Maximizing Impacts of High Speed Rails: Efforts by City Sides and Engineering

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2. Social and Economic Impacts of HSRs

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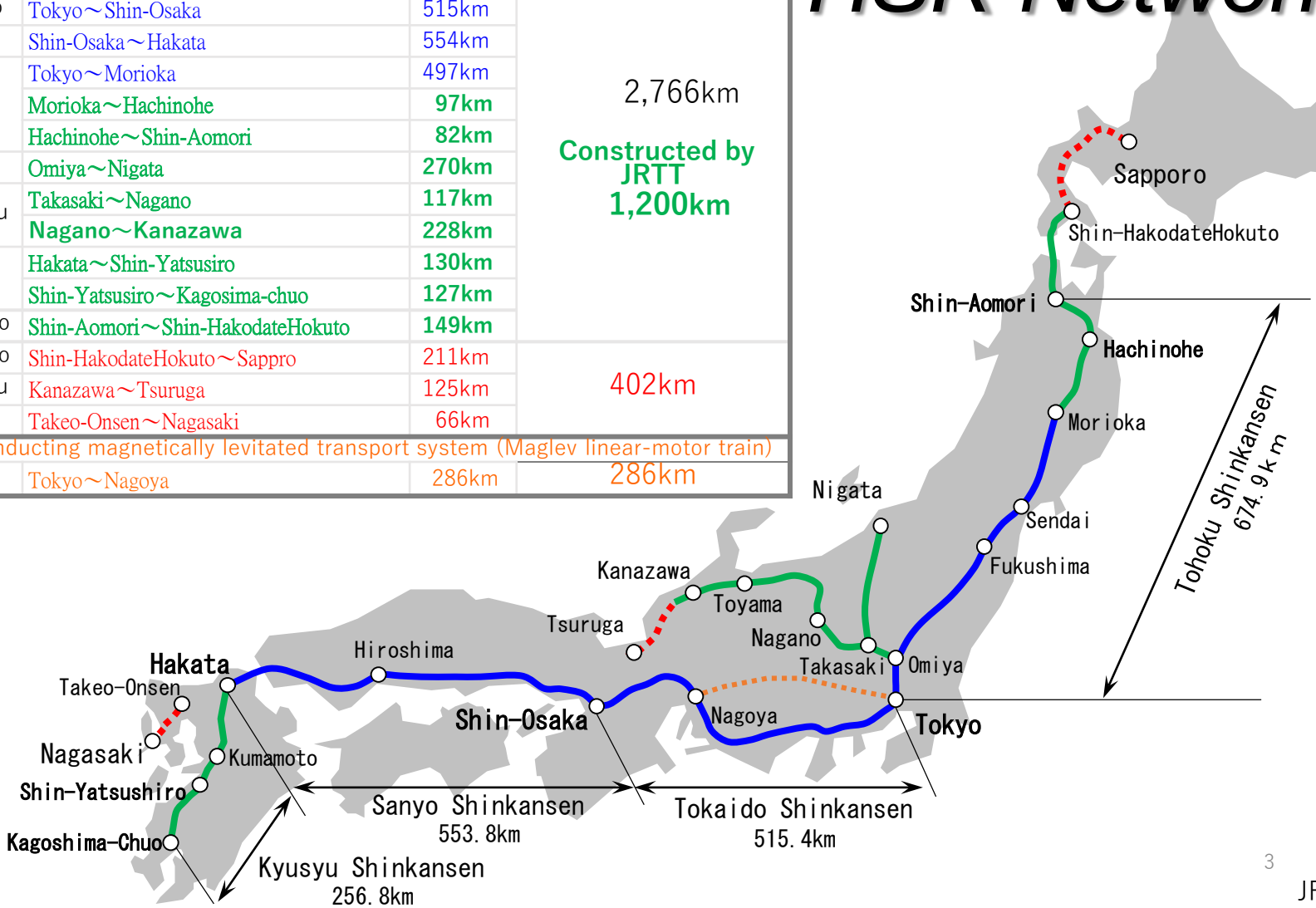
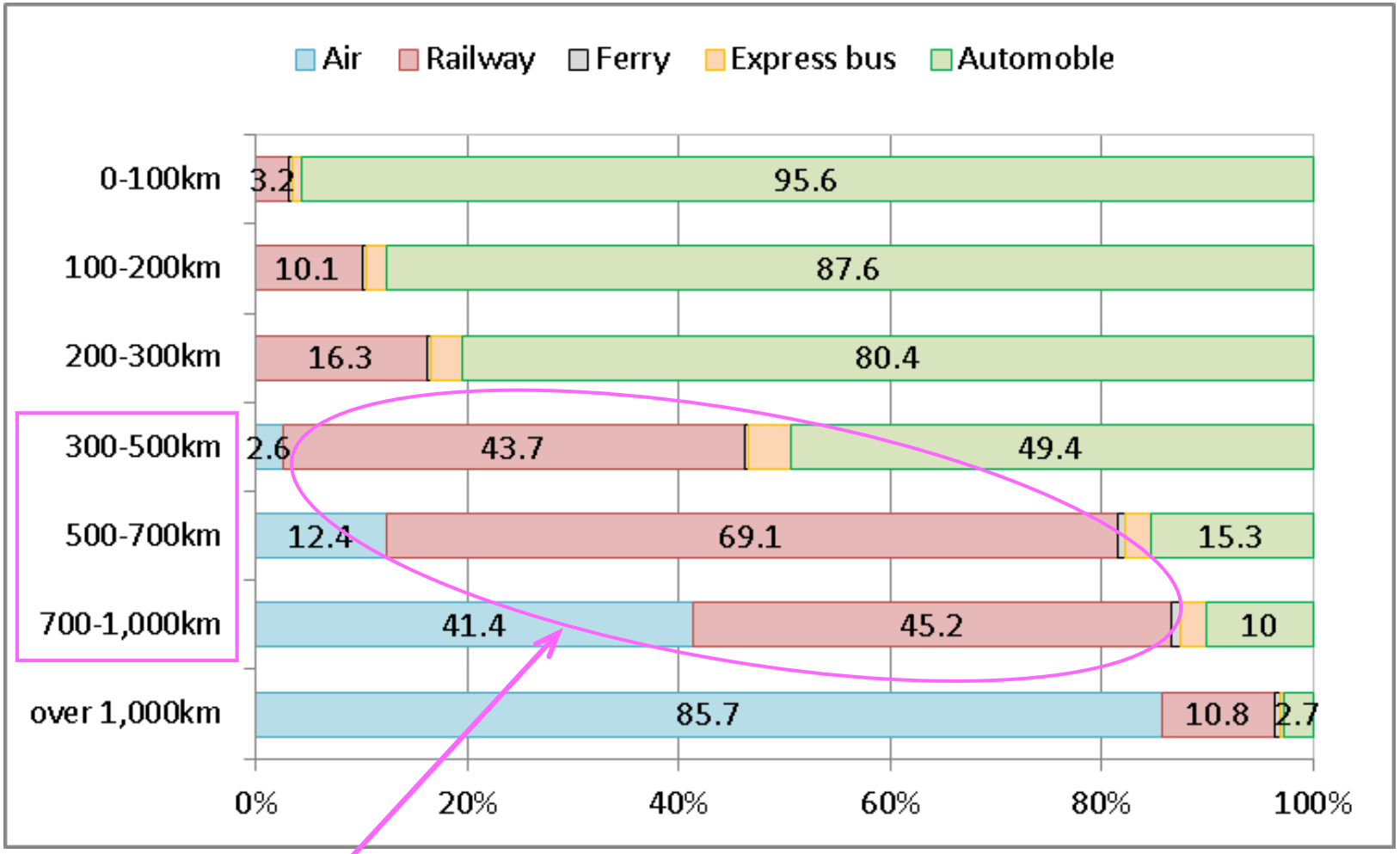
Overview of Shinkansen,Japanese HSR Network

	Line	Section	Length	Total
In Operation	Tokaido	Tokyo～Shin-Osaka	515km	2,766km Constructed by JRTT 1,200km
	Sanyo	Shin-Osaka～Hakata	554km	
	Tohoku	Tokyo～Morioka	497km	
		Morioka～Hachinohe	97km	
		Hachinohe～Shin-Aomori	82km	
	Joetsu	Omiya～Nigata	270km	
	Hokuriku	Takasaki～Nagano	117km	
		Nagano～Kanazawa	228km	
	Kyushu	Hakata～Shin-Yatsusiro	130km	
		Shin-Yatsusiro～Kagosima-chuo	127km	
	Hokkaido	Shin-Aomori～Shin-HakodateHokuto	149km	
Under Construction	Hokkaido	Shin-HakodateHokuto～Sappro	211km	402km
	Hokuriku	Kanazawa～Tsuruga	125km	
	Kyushu	Takeo-Onsen～Nagasaki	66km	
Superconducting magnetically levitated transport system (Maglev linear-motor train)				
	Chuo	Tokyo～Nagoya	286km	286km



