Ministry of Infrastructures and Transport

DIGIFEMA

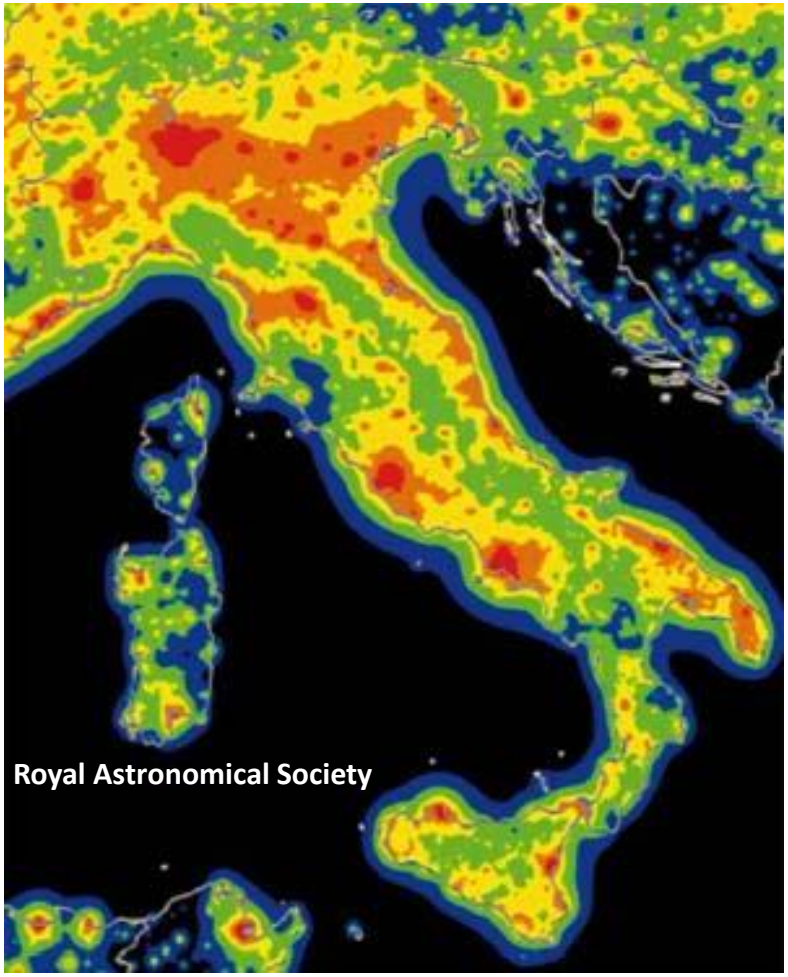
Directorate-General for Rail and Marine Investigations

HSR in Italy, experience so far and competition: a win-win game!

