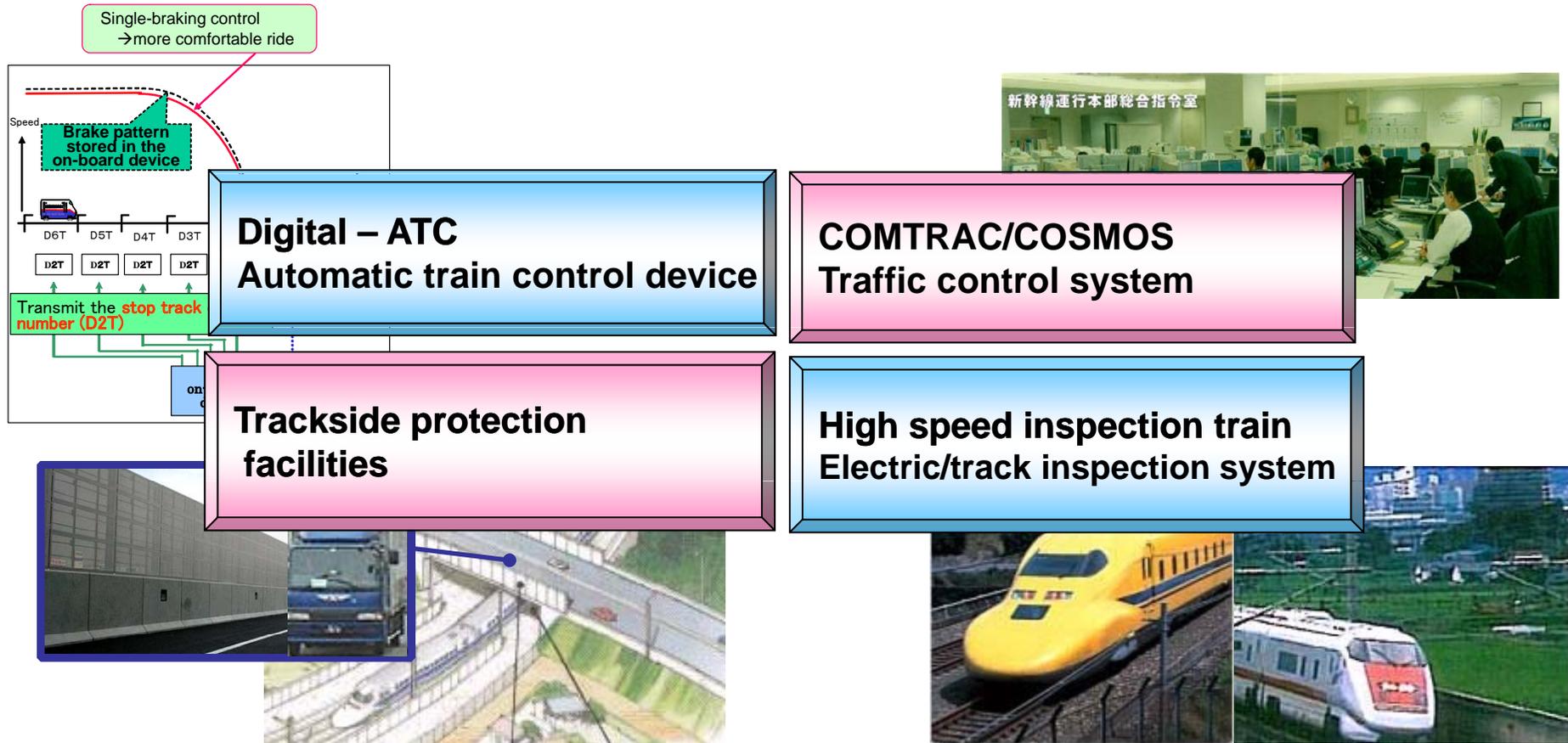
## ○ Growth in the annual number of Shinkansen passengers

(million passengers)



Source: Railroad 2009 through Figures, Shinkansen (Sankaido)

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Fatalities to date: **ZERO** for 47 years

since the start of operation in 1964

Up to 14 services per hour thanks to train control technology

○ Departure information at a Shinkansen station



■ Average delay time :  
less than **1 min** for 47 years

*Excellent environmental performance*

**CO<sub>2</sub>**  
emission comparison



Automobile

:



Airplane

:



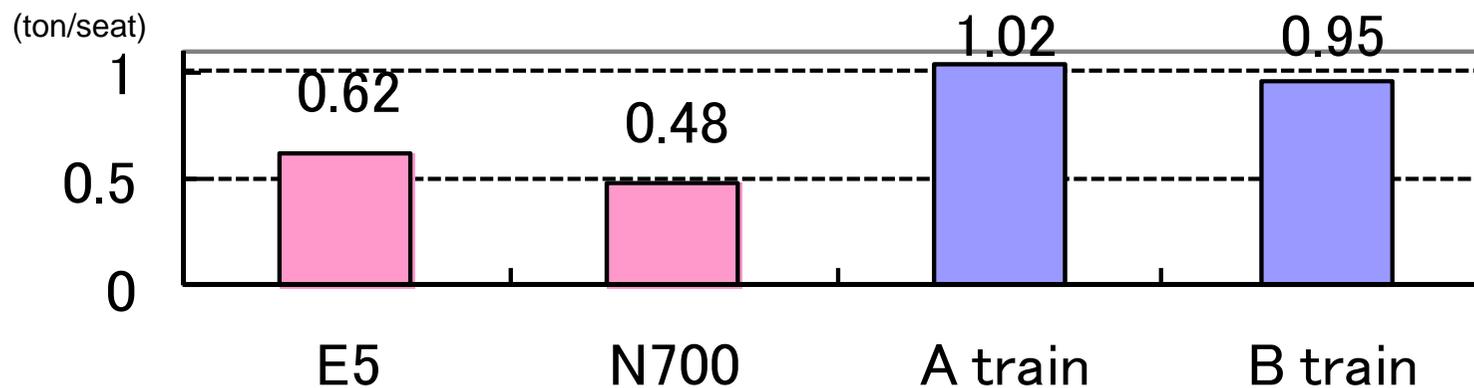
Shinkansen

## ○ Comparison

	Shinkansen  Series E5	Shinkansen  Series N700	A train 	B train 
Trainset (cars) - Seats (No.)	10 - 731	16 - 1323	20 - 750	16 - 858
Train Weight (ton) *	454	635	766	818
Train Weight/Seat (ton/seat)	0.62	0.48	1.02	0.95

