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**HIGHSPEED**

Morocco 2023

*HIGH-SPEED RAIL : THE RIGHT SPEED FOR OUR PLANET*

Under the High Patronage of his Majesty King Mohammed VI

# Session 6.1, Room Fez 2

## Network planning 1

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Moderator : Mr. Benoit Chevalier  
Chief Network Strategy Officer, SNCF Réseau, France



## Session 6.1

### Network planning 1

### Speaker Lists;

1



Mr.Bichoi  
Metias

Germany

2



Mr.Radek  
Čech

Czech Republic

3



Mr.Arturo  
Pastor García

Spain

4



Mr.Roumen  
Markov

Bulgaria

5



Mr.Qachar  
Mohamed

Morocco



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**Marrakech, 7-10 MARCH 2023**

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# **MOVING EGYPT – 6th Largest High Speed Rail Network in the world**



Continued innovation leadership secured by growing R&D investment

**37,400**

employees worldwide<sup>1</sup>

**17,200**

employees for more than 10 years with Siemens Mobility

**81%**

Coworkers, that are proud to work for Siemens Mobility<sup>2</sup>

**2,800**

R&D employees<sup>1</sup>

**1,420**

patent applications since 2016<sup>3</sup>

**600**

apprentices<sup>1</sup>



## Locations Close to or



|| All   Factory   Service Center   R&D Center   Sales Hub   Project Hub   Software companies



## We are the most diversified and vertically integrated mobility company

### Rail infrastructure

Products and solutions for Rail Automation and Electrification



### Software solutions

Apps and backend systems for passenger information, booking, payment and management of data, infrastructure and fleets



### Turnkey projects

Complete turnkey rail solutions integrating the entire portfolio and beyond



### Rolling stock

Short-distance, regional and long-distance rolling stock, product and system solutions for passenger and freight transport



### Rail services

Services for Rolling Stock and Rail Infrastructure, throughout the entire life-cycle







## We connect Egypt



A modern **rail network for passengers and freight**: 2,000 kilometers and 60 stations offering access to affordable and sustainable mobility for 90% of all Egyptian citizens

September 1, 2021: Contract signed for the first part of the network, dubbed “**Suez Canal on rails**”

May 2022: Contract signed for the second part, comprising **two further lines** as a turnkey project

Siemens Mobility's order share of the entire project is **8.1 billion euros**

For Siemens, the **biggest order in its history**



## A rail network to transform people's everyday life



### Infrastructure

Safe, fast rail connections, more than 35 billion passenger kilometers per year; more freight capacity

### Quality of life

Cuts travel times by 50% for selected journeys in comparison with current car/bus transport

### Environment

Reduces CO<sub>2</sub> emissions by 70% in comparison with current passenger transport by car and bus

### Jobs and training

Up to 40,000 local jobs through the consortium, and a further 10,000 indirect jobs in the Egyptian economy

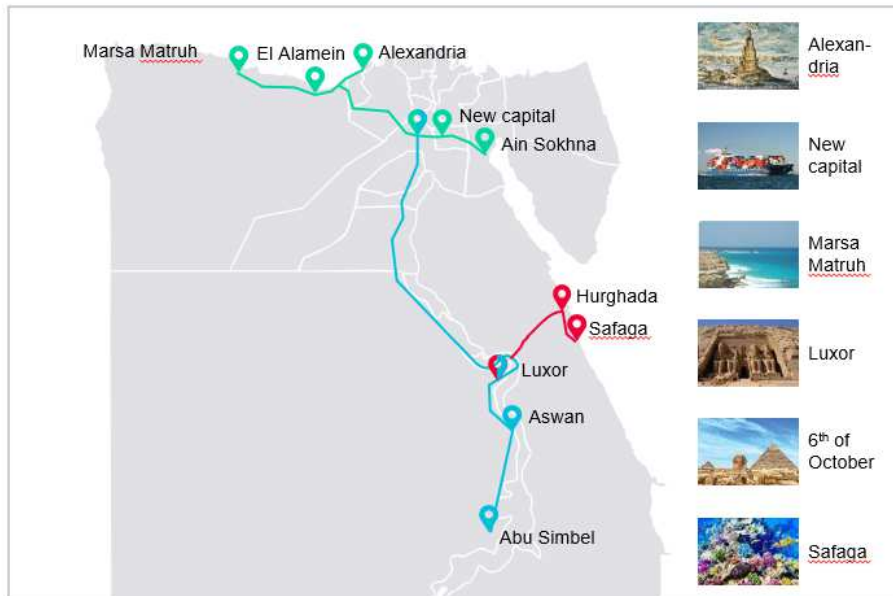
### Outlook

Egypt will become sixth in the global ranking of highspeed countries





## Siemens Egypt Highspeed Project – Siemens entered a long-term partnership in Egypt to execute and maintain a modern railway network, guaranteeing the highest level of availability



### 41 Velaro

Highspeed trains



### 94 Desiro HC

Regional trains



### 41 Vectron

Freight locomotives



**2,000 km**  
electrified  
network



**60** stations



**15** years  
maintenance



**8"1 €**  
SMO contract value  
**3"9 €** for civil works



**2** depots,  
**6** service areas



**1** integrated railway  
system



**500 million**  
passengers per year



**70%** less CO<sub>2</sub>  
emissions



**50%** less travel time



Up to **100%**  
availability

Railigent X



**46%** increased  
freight capacity



**>40 k** direct jobs  
and ~10 k induced/  
indirect jobs

SCOPE

System  
Integration

Signaling

Desert proof  
Rolling Stock

Communication  
system

Power Supply

Automatic Fair  
Control

Depot  
equipment

Maintenance

Track Work



## Success factors for Egypt



- 1 Trains sold are **standard configuration** with only climate related adjustments – easy to replicate and easy to maintain
- 2 **Continuous production** and delivery of all fleets (Regional, High Speed and Locomotives)
- 3 EulerHermes (German ECA) coverage for 85% of SMO supply scope, **attractive financing terms** compared to local market alternatives, tenors of up to 14 years (repayment period)
- 4 The network will also operate **50% commuter and 25% freight** trains
- 5 We employ **predictive maintenance**, based on Railigent® and digitalized depots for up to 100 percent availability
- 6 Installation of **ETCS Level 2** signaling technology for high safety, including 217 ETCS onboard units
- 7 **Digital planning** of overhead lines with Sicat Master/Bentley Open Rail
- 8 No industrial localization, no Maintenance JV



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# **PREPARATION OF HSR NETWORK IN THE CZECH REPUBLIC**

Radek Čech, Ph.D.

