DESIGN AND BUILD A HIGH SPEED RAILWAY:
THE FRENCH EXPERIENCE

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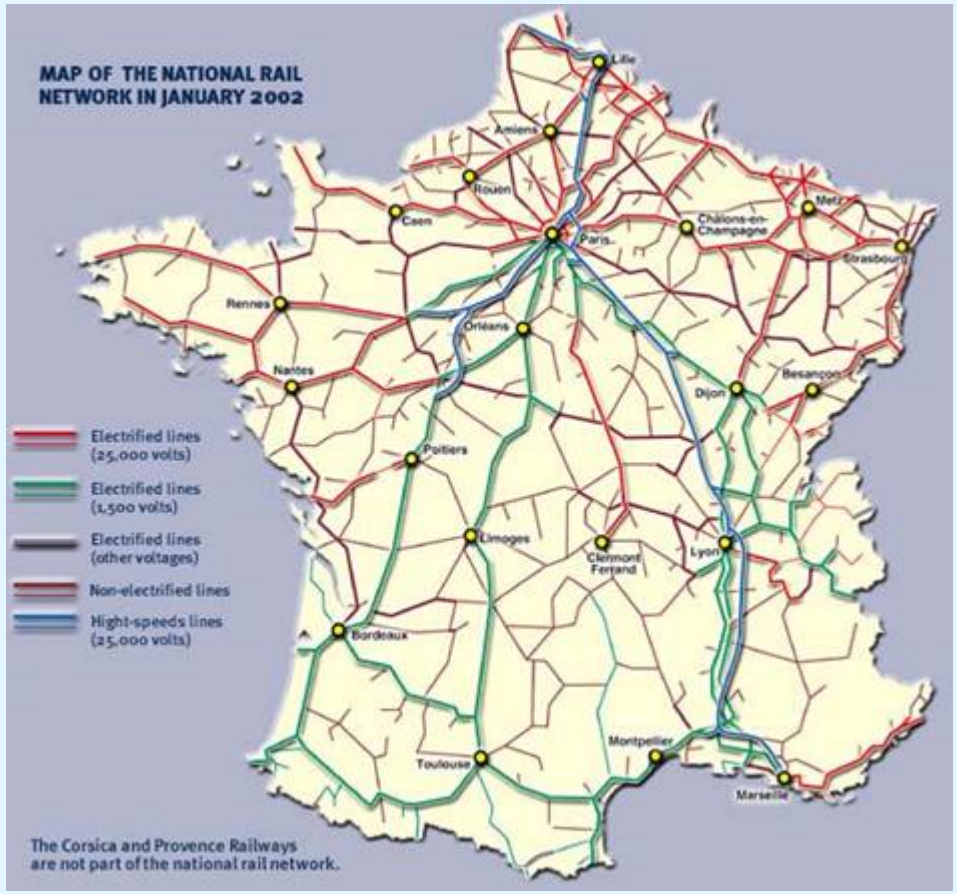
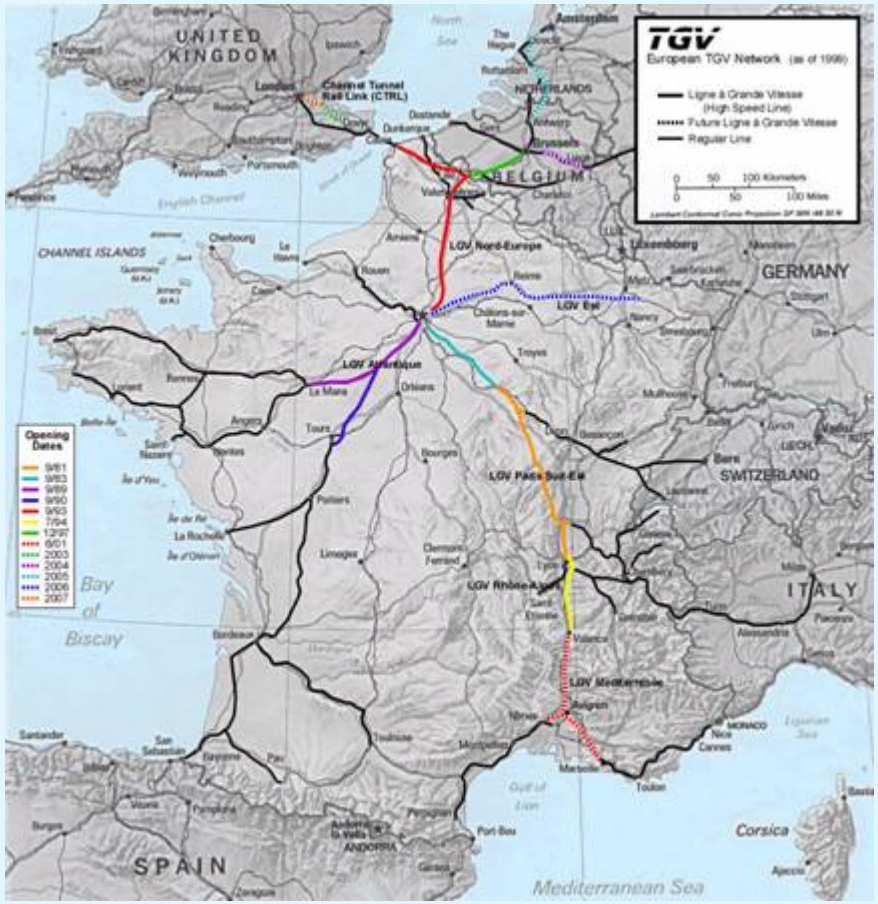
Jean-Pierre ORSI
Director Europe
SYSTRA