Modal Share in Intercity Passenger Transportation

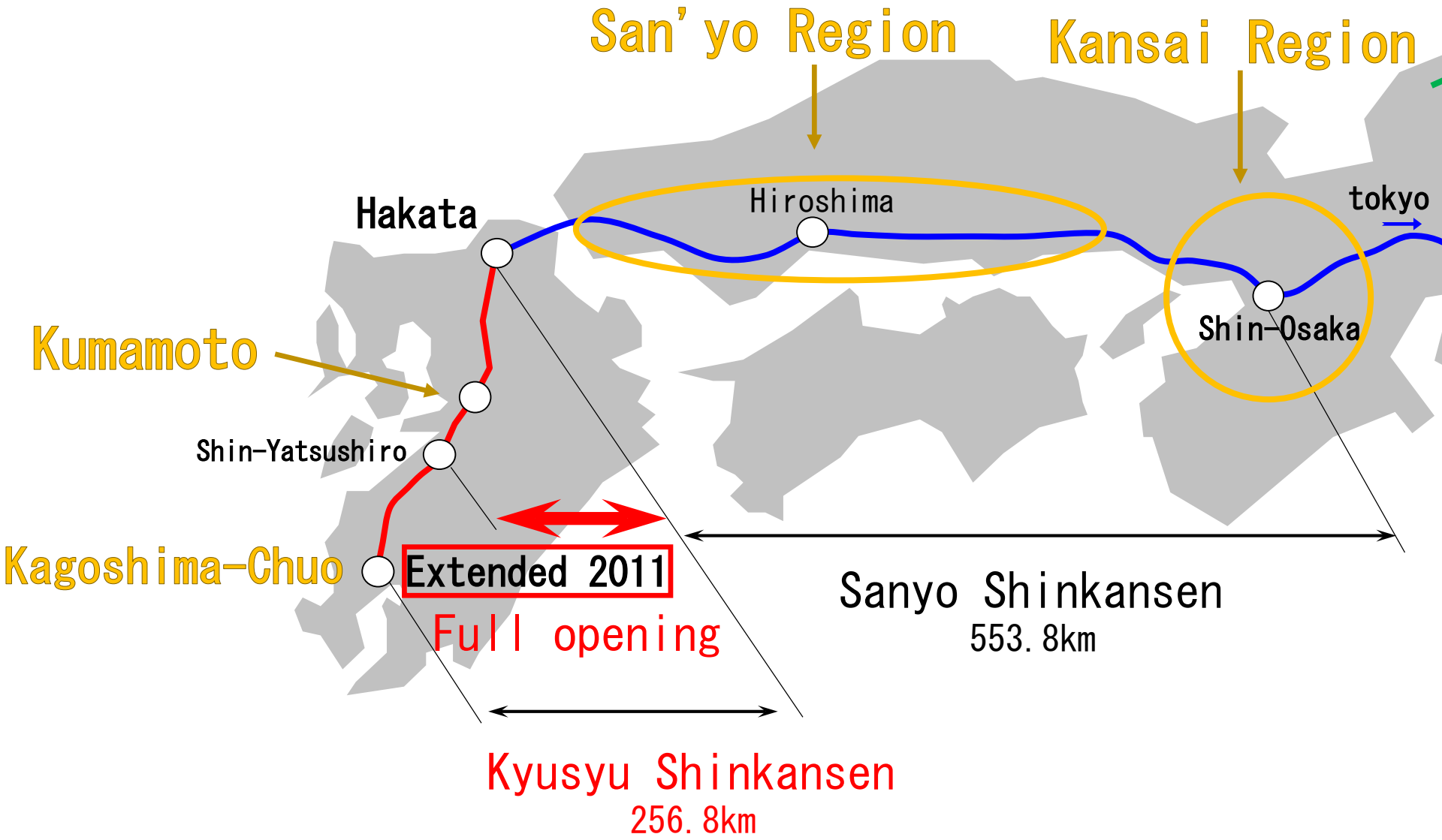


Advantageous for HSR

MLIT: Inter Regional Passenger Flow Survey, 2010

2.Social and Economic Impacts of HSRs

Outline of Kyusyu Shinkansen

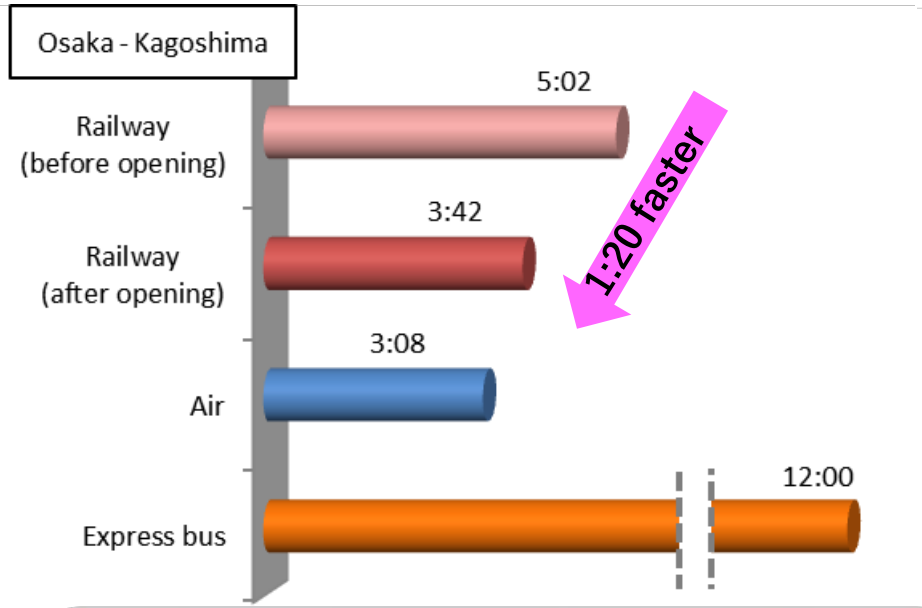


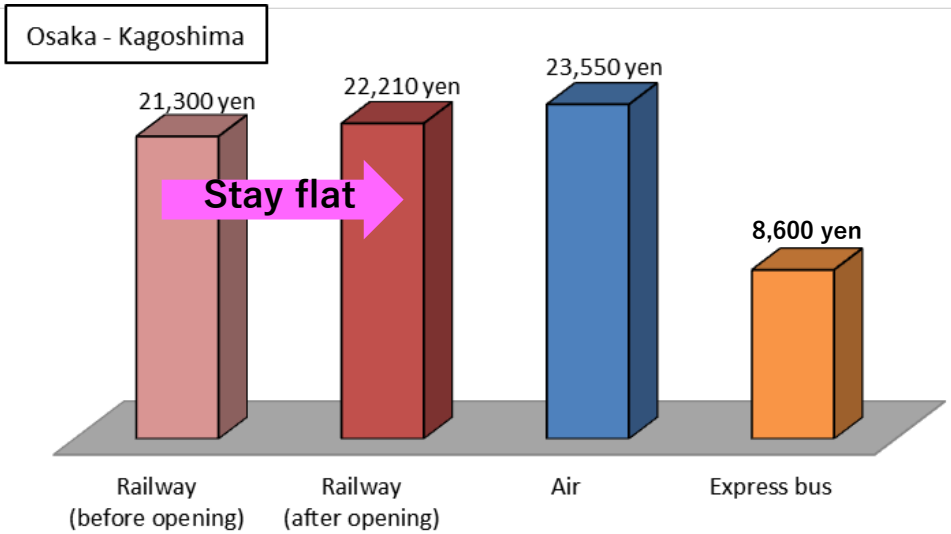
2.Social and Economic Impacts of HSRs

Effects of Extension of Kyushu Shinkansen

(Kagoshima connected to Osaka)

(1)-1 Travel Time Shortened





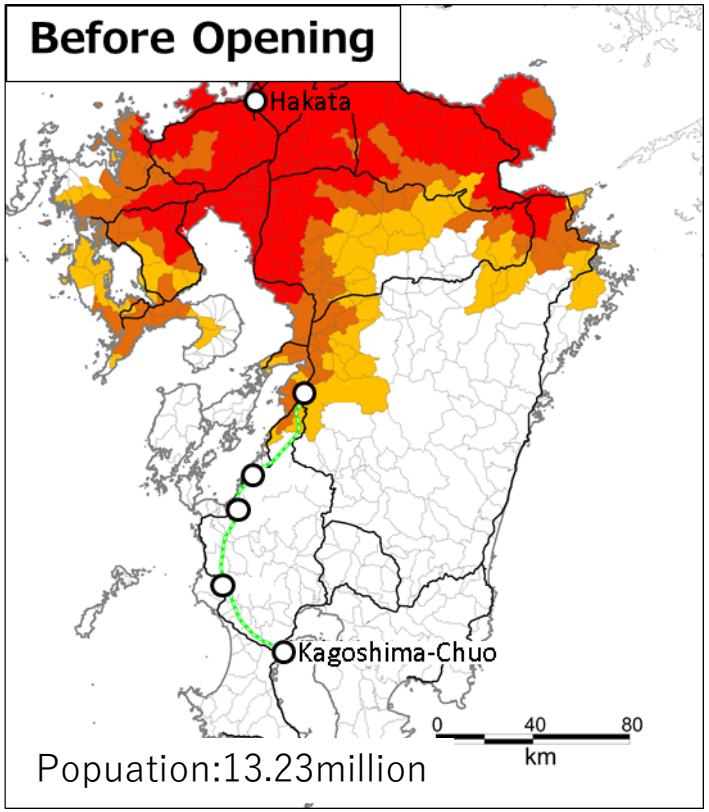
Travel time by rail is shortened to within 4 hours (1 hour 20 minutes faster)
Mostly the same by airplane when access to airports taken into account