Director of International Affairs Department, Správa železnic (SZCZ), Czechia

Planning & Design / Network planning

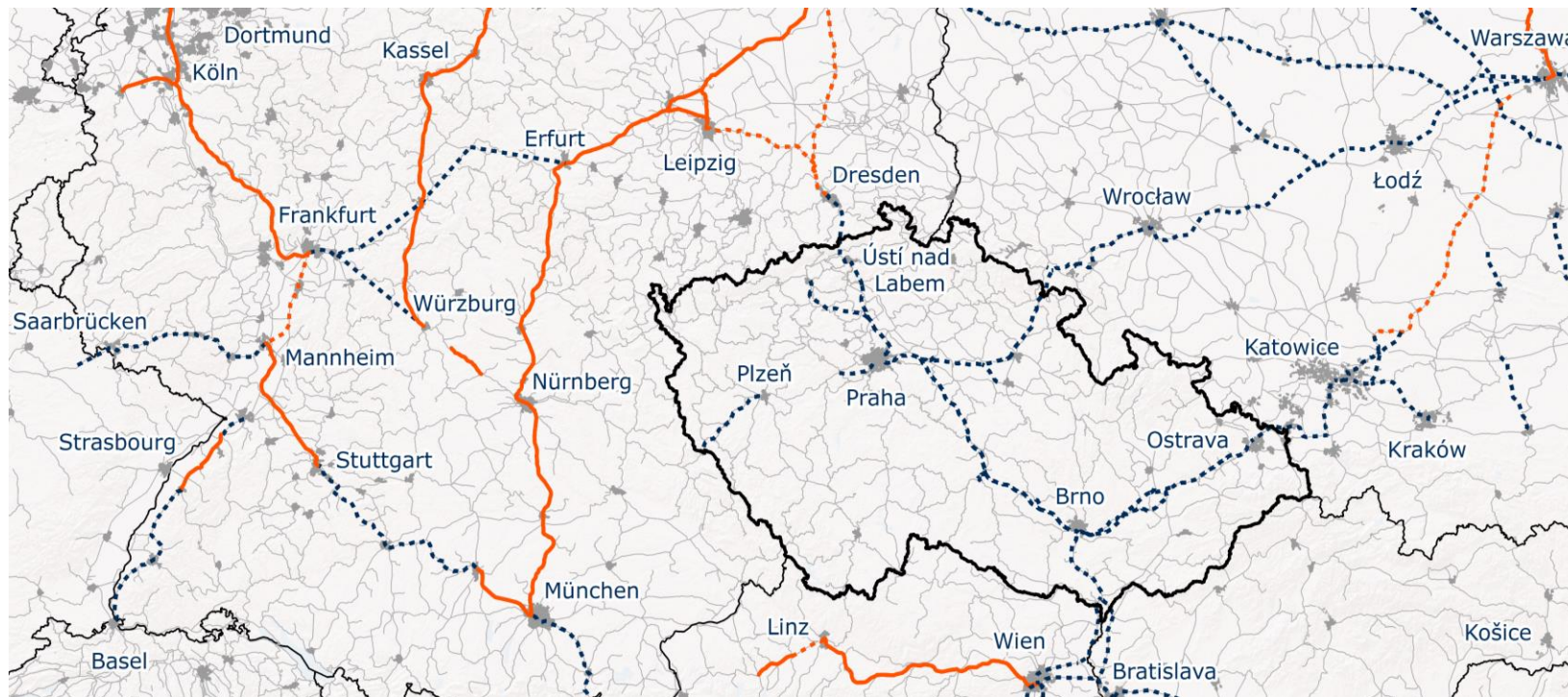
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## WHY HSR?

## CZECHIA IS CROSSROAD IN CENTRAL EUROPE







## HSR – KEY COMPONENT OF SUSTAINABLE & SMART MOBILITY STRATEGY



HSR will be part of **zero-emissions solutions** and will be built according to top standards (Správa železnic cooperates with SNCF Réseau)



**Reducing energy intensity** and dependence on raw energy materials from Russia



HSR will **release capacity** on conventional lines, hence:



modal-shift of freight and passenger from road to rail will be possible



traffic flows on conventional lines will be optimised



CO<sub>2</sub> emissions will be reduced significantly as a result



New HSR are the best opportunity for implementing **smart digital solutions and intelligent transport systems** (ERTMS & Digitisation)



## HSR AS BACKBONE OF SUSTAINABLE TRANSPORT

- ➡ The need for **fast, high-capacity and ecological transport** between large settlements
- ➡ Significant **increase in freight capacity** on the existing infrastructure

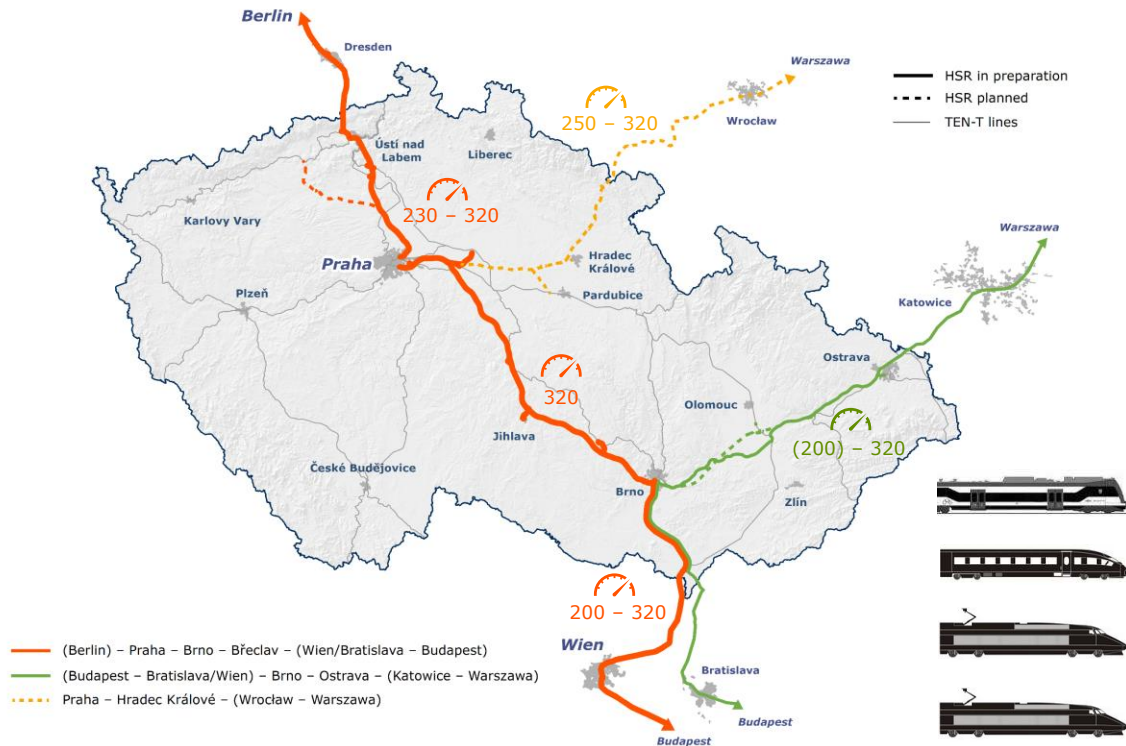


- ✔ Meeting **Green Deal** and **Sustainable & Smart Mobility Strategy** objectives



## FAST TRANSPORT FOR CZECHIA

VIA VINDOBONA



- ✓ Availability of fast rail transport for at least 75 % of the Czech population
- ✓ Accessibility of regional cities within 2 hours
- ✓ HSR feasibility studies take into account further rail network modernisation