- Fundamental parameters of the Trans-European high speed railway system.
- Speed increase on conventional lines.
- Management of the high speed project.

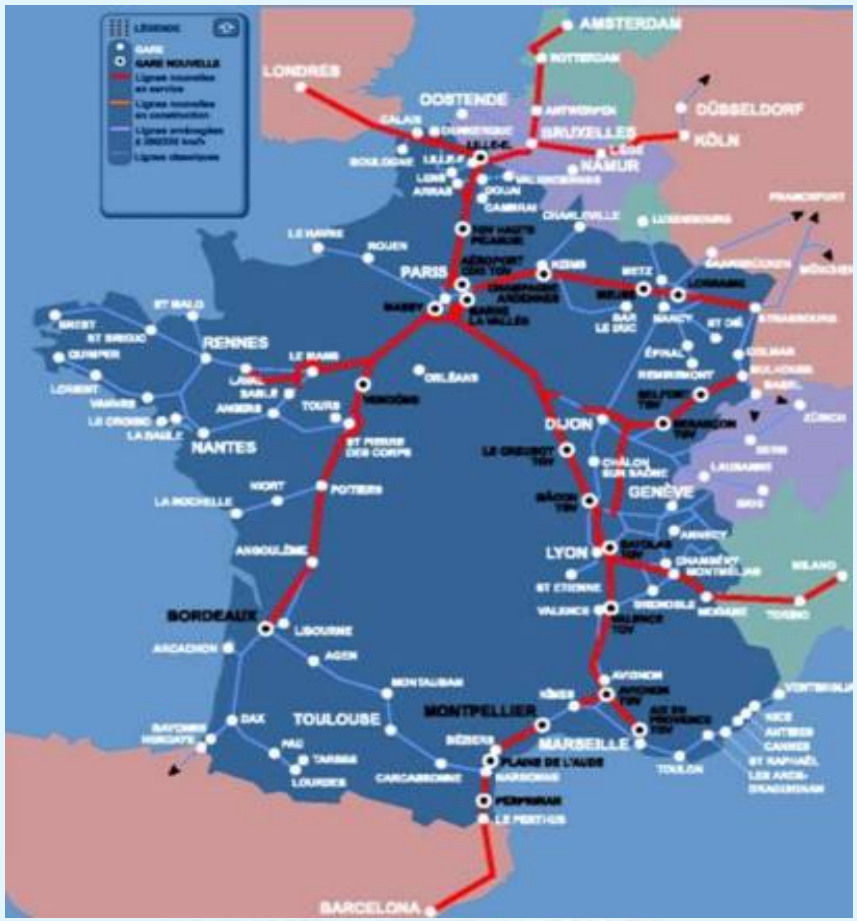
The French domestic network



The French High Speed network



The High Speed network to 2020



Fundamental parameters of the Trans-European HSR system (extract)

1. **Minimum radius of curvature**

   Is a function of:

   – the maximum cant: 180 mm (or 200 mm if passenger trains only),

   – the maximum cant deficiency: 100 mm,

   – the maximum permissible speed for R: 3793 m with a cant of 180 and speed of 300 km/h.