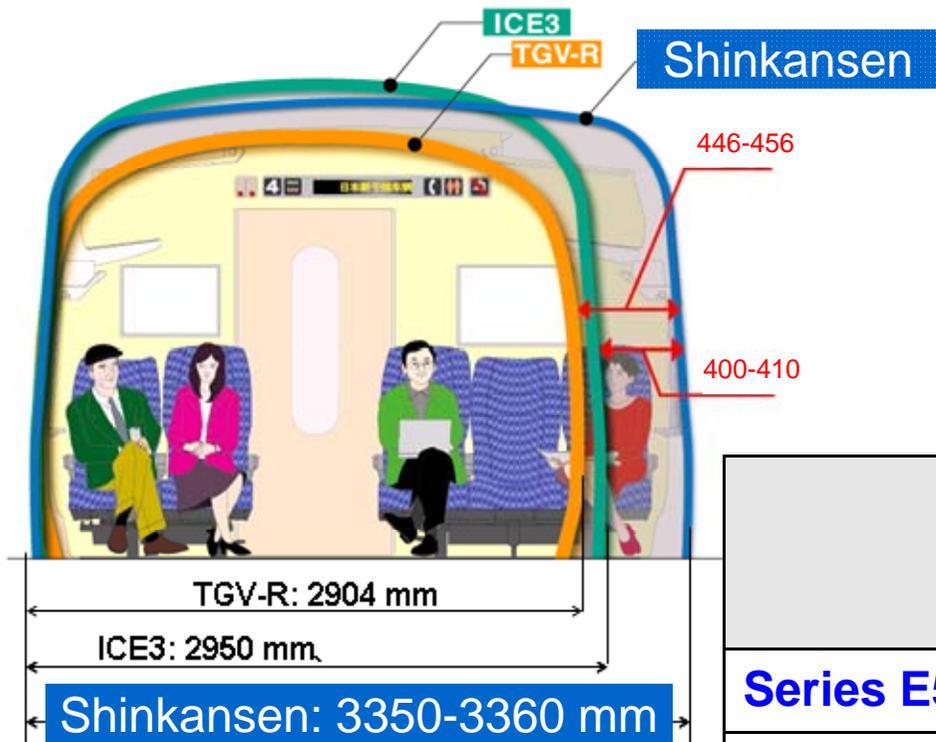
\*Unloaded train data

Train weight per seat



**Lower CO2 emissions & Energy consumption**

The car body of the Shinkansen is wider than that of any other high speed rail train.



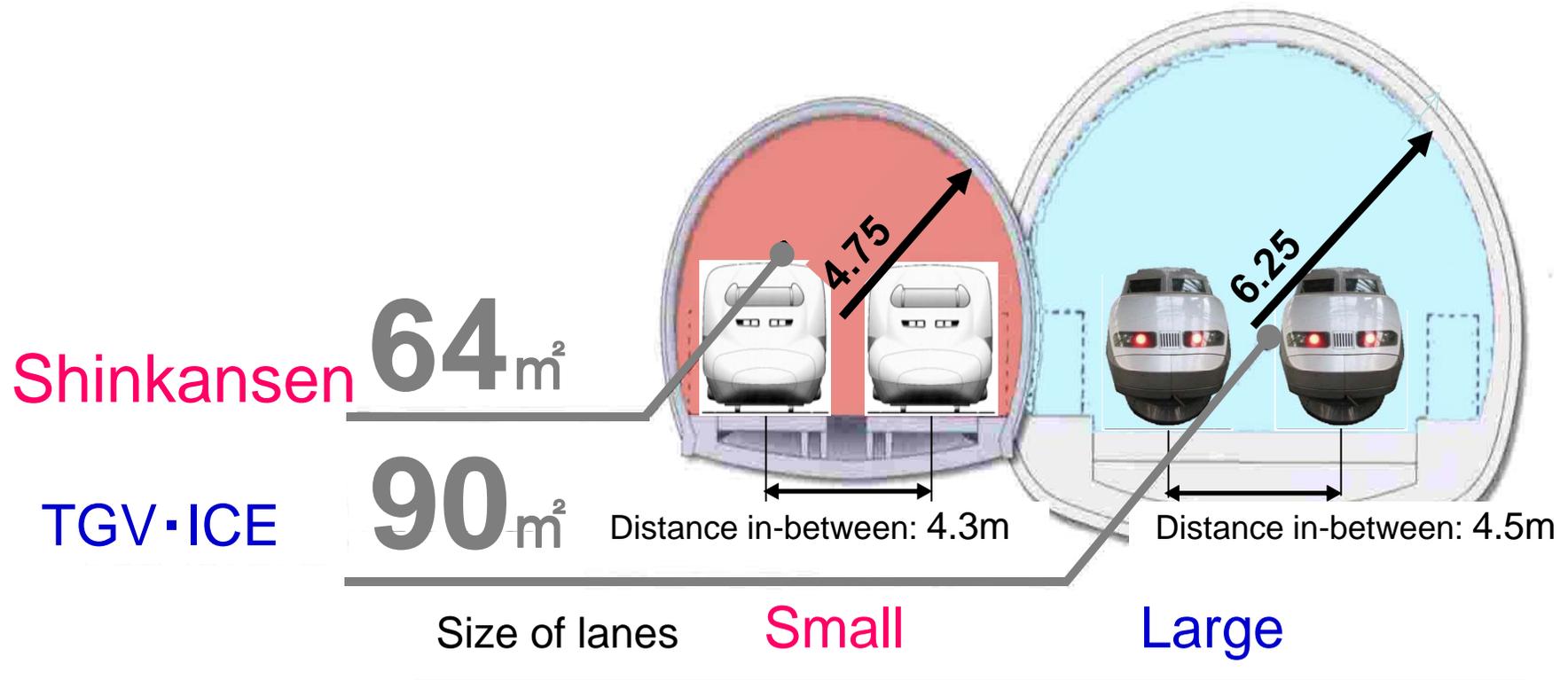
More passengers

Comfort

	Width (mm)	Seat Pitch (mm)	Seats/Car (No./car)
<b>Series E5</b>	<b>3350</b>	<b>1040</b>	<b>73.1</b>
<b>Series N700</b>	<b>3360</b>	<b>1040</b>	<b>82.7</b>
<b>Train A (TGV-R)</b>	<b>2904</b>	<b>900</b>	<b>37.5</b>
<b>Train B (ICE3)</b>	<b>2950</b>	<b>920</b>	<b>53.6</b>