**Regional Express (PSO)** < 200 km/h



**Fast train (PSO)** 230 km/h



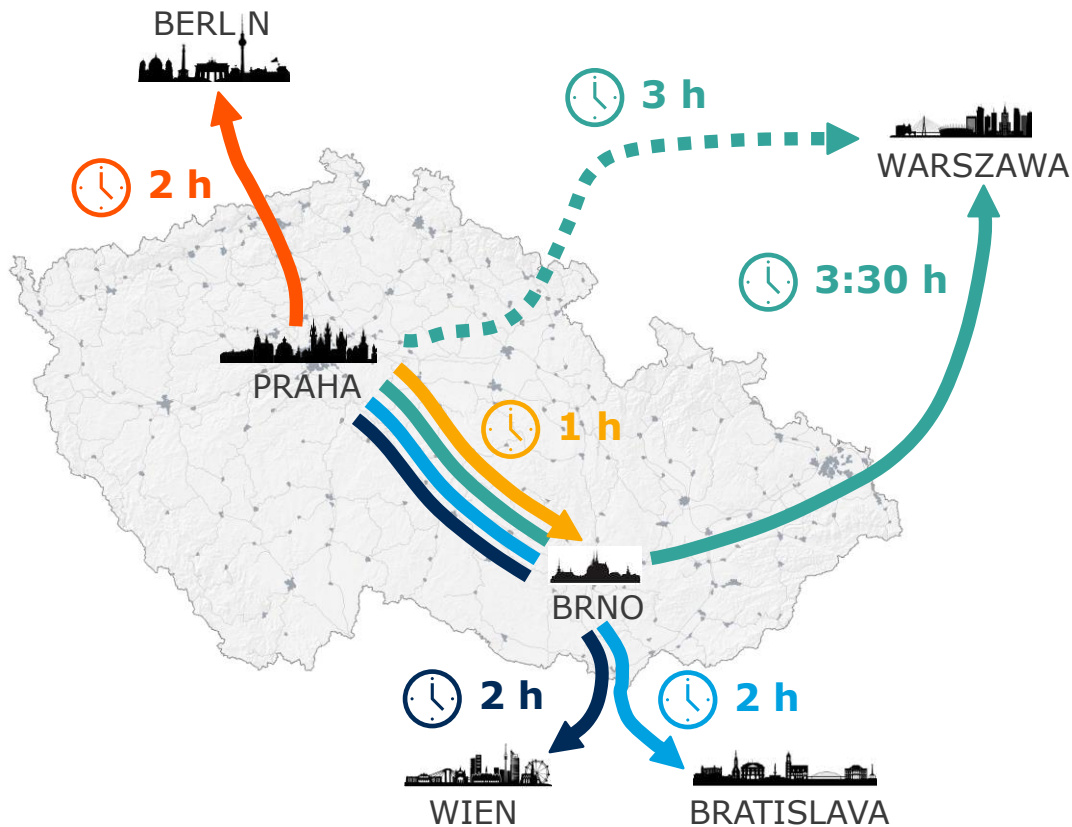
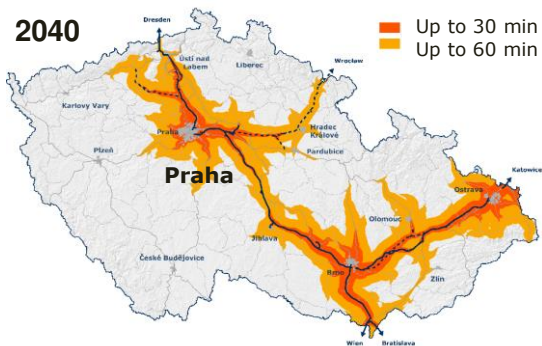
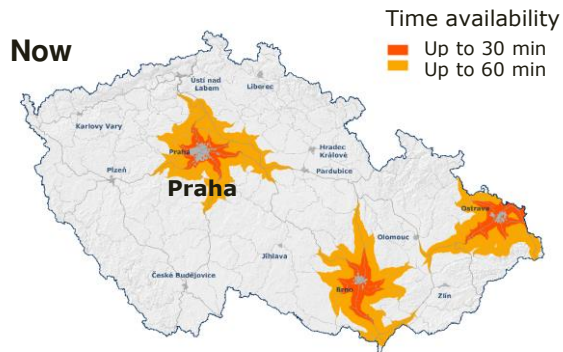
**Express (PSO)** up to 320 km/h



