

Railways in Korea with **Korea National Railway**

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I . Rail Network in Korea



Korea Railway History

- ✓ In 1905, Old Korea started to operate railway Seoul through Pyoung-yang connecting to Europe
- ✓ After the Korean War(1950), South Korea restores the railway system with its economic growth

| From beginning to decline | | 2004 Restructuring of Railway Industry | New beginning and renaissance |
|---|--|---|--|
| 1899 to 1950 Birth of railways in Korea | 1960 to 2003 Railway industry on decline | 2004 to 2010 Separation of Infrastructure & Operation | 2011 to today Traveling the future on eco-friendly railways |
|  <p>1899 Opening of first railway (Gyeongin Line)</p> |  <p>1969 Saemaeul train launched for commercial service</p> |  <p>2004 Opening of First HSR (Gyeongbu HSR, 300km/h)</p> |  <p>2015 Honam HSR opened 2016 Suseo HSR opened</p> |
|  <p>1950 Korean War breaks out</p> |  <p>1974 Opening of first MRT (Seoul Metro 1)</p> |  <p>2010 KTX-Sancheon launched for commercial service (100% Korean technology)</p> |  <p>2021 KTX-Eum launched for commercial service (EMU, 260km/h)</p> |

• Korea Railway Organization •

- ✓ KNR(Korea National Railway) under MOLIT deals with railway policies, budget and safety
- ✓ KNR is fully government-owned and established by the railway industry development acts

MOLIT Ministry of Land, Infrastructure & Transport

Railway policy & planning

Investment program

Safety regulations, etc.

Korea National Railway

Railway construction

Railway Infrastructure Management

Railway station area development

Korea Railroad Research Institute(Mar1996~)

Railway Research

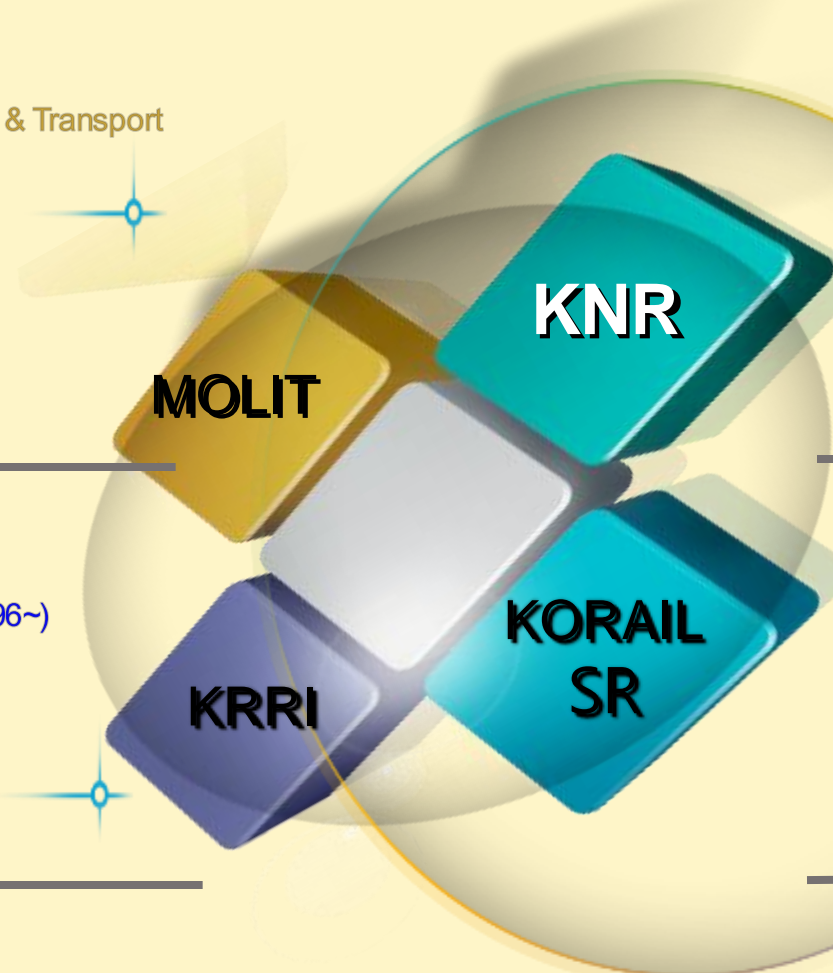
Technology development

Korea Railroad Corporation (Jan 2005~)

SR Corporation – Suseo High-Speed Railway (Dec 2013~)

