The Italian High Speed Rail Market: initial feedback and results

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Need of mobility in Italy

Residential density

The solution

Royal Astronomical Society

Columbia University NY

Link Hub
Spoke

Persons per km²
- 0
- 1 - 4
- 5 - 24
- 25 - 249
- 250 - 999
- 1,000 +
The Italian HS network

**HS NETWORK**

<table>
<thead>
<tr>
<th>Year</th>
<th>Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>600</td>
</tr>
<tr>
<td>2008</td>
<td>800</td>
</tr>
<tr>
<td>2009</td>
<td>970</td>
</tr>
</tbody>
</table>

**Travel time at June 2013**

<table>
<thead>
<tr>
<th>Line</th>
<th>TO-MI</th>
<th>MI-BO</th>
<th>BO-FI</th>
<th>RM-NA</th>
<th>RM-MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>No HS best time</td>
<td>1:25’</td>
<td>1:45’</td>
<td>59’</td>
<td>1:27’</td>
<td>4:30’</td>
</tr>
<tr>
<td>HS</td>
<td>50’ December 2012</td>
<td>1h June 2013</td>
<td>35’ December 2009</td>
<td>1:10’ December 2009</td>
<td>2:50’ no stop June 2013</td>
</tr>
</tbody>
</table>
MAIN GOALS of the HS System

- More than double overall capacity
- Increase efficiency and speed
- Urban renewal in metropolitan areas
- Long distance and average-short-distance separation
- New interconnections
- Integration with the international corridors of the European HS network
General info HS system

**OPERATION DINAMICS DATA**
- Max operation speed: 300 km/h
- Maximum tested speed: 362 km/h
- Uncompensated radial acceleration: 0.6 m/s²
- Max axle load: 25 t

**PERFORMANCE DATA**
- Power supply: 25 KVa.c.
- Power supply sub stations coverage modularity: 50 Km
- Sub station electrical power: 60 MVA
- RBC train limit management: 30 train/ 60 Km

**LINE DATA**
- Gauge: 1.435
- Max gradient: 15 ÷ 18 %
- Artificial tunnels free section: 100 m²
- Natural tunnels free section: 82 m²
- Limit profile: Gabarit C – PMO n° 5
- Recovery tracks module: 750 m
MILANO-BOLOGNA HIGH SPEED LINE: CABLE-STAYED BRIDGE OVER PO RIVER (designed by Calatrava)
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MILANO-BOLOGNA HIGH SPEED LINE : CABLE-STAYED BRIDGE OVER PO RIVER

DETAIL: EXPANSION JOINT
CABLE-STAYED BRIDGE OVER PO RIVER : EXPANSION JOINT
TORINO-MILANO: BRIDGE DESIGNED BY CALATRAVA
The Italian HS: DEDICATED and MODERN PATH

POINTS OF EXCELLENCE: INTEGRATION INTO THE TERRITORY

The Gelsi tunnel
(Rome-Naples HS line)

Railway flanking the motorway - Carisio
(Turin-Milan HS line)
Points of excellence: archaeological management

during HS lines construction

300 archaeological interventions

51 main archaeological sites
The Italian HS new stations (1)

REGGIO EMILIA
Arch. Santiago Calatrava

NAPOLI
Arch. Zaha Hadid

FIRENZE
Arch. Norman Foster
The Italian HS new stations (2)

ROMA
Arch. Paolo Desideri

TORINO
Arch. AREP – Silvio d’ ASCIA and Agostino Magnaghi

BOLOGNA
ITALFERR
Torino Porta Susa

- Project: AREP Group - J.M. Duthilleul and E. Tricaud (in cooperation with Silvio D’ Ascia and Agostino Magnaghi), winner of an international tender.
- Lenght m. 385, width m. 30.
- Steel (108 arches) and glass.
- Integrated photovoltaic system 800-1000 kVA.
- Cost: M€ 69
Torino Porta Susa

Winner of Eurosolar award (Berlin, Deutscheland)
Covered surface 11,800 sqm
• commercial areas (warehouses included) 8,000 sqm
• technical areas 1,100 sqm
• services to travellers 2,700 sqm

Parking underground area 7,640 sqm
• Five levels, three of them underground.
• 10 elevators and 19 escalators.
• Main hall at street level.
• First floor: offices
• Floors -1 and -2: commercial area, services to travellers, parking area, taxi station, kiss&ride.
• Floor -3: platforms and access to the underground.
Torino Porta Susa
Torino Porta Susa
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Torino Porta Susa
Torino Porta Susa