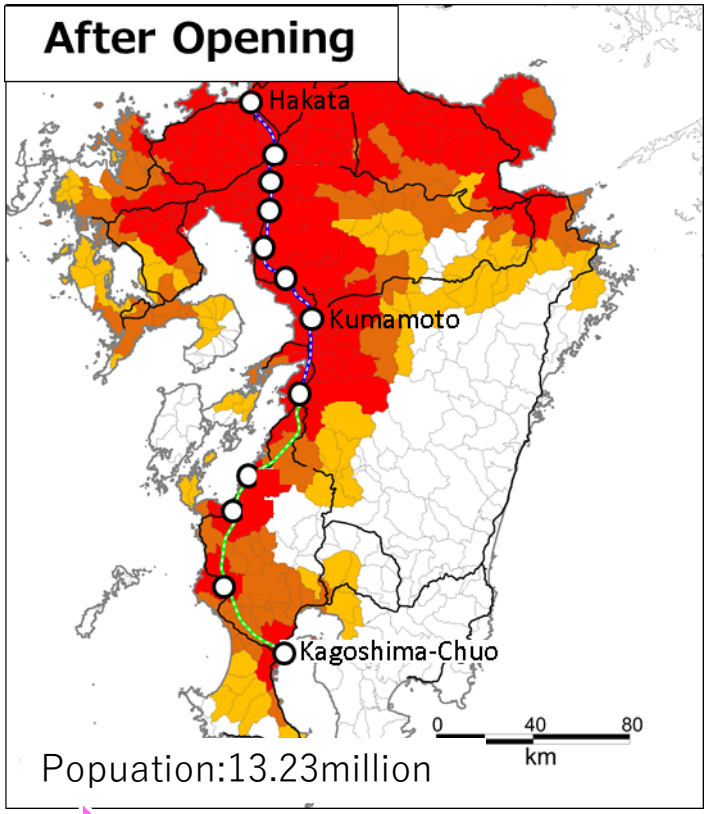
Railway cost stays almost the same and keeps Lower than airplane's

Competitive against airplane

2.Social and Economic Impacts of HSRs

(1)-2 Expanded Accessible Area from Osaka





- 4.0-hours area (6.85 million people)
- 4.5-hours area (9.01 million people)
- 5.0-hours area (9.65 million people)

Increased

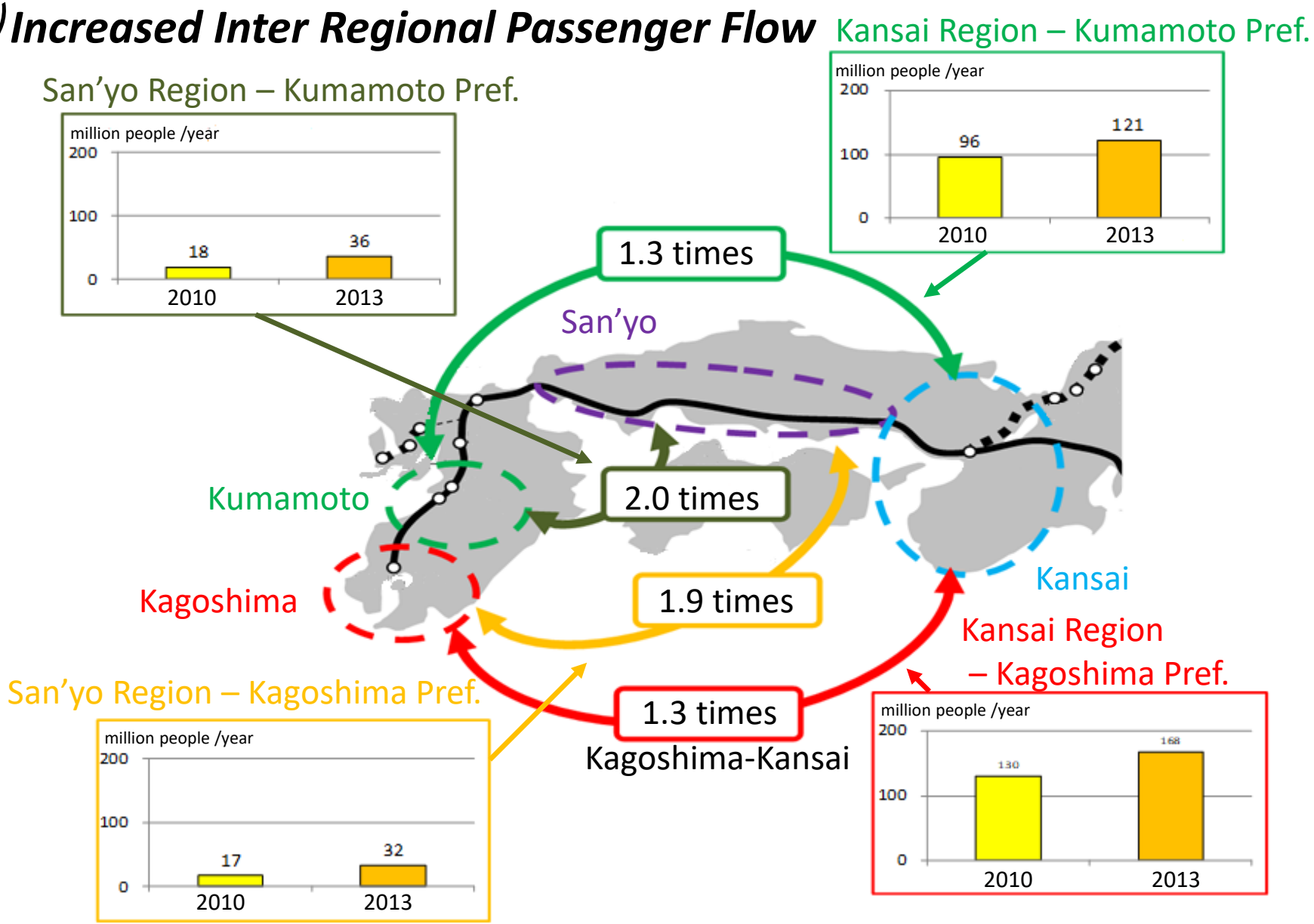
- 4.0-hours area (8.90 million people)
- 4.5-hours area (10.32 million people)
- 5.0-hours area (11.09 million people)