Commercial railway operation

Rolling stock management

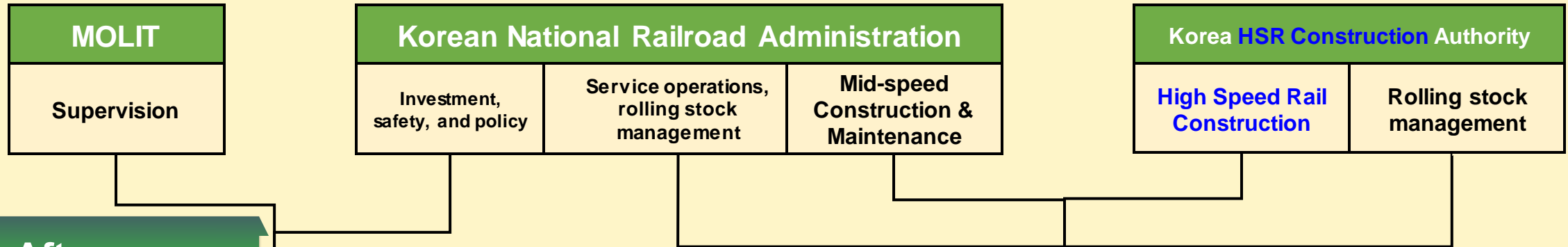


Restructuring Organization

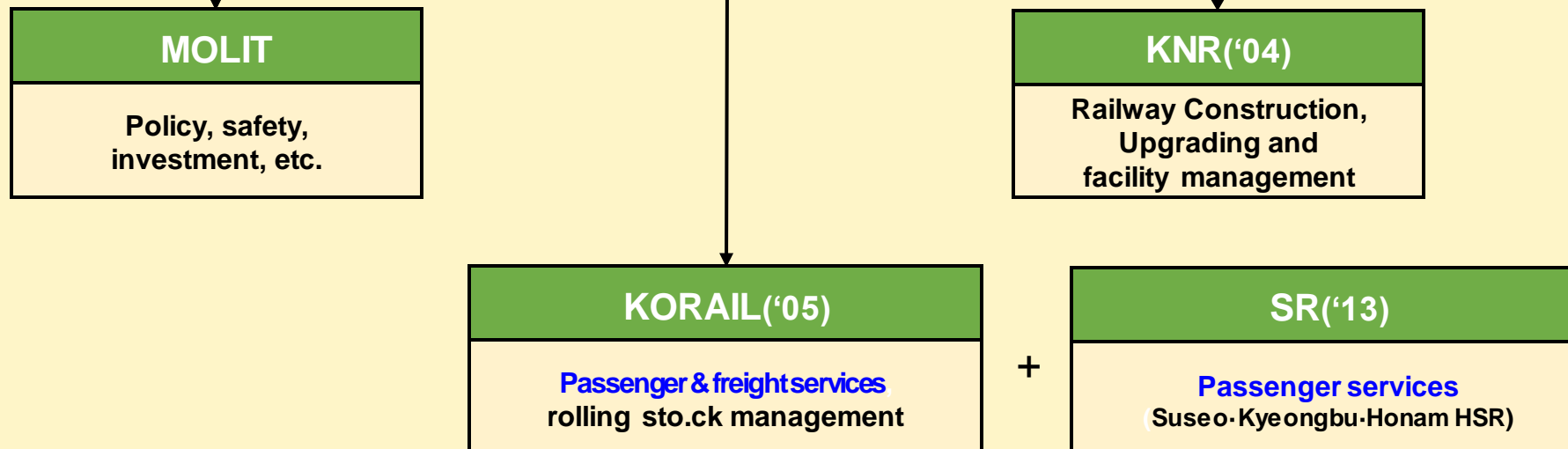
✓ MOLIT and KR in charge of railway facility management entrust maintenance works to KORAIL by the law.

* KR was the short name of Korea Rail Network Authority and now renamed it to Korea National Railway in Sep. 2020.

Before 2004



After



About KNR

- ✓ Korea National Railway is a fully state-owned rail infrastructure manager launched in 2004.
- ✓ KNR changed its name From Korea Rail Network Authority(Jan 2004~Sep.2020), Korea High Speed Rail Construction Authority(Mar1992~Dec2003)



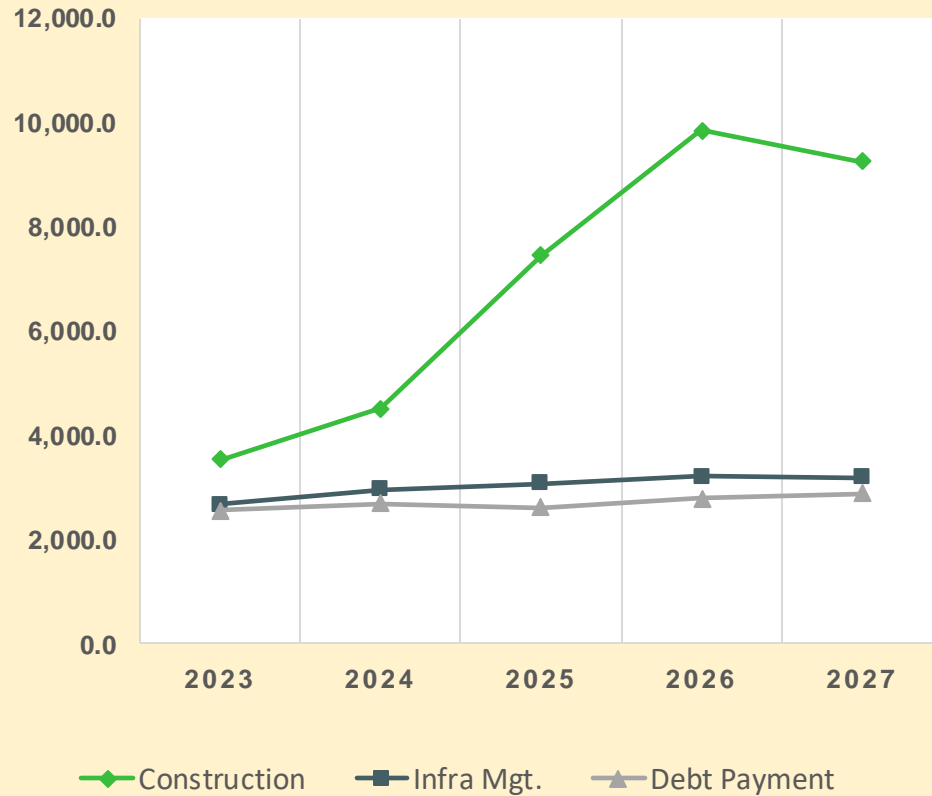
Head Office in Daejeon,
Republic of Korea

| Name | <i>Korea National Railway</i> |
|--------------------|---|
| Founded | <i>1 January 2004</i> |
| Organization Type | <i>State-owned agency</i> |
| Annul budget | <i>USD 8 billion</i> |
| Railway Asset Mgt. | <i>USD 100 billion (National 50Bil, KNR 50Bil)</i> |
| Credit rating | <i>Domestic AAA Moody's Aa2 S&P AA</i> |
| Employees | <i>2,194</i> |

KNR Investment Plan

- ✓ KNR is increasingly implementing its construction projects and infrastructure upgrading and maintenance.
- ✓ However, KNR has also a burden to pay HSR loans.