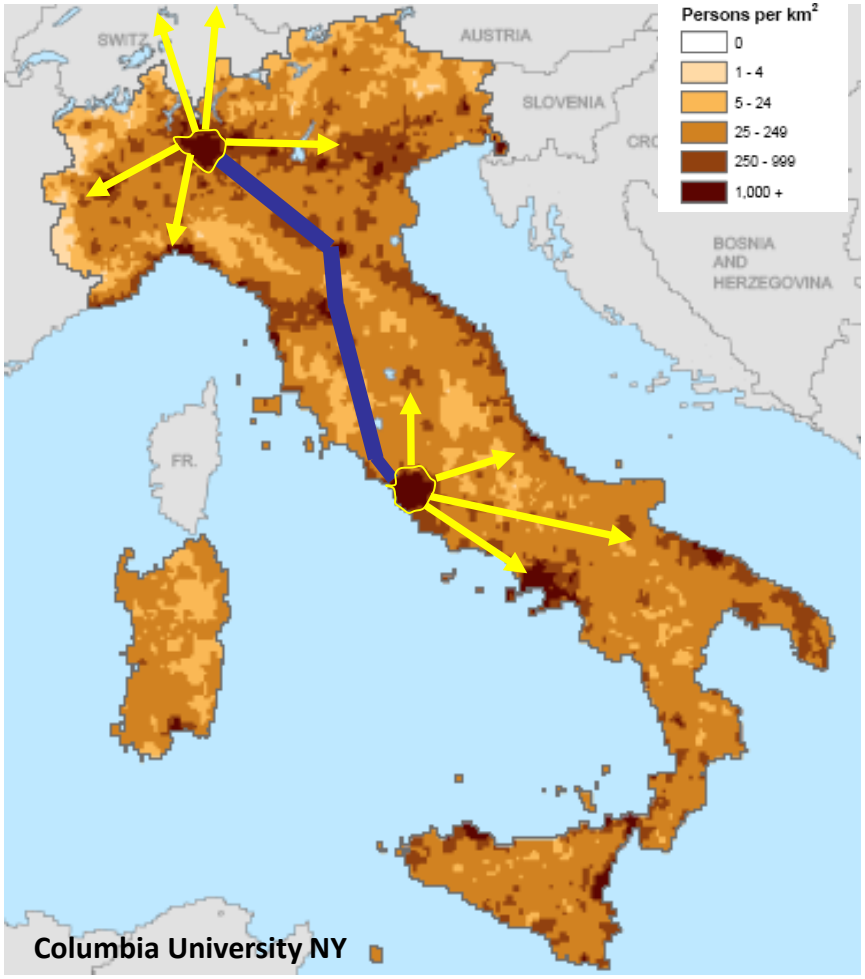
Fabio Croccolo Ph. D.
General Director

Needs of mobility in Italy

Residential density



The solution



Link Hub

Spoke

The Italian High Speed Network

Novara-Milano
December 2009

Torino-Novara
February 2006

HS Station Torino Porta Susa
2011

HS Station Roma Tiburtina
2011

Roma-Gricignano
December 2005

HS Station Napoli Afragola
2019

Gricignano-Napoli
December 2009

Napoli-Salerno
June 2008

HS Station Reggio Emilia
June 2013

Milano-Bologna
December 2008

HS Station Bologna
December 2012

Bologna-Firenze
December 2009

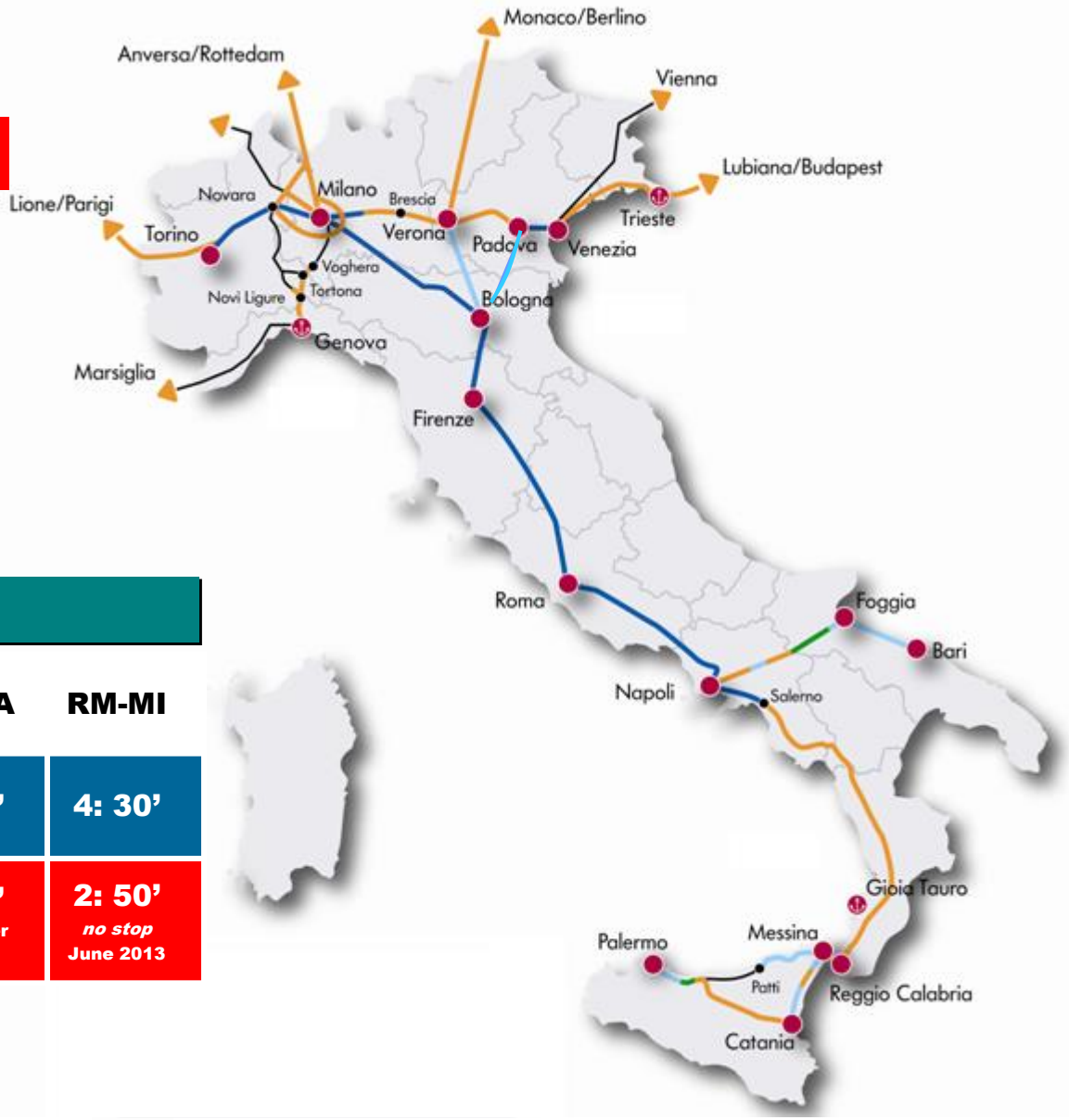
HS Station Firenze
2018

Roma-Firenze
1992

The Italian HS network

HS NETWORK

	Km
2006	600
2008	800
2009	970



Travel time at June 2016

Line	TO-MI	MI-BO	BO-FI	RM-NA	RM-MI
No HS best time	1: 25’	1: 45’	59’	1: 27’	4: 30’
HS	50’ December 2012	1h June 2013	35’ December 2009	1: 10’ December 2009	2: 50’ *no stop* June 2013

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 (350) km/h
	Maximum tested speed (February 27th 2016)	394 km/h
	Uncompensated radial acceleation	0.6 m/s^2
	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 m^2
	Natural tunnels free section	82 m^2
	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)

MILANO-BOLOGNA HIGH SPEED LINE: CABLE-STAYED BRIDGE OVER PO RIVER (designed by Calatrava)

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)

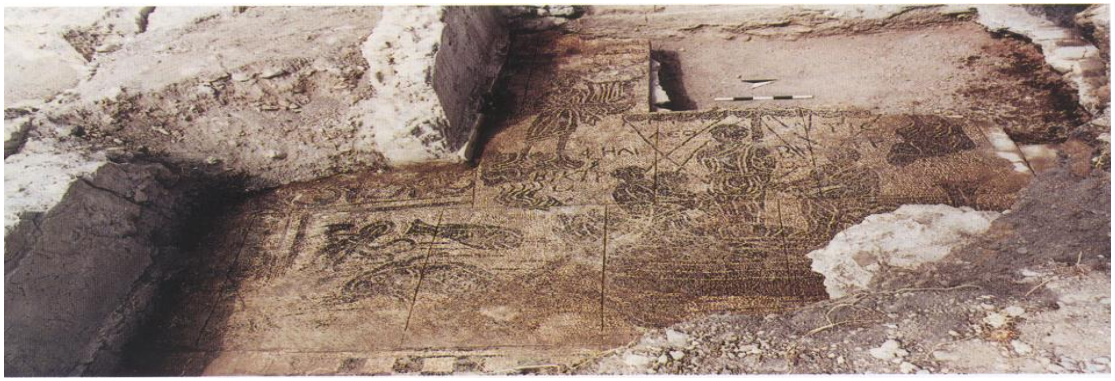
Railway flanking the motorway - Carisio (Turin-Milan HS line)

Points of excellence: archaeological management

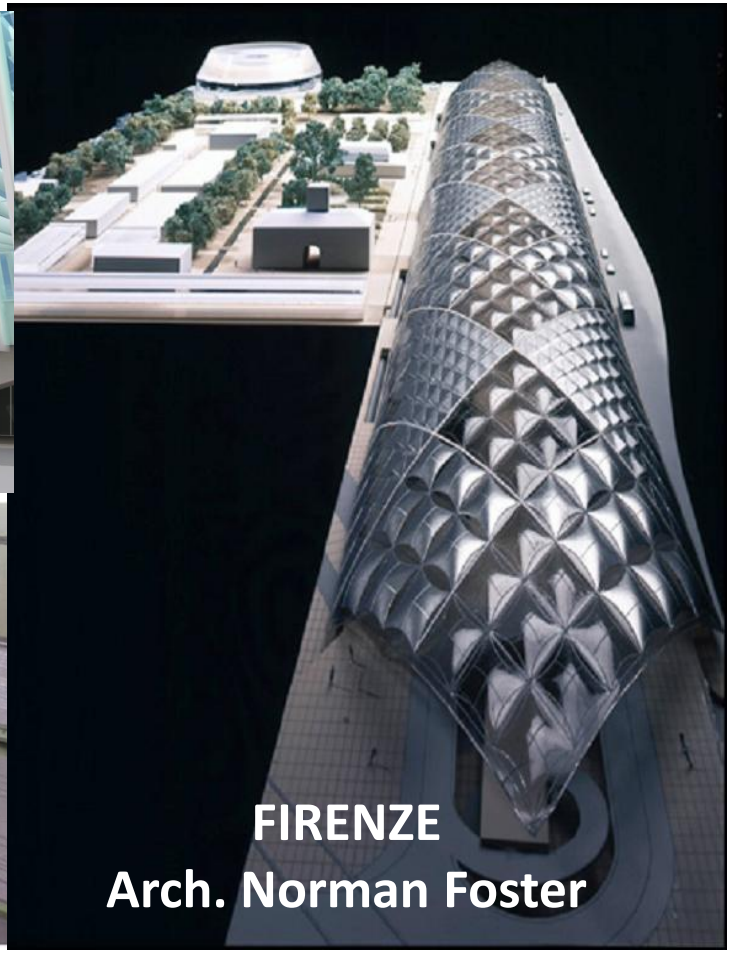
during HS lines construction

300 archaeological interventions

51 main archaeological sites



The Italian HS new stations (1)