Large citys are in 4.0-hours area

JRTT

2.Social and Economic Impacts of HSRs

(2) *Increased Inter Regional Passenger Flow*

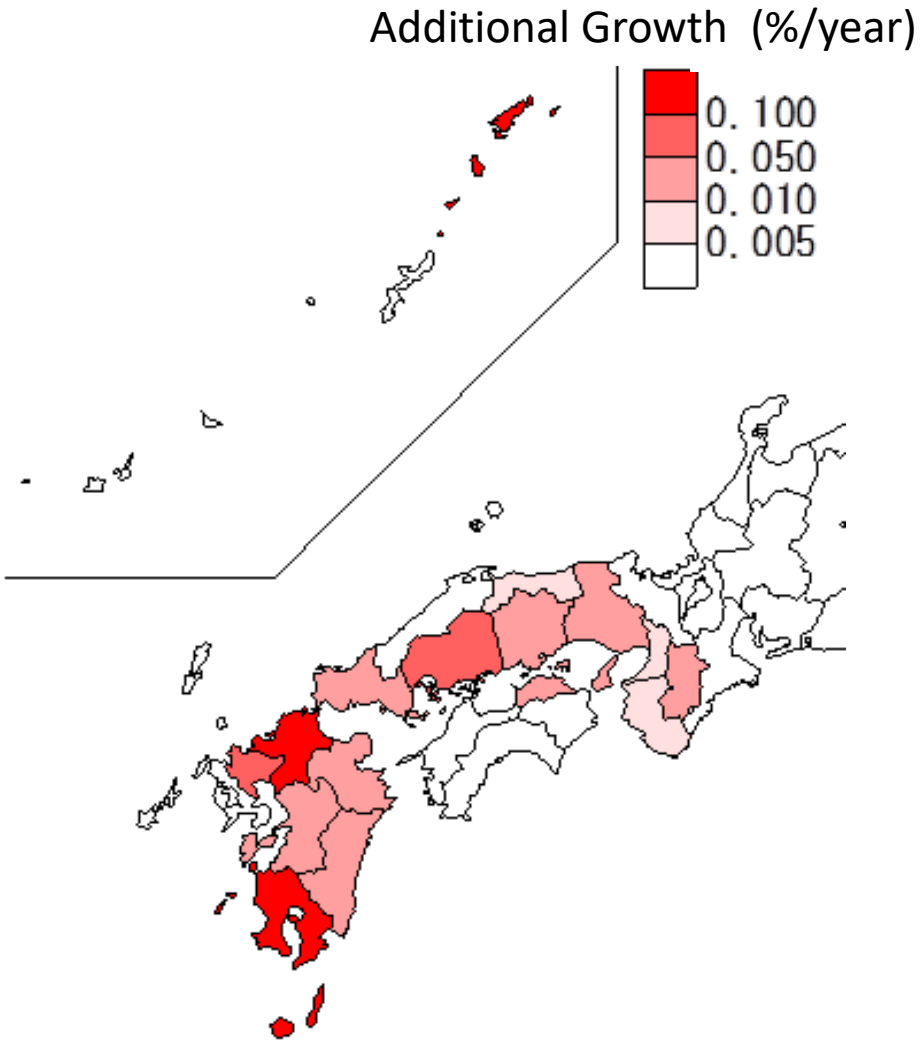


JRTT/ Source: Inter Regional Passenger Flow Surveys（MLIT）

(3) *Accelerated Growth of Regional Economies*

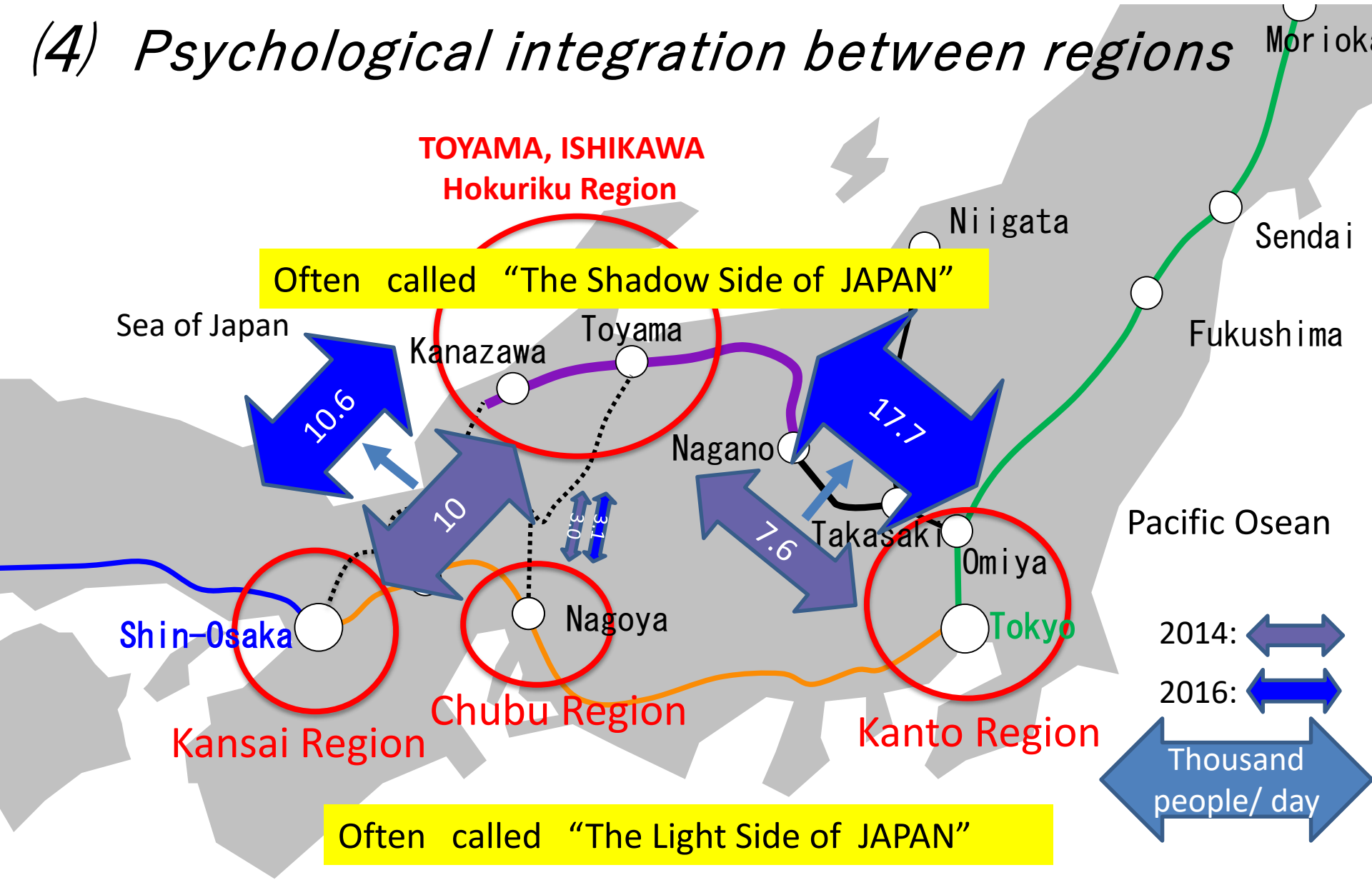
	Growth of Product
Whole of Japan	\73.4 bln/year
Additional Growth against 2010	
Fukuoka Pref.	0.102%/year
Saga	0.053%
Kumamoto	0.038%
Kagoshima	0.220%
Yamaguchi	0.027%
Hiroshima	0.052%
Okayama	0.039%

※ Analyzed by Spatial Computable General Equilibrium Model from Input-Output Table of 2010



2.Social and Economic Impacts of HSRs

(4) *Psychological integration between regions*



JRTT/ Source: Inter Regional Passenger Flow Surveys （MLIT）

Summary of Effects of HSR

1. **Travel time shortened dramatically.**
   Expansion of accessible area
   Extension of available time at destination

2. **Inter-Regional Exchange vitalized**
   between MPAs and Regions, among Regional Cities

3. **Regional Economies Vitalized**
   especially in Regions along HSRs

4. **Psychological integration between regions**
   Unification of shadow and light side of Japan

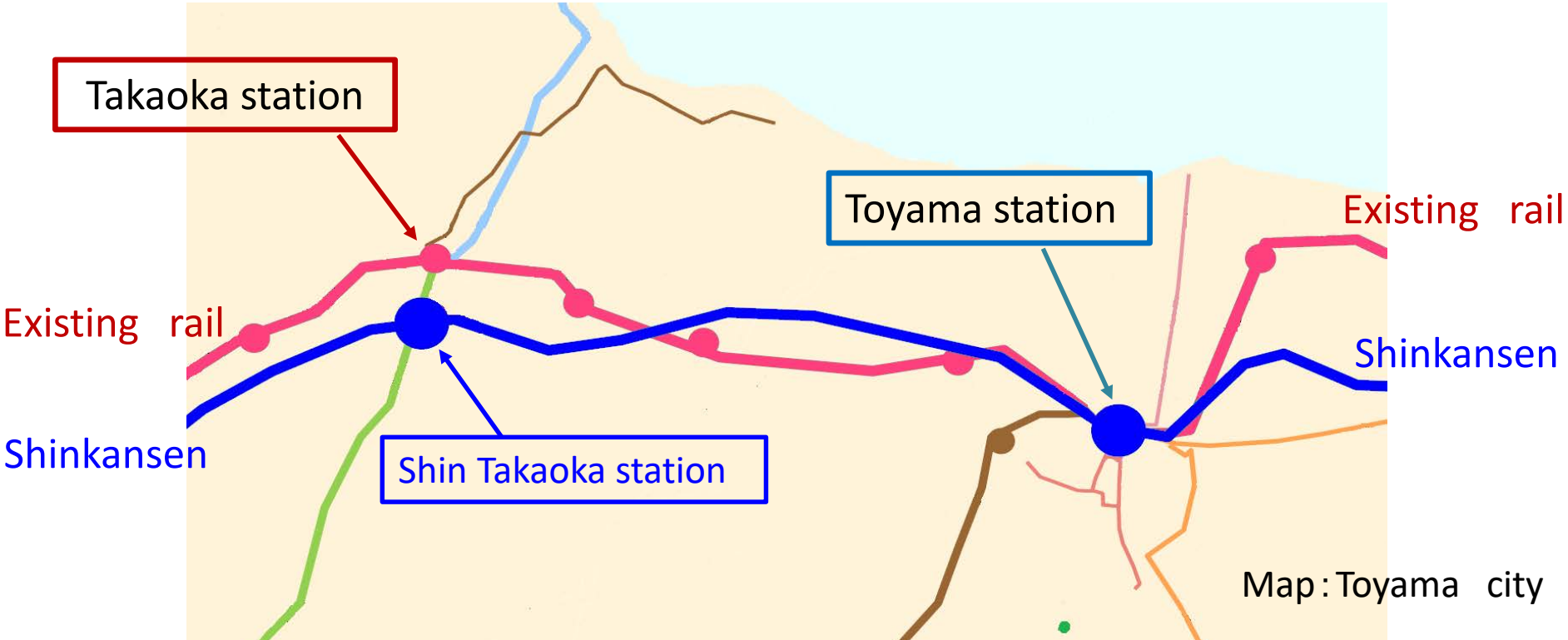
3.Efforts by City Sides to Maximize HSR`s Impacts

