Creating Value for a Sustainable Society through Railways

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Table of Contents

1. Overview of Railways in Japan

2. Railway Network Development in Japan

3. Toward a Sustainable Society

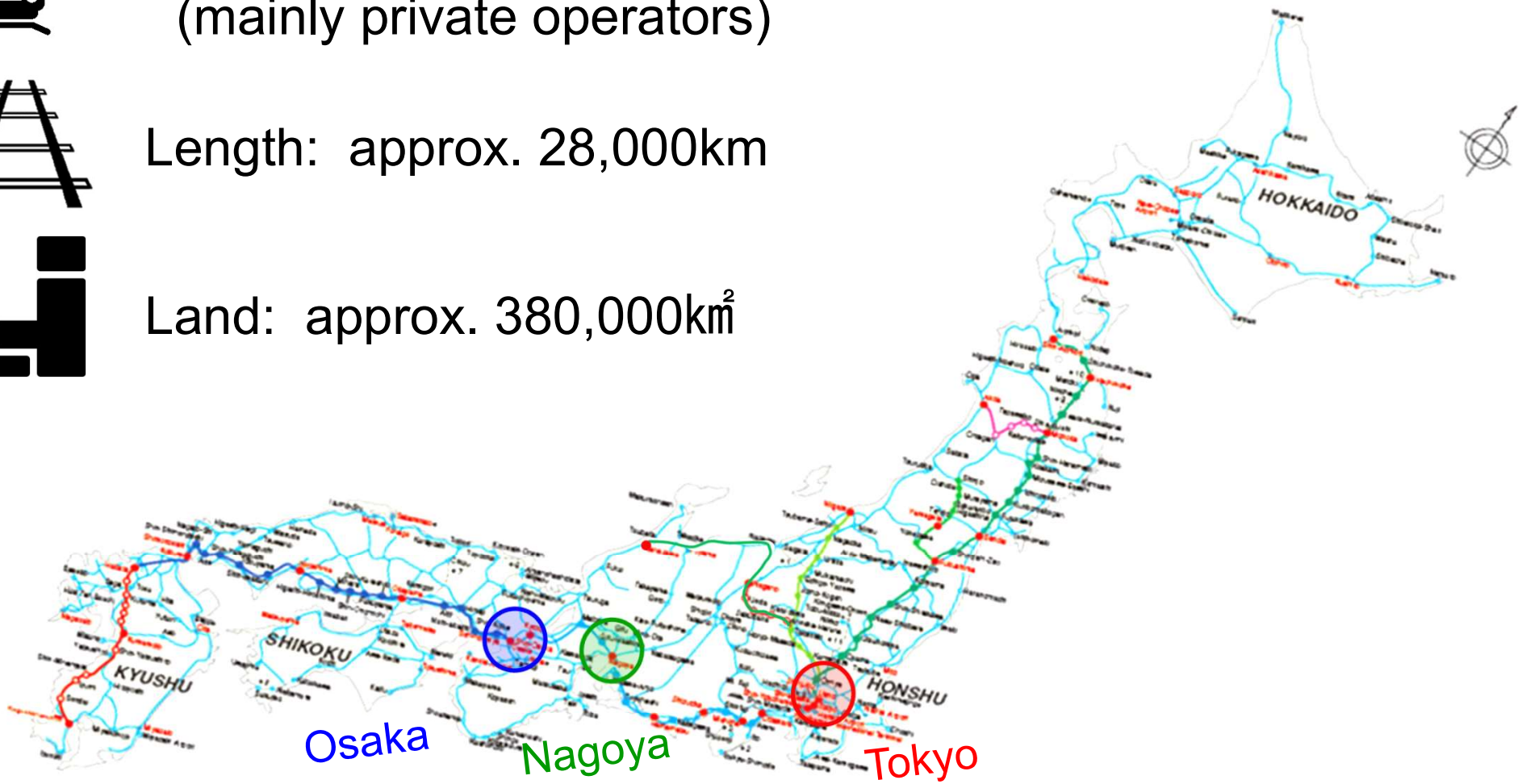
Development of Japan's railway network

History: Since 1872（152years）

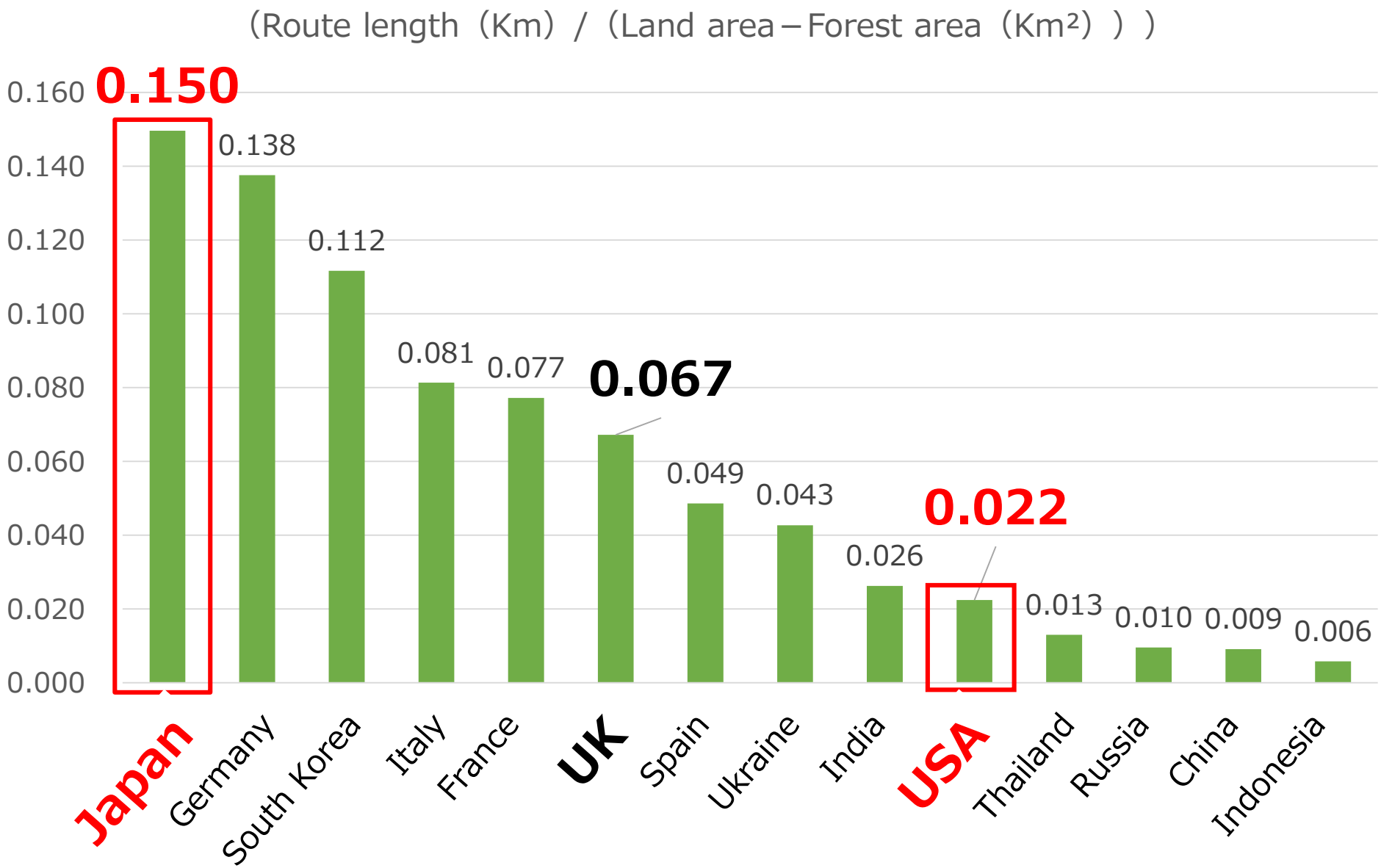
Operators: 217
(mainly private operators)

Length: approx. 28,000km

Land: approx. 380,000㎢



Route density (Route length/Flat Area)



Transportation Share

Passenger - km（FY2019）

	Rail	Car (incl. Bus)	Air
Japan	30%	63%(※)	7%
UK	9%	90%	1%
Germany	9%	85%	6%
France	11%	87%	2%
USA	1%	84%	15%

（※）Person-kilometers transported by cars in Japan are estimates based on model equations.

c.f. Number of Passengers by rail: 25 billion passengers (FY2019)

Environmental Advantages of Railways

CO_2 emissions per passenger-kilometer (FY2019)