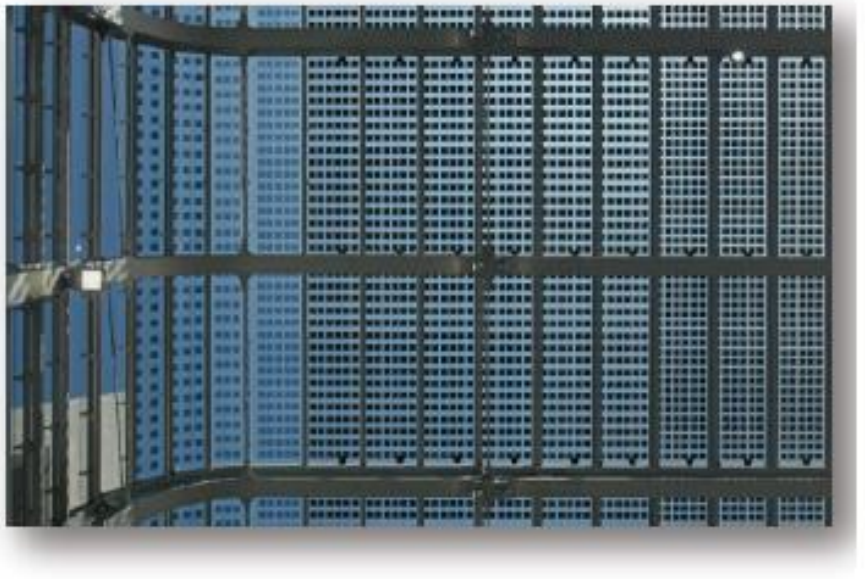
The Italian HS new stations (2)

Torino Porta Susa

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



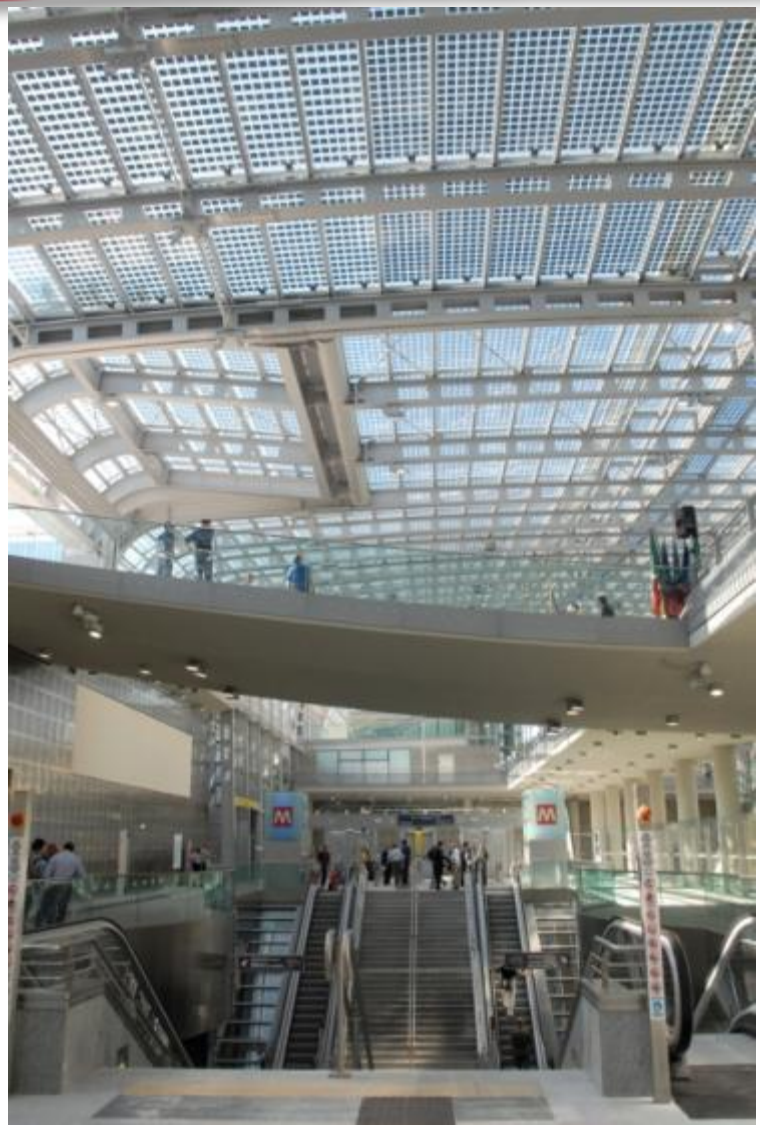
Winner of Eurosolar award (Berlin, Deutscheland)