**Sprinter (Commercial)** up to 320 km/h



## CZECH HSR AS CROSSROAD OF CENTRAL EUROPE



## ACCELERATING HSR PREPARATION



Public consultations  
on documentation



Cooperation with Czech  
Geological Survey on tunnel  
constructions

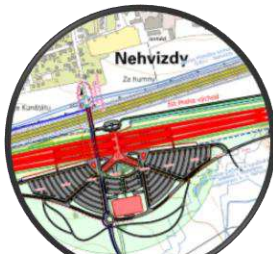


Integration of HSR into  
landscape & compensatory  
measures

New organisational unit  
**High-Speed Lines  
Construction Management**



More effective preparation  
process & operational  
concept of HSR



App for constructions and  
communication with public



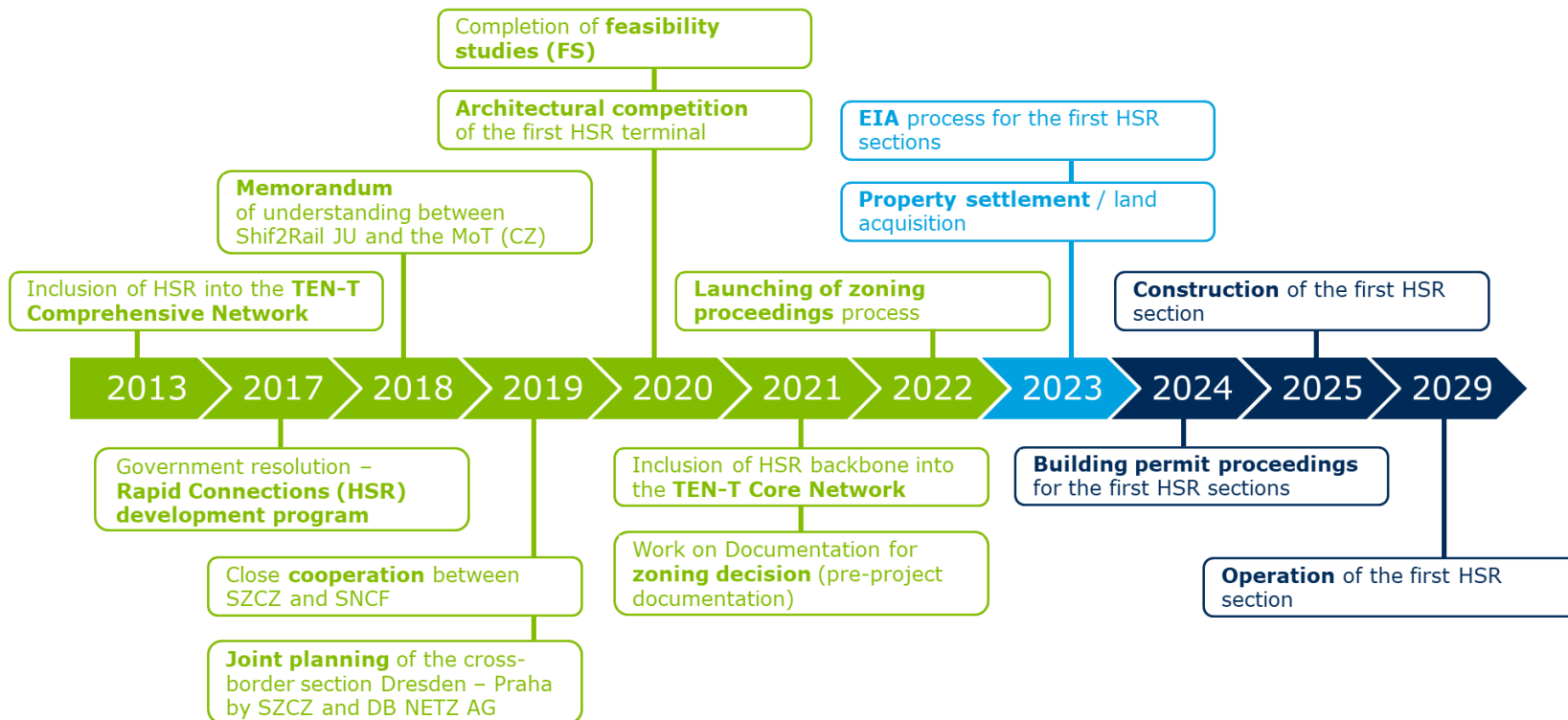
App for constructions  
and closures



We are online  
**#spravazeleznic**



## PATH TO HSR IMPLEMENTATION IN CZECHIA





## BASIC TECHNICAL PARAMETERS OF CZECH HSR



**TSI compatible**



**French (SNCF) know-how**



Passenger trains operation (mostly)



Double-track, ballasted



**Design speed 350 km/h,  
operating speed 320 km/h**



Curve radius over 7 000 m,  
slope gradients up to 35 ‰



2x 25 kV, 50 Hz power supply



GSM-R / FRMCS



ETCS L2 baseline 3 signalling



Night maintenance





## INTERNATIONAL DIMENSION OF CZECH HSR



Agreement on cooperation –  
project preparation for construction  
**“New railway connection Dresden – Praha”**

Strong support of **Via Vindobona**  
including Czech part



SZCF/CPK established  
working group to coordinate  
FS on sections development

**Praha – Wrocław**  
**Ostrava – Katowice**



Close cooperation on planning,  
construction, development and  
maintenance of Czech HSR system



Best practice sharing –  
smart digitisation

Strong support of **Via Vindobona**  
including Czech part  
esp. Praha – Brno section



Czech HSR will be  
part of future “V4” HSR

International support for  
infrastructure construction





## CONCLUSIONS AND NEXT STEPS

- ❖ Trans-national significance of the project and sustainability ("**Via Vindobona**")  
→ **Berlin – Wien in 4 hours**
- ❖ Future for whole region → **connecting Europe**
- ❖ **HSR** – **solution** for congested lines and **opportunity** for regions **development**
- ❖ **Opportunity** for single **technology market** and space for **innovation** and **research**
- ❖ Fulfilling EU objectives → White Paper, **Sustainable & Smart Mobility Strategy**, **Green Deal** and Digitisation
- ❖ The project is **TSI compliant**
- ❖ Strengthening **international cooperation**
- ❖ Reduction of energy dependence



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## **DEVELOPMENT OF HIGH-SPEED RAIL IN SPAIN**