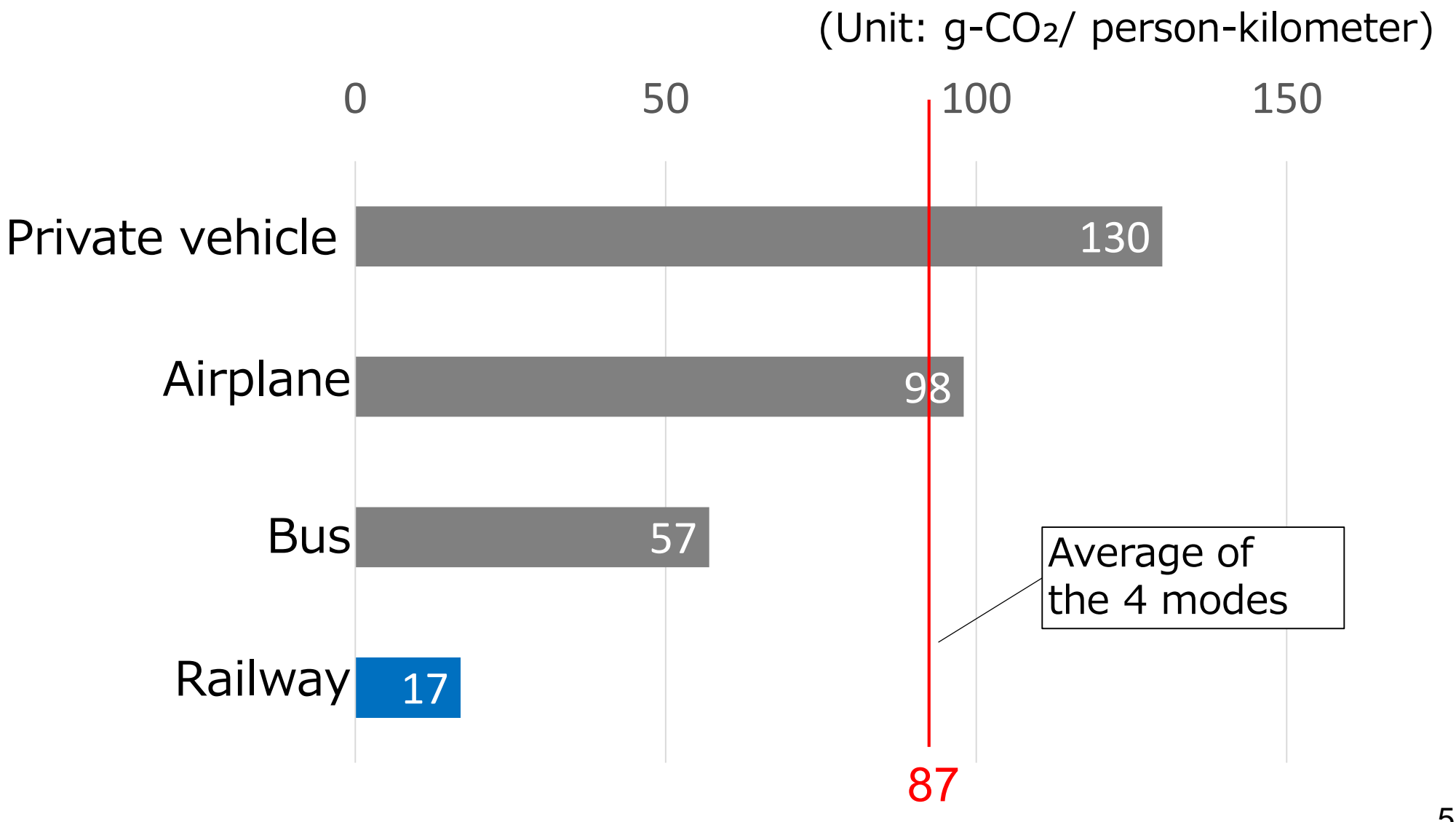


Table of Contents

1. Overview of Railways in Japan

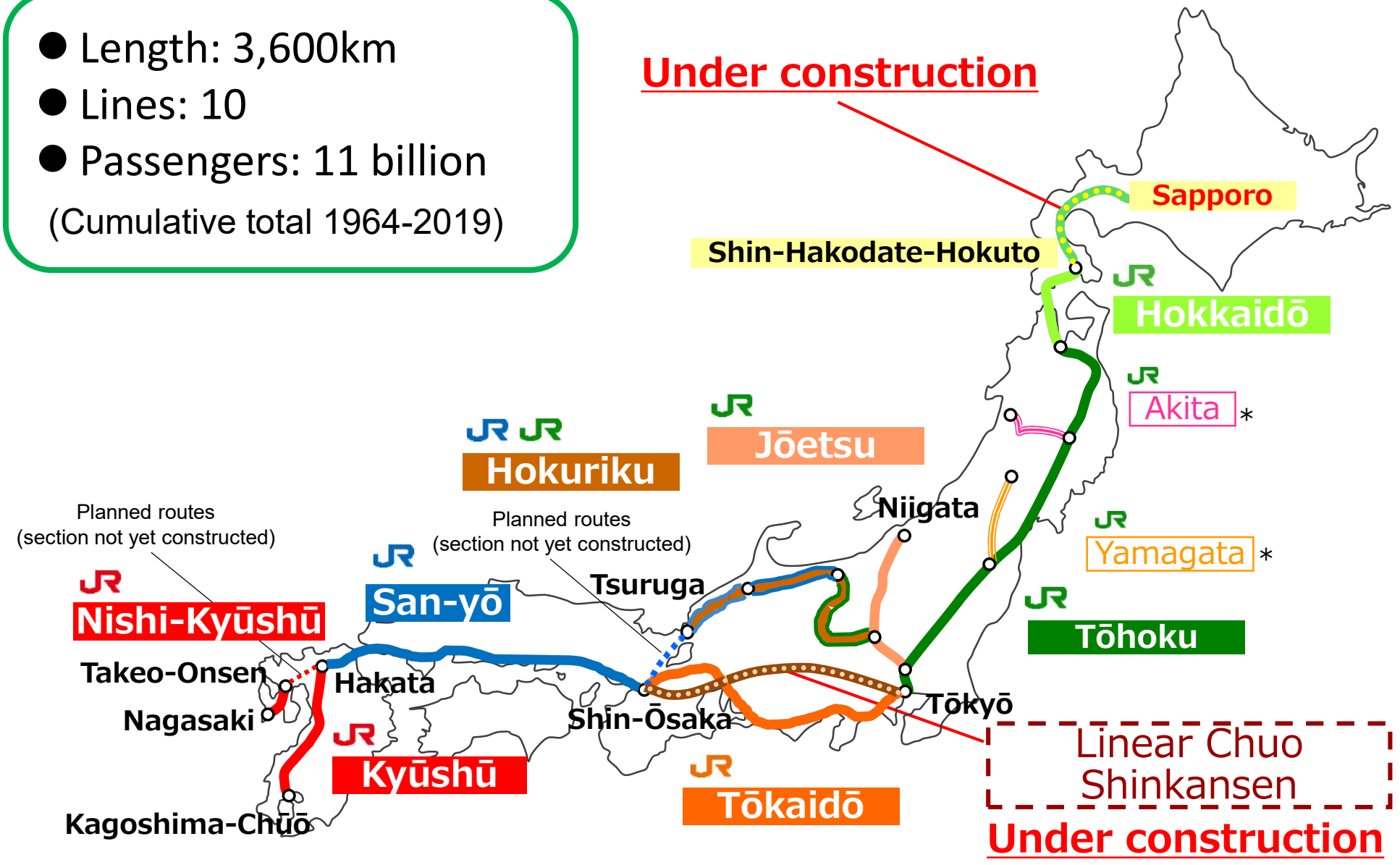
2. Railway Network Development in Japan

3. Toward a Sustainable Society

Shinkansen Network

- Length: 3,600km
- Lines: 10
- Passengers: 11 billion

(Cumulative total 1964-2019)



＊ Converted Conventional line providing through operation service from Shinkansen (“mini Shinkansen”)

Impacts of Hokuriku Shinkansen

Tokyo–Kanazawa (454 km)

Time Saving:

3 hrs. 47 min ➡ 2 hrs. 28 min (▽**79 min**)

Impacts of Shinkansen

Station Area

Land Value
(2014-2015)
+17%

Hotels
(2014-2018)
+127%

(Source) MLIT, Kanazawa city

Prefectures

Economic Effect
(2015, estimated)
USD 454 mil
(Consumption by tourists, Ishikawa Prefecture, only)