L’ingresso su Corso Bolzano
Bologna Centrale

- Length: m. 640 m, three underground levels (plus connecting tunnels).
- Floor -3: HS platforms (6 tracks).
- Floor -2: HS Hall, commercial area and services to travellers.
- Floor -1: taxi station, kiss&ride, emergency vehicles, connection to the new underground parking.
Project ITALFERR
Overall surface 77,500 sqm
Cost: M€ 530
LED lighting for low energy consumption
Bologna Centrale

Connecting tunnels

HS Hall

Hall Carracci
Bologna Centrale

Building phases

HS platforms
Firenze Belfiore

New HS Station
Firenze Belfiore

- Cost: M€ 410.
- Project: Foster & Arup, winner of an international tender.
- Length m. 450, width m. 50, depth m. 21.
- Steel and glass cover, height m. 18.
- Underground parking: capacity 570 cars.
- Overall surface 45,000 sqm.
Il progetto (Descrizione del progetto di Foster)

- Distribuzione delle funzioni
- Studio della luce
- Qualche numero...
- Quanto costa
- Quando è iniziato il cantiere
- Quando sarà finita

Firenze Belfiore
Firenze Belfiore
Street level: main hall, services to travellers, commercial area.
Floor -1: automatic ticket machines.
Firenze Belfiore

Floor -2 (m. 22 underground): platforms
Escalators from floor -2
Underground, but solar light
Roma Tiburtina

Project: Arch. Paolo Desideri
Cost: M€ 196
Roma Tiburtina

- 50,000 sqm overall surface
- 10,000 sqm commercial areas
- 7,000 external glass surface
- 29 elevators
- 57 escalators
Roma Tiburtina

Top cover  +26,1 m.

- Floor 2 (+14,5 m): services to travellers and commercial areas.
- Floor 1 (+ 9 m): commercial areas and access to platforms.
- Floor 0: platforms and main entrances.
- Floor -1 (-4,5 m): main hall.
- Floor -2 (-9,5 m) technical services.
Roma Tiburtina

New underground roads and parking
Roma Tiburtina

New underground roads and parking
The Italian HS: NEW TECHNOLOGIES

ERTMS
(European Railway Traffic Management System)
The EU standard

Network Remote control
SCC (Command and Control System)

ATC
Automatic Train Control

TLC
Telecommunication

GSM-R

ETCS (European Traffic Control System)

Efficiency and development

ACC Multi-station
Central computerised device

Train Diagnostics
High Speed services
The Italian “Arrows”: FrecciaRossa e FrecciaArgento
High Speed services
The Italian “Arrows”: NEW TRAINS

59 ETR 500
Freccia Rossa
Speed max: 350 km/h

19 ETR 600/610
Freccia Argento
Speed max: 250 km/h

15 ETR 485
Freccia Argento
Speed max: 250 km/h

Fleet
ETR AV

- 2010
  - 91
- 2011
  - 91
- 2012
  - 93
- 2013
  - 93
- 2014
  - 99
- 2015
  - 109

New interoperable UE Trains (since 2014)

50 new ETR 1000

- commercial speed 360 km/h on traditional rail network (300 km/h)
- Maximum speed: >400 km/h
- 2018 complete HS fleet (143 trains)
High Speed services: the FRECCIAROSSA network

**Number of daily links**
- 68 Milan - Rome
- 35 Milan - Naples
- 14 Turin - Rome
- 4 Milan – Salerno

**Travelling time**
- 37’ Bologna - Firenze
- 60’ Turin – Milan
- 70’ Rome – Naples
- 4h 10’ Milan – Naples
- 4h 10’ Turin - Rome

**No - stop links**
- 2h 45’ Rome Tib. – Mi Rog.
- 2h 59’ Rome Term. – Milan C.le.

- Easy learning timetable (00, 15, 30)
- Comfortable seats
  (seats are spaced 98 cm apart, 20 cm more than air seats distance)
High Speed services: the FRECCIARGENTO network

Number of daily links:
- 26 Venice – Rome (of which 4 FAST Trains)
- 6 Verona - Rome
- 10 Rome – Bari (of which 4 FAST trains)
- 4 Rome – Lamezia T. (4 FAST trains)

Travelling time:
- 3h 15’ Venice – Rome
- 3h 00’ Verona – Rome
- 3h 59’ Rome - Bari
- 3h 59’ Rome – Lamezia T.
High Speed services
the italian “Arrows”: NEW SERVICES

- Easy and quick on-line ticketing:
  - New selling system to find best fares, seats and fast ticket purchase

- Welcome at the stations
  - Self service area assisted by staff

- Baggage door to door service
  - Baggage collection & delivery to and from the main Towns linked by the Italian Arrows