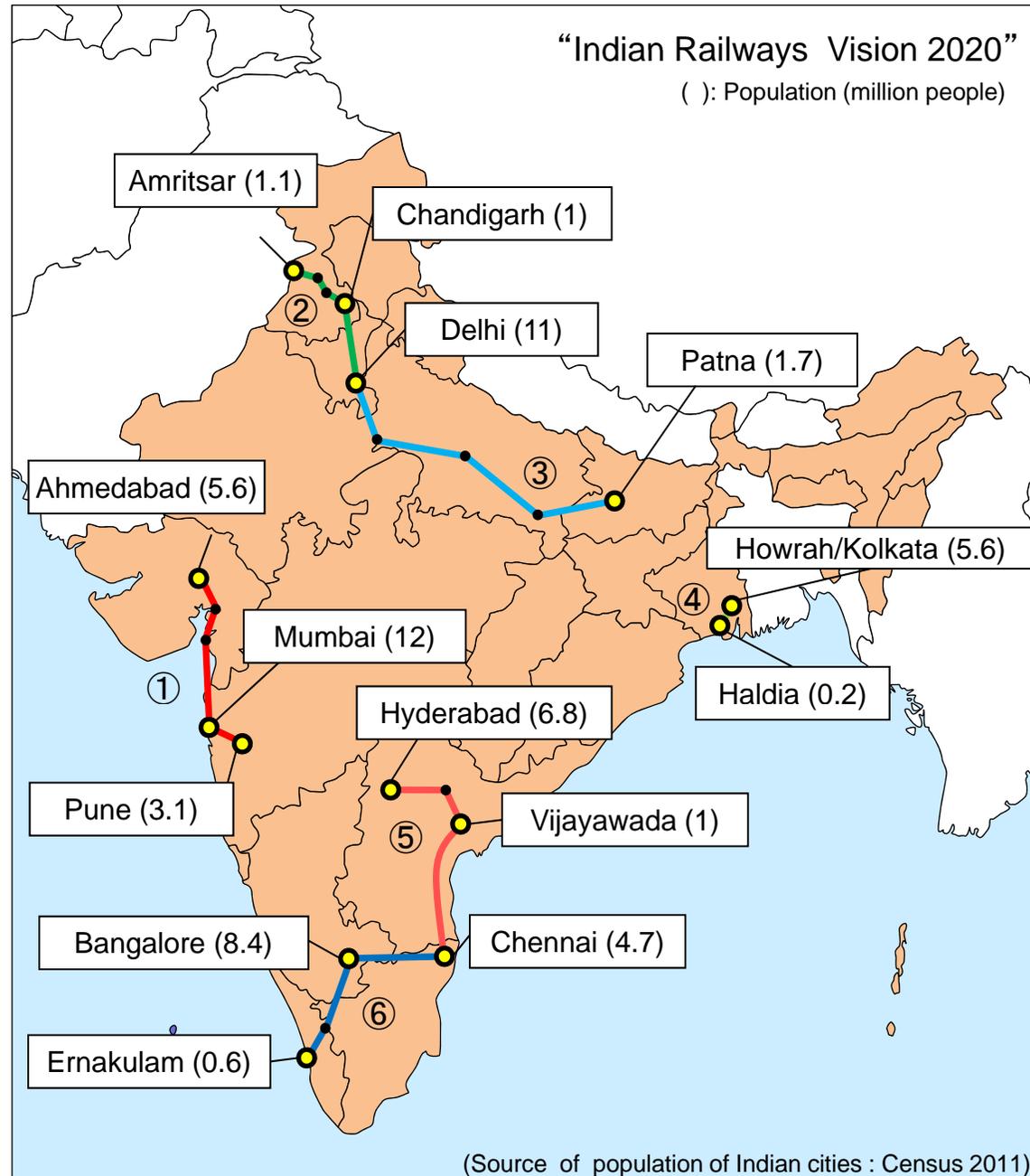
The excellent air tightness of the car body of the Shinkansen allows for tunnel cross sections to be constructed small.

## Tunnel Cross Section



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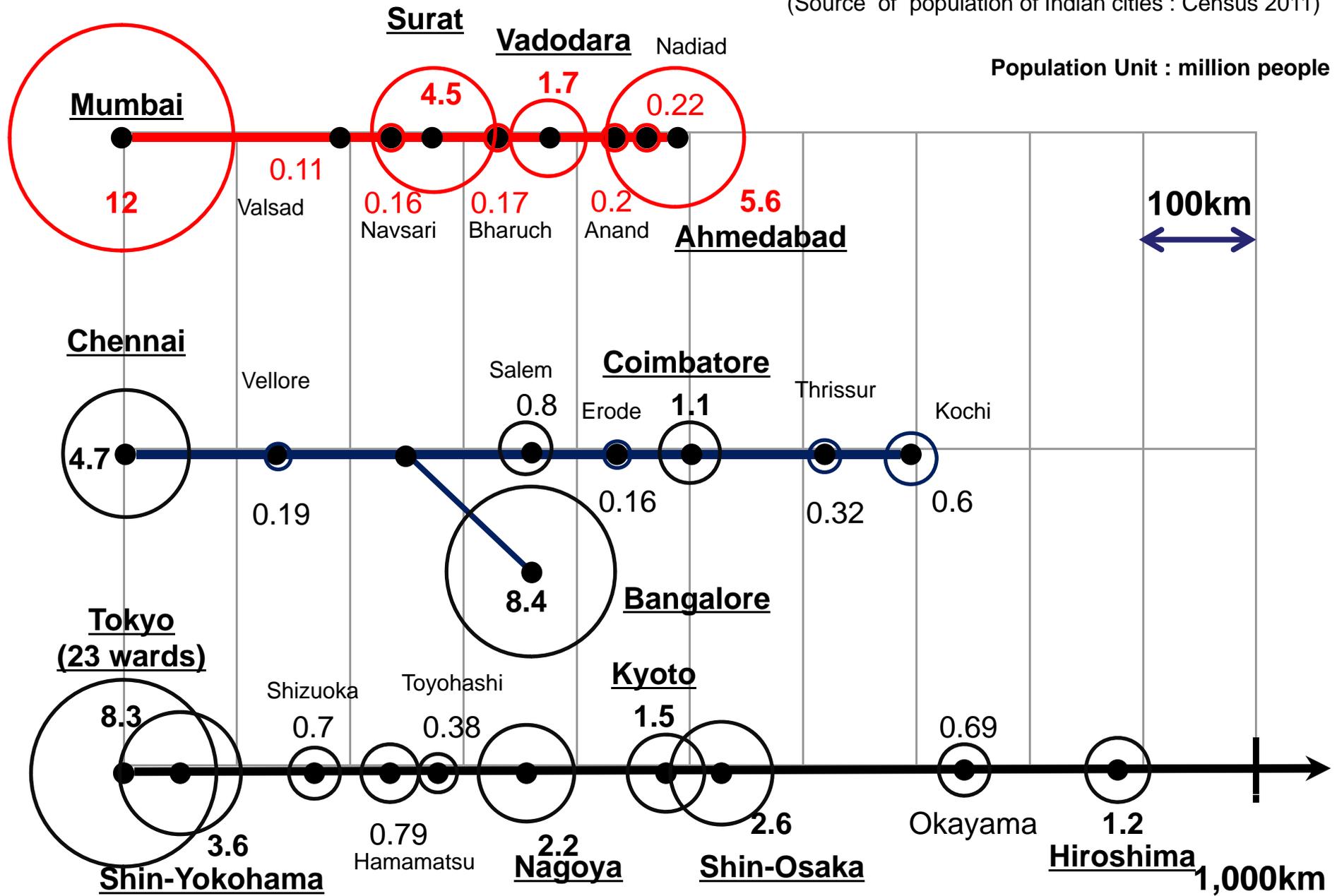
# High Speed Railway Corridors in India