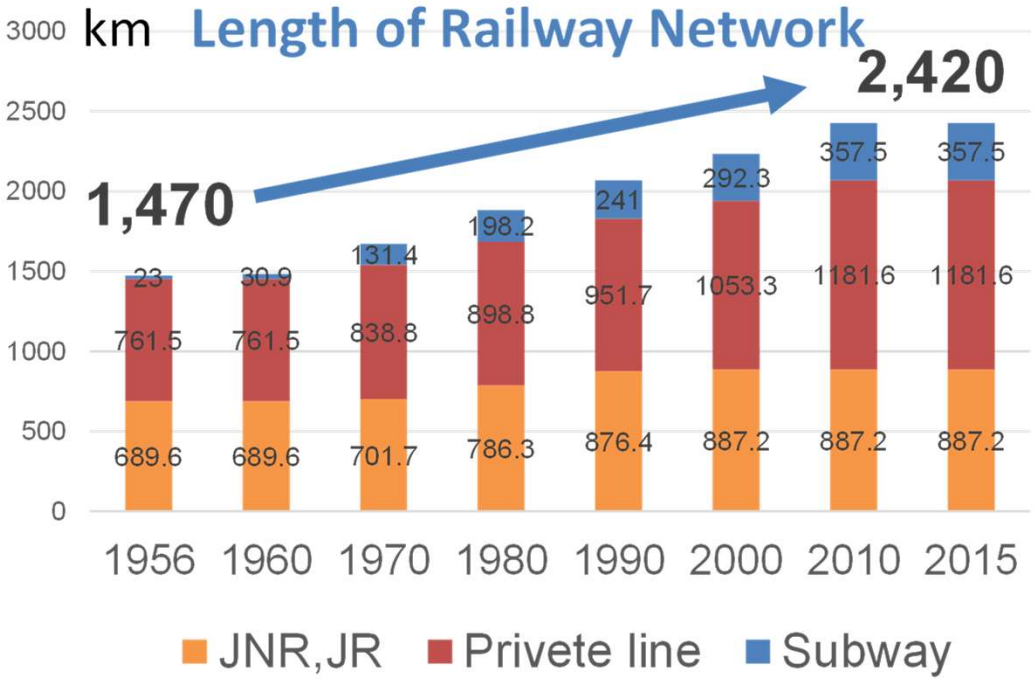
(Source) Development Bank of Japan

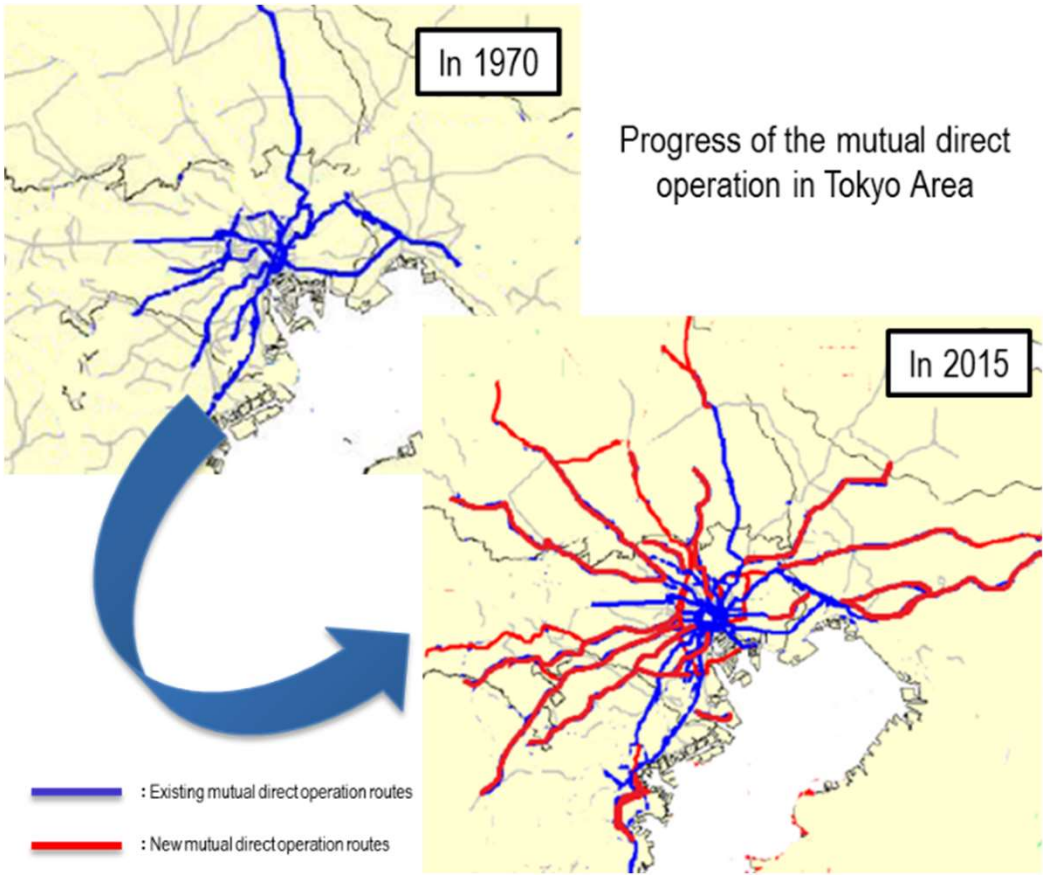
Tourists (TTL)
(2014-2015)
+16%
(Ishikawa Prefecture, only)