Arturo PASTOR GARCÍA

Deputy Director of Eastern Line Construction. ADIF AV. Spain

Session1-6.1 Network planning 1





## FACTS & FIGURES



**Investment since creation (2005-2021): >53.000 M€**



**+43.000 M€**

HSR Investment



**1.200 km**

HSR under construction



**2.417 km**

ERTMS equipped lines



**+10.000 M€**

Conventional Rail Network



**+15.000 km**

Managed Network

**3.697 km**

ASFA equipped lines



**1.497 Stations**

46 HSR

1.451 Conventional Rail Network



**> 4.000 km**

of High-Speed Network, the  
second largest in the world



**5.500 trains**

during peak times on Adif managed  
network

## STATUS OF THE NETWORK

## Lines in operation and under construction

— In operation  
..... Under construction





## RRF FUNDS. INVESTMENT

### Spain's Recovery and Resilience Plan (PRTR)

❖ 4 main objectives

#### RRP Objectives



Green  
Transition



Digital Transition



Territorial  
and Social  
Cohesion



Gender  
Equality

2021-2023-2026



SPAIN

**72.000 M€ - 140.000 M€**



ADIF

**+5.800 M€**



## MAIN PROJECTS UNDER CONSTRUCTION

### Variante de Pajares



### Y Vasca Vitoria-Bilbao-San Sebastián



### Galicia Stations



#### Ourense

105 M€

#### A Coruña

56,8 M€

#### Santiago

27,8 M€

### LAV Murcia-Almería Murcia-Almería





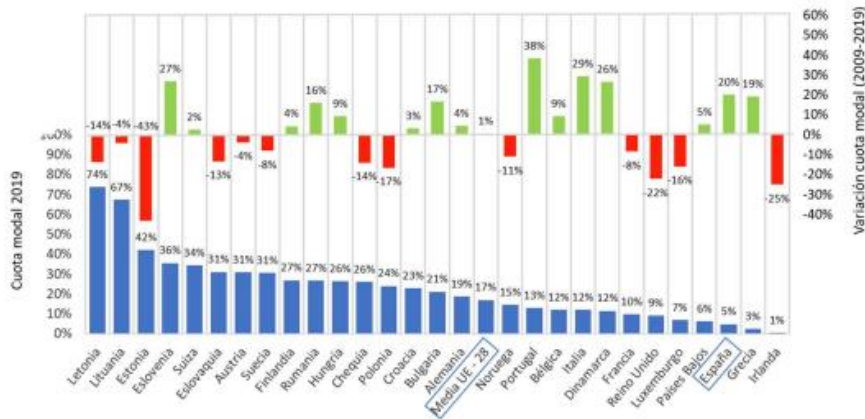


## PORTS



### Status in Spain (2019):

Spain, 4.8% vs. Average in UE-28, 17%



Fuente: Eurostat

**Objectives:** (1) 2030: 30% (2) 2050: >50%

## PORT CONNECTIONS

- Atlantic Corridor
- Mediterranean Corridor

### Langosteira (A Coruña)



115 M€

### La Llagosta (Barcelona)



71 M€

### Sagunto (Valencia)



18,3 M€

### Bajos de la Cabezuela (Cádiz)



16,8 M€

### Castellón



111 M€

### Sevilla



19,8 M€

## PASSENGER TRAFFIC LIBERALIZATION PROCESS

### ❖ Challenges:

- Continuing existing services
- Access to newcomers

### ❖ Start of operations: May 2021

**3 operators: one of the most competitive markets in Europe**



### ❖ Success: Promoting the shift from aviation to rail

### ❖ Average service increase > 60%



## MADRID. CHAMARTÍN - ATOCHA – TORREJÓN. CONNECTION OF TWO NETWORKS



Length

**35,3 km**



Planned investment

**1.230 M€**



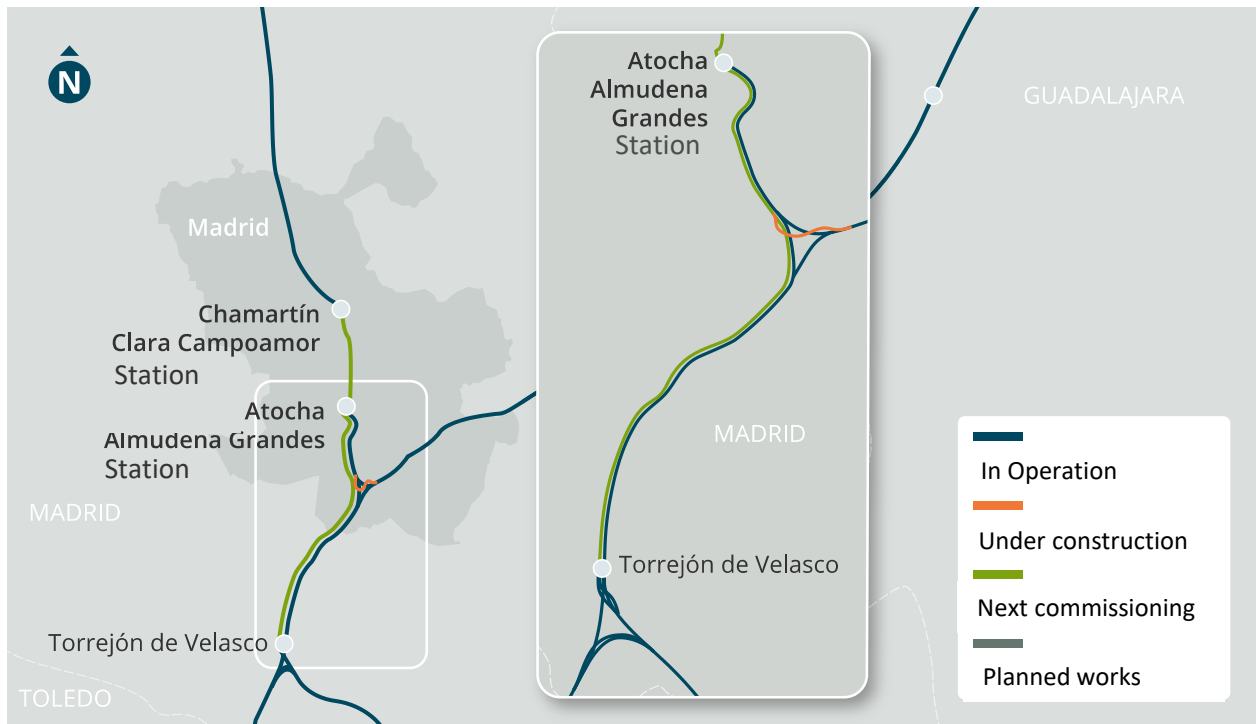
Executed investment

**1.064,8 M€**



Date of completion

**2022**





## MADRID. MADRID CHAMARTÍN – CLARA CAMPOAMOR STATION



Planned investment

**197,3 M€**

● Tracks 14 y 15 - foundation piles  
tracks 13 y 17

**10 M€**

Extension and remodelling of tracks  
and platforms, passenger building  
and 4 other projects.

**171 M€**

Sig&Comm new alignment Chamartín

**9,2 M€**

ERTMS new alignment Chamartín

**7,1 M€**

**A** Remodelling Tracks 1 to 13

**B** Track gauge change 14-15

**C** Tracks 16-21

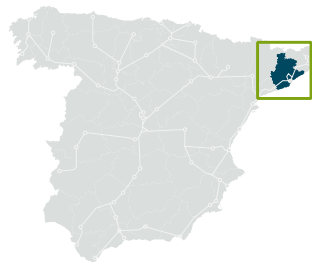
**D** Extension of Tracks 22-25

● Commuter trains ● HS



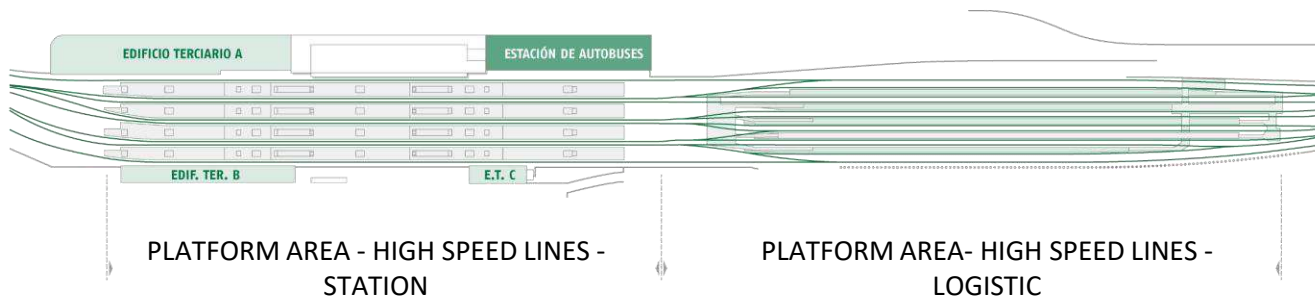
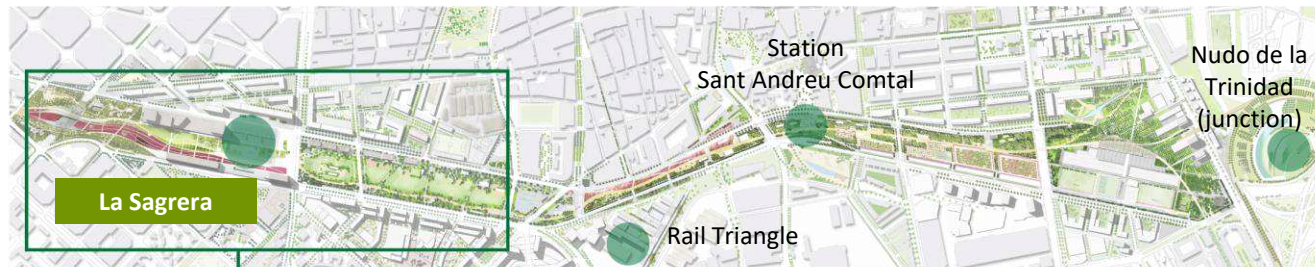


## CATALUÑA. SANTS, LA SAGRERA & SANT ANDREU (BARCELONA) STATIONS



Planned investment

**114,7 M€**



- Track assembly La Sagrera  
**13,7 M€**
- Rearrangement of passenger building Sants Station  
**51,8 M€**