# The Similarity in Population Distribution

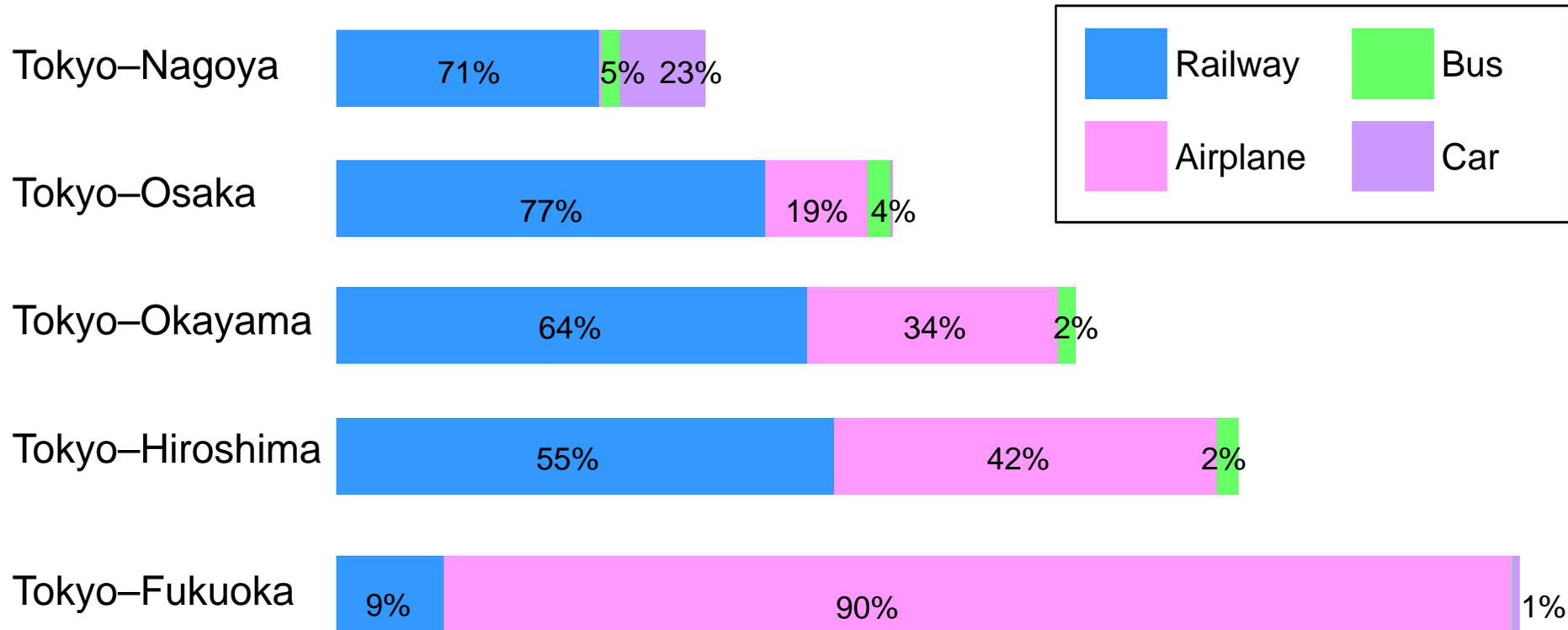
(Source of population of Indian cities : Census 2011)

Population Unit : million people

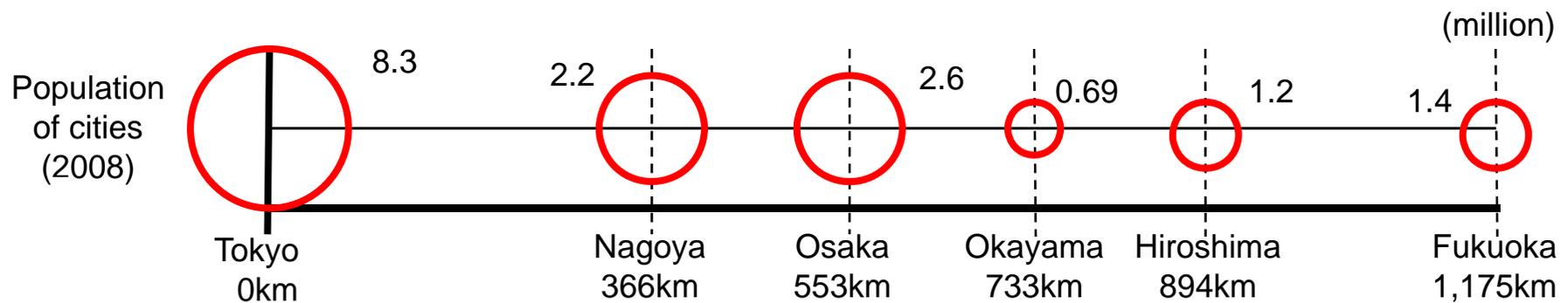


# The Competitiveness among the Other Transport Modes

## ○ Passenger shares for the modes of passenger transport between Tokyo and Fukuoka



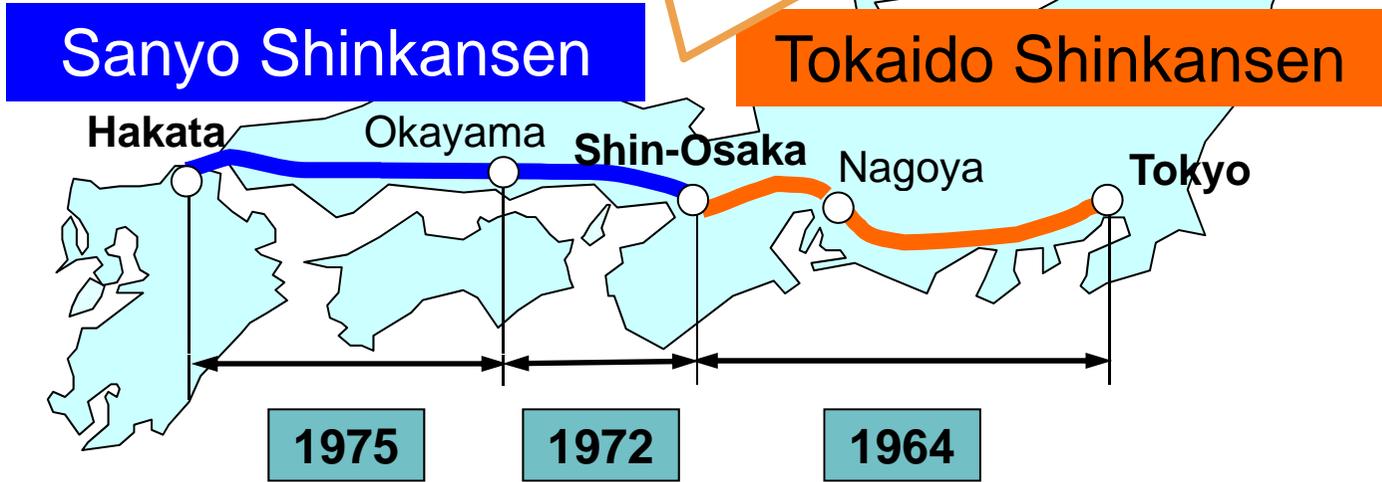
Source: Inter-Regional Passenger Mobility Survey FY 2007



## (1) Tokaido and Sanyo Shinkansen

The construction costs were fully covered by **loans**.

- This line covered **the most densely-populated areas** in Japan.
- The profit was enough to return the loans within 7-8 years of the start of operations.