Int'l Tourists
(2014-2015)
+50%
(Ishikawa, Toyama and Fukui Prefecture)

(Source) Ishikawa Japan

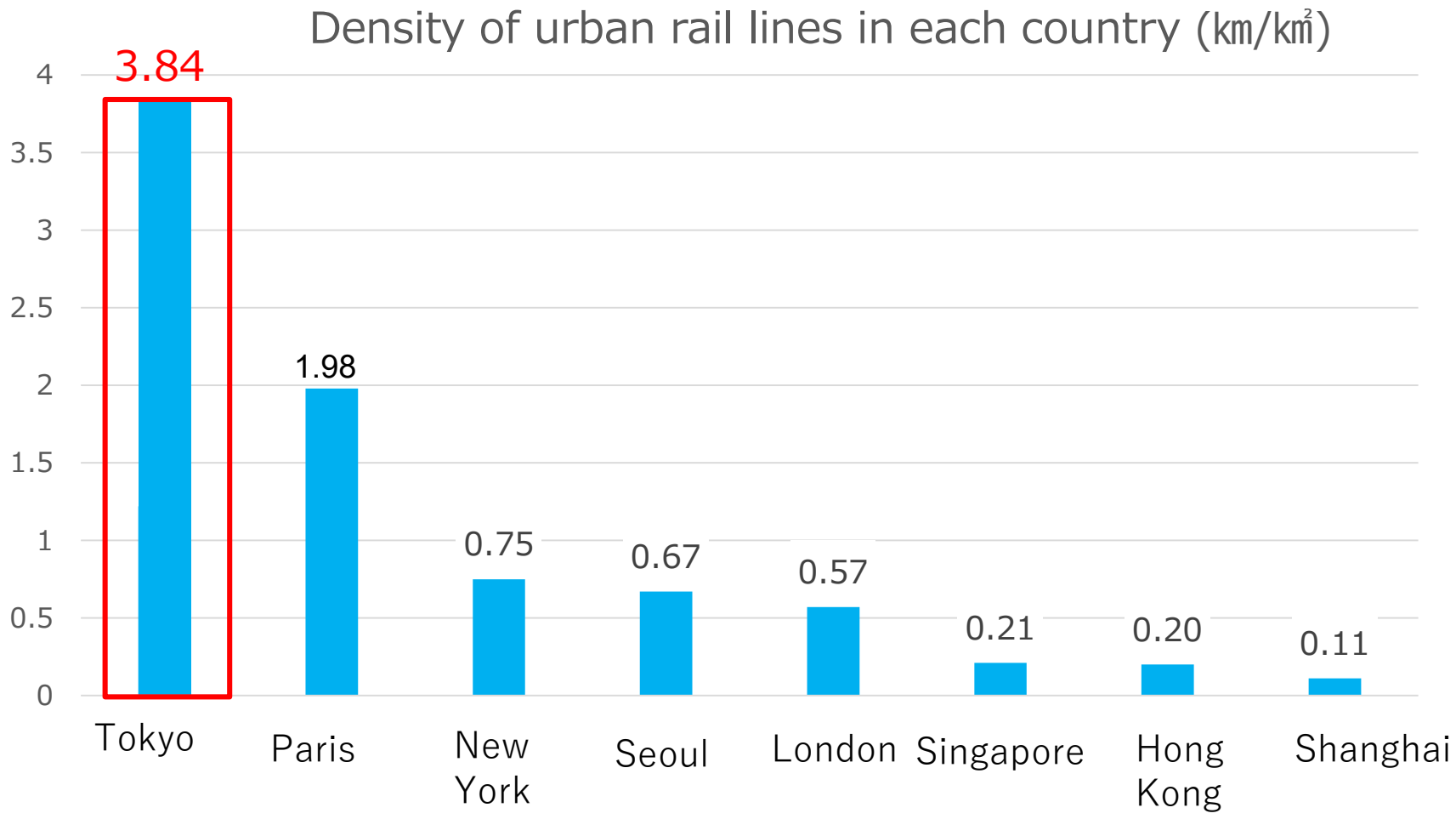
Development of the urban railway network