## SUSTAINABLE DEVELOPMENT GOALS AND AGENDA 2030



### STRATEGIC SDG IDENTIFIED BY ADIF-AV







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# High-speed railway corridor Athens - Thessaloniki - Sofia - Bucharest

Roumen, Markov  
General manager, Large  
Infrastructure Projects, Bulgaria  
Planning a High-Speed line  
Session1-6.1 Network planning 1





## Large Infrastructure Projects ( LIP ) LLC is developer of large projects in transport infrastructure and water management

- ❖ LIP Is a private company situated in Sofia, Bulgaria.
- ❖ Our projects are of Pan-European importance. They are in the interest of both the countries within the scope of the projects and of the whole Europe.
- ❖ The private initiative and the predominant participation of private investments in the creation, development, implementation and subsequent long-term operation of the projects are a guarantee for their profitability and benefits for society.
- ❖ The projects, which LIP develops, will be implemented through PPP and more specifically public works concessions.
- ❖ Efficiency, sustainability, multimodality and state-of-the-art technologies are the main drivers of the LIP projects.
- ❖ The company has developed the following high-speed railway projects: South – North Stream, Sofia – Thessaloniki and Sofia - Varna with a branch to Ruse/Bucharest



## High-speed railway lines in Bulgaria and connectivity with neighboring countries

The reasons for developing the projects for high-speed rail lines are:

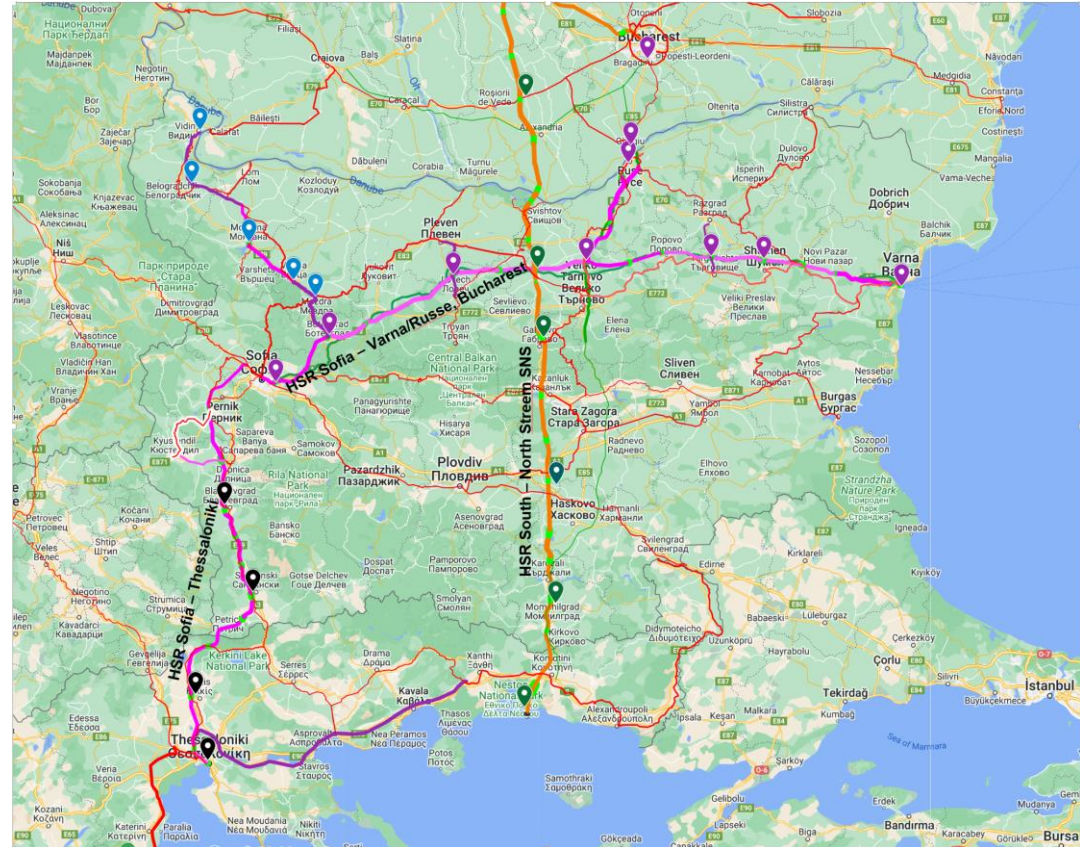
- ❖ The practical impossibility of traveling by train from Sofia to Ruse, Bucharest, Thessaloniki and Athens. In recent years **there are no passenger trains between Bulgaria and Greece**, and between Sofia and Bucharest the journey takes **9 hours and 50 minutes** for a distance of about **400 km**;
- ❖ Saturation with modern transport infrastructure, as the necessary condition for prosperity;
- ❖ European Union policies for connectivity between the member states and the shift the travel from plane to train.

The aims of the project are:

- ❖ Connecting Sofia with Bucharest and Thessaloniki, as part of a high-speed railway line Athens - Thessaloniki - Sofia – Bucharest;
- ❖ Connecting the regions in Northern Bulgaria and in South-Western Bulgaria with the capital and between them with a high-speed railway line;
- ❖ Reducing greenhouse gases by using "green" rail transport instead of road and air;
- ❖ Long-term sustainable solutions for the underdeveloped regions in Bulgaria.

## LIP projects for high-speed rail lines for over 250 km/h in South-East Europe

- ❖ The projects connect Greece, Bulgaria and Romania in order to integrate the economies of the three countries.
- ❖ A high-speed train has been in operation between Athens and Thessaloniki for the last several months, which is a good start for the development of the corridor Athens - Thessaloniki - Sofia - Bucharest
- ❖ The projects are the basis for the high-speed rail connections between Sofia and Istanbul, Sofia and Belgrade, Budapest, Vienna and Bucharest and Budapest.





**SOUTH - NORTH STREAM railway (SNS)** - the land bridge between Aegean Sea and Baltic Sea, which connecting Greece, Bulgaria, Romania, Hungary, Slovakia and Poland

SNS is:

- a new mixed use high- speed rail line intended mainly for freight but also for passengers
- fast and competitive transportation of goods and passengers in the Eastern part of EU
- a green field project
- leader in application of state-of-the-art technology

**10 hours** is needed for movement a freight train between the Aegean Sea and Baltic Sea

#### High speed mixed use railway ( HSR )

Gauge	1435 mm	
Trackway	double tracks	
Axle load	25 t/axle	
Speed	- freight trains - 200 km/h - passenger trains - 400 km/h	
Length of trains	1800 m and 3080 m length of railway stations	
Weight of freight trains	up to 14 000 t	
Electrification	Electrified, 2*25 kV, 50 Hz	
High level of digitalization	GoA3 for passenger trains, GoA4 – for freight trains	
Length of rail line	<b>1668 km, broken down by country as follows:</b>	
	km	%
	GR	56,705 3,39
	BG	276,672 16,50
	RO	540,803 32,36
	HU	81,398 4,87
	SK	133,896 8,01
	PL	582,672 34,87