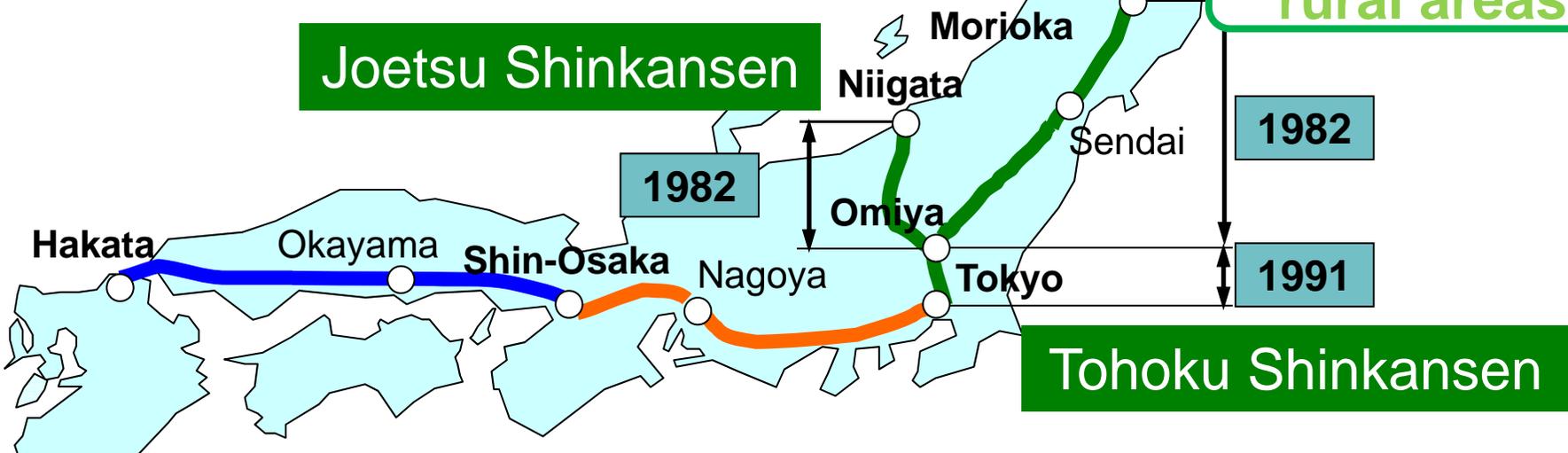


## (2) Tohoku and Joetsu Shinkansen

A large part of the cost\* was still covered by loans.

\* The government funded 13 % of the construction.

Expansion to rural areas



The profit was not large to return the loans.



The construction cost placed a heavy burden on the Japanese National Railways (JNR).

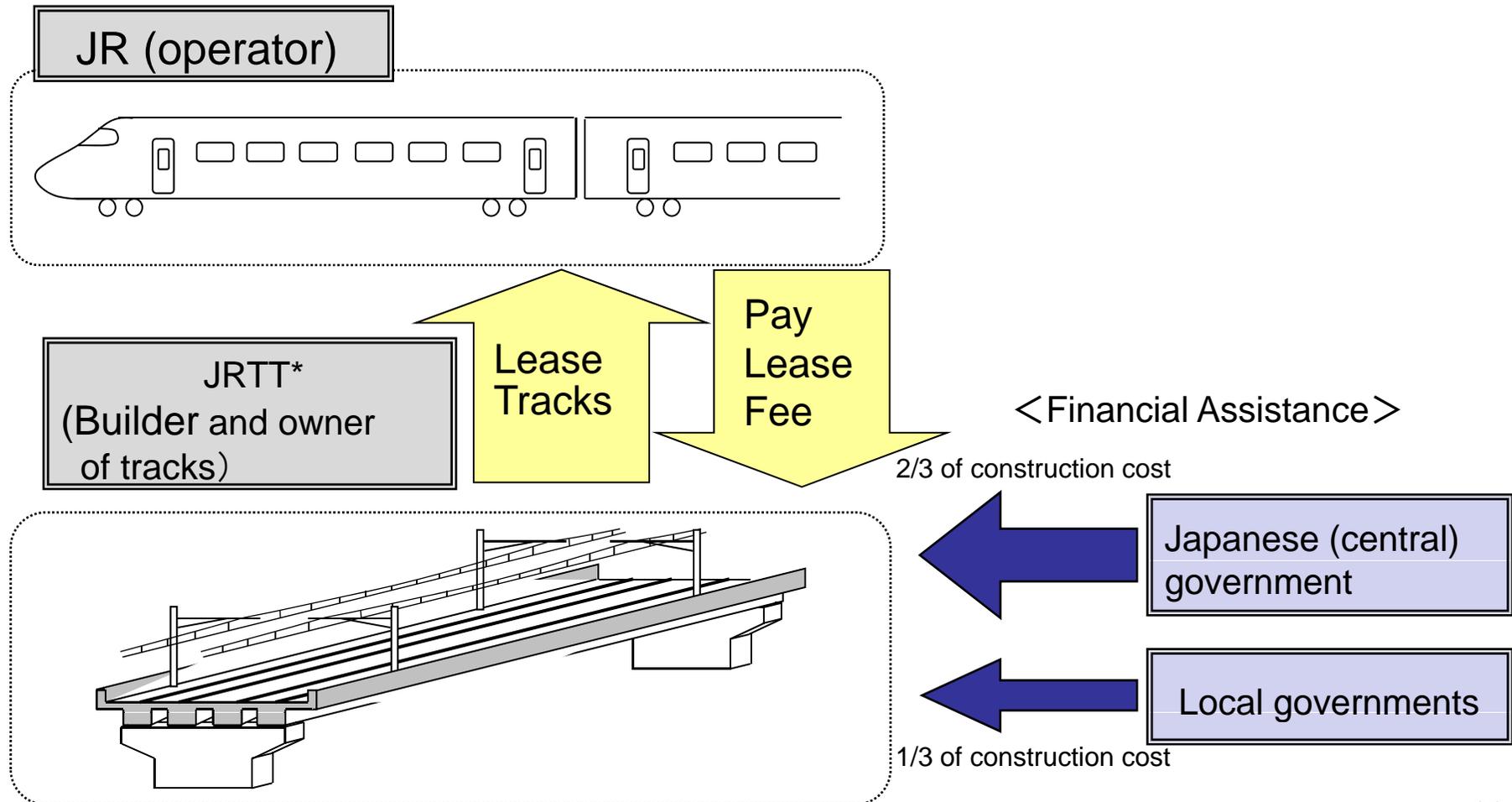


It led to the privatization of the JNR in 1987.

# Construction-operation Separation Scheme

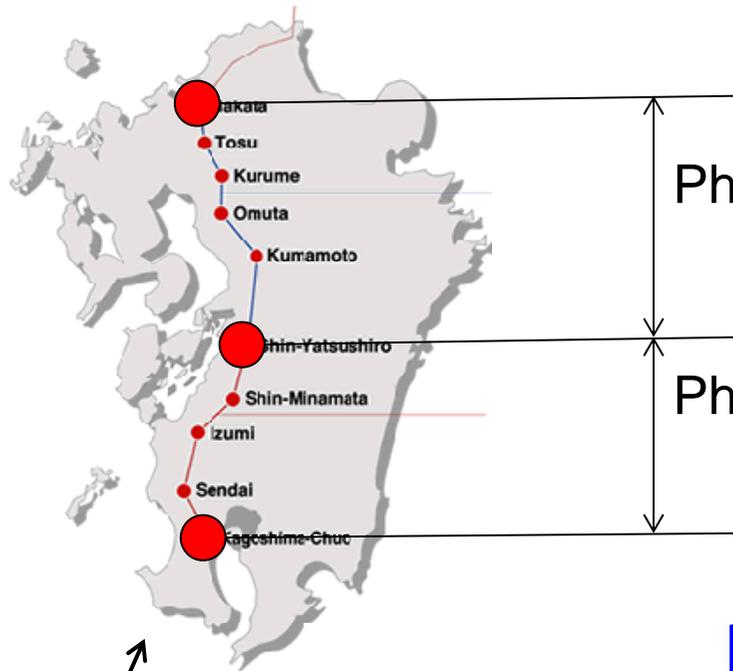
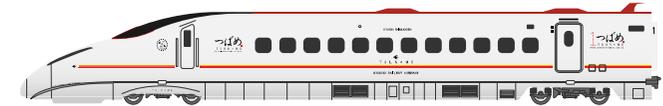
After 1997,

- central and local governments pay for the construction cost.
- operators (JRs) no longer shoulder the burden of the construction cost.
- this scheme ensures the sustainable operation of the JRs.