2. **Maximum Axle load**

   – 170 kN (180 kN at S 250 km/h).

Fundamental parameters of the Trans-European HSR system (extract)

3. Maximum Slopes and radiuses

- 2.5 % over 10 consecutive km.
- 3.5 % over 6000 m.

4. Maximum distance between centres of tracks

- 4.5 m.
- 4.2 m at 300 km/h.
- 4.0 m at 250 km/h.

Fundamental parameters of the Trans-European HSR system (extract)

5. Supply voltage

- 25000 V – 50 Hz except in countries currently electrified in other voltages.

6. Catenary geometry

- Catenary height: 5080 or 5300 mm
- Pantograph dimension:
  - Width: 1600 mm,
  - Working zone: 1200 mm,
  - Strip width: 800 mm.

Fundamental parameters of the Trans-European HSR system (extract)

7. Extreme electric characteristics of the rolling stock

- Voltage and frequency of electric supply.
- Power factor.
- Disruptions to the signalling system.
- Disruptions to the telecommunications.
- Disruptions to the radio frequencies.
- Electric immunity of the on-board equipment.

Fundamental parameters of the Trans-European HSR system (extract)

8. Extreme mechanical characteristics of the rolling stock

Three reference collision:

- 2 TGV trainsets at 36 km/h,
- 1 TGV and one 80 t railway vehicle at 36 km/h,
- 1 TGV at 110 km/h against a 15 t road vehicle.

Fundamental parameters of the Trans-European HSR system (extract)

9. Other system characteristics

- Braking and signalling performances.
- Starting in downgraded mode.
- Distortions to the public power network, a function of the line throughput and profile, train power, electrification system and of the distance between the connection points and sub-stations.
- Noise standards.

Speed increase on conventional line

- Poor performance of the original layout, limited improvement with tilting trains.
- Difficulty to insert rapid trains in normal train traffic, the high speed is hampered by the incidents affecting the others, the running of trains at different speeds causes a loss of capacity.
- The crossing of urban areas is often very slow, unless complex and costly alterations have been made.

Speed increase on conventional line

- Difficulties to perform upgrading works on lines in operation:
  - Consolidation of structures,
  - Removal of level crossings,
  - Straightening of layouts,
  - Improvements to track quality,
  - Modifications to the signalling system,
  - Modifications to the power supply installations,
  - Fencing off of the territory, noise protections, etc.

Management of the High Speed Project

- The characteristics of railway high speed prove the need to work at the level of the system, taking into account:
  - the analysis of the transport demand, The current supply,
  - the desired performances (travelling times, service frequency, comfort, safety, protection of the environment),
  - the relief in the area involved,
  - the towns to be served, siting of the stations, associated transport systems,
  - Social and economic parameters.

Management of the High Speed Project

- Project stages:
  - Emergence,
  - Initialisation (1/250 000),
  - Feasibility (1/25 000),
  - Preliminary project, decision definition file (1/5 000),
  - Final choice of the Engineer who will mastermind the project construction,
  - Project (1/1 000),
  - Works and commissioning.

Management of the High Speed Project

- Client objectives:
  1. Design, build and operate a system tailored to its country.
  2. Limit the technical and financial risks.
  3. Benefit as much as possible from international competition.
  4. Optimise the line layout and the valorisation of the estate.
  5. Define the most efficient organisation for construction and operation.
  6. Define the best possible relations with the conventional rail.
  7. Maximise the transfer of the high speed know-how.

Management of the High Speed Project

- General Consultant competencies
  1. Have complete mastery of the design, construction and operation of a high speed system.
  2. Demonstrate its ability to work with foreign partners.
  3. Have available trusted and tried design and financial models.
  4. Have experience in training and the transfer of know-how.
  5. Implement straightforward and efficient project management methods.
  6. Be in a position to commit itself to a project.
  7. Have made the proof of its objectivity and professionalism.

Management of the High Speed Project

- Examples of current TGV projects
  - TGV Est,
  - CTRL,
  - Korea,
  - Taiwan.