Torino Porta Susa

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

Torino Porta Susa



- 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

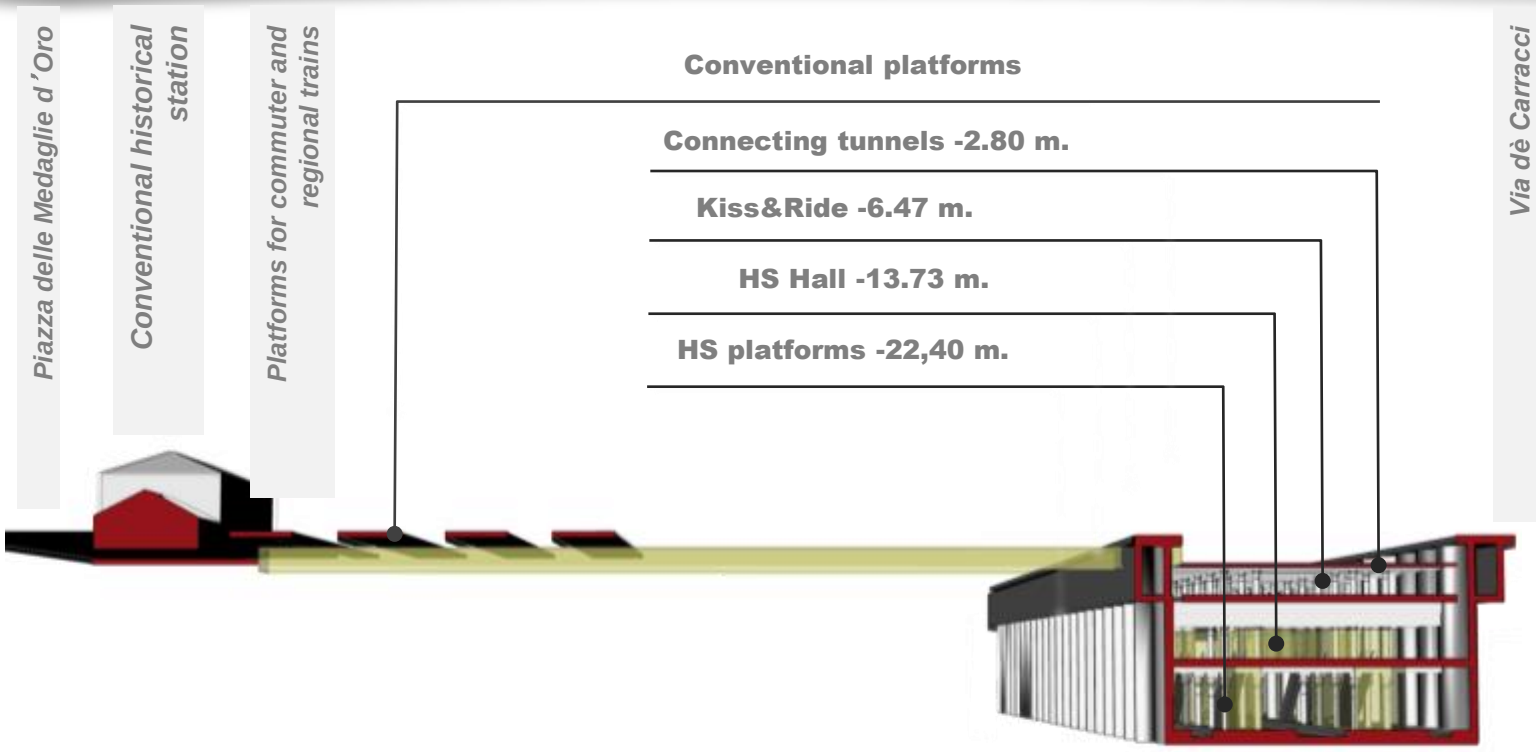
Torino Porta Susa

Torino Porta Susa

Torino Porta Susa

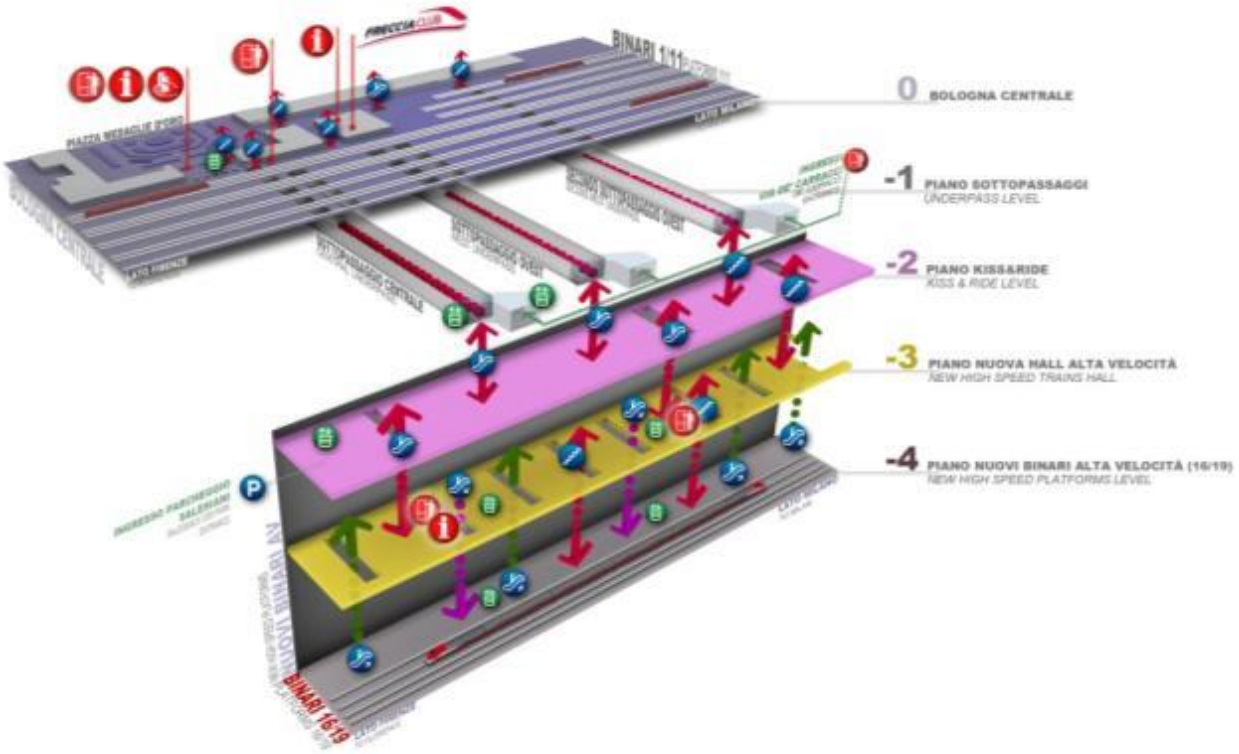
L’ingresso su Corso Bolzano

Bologna Centrale



- Lenght: 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.