Takaoka City

- Historical City
- Built a new HSR station at 2.0km(1¼ mi) away of the city center
- Built a new station on existing local rail line adjacent to the new Sinkansen station.
- Multiple efforts from various aspects

Toyama City

- The capital of Toyama Prefecture
- Sustainable Urbanization using LRT system
- Build a new Shinkanen station adjacent to the existing rail station
- Strengthened Connection among various transportation modes



Map : Toyama city

3.Efforts by City Sides to Maximize HSR`s Impacts

Takaoka HSR　Action Plan

1．Connecting HSR to the central City

Takaoka Station(existing Central Station)

1）Construction of “Gateway” Facilities
New HSR Station , the existing Central Station

2) Connection of the New HSR Station and the Existing Central Station of the city

- Built a new station on an existing rail line
- adjacent to the new Shinkansen station for access to/from the central station.

3) Connecting Services to Cities and Tourist Sites

Photo:Takaoka City

3.Efforts by City Sides to Maximize HSR`s Impacts

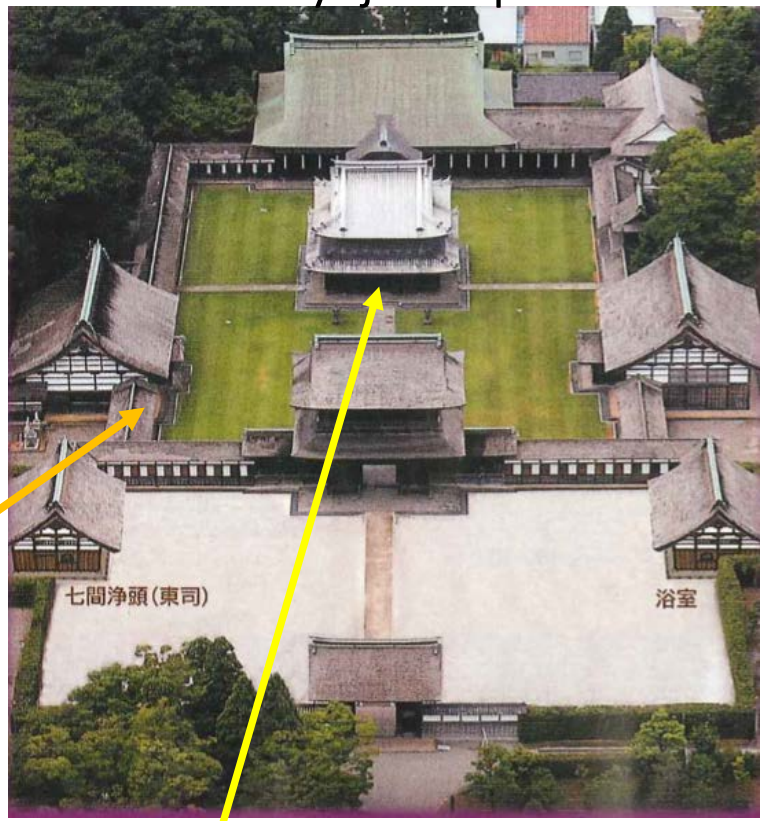
Takaoka HSR Action Plan

2. Raising Takaoka's Charm

3. Communicating outside

4. Cultivate awareness of citizens

Zuiryuji-Temple



You can enjoy a walk along the corridor.

Photo:Takaoka City

You can enjoy views along the corridor.

3.Efforts by City Sides to Maximize HSR`s Impacts

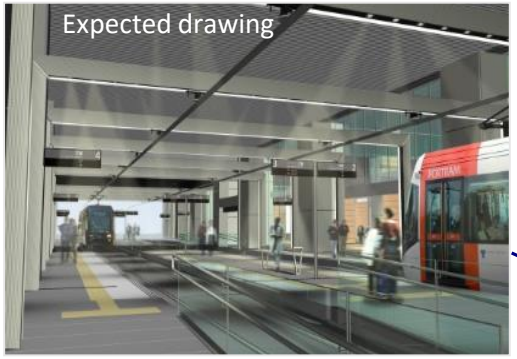
Development around Toyama Station（Conventional Rail/HSR）

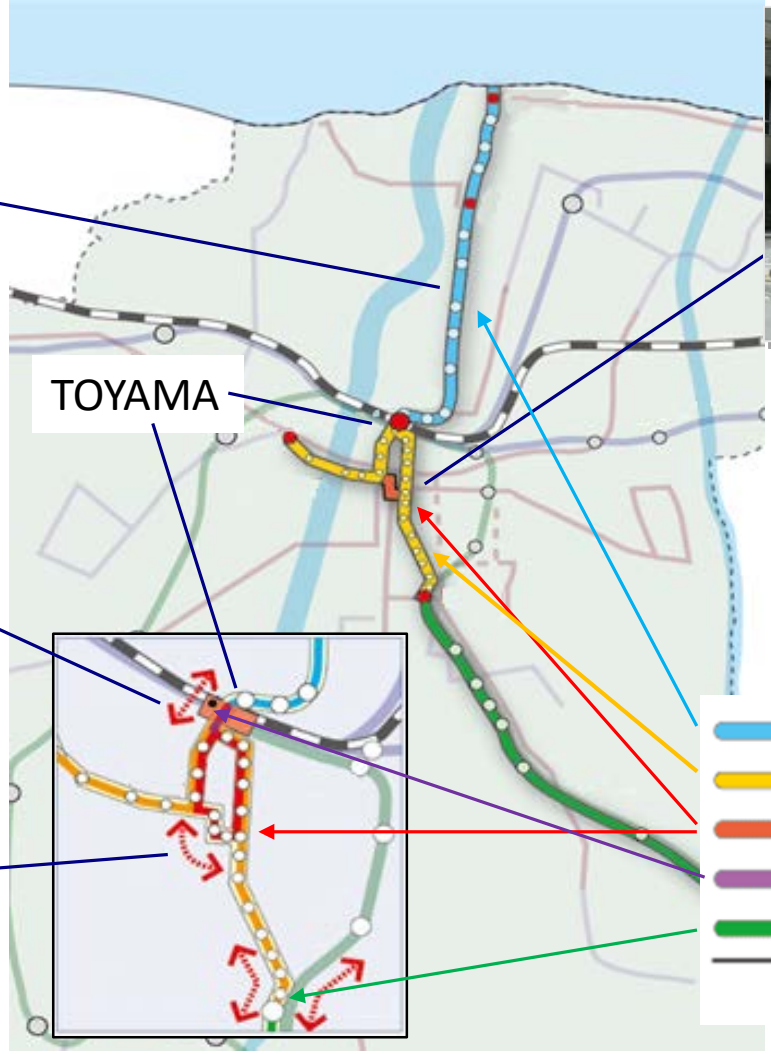
Photo:Toyama City

3.Efforts by City Sides to Maximize HSR`s Impacts

Shaping LRT Networks in TOYAMA CITY

Toyama City is aiming at a compact city where people can live without driving cars





Toyama Light Rail	7.6km
TOYAMA CHIHOU TETSUDOU	6.4km
Circularization	0.9km
North-South Track connection	0.3km
Through Service operation	0.1km
Total =	25.3km

Source : Toyama City

4. Engineering supporting Japanese HSRs

1) Pursuit of perfect safety

Safety is the top priority in High Speed Rail

2) Operational Stability

Punctual Operation not affected by Severe Weathers

3) Minimization of necessary structures and facilities by Shinkansen technology

Reduce Total Life Cycle Cost
(both construction and operation costs)