KNR Strategy Plan(MAY 2023)



In Billion Won

| | 2023 | 2024 | 2025 | 2026 | 2027 |
|-------------------------|---------|----------|----------|----------|----------|
| Total Budget | 9,198.8 | 10,688.2 | 13,567.4 | 16,224.1 | 15,665.9 |
| CAPEX | 6,347.1 | 7,708.2 | 10,675.1 | 13,164.7 | 12,493.2 |
| High-Speed | 448.6 | 786.5 | 1,820.5 | 1,999.0 | 1,244.4 |
| Conventional | 2,225.1 | 2,095.1 | 4,232.4 | 6,504.9 | 6,564.9 |
| Inter-City | 855.1 | 1,639.8 | 1,385.6 | 1,348.1 | 1,439.2 |
| Upgrading & Maintenance | 2,670.3 | 2,951.9 | 3,073.7 | 3,208.1 | 3,198.9 |
| The others | 148.1 | 234.9 | 163.0 | 104.6 | 45.8 |
| OPEX | 293.3 | 276.7 | 281.1 | 263.4 | 276.6 |
| Debt payment | 2,554.6 | 2,699.4 | 2,607.2 | 2,791.9 | 2,891.9 |
| Contingency | 3.8 | 3.9 | 4.0 | 4.1 | 4.2 |

II . KNR's Performance



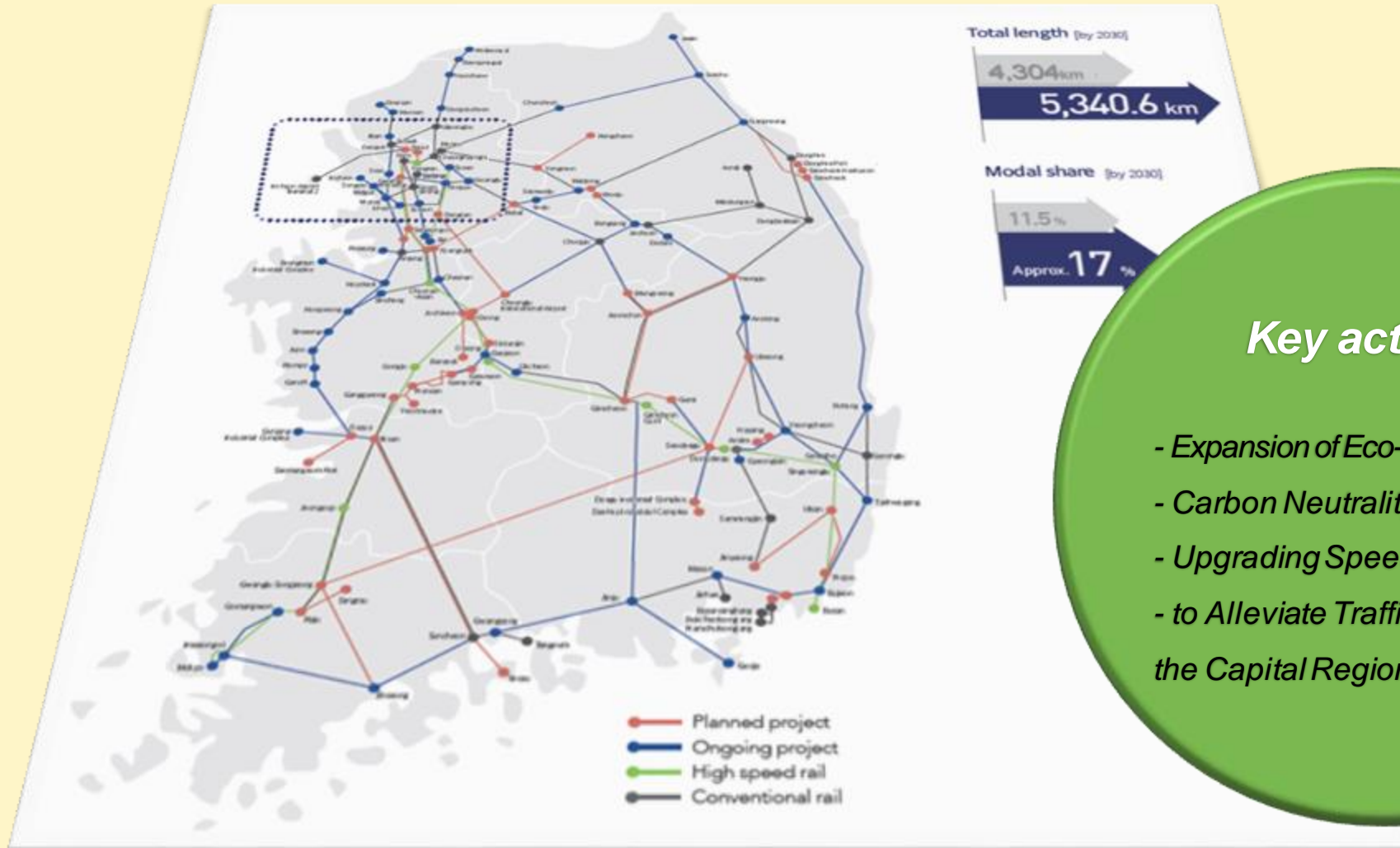
Construction Process

- ✓ Railways is a key national infrastructure and projects are implemented according to medium to long term policy plans.
- ✓ 4th National Rail Network Plan made by government policy goes together with KNR



. 4th National Rail Network Plan .

- ✓ Performance goals by 2030 are total length 5,340km(from 4,304km) and modal share 16.5%(from 11.5%)
- ✓ Key activities are expansion of eco-friendly railways, speed upgrading and Alleviating traffic congestion by GTX



Key activities

- Expansion of Eco-friendly Railways
- Carbon Neutrality Link
- Upgrading Speed
- to Alleviate Traffic Congestion in the Capital Region

Railways in Korea Today

- ✓ Today, there are 4,304 kilometers of railway and about 79.9% of it is electrified.
- ✓ We have 3 HSR lines, 34 main lines and 55 branch lines.



High speed rail

- ✓ KNR constructed the three HSRs over 300 km/h and total 657 km in length in Korea as of today
- ✓ KNR recently the third HSR Suseo line opened in 2016 to provide HSR services to southern districts of Seoul.