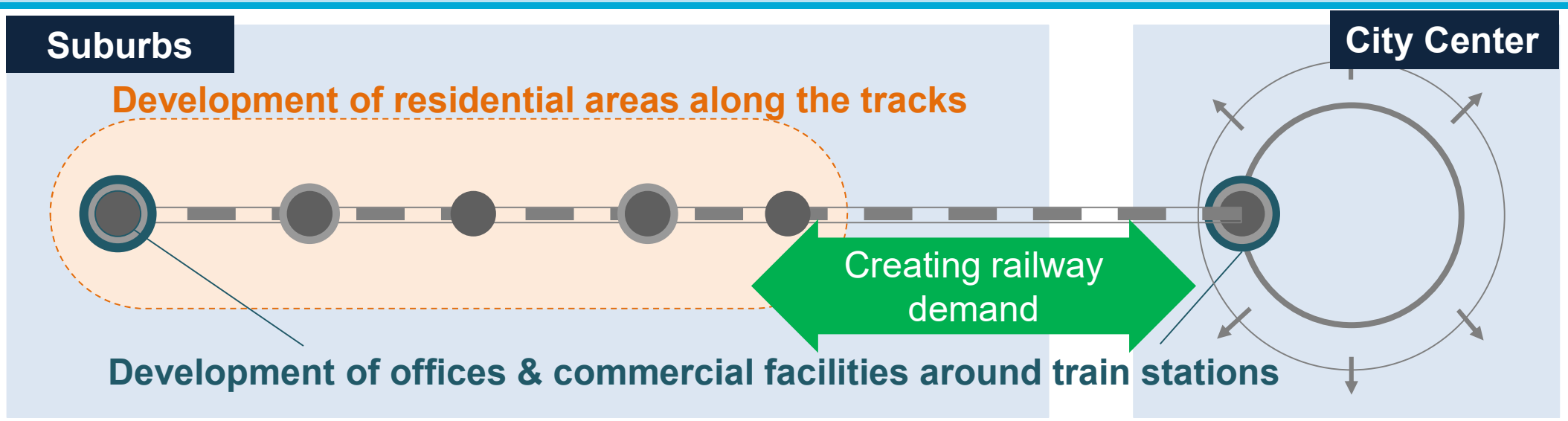
Progress of the mutual direct operation in Tokyo Area

Dense urban railway network in Tokyo



(*) Rail station density and line density are calculated by the Ministry of Land, Infrastructure, Transport and Tourism based on "Subways of the World" by the Japan Subway Association, "Major Transportation Situation Survey Report" by the Ministry of Land, Infrastructure, Transport and Tourism, "NAVITIME Transit" by Navitime Japan, and other sources.