Bologna Centrale



Project ITALFERR
Overall surface 77,500 sqm
Cost: M€ 530

Bologna Centrale

LED lighting for low energy consumption

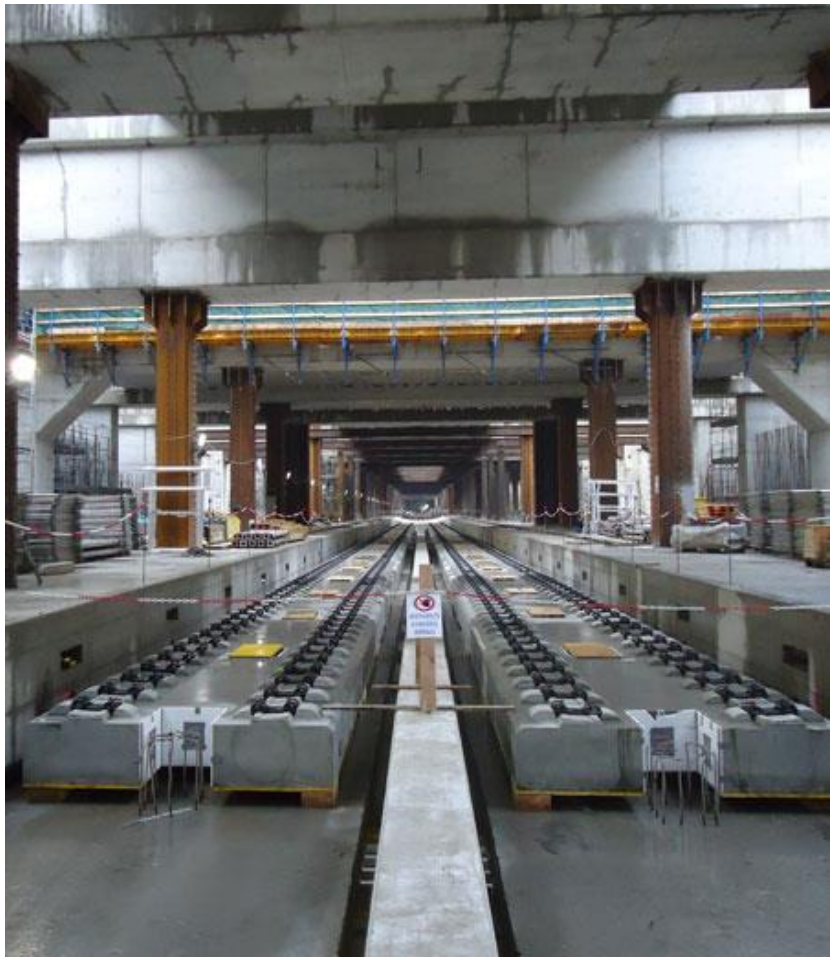
Bologna Centrale

Connecting tunnels

HS Hall

Hall Carracci

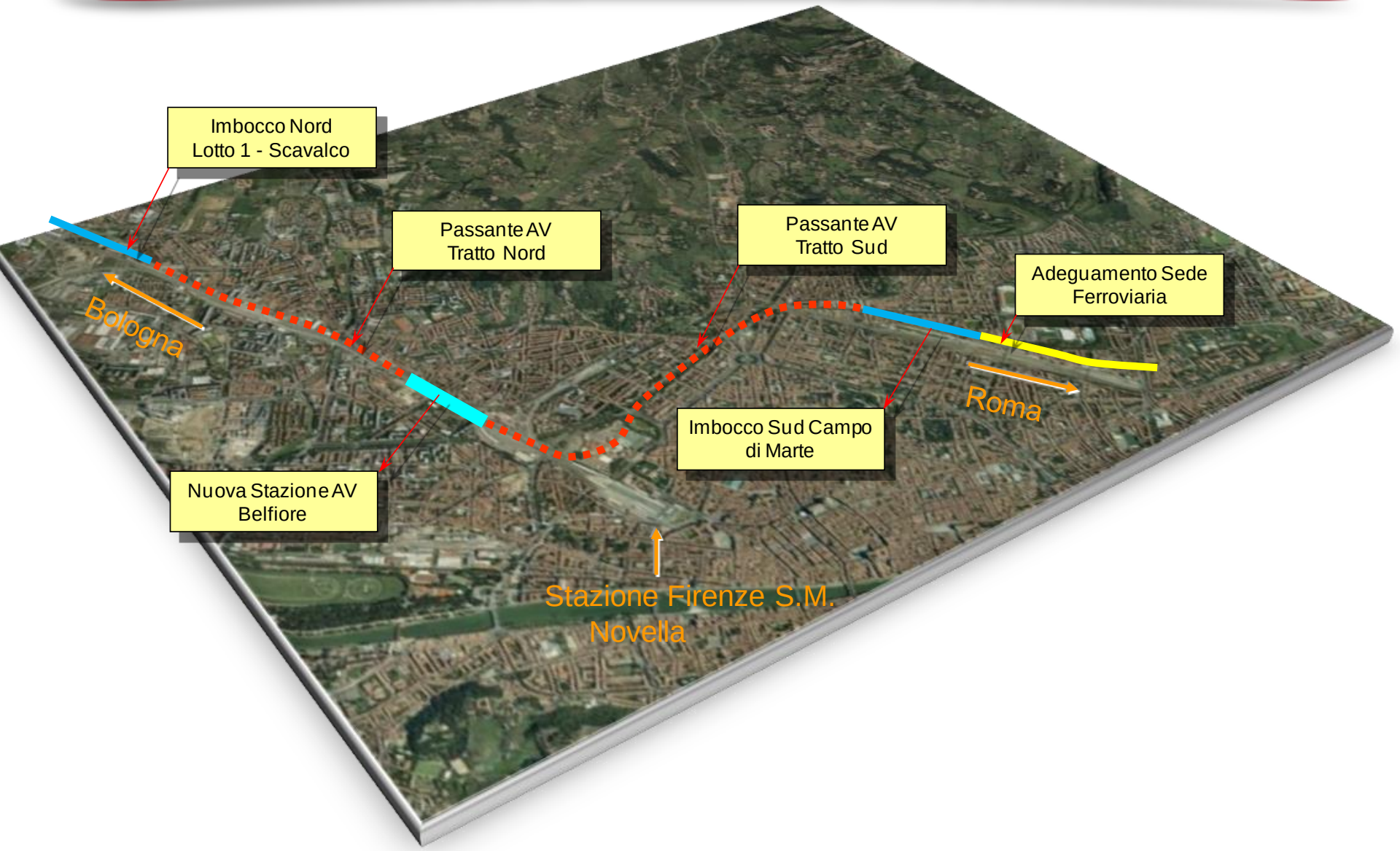
Bologna Centrale



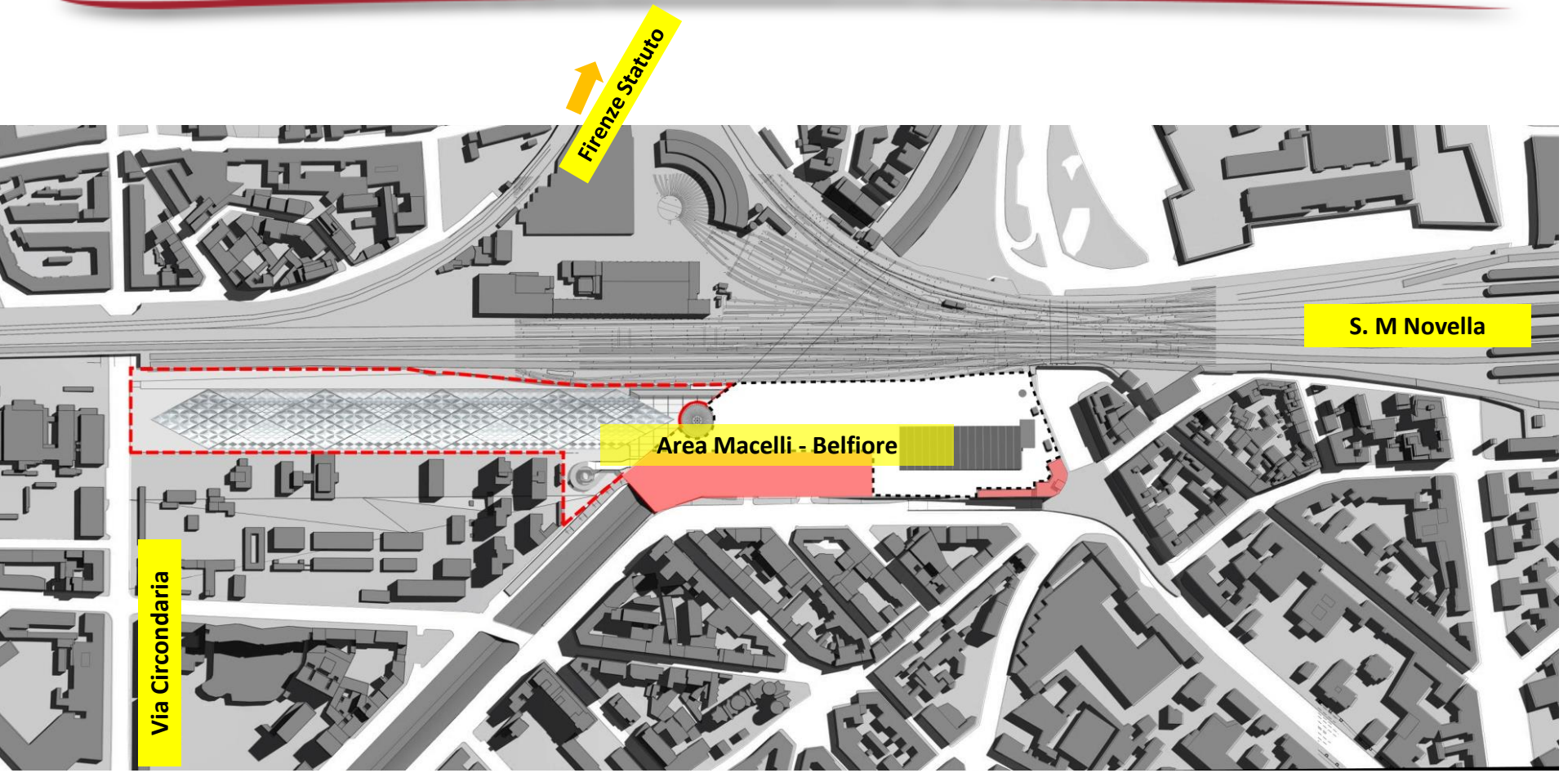