Honam HSR

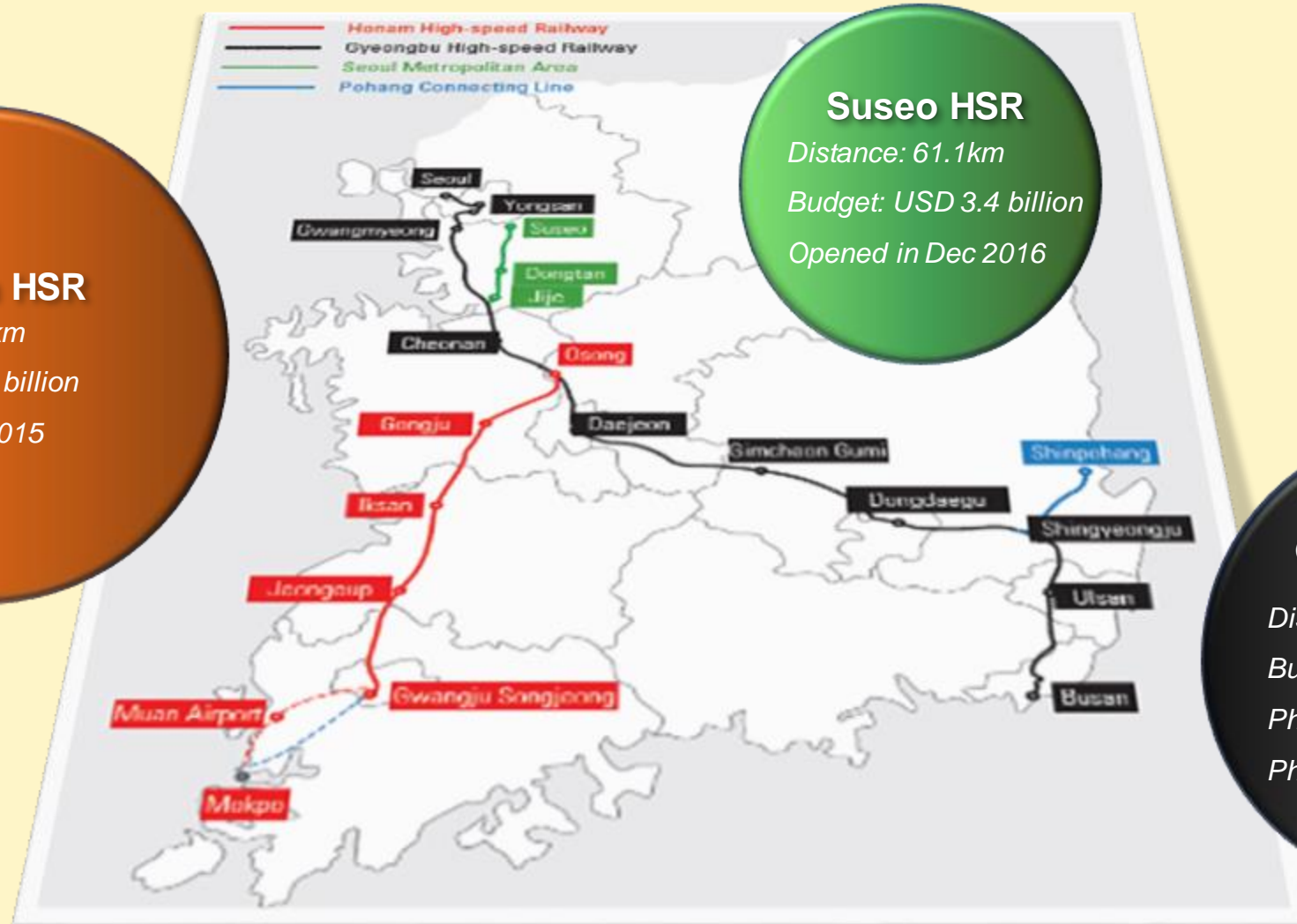
Distance: 183.8km
Budget: USD 10 billion
Opened in Apr 2015

Suseo HSR

Distance: 61.1km
Budget: USD 3.4 billion
Opened in Dec 2016

Gyeongbu HSR

Distance: 412.5km
Budget: USD 19 billion
Phase 1 opened in Apr. 2004
Phase 2 opened in Nov. 2010



. Conventional & Inter-city Lines .

- ✓ KNR have Conventional and Inter-city lines that total 3,413.6 km in length
- ✓ KNR recently have 22 ongoing Conventional rail projects and 7 Inter-city rail projects.



Completed projects

673 stations
83 lines: 3,413.6 km
- Electrified: 2,308 km

Ongoing projects

including upgrading of existing railways

Conventional lines
- 22 projects (1,361.5 km)

Intercity lines
- 7 projects (267.6 km)

Upgrading of existing railways
- tracks, signaling and catenary
to increase speeds up to 250 km/h

Speed-up Projects

- ✓ KNR have 10 lines covering 1,462 km upgraded to 200-250km/h
- ✓ EMU-260 rolling stocks are operating on the Upgraded lines.

3. Gyeongchun Line (Seoul – Chuncheon)

| | |
|--------------|-----------|
| Length (km) | 80.4 |
| Speed (km/h) | 150 → 180 |

4. Jungang Line (Wonju – Jecheon section)

| | |
|--------------|-----------|
| Length (km) | 44.1 |
| Speed (km/h) | 120 → 250 |

1. Gyeonagbu Line (Seoul – Busan)

| | |
|--------------|-----------|
| Length (km) | 444.5 |
| Speed (km/h) | 120 → 140 |

5. Jungang Line (Dodam – Yeongcheon section)

| | |
|--------------|-----------|
| Length (km) | 148.1 |
| Speed (km/h) | 150 → 250 |

8. Seohae Line (Hongseong – Daeya section)

| | |
|--------------|-----------|
| Length (km) | 86.6 |
| Speed (km/h) | 150 → 250 |

6. Jungang Line (Yeongcheon – Singyeongju section)

| | |
|--------------|-----------|
| Length (km) | 25.5 |
| Speed (km/h) | 130 → 250 |

9. Seohae Line (Daeya – Iksan section)

| | |
|--------------|----------|
| Length (km) | 14.3 |
| Speed (km/h) | 90 → 250 |

7. Donghae Line (Singyeongju – Bujeon)

| | |
|--------------|-----------|
| Length (km) | 107.6 |
| Speed (km/h) | 120 → 200 |

2. Jeolla Line (Iksan – Yeosu)

| | |
|--------------|-----------|
| Length (km) | 180.4 |
| Speed (km/h) | 150 → 230 |