Movement of the trains

**in the night – freight trains**

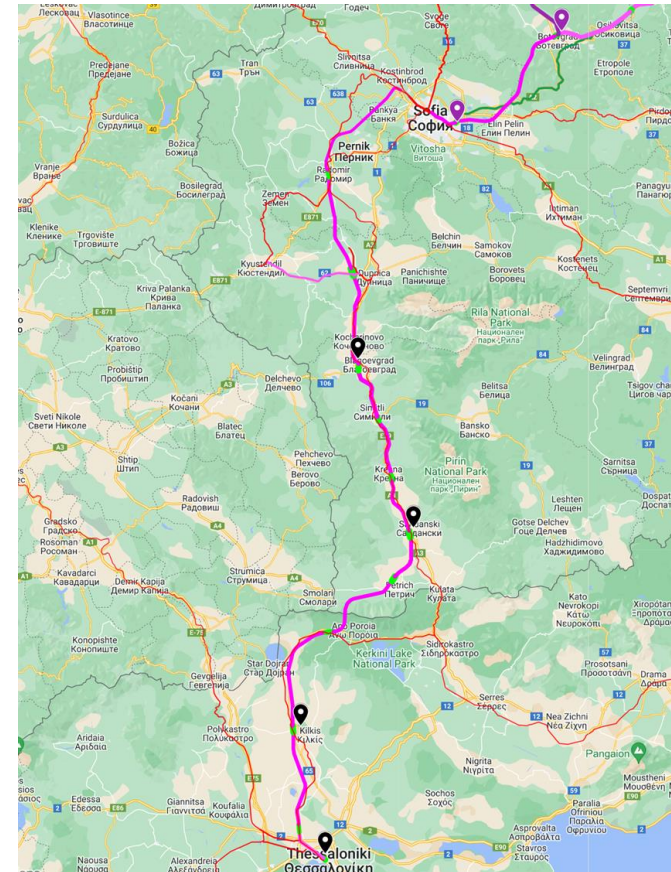
**in the day – passenger trains and railway maintenance**



## High-speed railway line Sofia - Thessaloniki

It is double-track railway line for mixed use - movement of high-speed passenger trains (EMUs without tilting), high-speed light freight trains and freight trains

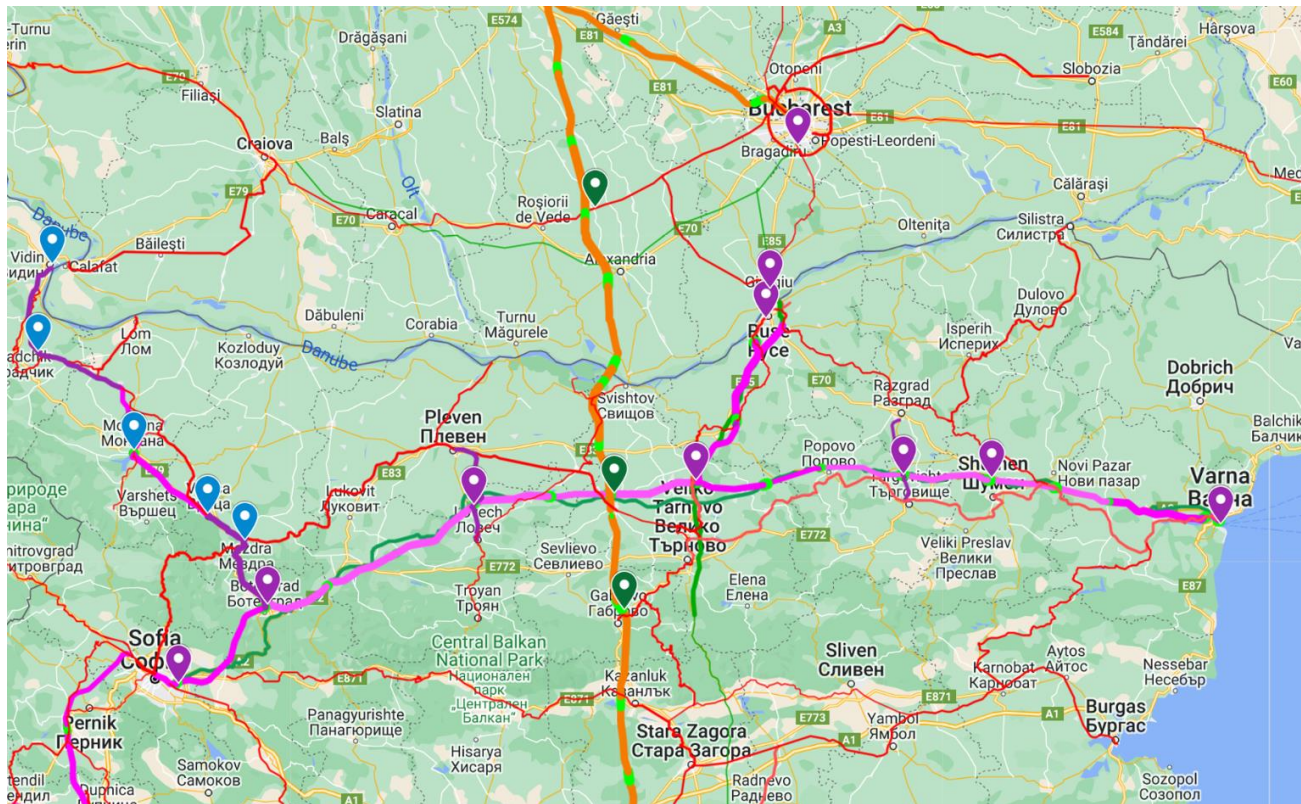
- ❖ Maximum speed of high-speed trains – 280 km/h
- ❖ Maximum cant – 150 mm
- ❖ Maximum longitudinal slope – 19.50 ‰
- ❖ Axle load - 25 tons
- ❖ Ballast less bed
- ❖ Power supply 2 x 25 kV, 50 Hz
- ❖ Communication system FRMCS – 5G
- ❖ ATO level GoA3 and later GoA4
- ❖ The length of the newly built railway line in the Bulgarian section is 192,168 km, and in Greece - 79,430 km.



## High-speed railway line Sofia – Varna with branch to Ruse/Bucharest

The aims of the project are:

- ❖ Connecting the districts in Northern Bulgaria with the capital and between them with a high-speed railway line;
- ❖ Implementation of the high-speed railway Athens-Thessaloniki-Sofia-Bucharest;
- ❖ Restriction and termination of air and bus travel between Sofia and the remote centers.





## High-speed railway line Sofia – Varna

It is a double-track railway for movement of passenger (EMUs without tilting) and light freight trains with speed up to 300 km/h.

- ❖ Maximum cant – 160 mm
- ❖ Maximum longitudinal slope – 30 ‰
- ❖ Axle load - 17 tons
- ❖ Ballast less bed
- ❖ Power supply 2 x 25 kV, 50 Hz
- ❖ Communication system FRMCS – 5G
- ❖ ATO level GoA3 and later GoA4
- ❖ The length of railway line is 409,051 km of which 396,147 km is newly built one.