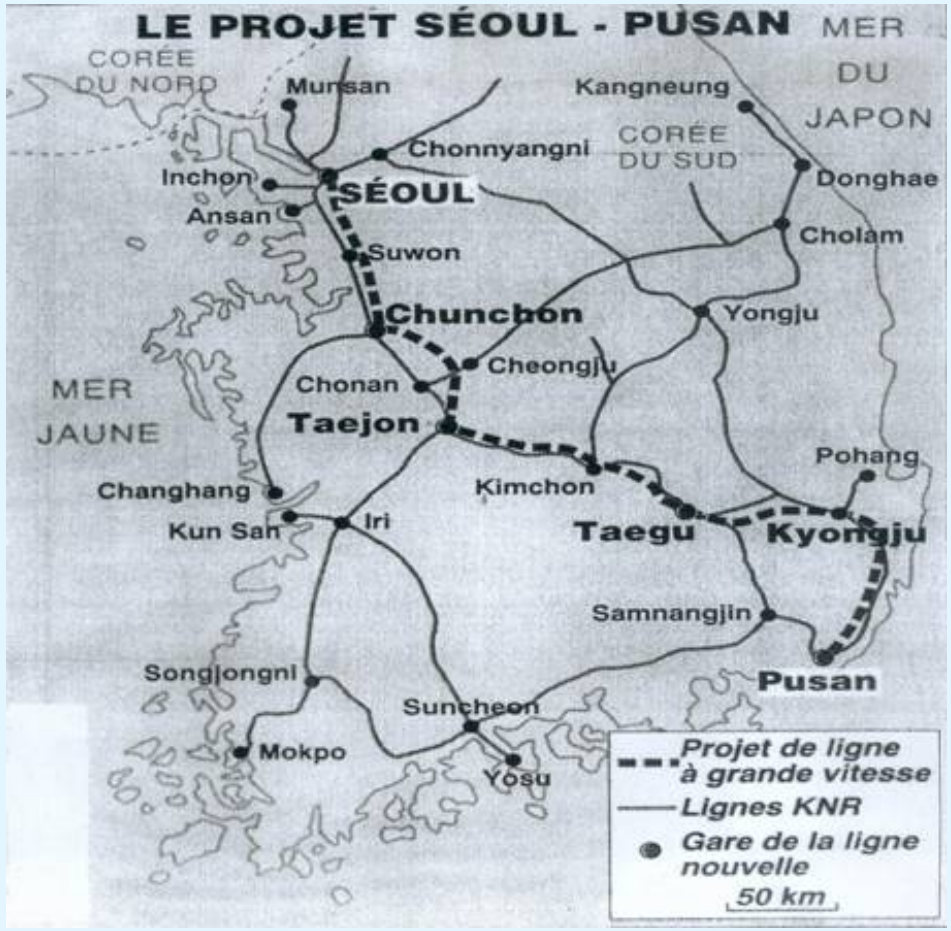
TGV Est


vers LONDRES
vers BRUXELLES
Belgique
Luxembourg
Allemagne
PICARDIE
CHAMPAGNE-ARDENNE
LORRAINE
PARIS
MARNE-LA-VALLEE
SAUDRECOURT
VENDENHEIM
STRASBOURG
vers RENNES et NANTES
vers BORDEAUX
Suisse

CTRL


London
St Pancras
Stratford
SECTION 2
Waterloo
Ebbsfleet
Gravesend
Link to Waterloo
(existing line)
Medway
Towns
SECTION 1
Canterbury
Maidstone
Ashford
Dover
Folkestone
Channel Tunnel
N

Korea


LE PROJET SÉOUL - PUSAN
MER DU JAPON
CORÉE DU NORD
CORÉE DU SUD
MER JAUNE
Mursan
Kangneung
Chonnyangni
Inchon
SÉOUL
Donghae
Ansan
Cholam
Suwon
Chunchon
Yongju
Cheongju
Chonan
Taejon
Pohang
Changhang
Kimchon
Kun San
Iri
Taegu
Kyongju
Samnangjin
Songjongni
Pusan
Suncheon
Mokpo
Yosu
Projet de ligne à grande vitesse
Lignes KNR
Gare de la ligne nouvelle
50 km

Taiwan


0
50km
Panchiao
Taipei
Taoyuan
Nankang
Hsinchu
Hsichih depot
Liuchia maintenance base
Miaoli
Taichung
Wujih depot
Changhua
Yunlin
Chiayi
Hualien
Taipao maintenance base
Tainan
Yien Chou main workshop
Taitung
N
Tsoying depot
Tsoying
Kaohsiung
TAIWAN
New line under construction
TRA lines (1067mm gauge)


SYS
TRA