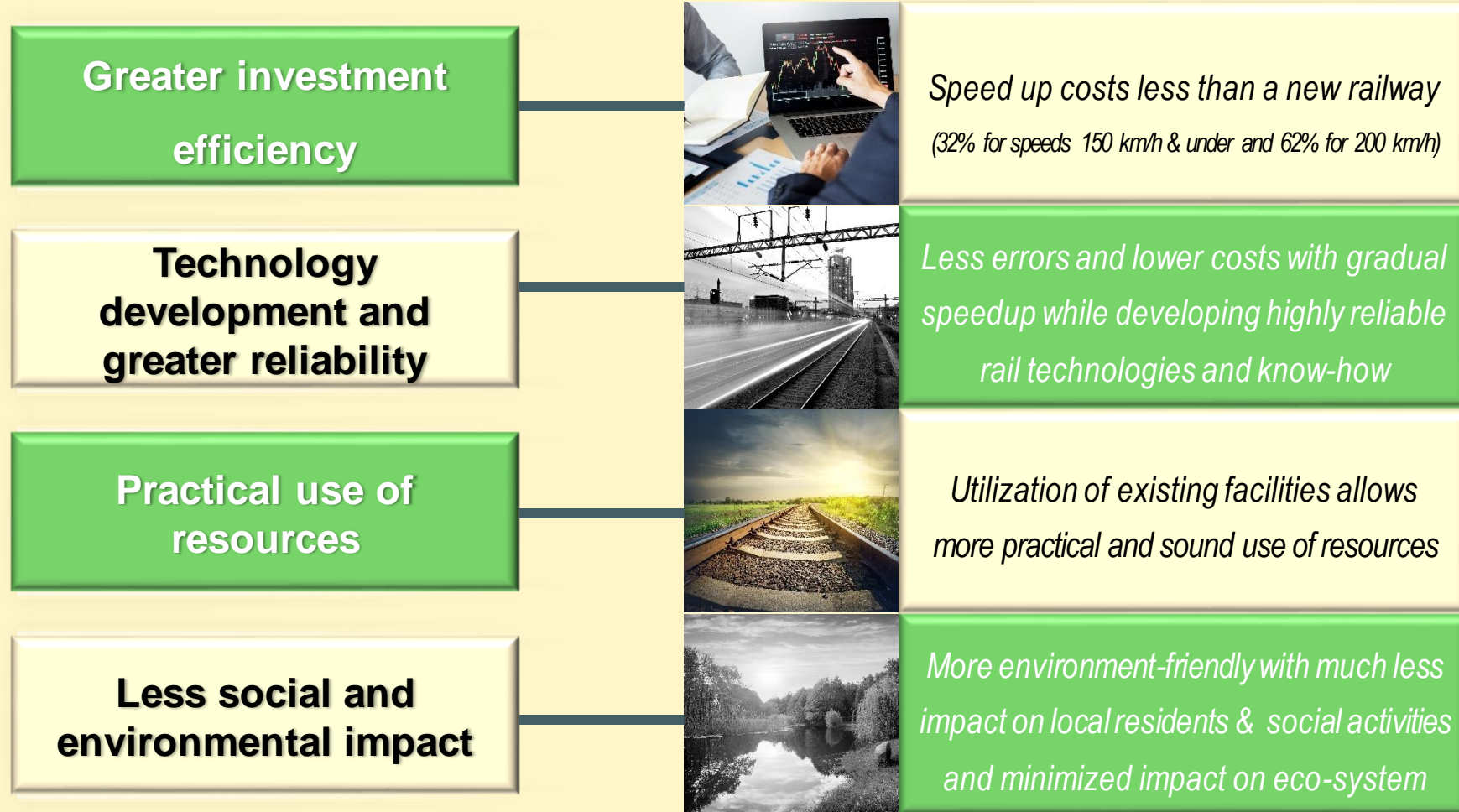
10. Gyeongjeon Line (Gwangyang – Jinju)

| | |
|--------------|-----------|
| Length (km) | 46.5 |
| Speed (km/h) | 150 → 200 |



Why Speed-up Projects

- ✓ Speed-up costs less than a new railway up to 62% in Korea
- ✓ Utilization of existing facilities and more eco-friendly.