1) Pursuit of perfect safety

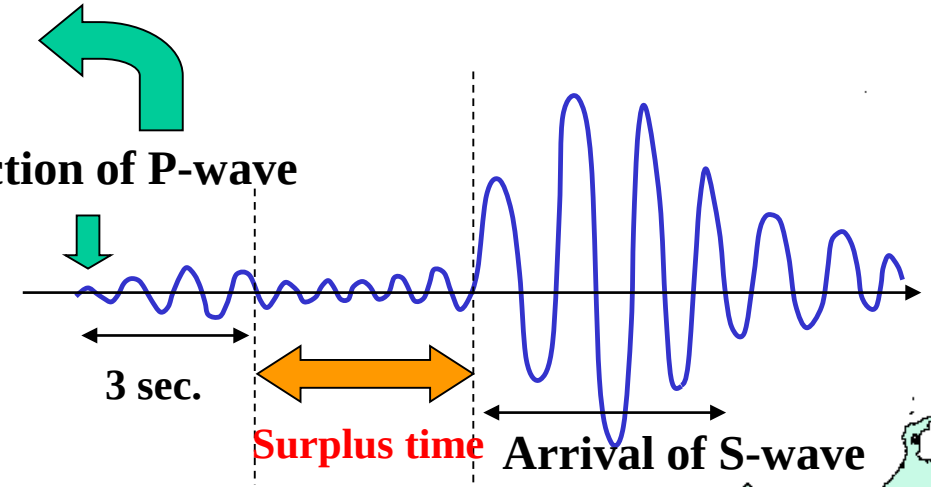
Urgent Earthquake Detection &Alarm System

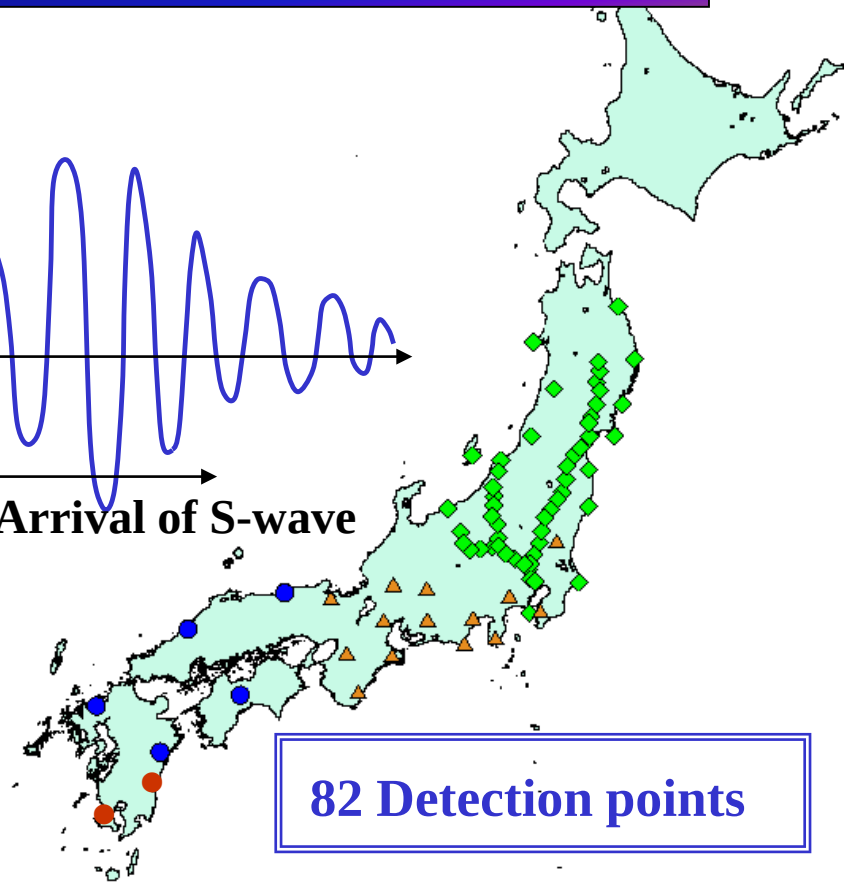
Estimate Magnitude And Epicenter

Estimate Damage

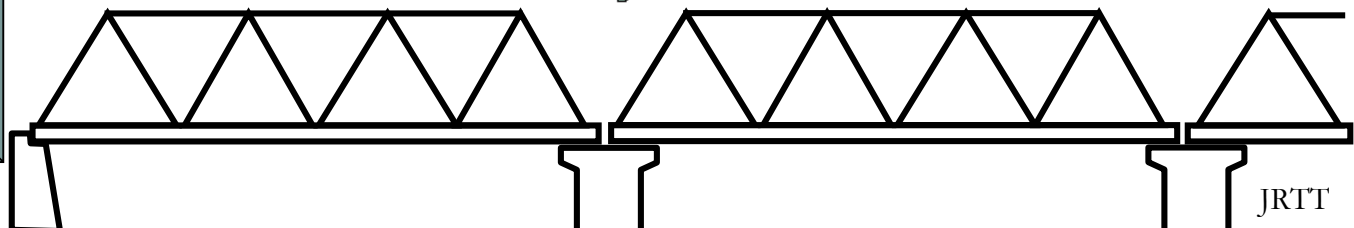
Power shut down

Stop train running Before big shock





82 Detection points



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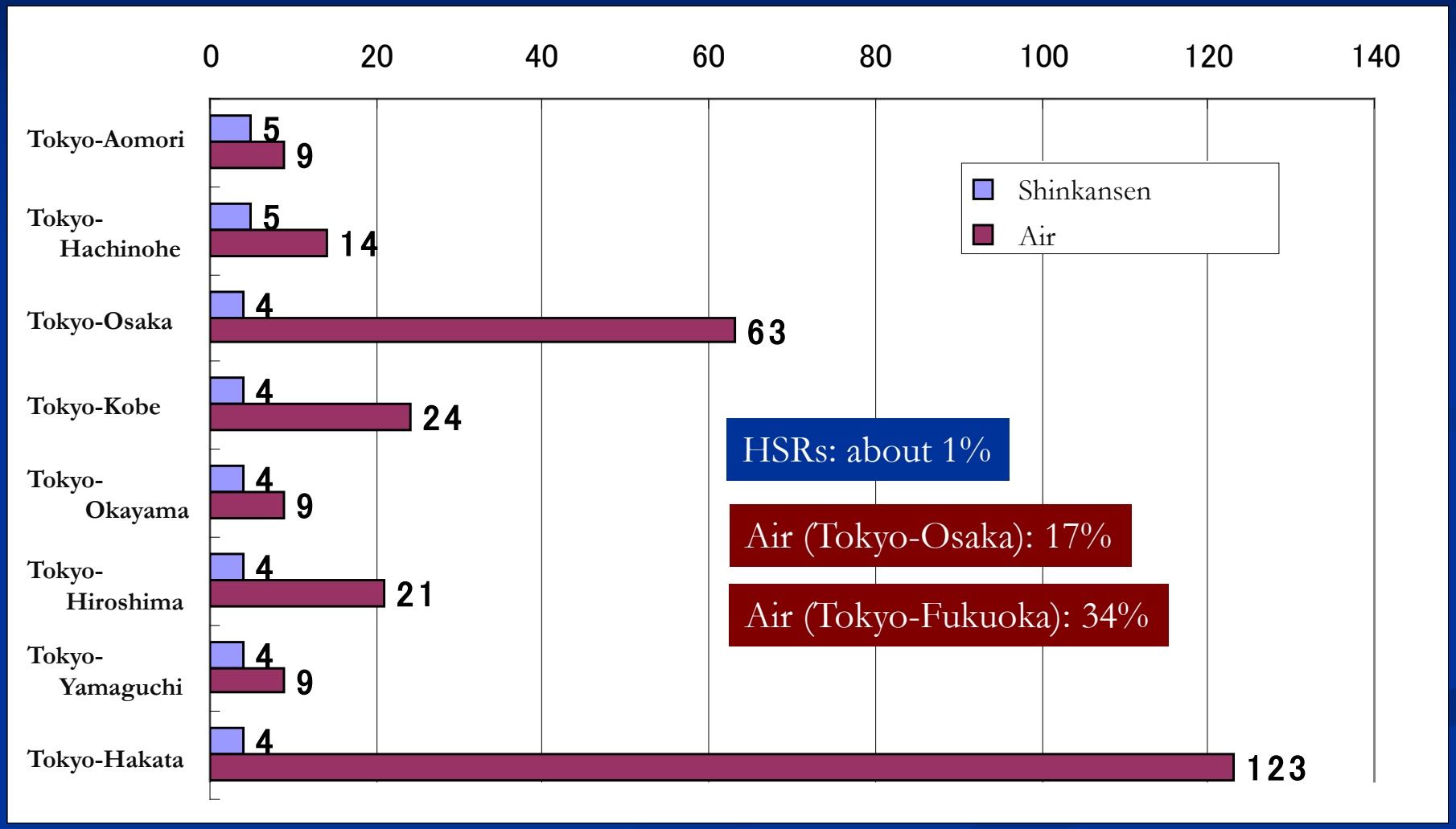
2) Operational Stability

Annual Number of Days Operation Suspension Occurred*: HSRs and Air



* Days operation suspension occurred: Days more than 1 service are suspended.
Count even if only 1 out of 300 is suspended