Japanese-Style TOD



Profit structure of railway operators

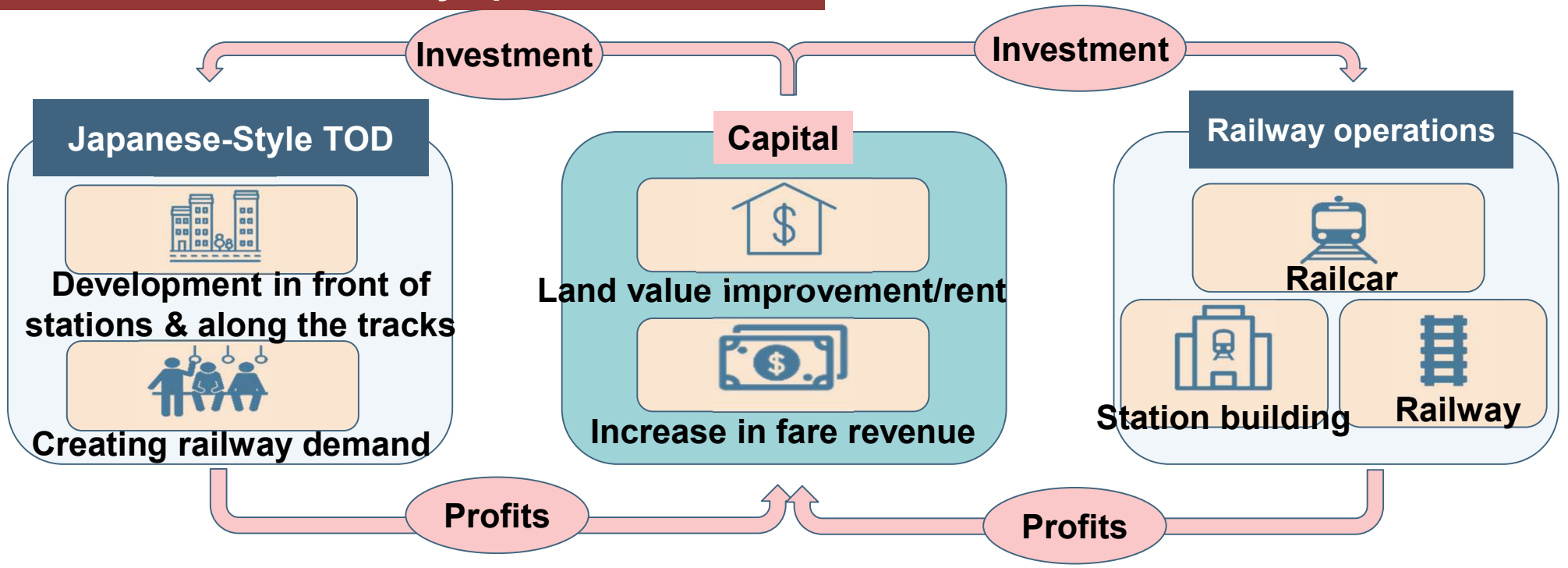


Table of Contents

1. Overview of Railways in Japan

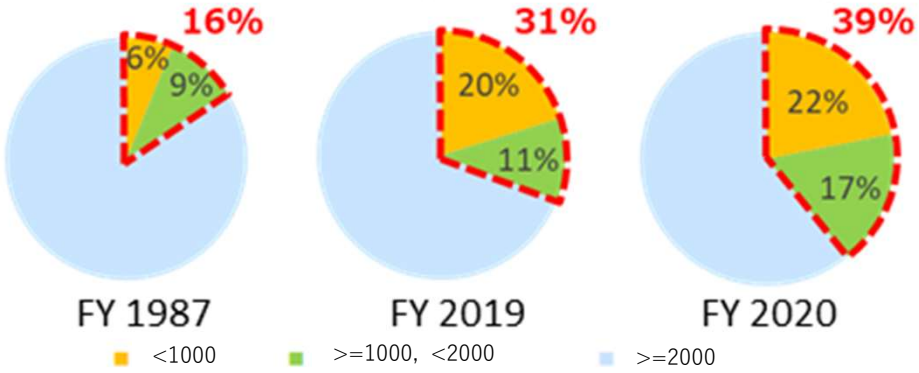
2. Railway Network Development in Japan

3. Toward a Sustainable Society

Challenges Facing Japan's Railways

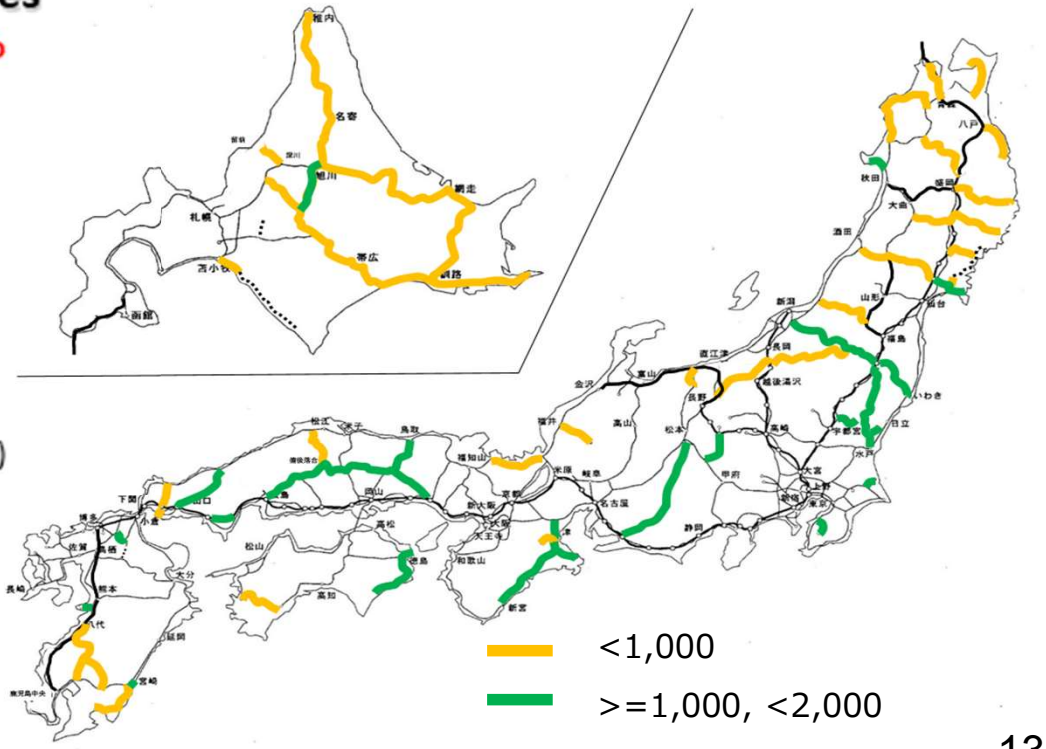
- An increasing number of railway lines are **no longer able to demonstrate the characteristics of railways**.
- The number of railway lines that see **service interruptions due to frequent natural disasters** has been increasing.