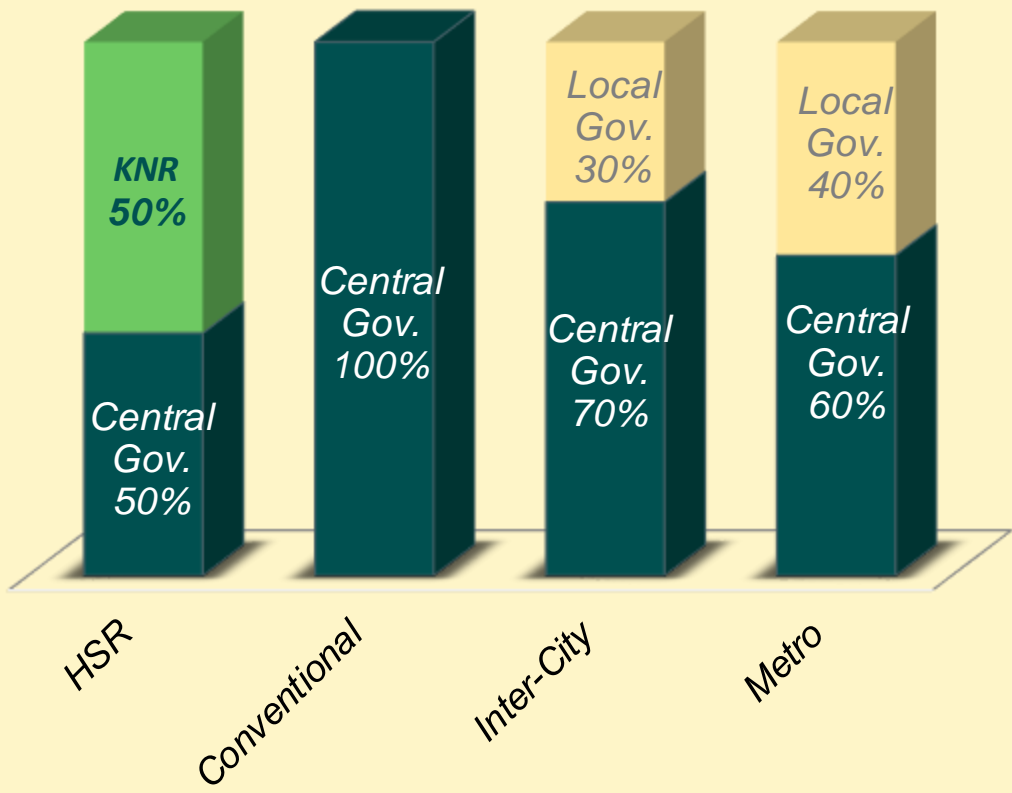


Ⅲ. Korea High Speed Railway



Financing Sources of KNR

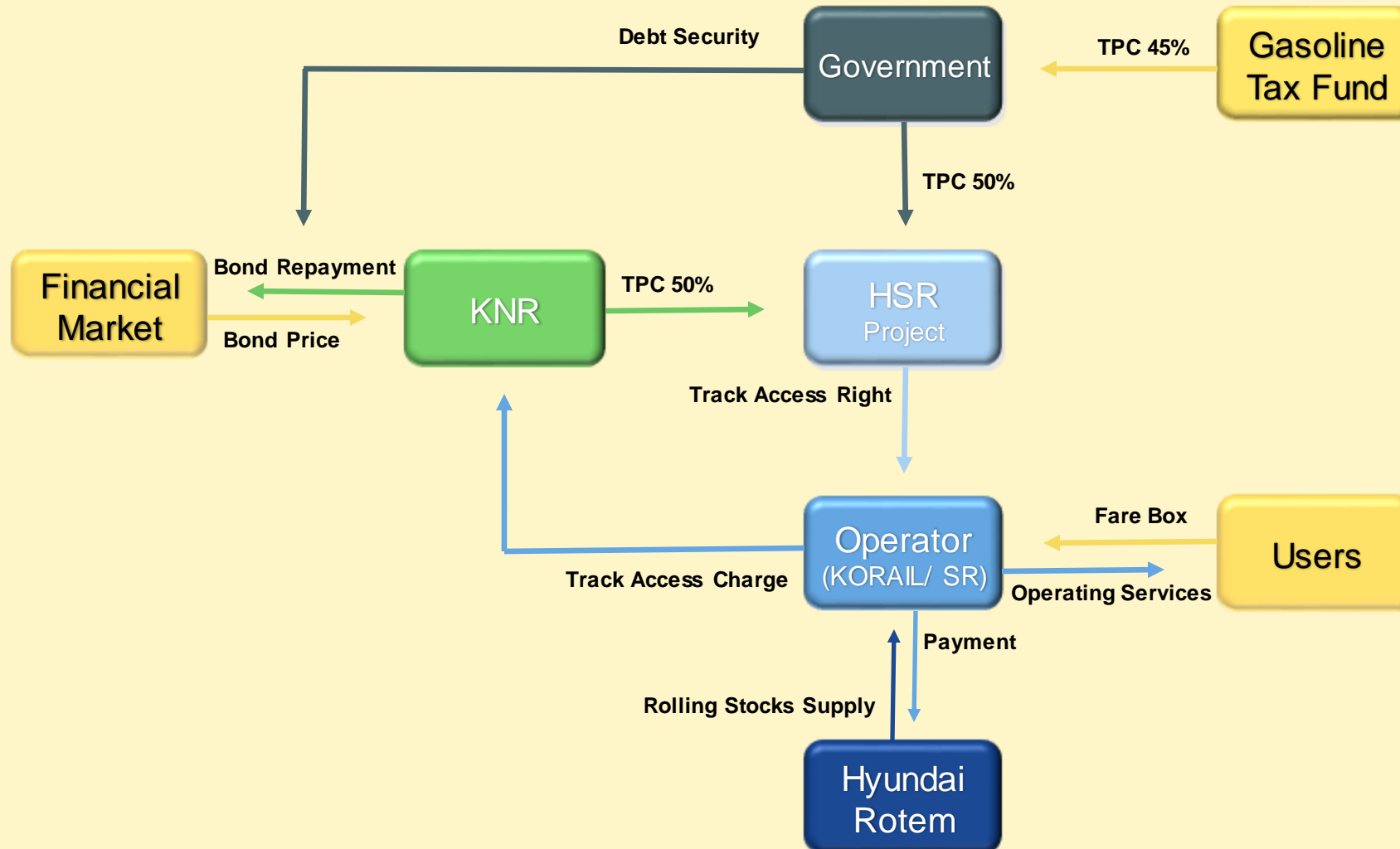
- ✓ KNR Shares HSR construction project cost with Government Contribution by KNR Bond Issuance
- ✓ In case of HSR, GyungBu 1st Phase(35%: KNR 65%), GyungBu 2nd & Honam(50:50) and Suseo Line(40: KNR 60)



| Type | Total Construction Project Cost | Facility Upgrading | Maintenance |
|----------------------|--|--------------------|----------------------------|
| High-Speed (300km/h) | GyungBu 1 st Phase : KNR 65% GyungBu 2 nd , Honam : KNR 50% Suseo Line : KNR 60% → Gov. Contribution 35% ~ 50% | Gov. 100% | KNR 100% |
| Conventional | Gov. 100% | Gov. 100% | Gov. 40% KNR 60% |
| Inter-City | Gov. 70% Local Gov. 30%(Seoul City 50%) | Gov. 100% | Gov. 40% KNR 60% |

Financing Sources of KNR

- ✓ KNR earns Track Access Charges from Railway operators(KORAIL/SR) in return for KNR investment.
- ✓ Instead of that, Railway operators(KORAIL/SR) have track access rights for safe operation of trains running on the same track.