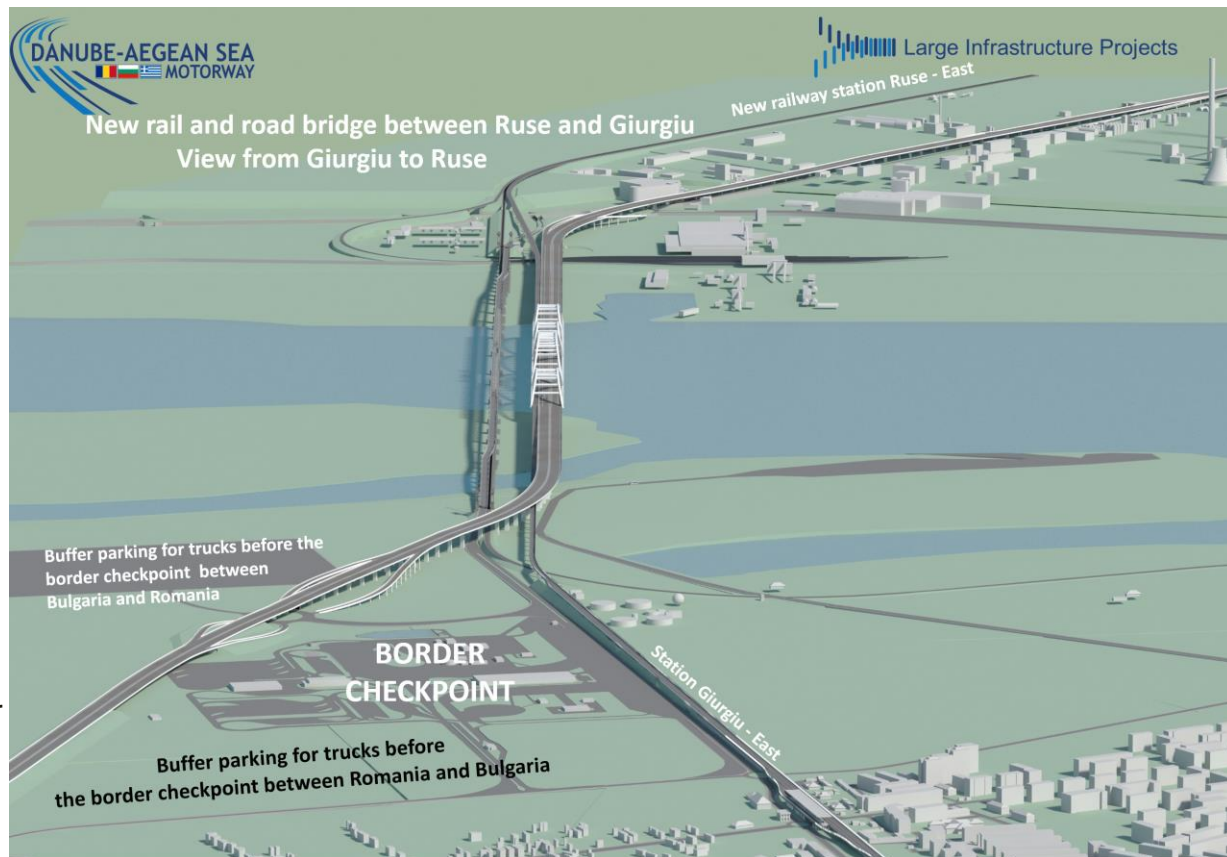
- ❖ According to the project, a new railway station will be built at Sofia Airport as part of a multimodal center and all passenger trains will pass through there.
- ❖ The high-speed rail line for North-western Bulgaria starts from the new Botevgrad railway station.
- ❖ To serve the regional centers of Pleven and Lovech, as well as for Razgrad and Targovishte, new railway stations are planned between them, which are connected to the highway and car parking is provided.
- ❖ New short rail lines have been designed to connect the regional centers of Gabrovo and Shumen with the railway line Sofia – Varna.
- ❖ According to the prepared timetable, the interval of trains departing from the two railway stations Sofia and Varna will be every hour, and from Sofia it will be every round hour between 6 a.m. and 10 p.m.



## Branch to Ruse/Bucharest and the new bridge over the Danube River

The branch to Ruse is also a double-track railway and is for the movement of high-speed passenger trains and freight trains.

- ❖ Maximum longitudinal slope – 17,5 ‰
- ❖ Maximum cant – 150 mm
- ❖ Axle load - 25 tons
- ❖ The length of the branch for Ruse is 68,503 km of which 57,041 km is newly built one
- ❖ The LIP project for the new bridge is for double-track railway and express road.





## Importance of the LIP projects for high-speed railways

- ❖ With the implementation of the projects for the high-speed railways Sofia – Thessaloniki and Sofia - Varna with a branch for Ruse/Bucharest, the travel times will be reduced as follows:

Sofia to Thessaloniki from 5 hours and 52 minutes to **1 hour and 34 minutes**

Sofia to Varna from 7 hours and 35 minutes to **2 hours and 10 minutes**

Sofia to Ruse from 6 hours and 20 minutes to **1 hour and 32 minutes**

Sofia to Bucharest from 9 hours and 45 minutes to **2 hours and 21 minutes**

- ❖ The journey from Athens to Sofia will take **4 hours and 49 minutes**, and to Bucharest **7 hours and 12 minutes**.
- ❖ Also, the distances are reduced – to Varna by **134,512 km** compared to the distance of **543,563 km** on the existing railway; to Ruse by **60,185 km** and to Thessaloniki by **56,585 km**.
- ❖ The high-speed railway transport will become the backbone of passenger transport in North and South-West Bulgaria. On this basis, comprehensive solutions for rail transport in these regions have been developed, including the necessary rolling stock and associated timetables.
- ❖ Through the PPP, the projects will be implemented in a ten-years period, so that the positive effects of high-speed trains can be obtained in the foreseeable future.



## Conclusion

- ❖ Efficient, environmentally friendly transport connectivity in the Eastern part of the European Union can be achieved by building new modern high-speed railways for passenger and freight transport and connecting it to existing infrastructure.
- ❖ The high-speed railway line Sofia - Varna with a branch to Ruse / Bucharest, as part of the Connected Northern Bulgaria project is the right and long-term sustainable solution.
- ❖ The saturation of Northern Bulgaria with this transport infrastructure will stop the negative socio-economic trends and will make it a preferred place for business and living.
- ❖ The public-private partnership, which should rather be called a private - public partnership, is the engine and the tool for the creation and implementation of the modern transport infrastructure that is extremely necessary for Bulgaria and for the connection with the neighboring countries.
- ❖ Replacing road and air transport on short and medium distances within Bulgaria and to neighboring countries with high-speed trains will contribute to reducing the carbon footprint.





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**HIGHSPEED**

Morocco 2023

*HIGH-SPEED RAIL : THE RIGHT SPEED FOR OUR PLANET*

Under the High Patronage of his Majesty King Mohammed VI

# THANK YOU

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