Building phases

HS platforms

Firenze Belfiore

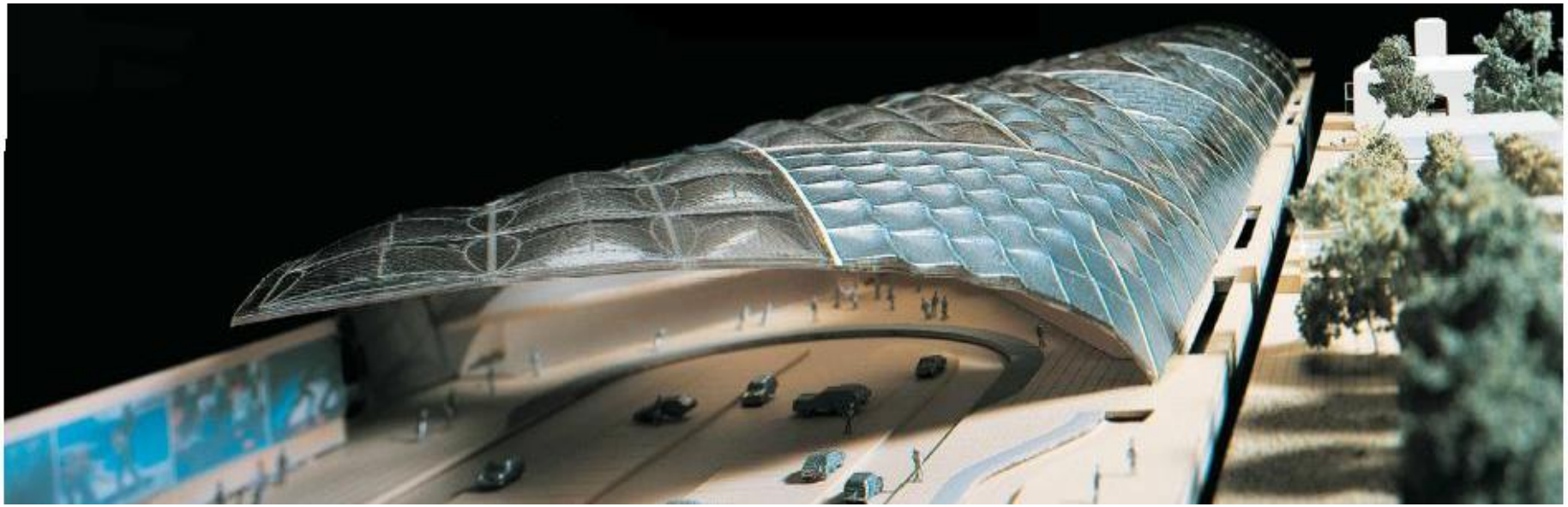


Firenze Belfiore



New HS Station

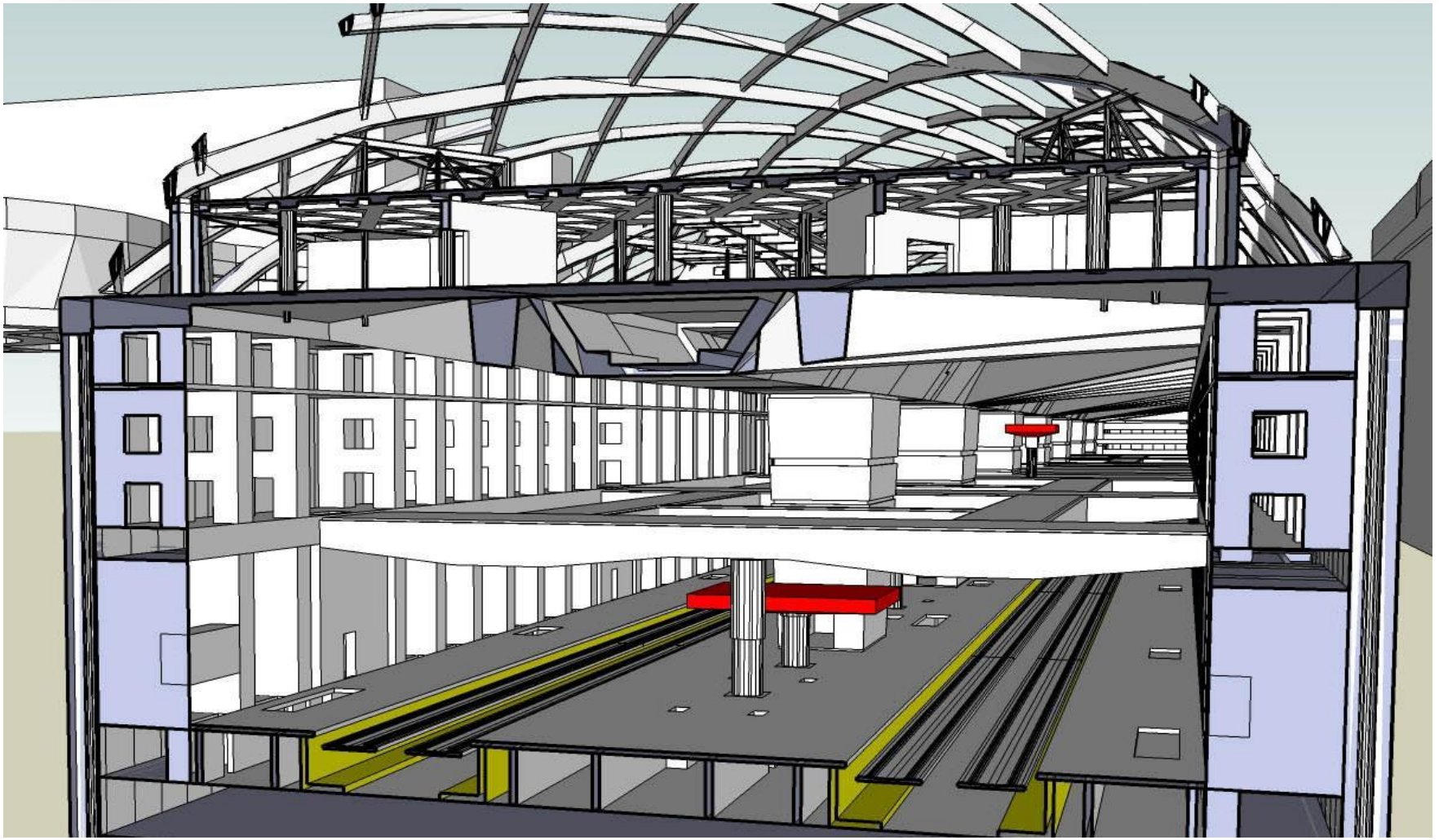
Firenze Belfiore



- Cost: M€ 410.
- Project: Foster & Arup, winner of an international tender.
- Lenght 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.