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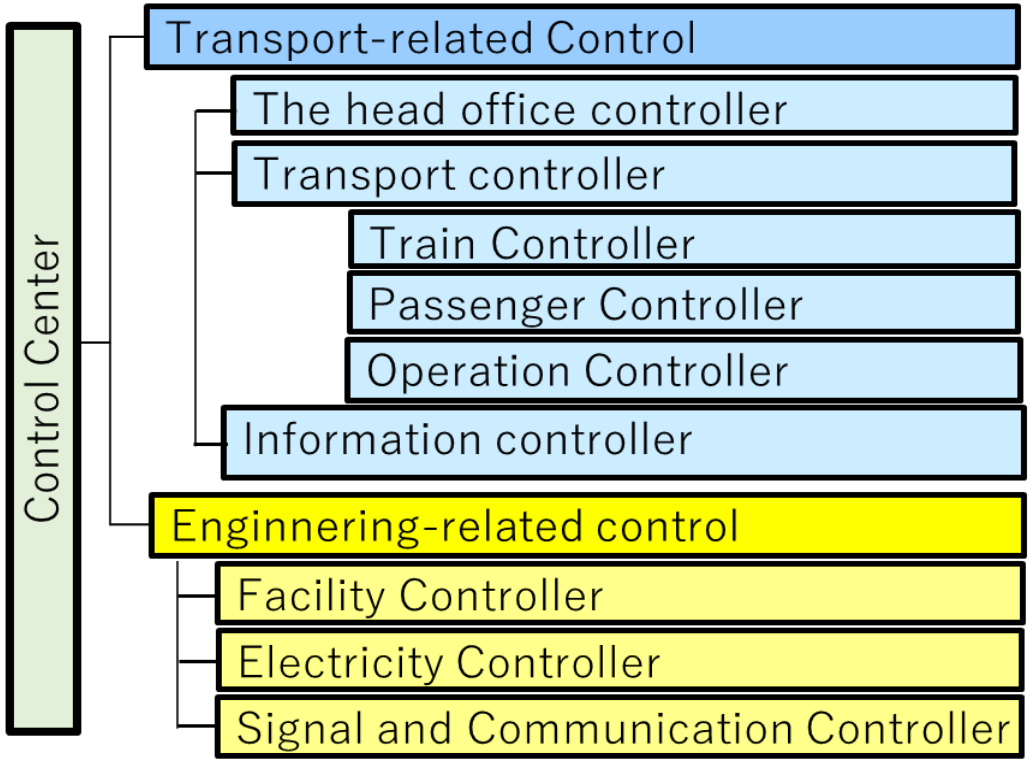
2) Operational Stability

Control Organization

- Getting the lay of land is very important when disasters and accidents occur.
- Control centers are set up to gather information and issue precise directions under discipline.



Example

Control Center

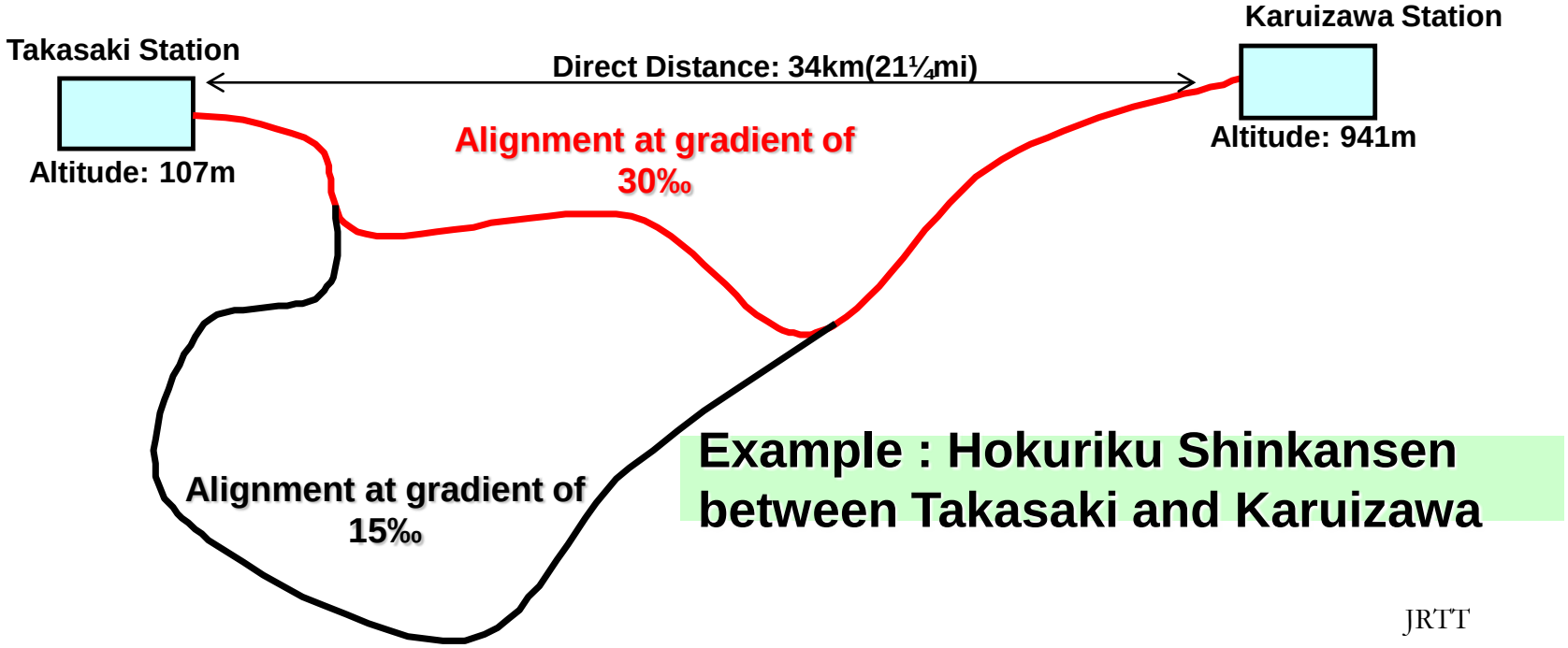
Photo:JRTT

3) Minimization of necessary structures and facilities by Shinkansen technology

○ Minimization of Route Length

Japanese HSR technology can use steep gradient in long section.

Maximum gradient is raised up to 30‰ from 15‰,
and 30 ‰ gradient continues 20km long in case of Hokuriku Shinkansen.