- Fidelity cards
  - Fidelity programme for frequent travellers

- Commercial agreements with partners
  - Train + car
  - Train + ship
  - Train + bus

- New technology to buy tickets and to check train time
  - “Prontotreno” for Ipad, Iphone, windows and symbian based devices
High Speed services
the italian "Arrows": NEW SERVICES
The *italo* trains
The .italo trains

WINTER 2011

Start of NTV’s TEST

21 APRIL 2012

Start of no-stop service

SUMMER 2013

NTV fully operative

50 TRIPS EVERYDAY
12,3 MILLION KILOMETERS PER YEAR
2 Millions of Passengers in the first year
The Italian HS: The MODAL SPLIT...

... a revolution

Modal split Milan – Rome (%)

2008
- 36% (Air)
- 12% (Train)
- 2% (Car)
- 1% (Bus)

2009
- 10.5% (Air)
- 38% (Train)
- 1.5% (Car)
- 1% (Bus)

2013
- 65% (Air)
- 26% (Train)
- 8% (Car)
- 1% (Bus)
Positive effects on GHG (GreenHouse Gas) Emissions


- Energy: -4%
- Services/Agriculture: -20%
- Residential: -18%
- Transport: 36%
- Industry: -17%


- Energy: 30%
- Services/Agriculture: 13%
- Residential: 8%
- Industry: 20%
- Other: 5%
- Transport: 24%
- Railways: <2%
- Aviation: 12%
- Navigation: 15%
- Road: 71%
- Other: 1%

Total 5.360 mln tCO$_2$eq

Total 1.310 mln tCO$_2$eq

In the last two decades, Transport is the only sector that continuously increased its GHG (GreenHouse Gas) emissions in Europe and it now accounts for nearly 25% of the total emissions.

Railways are responsible for a marginal share of the total sector GHG (less than 2%) including both direct and indirect emissions.

Source: UE - "Energy and Transport in figures", statistical pocketbook (2010 update); *Including International Bunkers
Positive effects on GHG (GreenHouse Gas) Emissions (2)

Railways have a **natural competitive advantage** with respect to the other transport modes in terms of sustainability.

In Italy **every passenger who chooses to move by train save to the Planet from 50% to 70% GHG emissions** relative to moving by plane or car.

The increasing of passengers in 2009 (+500,000) on HS route Rome- Milan has permitted a 30,000 ton CO₂ saving, because Frecciarossa service produces in average 72% CO₂ emission less a plane and 60% CO₂ less than a car.

Commitment for the environment
An environmentally sustainable transport: the green ticket

- In order to awaken public opinion on environmental issues and to contribute to the CO2 targets, also in the general framework of the EU commitment on this subject, by June 13, with the new Summer offers 2010, on train tickets it’s highlighted the lower CO2 emissions, produced by train vs other means of transport (car and plane)
Positive effects on passengers - Commuting region

From international experience, regions which are linked together in a band of cities, could be transformed in a unique integrated economic corridor. The HS line binds the labour and residential markets in one *commuting region*.

The introduction of the HS rail service has brought about a considerable increase of flows between close metropolitan areas, due to both changes in users’ mobility choices and residential location choices.

<table>
<thead>
<tr>
<th>Milan- Bologna route</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of passes</td>
<td>n.a.</td>
<td>1.345</td>
<td>1.956</td>
<td>45%</td>
</tr>
<tr>
<td>&gt; 3 days/week passengers</td>
<td>3,9%</td>
<td>6,5%</td>
<td>6,7%</td>
<td>72%</td>
</tr>
</tbody>
</table>
## The Italian HS: Urban Renewal

### Positive effects on real estate market

<table>
<thead>
<tr>
<th>City</th>
<th>Station Area</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Napoli</td>
<td>Afragola</td>
<td>+2,6%</td>
</tr>
<tr>
<td>Bologna</td>
<td>Centrale</td>
<td>+26,4%</td>
</tr>
<tr>
<td>Milano</td>
<td>Rogoredo</td>
<td>+27,5%</td>
</tr>
<tr>
<td>Roma</td>
<td>Tiburtina</td>
<td>+29,4%</td>
</tr>
<tr>
<td>Torino</td>
<td>Porta Susa</td>
<td>+24,0%</td>
</tr>
<tr>
<td>Reggio E.</td>
<td>Stazione</td>
<td>+24,7%</td>
</tr>
</tbody>
</table>

Increase on real estate price in HS service Cities (% 2003-2009)
A modern railway system is the greatest development opportunity for a country to increase mobility, logistics and environmental sensibility and to guarantee new economical & social benefits.