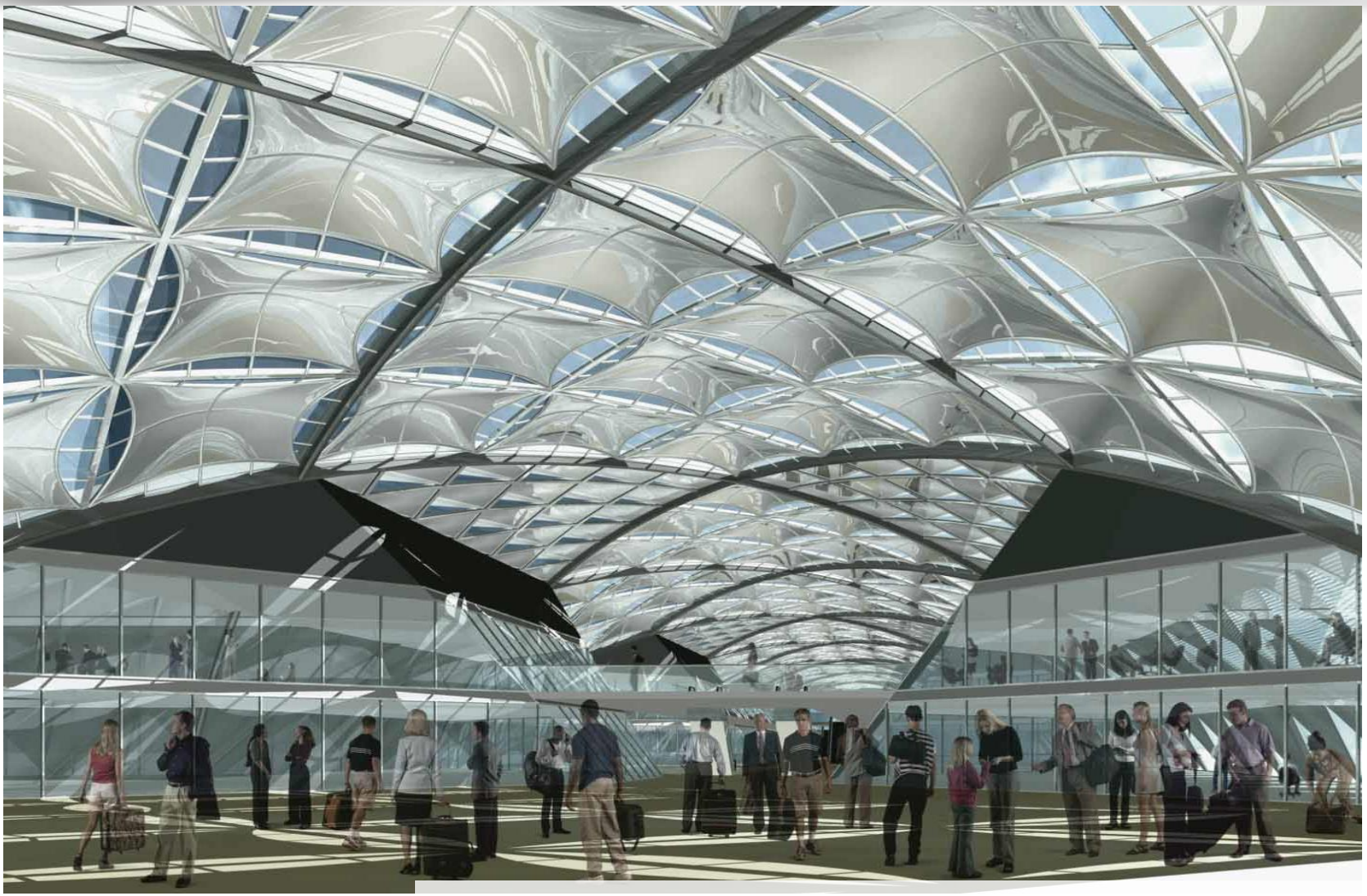
Firenze Belfiore

Firenze Belfiore



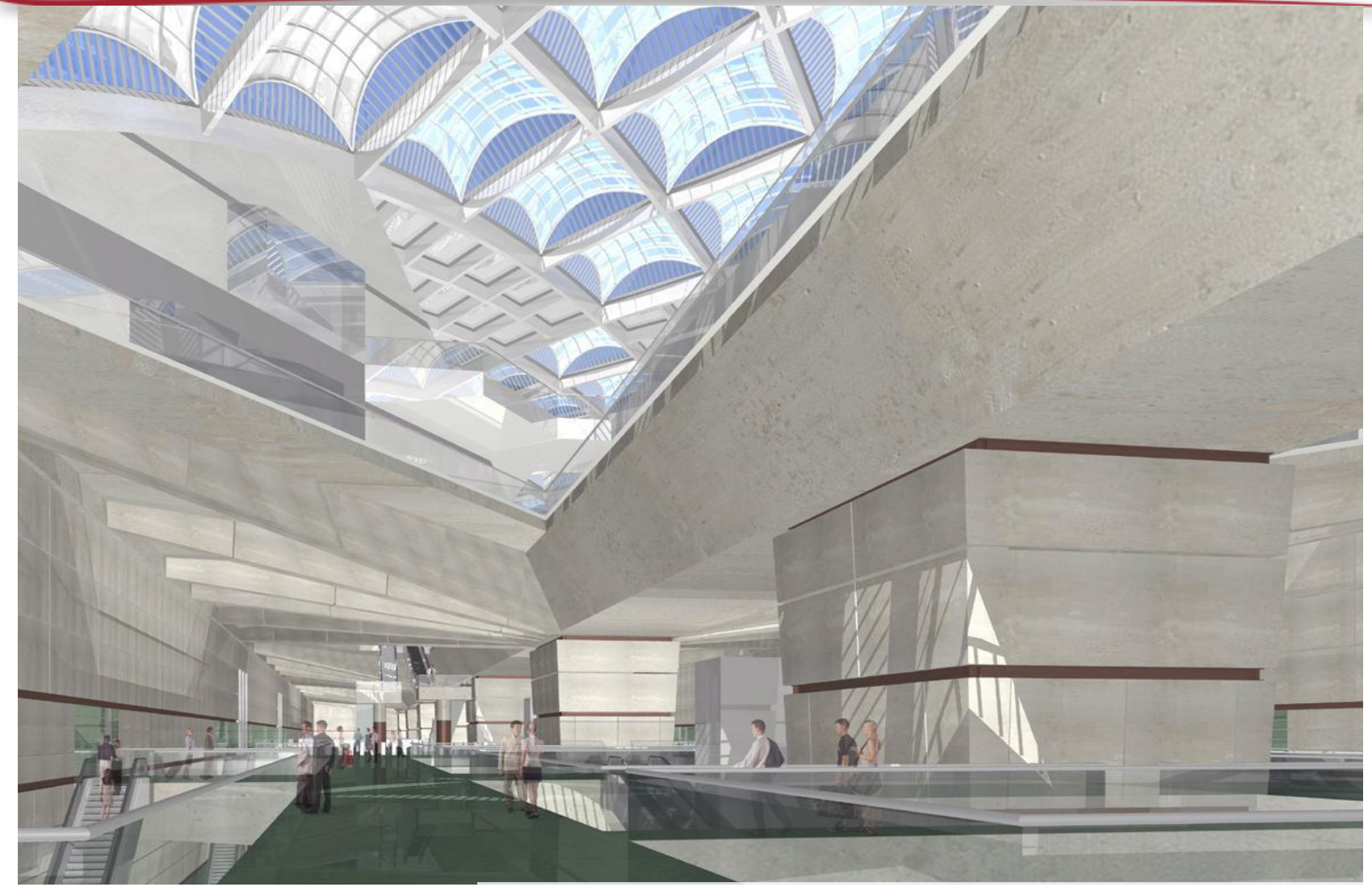
Firenze Belfiore

Firenze Belfiore



Street level: main hall, services to travellers, commercial area.

Firenze Belfiore



Floor -1: automatic ticket machines.