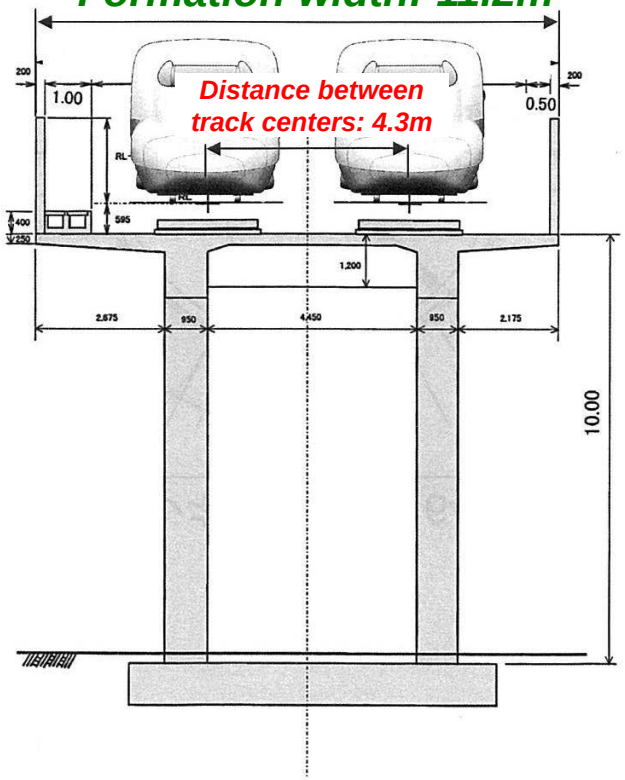


3) Minimization of necessary structures and facilities by Shinkansen technology

○ Minimization of Viaduct Width、Tunnel

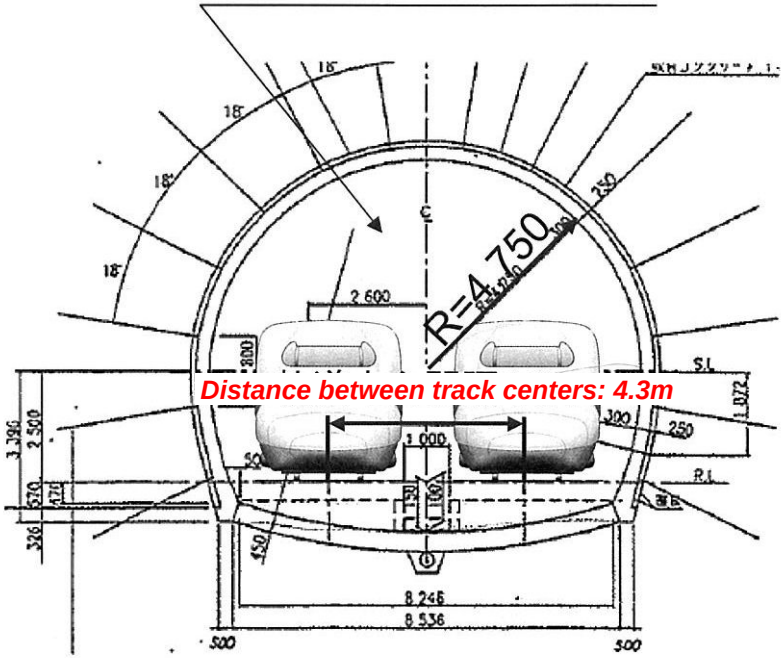
Rigid-frame viaduct

Formation width: 11.2m



Tunnel

cross-section: 64m²



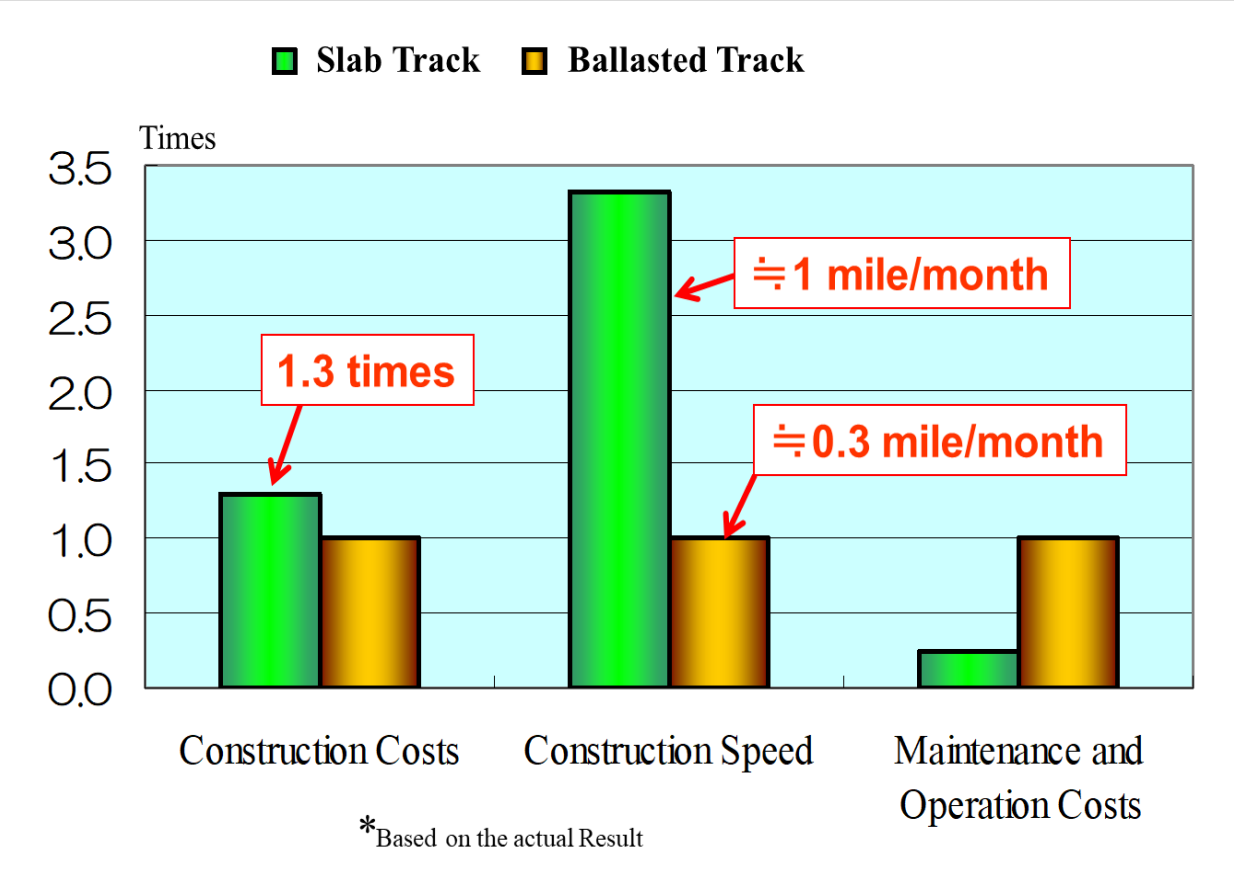
width of viaduct structure: small

cross-section: small

Shinkansen

3) Minimization of necessary structures and facilities by Shinkansen technology

○ Advantages of Slab Tracks



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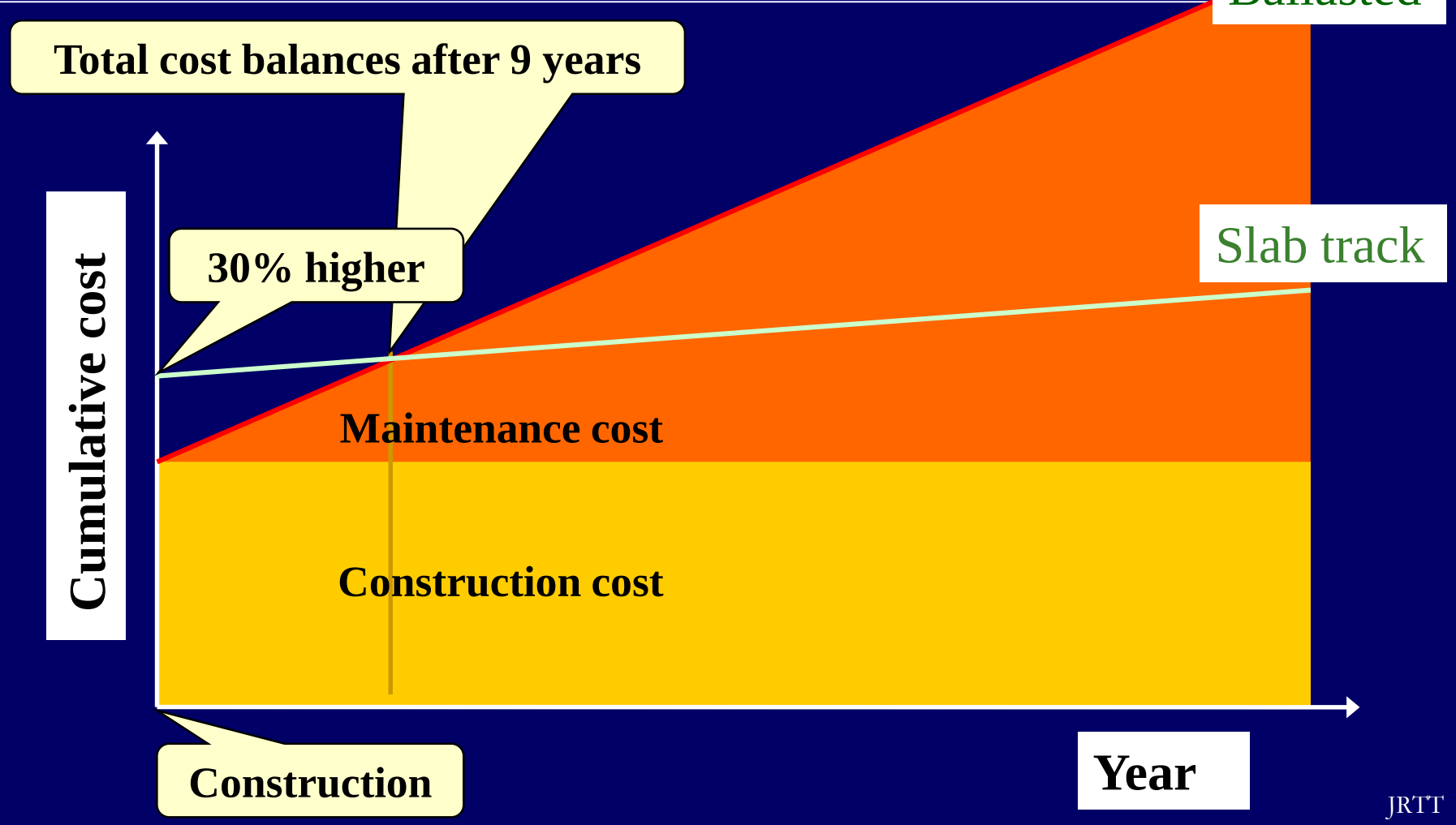
3) Minimization of necessary structures and facilities by Shinkansen technology

Ballasted tracks and slab tracks <comparison of the construction cost and maintenance cost>



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Hokkaido Shinkansen
(Shin-Aomori - Shin-Hakodatehokuto)
Opened in March 2016
Thank You
for your kind attention