Track Access Charge

- ✓ KNR repays principal & interest of KNR bond first by way of track access charge from railway operators.
- ✓ KNR also uses it to maintain of railway infrastructure

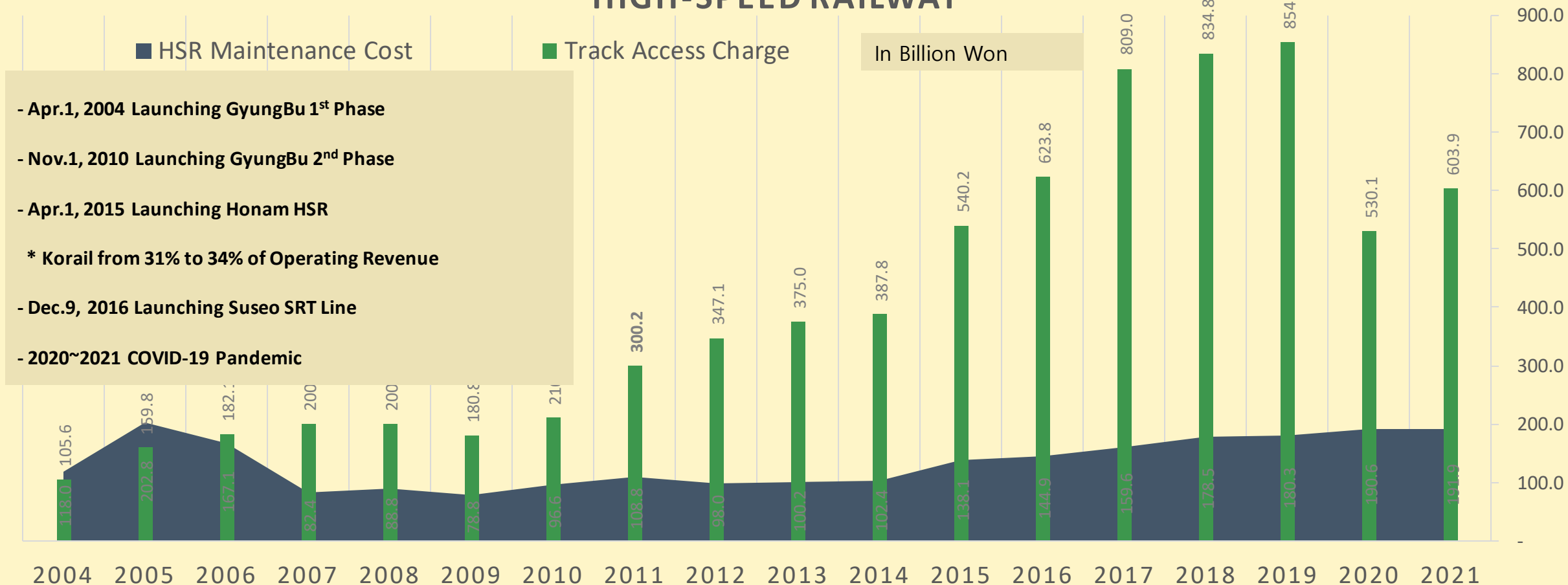
| Type | Facility Upgrading | Maintenance | Track Access Charge (KNR Revenue) |
|-------------------------|--------------------|---------------------|--|
| High-Speed (300km/h) | Gov. 100% | KNR 100% | (KORAIL) 34% of Operating Revenue (SR) 50% of Operating Revenue |
| Conventional | Gov. 100% | Gov. 40% KNR 60% | (KORAIL) 60% of Maintenance Cost |
| Inter-City | Gov. 100% | Gov. 40% KNR 60% | (KORAIL) 60% of Maintenance Cost |



.Track Access Charge for HSR.

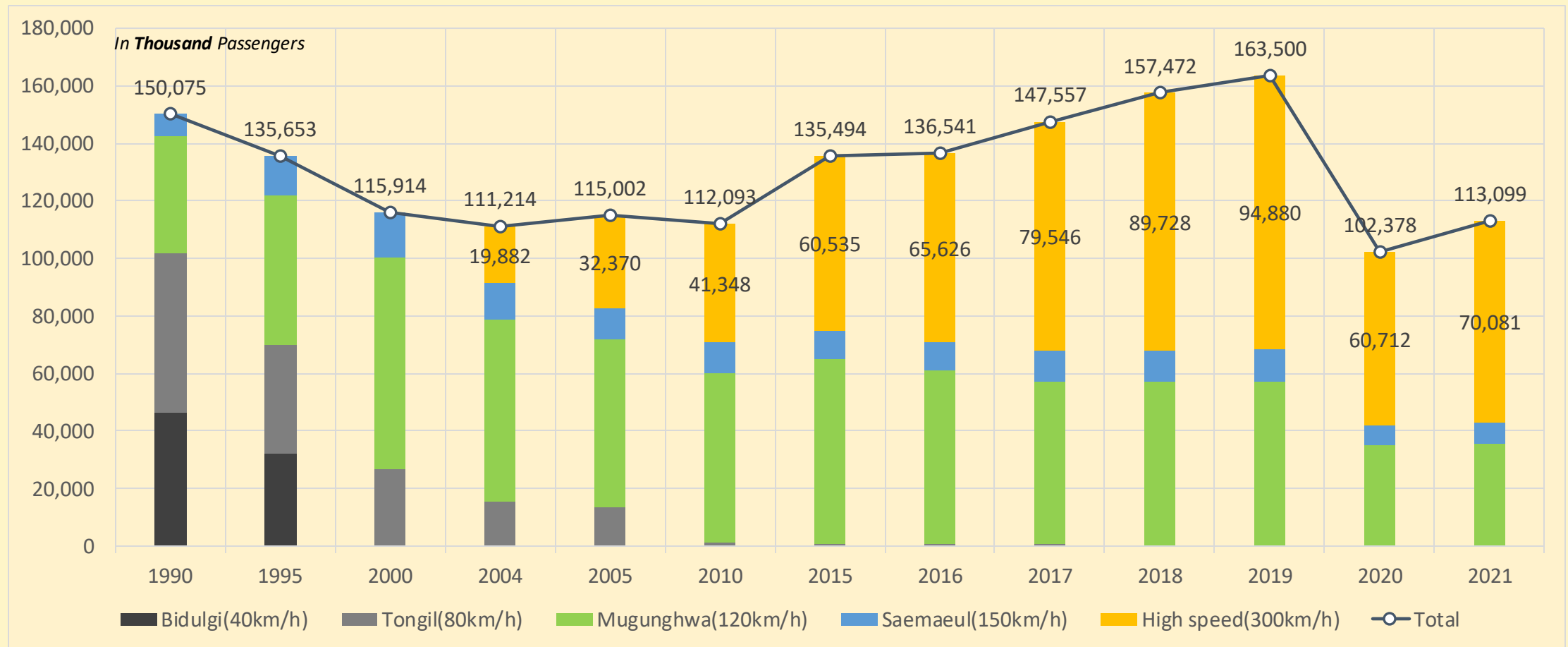
- ✓ KNR uses the track access charge for repayment of KNR bond and maintenance of HSR line.
- ✓ Government has contributed all of HSR upgrading costs

HIGH-SPEED RAILWAY



• Modal Shares by train types •

- ✓ Railway demand declined until April 2004 when the Gyeongbu HSR was opened, leading to a notable upturn.
- ✓ HSR passenger count exceeded over 50% in 2017 and reached 58% in 2019



IV. Overseas Railway Cooperation



KNR Business Area

- ✓ KNR's businesses into the 7 areas. KNR works together with the MOLIT on railway network planning.
- ✓ KNR has comprehensive knowledge and experience in railway project management throughout all stages.