Proportion of Train Lines with a Transport Density of less than 2,000 Passengers in the 6 JR Companies



*Average number of passengers per day and km
*Based on operating km (calculated on a route basis)

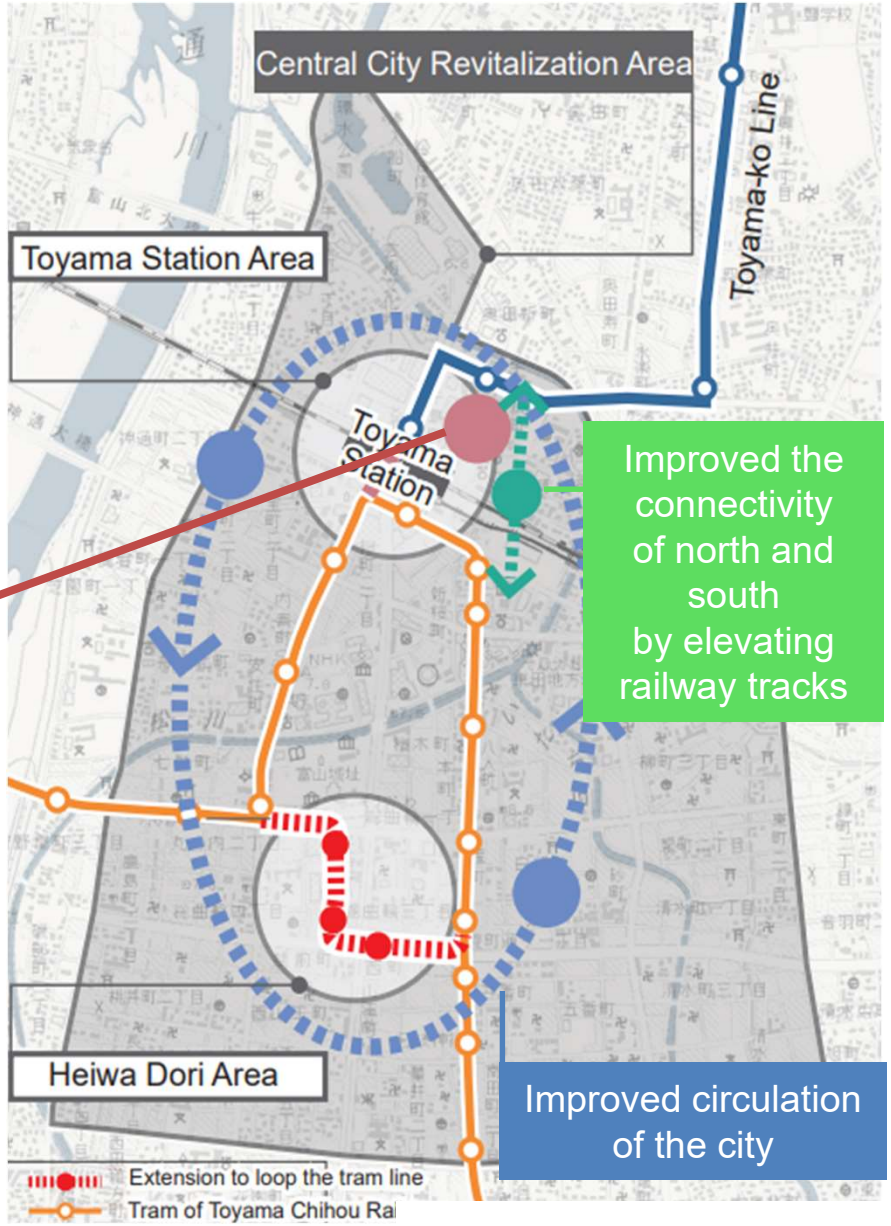
Transportation Density by Route for the 6 JR Companies (2019)



Compact City + Network : The Case of Toyama City

- Population: approx. 400,000, Area: 1240㎢
- Toyama City is aiming to **shift to a centralized urban structure**.
- The city is developing **hubs in conjunction with the public transportation axis** (concentrating urban functions such as residential, commercial, administrative, and cultural activities in the station area).

Developed a plaza to consolidate public transportation functions



Direction of Environmental Policies and Goals

Decarbonization of the railway business

- Introduction of **high-efficiency vehicles**
- **Utilization of regenerative power** generated during vehicle deceleration
- Use of **non-fossil diesel fuel**, development and introduction of **hydrogen fuel cell railcars, etc.**

" HYBARI " developed by JR East

Decarbonization through the use of railway assets

- **Solar power generation**
- **Securing renewable energy adjustment power** through the installation of **storage batteries**
- **Clean energy transportation**

Decarbonization by promoting the use of railways

- Increasing the use of **environmentally superior railways**
- **Promoting behavioral change** by visualizing the CO_2 emissions reduction effects

In 2050,

- **achieving carbon neutrality of the railway sector**

By the 2030s,

- **reducing CO_2 emissions by** an amount equivalent to **46%**

Summary

- Railways continue to play a significant role in achieving a sustainable society.
- However, some railways lines, especially in rural areas, have become difficult to maintain due to population declines and disasters.

- Considering railways as an integral part of urban development, improve the environment to make better use of the characteristics of railways.
- Further reduce environmental impacts and enhance the disaster response capacity.

Railways must continue to contribute to the realization of a sustainable society.

Thank you

for your kind attention