\*JRTT: The Japan Railway Construction, Transport and Technology Agency

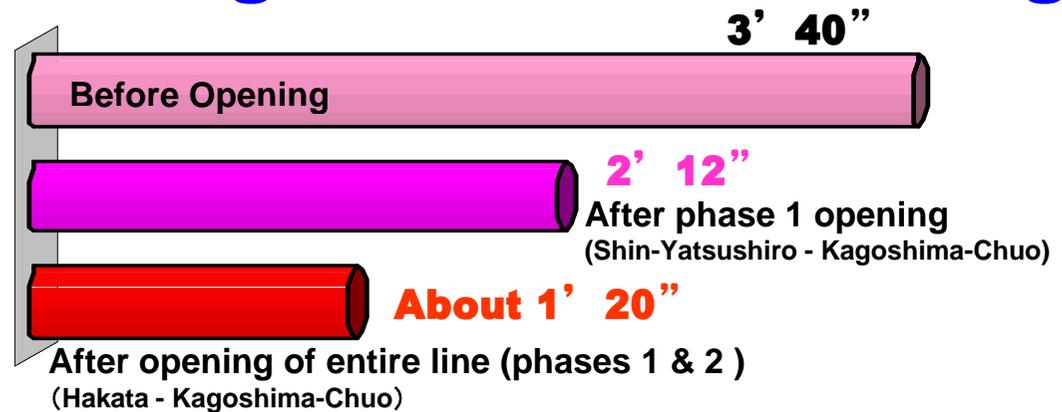
## Kyushu Shinkansen: Hakata - Kagoshima-Chuo (250 km)



Phase 2: Hakata - Shin-Yatsushiro  
opened in March 2011

Phase 1: Shin-Yatsushiro - Kagoshima-Chuo  
opened in March 2004

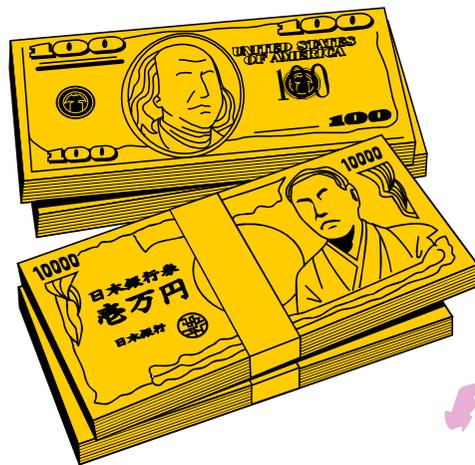
## ■ Significant time saving



## ■ Huge impact on local economies

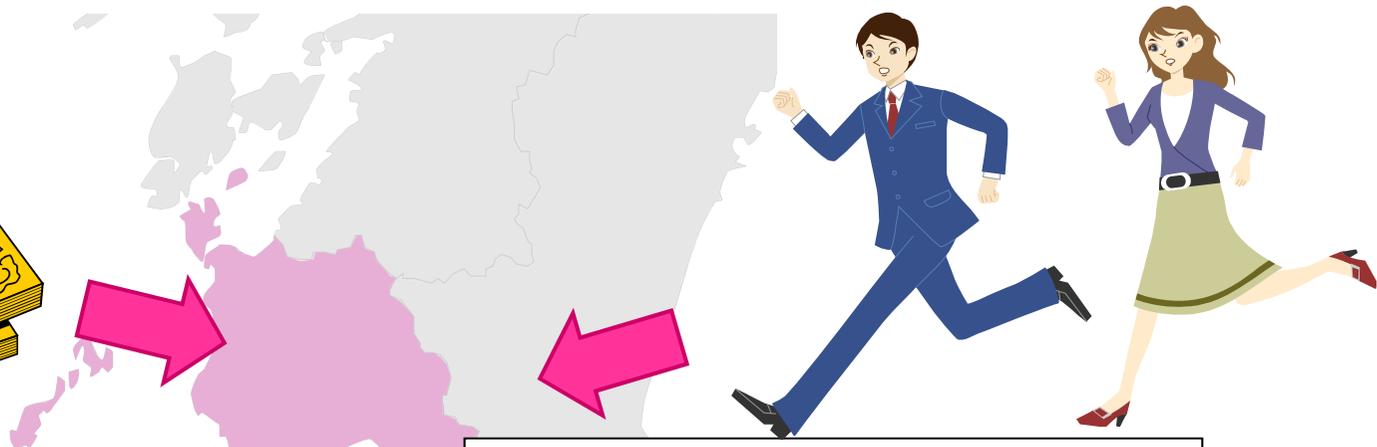
as a result of the increase in visitor numbers