Business areas

① Railway network planning

② Project management

③ Railway construction

④ Railway facilities management

⑤ Training & consulting

⑥ Station area and railway land development

⑦ Overseas railway projects

Supervision,
Inspection
&
Consultant

PM capabilities

Planning stage management

Design control

Construction management
(Supervision and Inspection)

Interface management

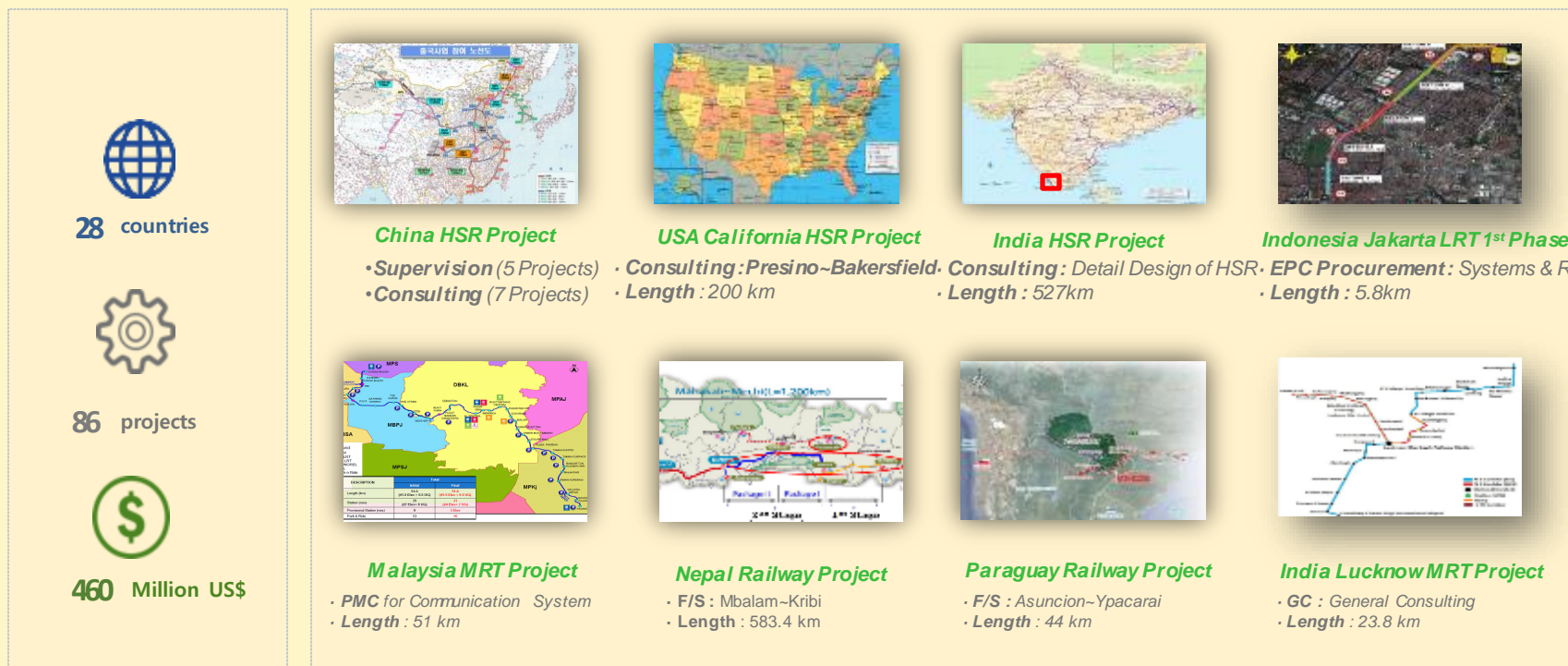
Verification, testing & commissioning



*Economical,
Safe and
Efficient
Railway*

Overseas Projects

- ✓ KNR has been participating in railway projects in other countries. Our first overseas project was in China in 2005.
- ✓ Project types range from technical consulting, to construction supervision, detail design, feasibility study, and training program



Conclusion

1

Are you a State-owned enterprise(SOE) only for HSR?

- ✓ 300km/h technology need interface between superstructure(catenary, train control system, rolling stock) and infrastructure(trackwork)
- ✓ Korea formed HSR construction authority(KHRC) in the early stage and we have lessons learned contemplated extensively for success

2

How SOE itself can make a Project Financing and government support ?

- ✓ Government can transfer its finance burden to SOE supported by contribution and debt guarantee
- ✓ KNR bears the HSR project debt financed by supplier loan(2.3bil\$) and issuance of HSR bond

3

Additional costs for Technology Transfer for Localization?

- ✓ As a way of TT & T, KNR adopted 1:1 matching with overseas PM service, construction Supervision, CORE system suppliers.
- ✓ KNR had set 50% of localization of core system and invested 300 million\$ with Korea Railroad Research Institute launched in 1996.

4

Enhancing Global Collaborating & Cooperating with International Partners?

- ✓ After opening HSR in 2004, KNR entered in the China HSR through HSR technology conference with Chinese railway ministry and SOEs.
- ✓ Inland extensive technology experience and over 900 project management professionals are valuable assets for overseas project works.
- ✓ KNR can form Korean one team as infrastructure manager, railway project manager including government, public, and private side.



KOREA GREEN INNOVATION DAYS

KGID CAIRO