the entire line opened in **March 2011**



Ripple Effect on Economy  
of Kagoshima Prefecture

**460 million dollars**  
(since the opening of the entire line)



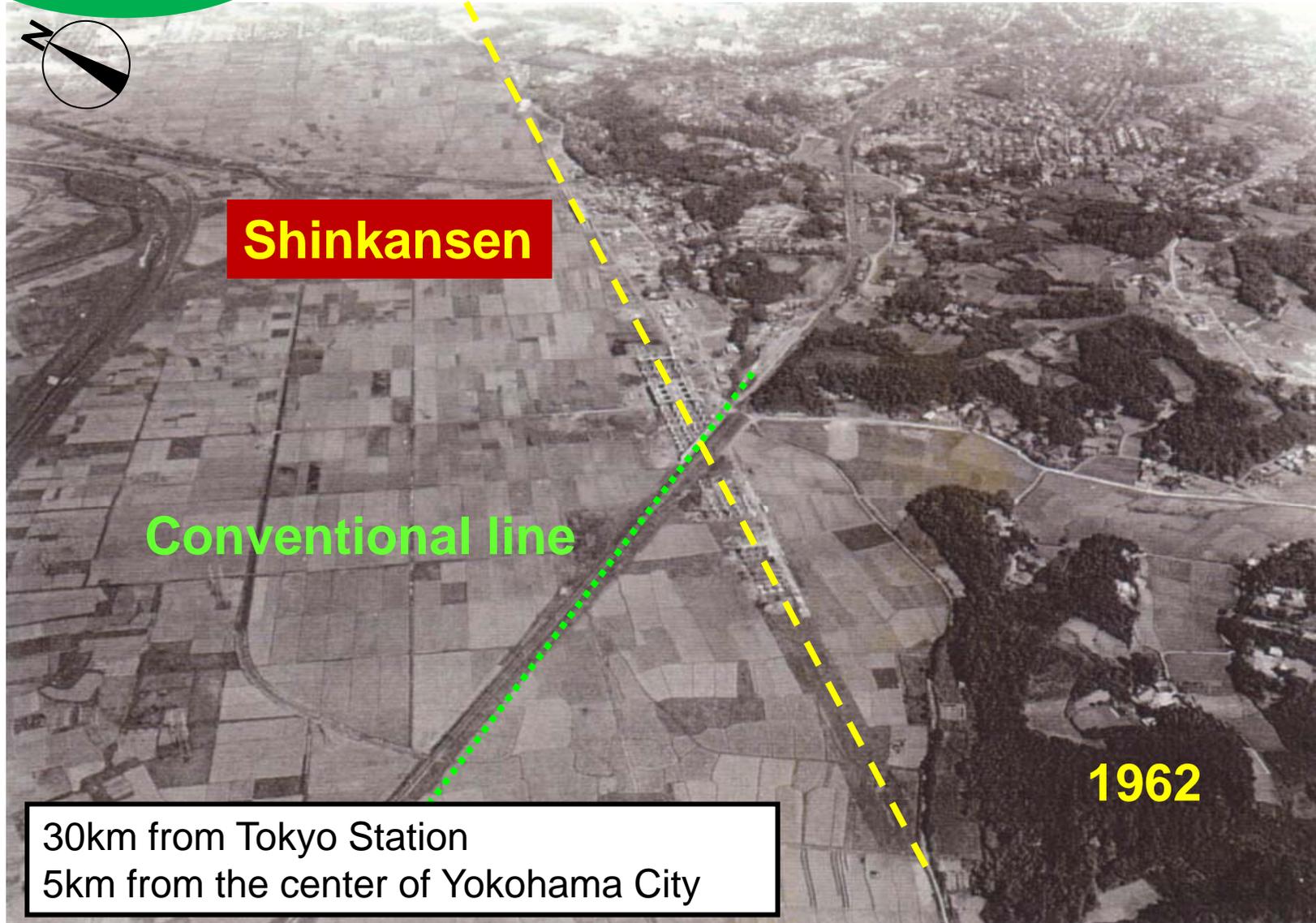
Visitors to Kagoshima Prefecture

**Increased by 24.5%**  
(year-on-year basis)



Before

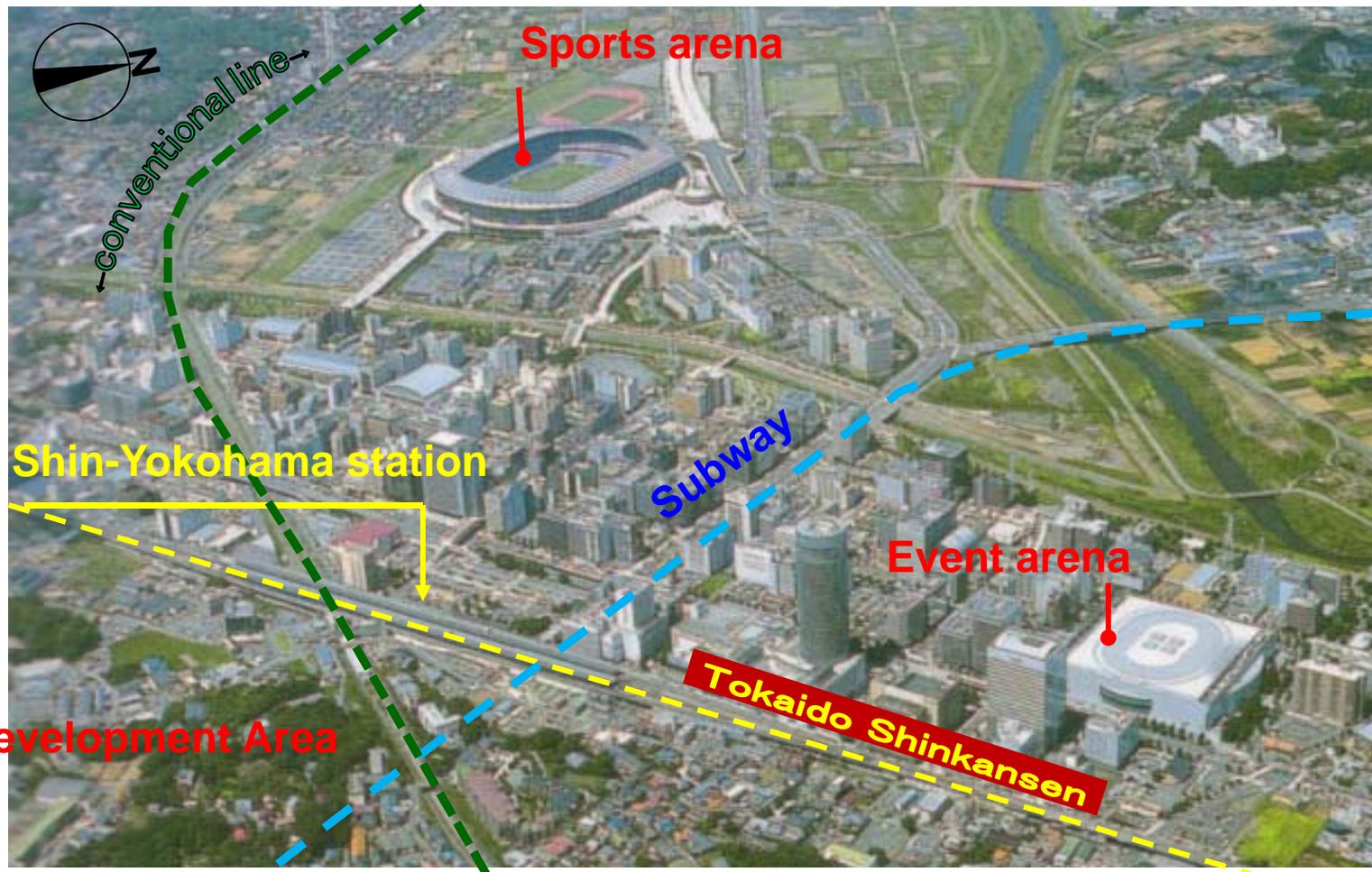
## Area around Shin-Yokohama station



After

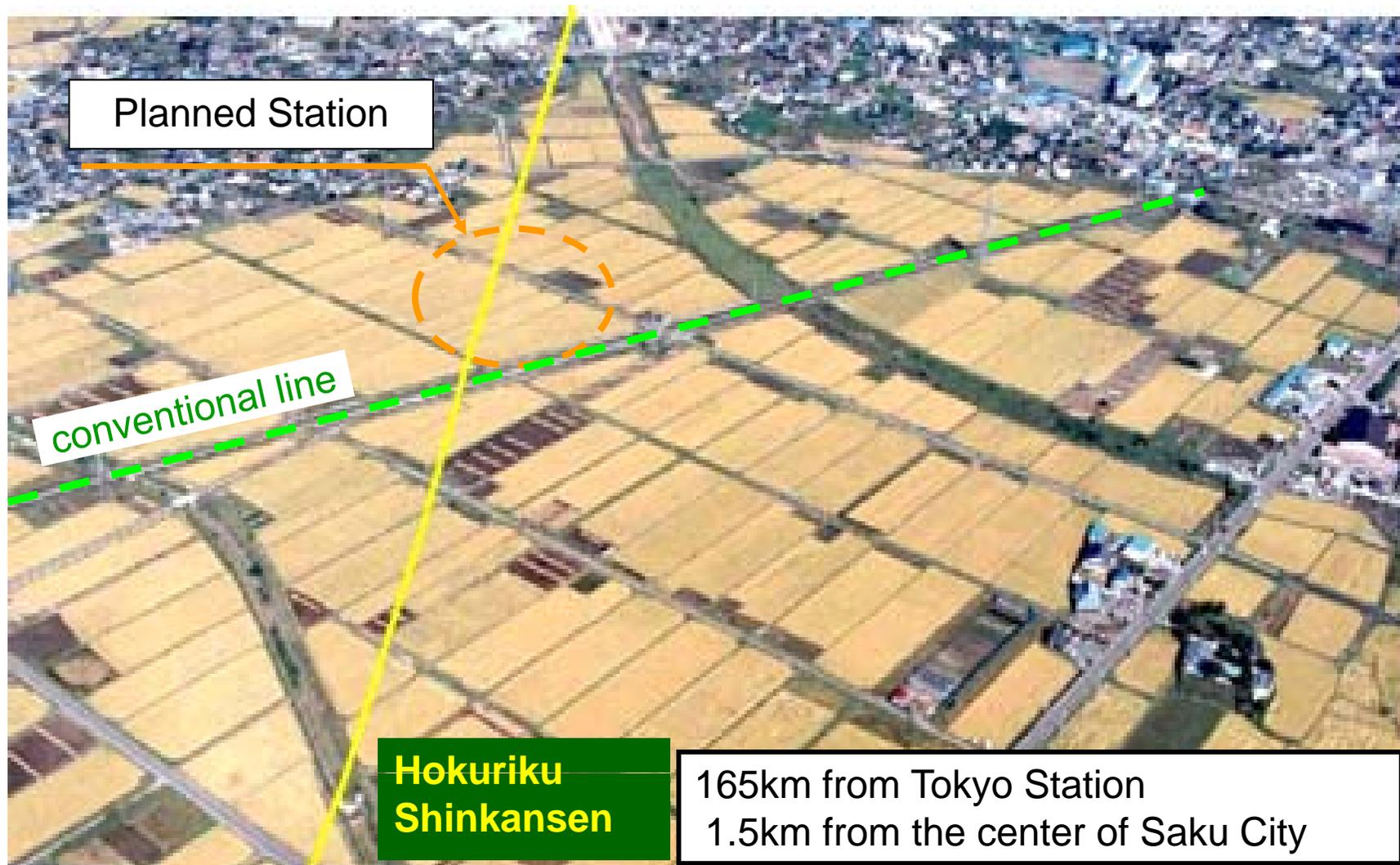
## Area around Shin-Yokohama station

Now... front entrance of Yokohama City



Before

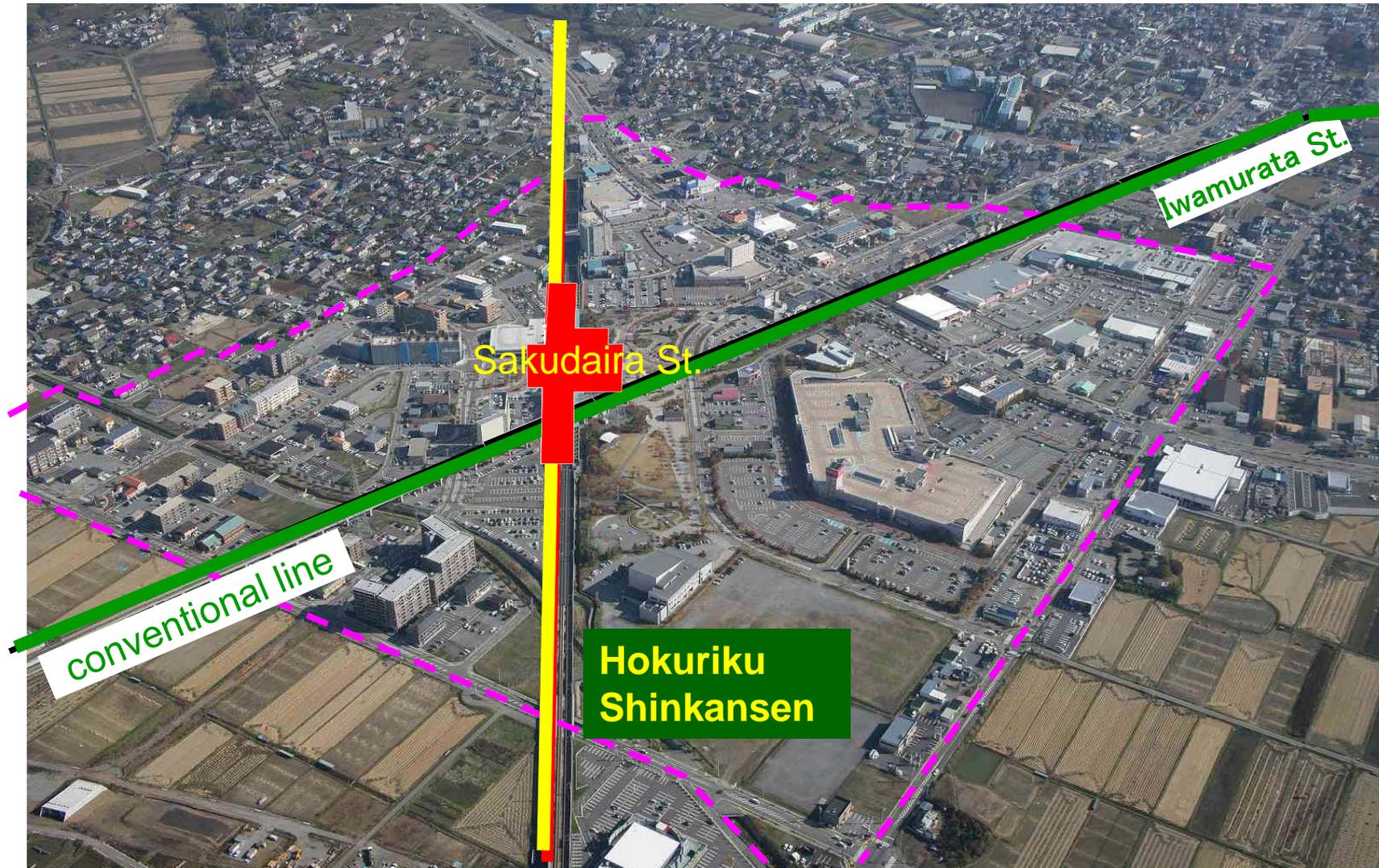
## Area around Sakudaira station



After

## Area around Sakudaira station

(10years after opening) = Year 2007



## Hakata Station (Kyushu Shinkansen)



Contribution to job creation and regional economic development



infrastructure construction

Contribution to job creation and regional economic development



rail track maintenance

Contribution to job creation and regional economic development



rolling-stock manufacturing

Japan can cooperate with India on the development of high speed rails in India.

Public  
sector

## Policy approaches

- nationwide railway network development
- administration that values railway safety

## Long experience in developing the Shinkansen

- financial scheme
- regional development

Private  
sector

## Technologies

- safety and reliability
- environmental sustainability
- small infrastructure

## Experience and expertise

- rail business
- commercial development in and around the station
- a wide range of other businesses

**Thank you**