Firenze Belfiore

Floor -2 (m. 22 underground): platforms

Firenze Belfiore

Escalators from floor -2

Underground, but solar light

Roma Tiburtina

Project: Arch. Paolo Desideri
Cost: M€ 196

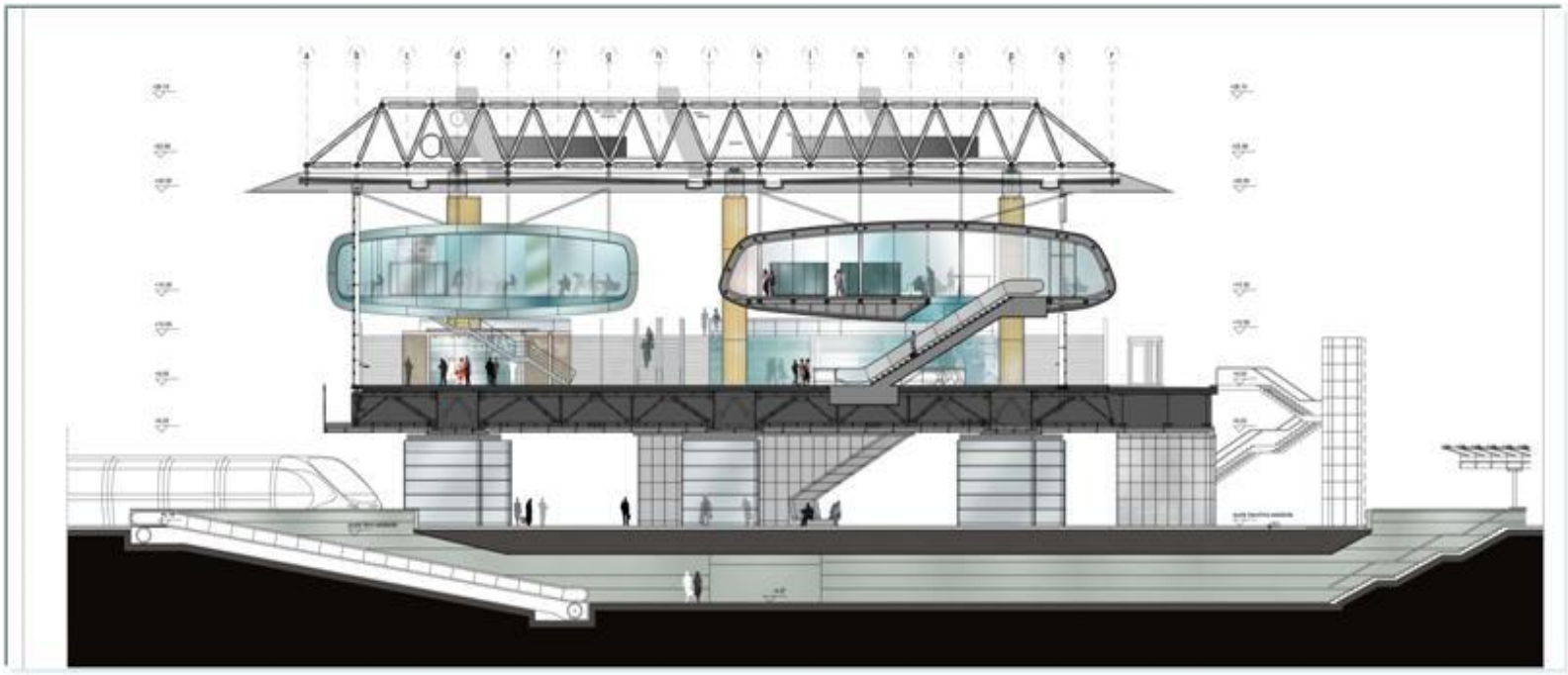
Roma Tiburtina

- 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.

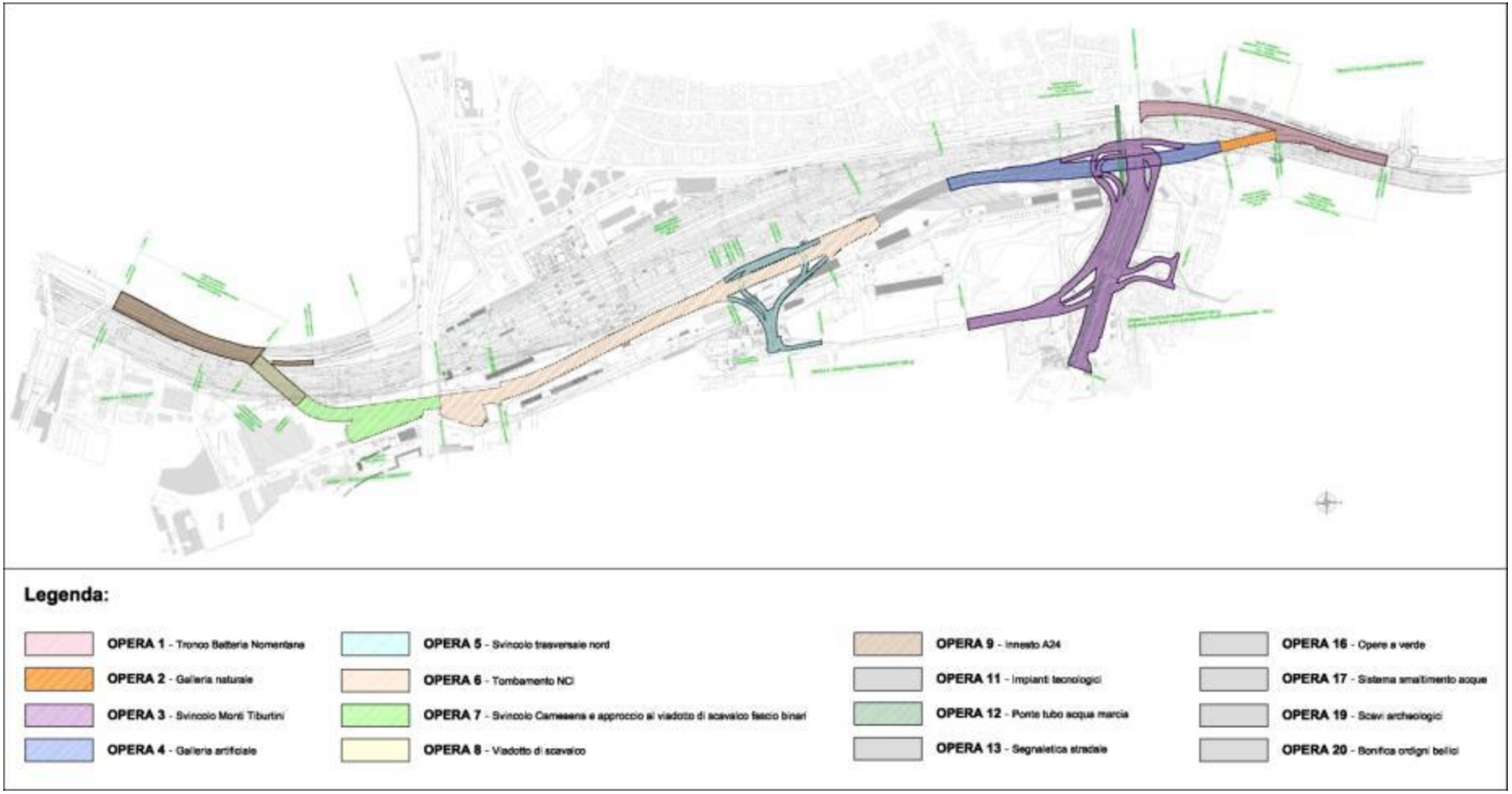
- Floor 2 (+14,5 m): services to travellers and commercial areas.
- Floor 1 (+ 9 m): commercial areas and access to platforms.
- Floor 0: platforms and main entrances.
- Floor -1 (-4,5 m): main hall.
- Floor -2 (-9,5 m) technical services.



Roma Tiburtina

Roma Tiburtina

New underground roads and parking



Roma Tiburtina

New underground roads and parking

The Italian HS: NEW TECHNOLOGIES

ERTMS

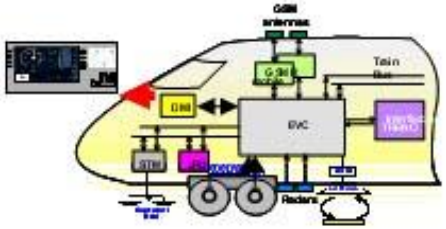
(European Railway Traffic Management System)

The EU standard

Network Remote control

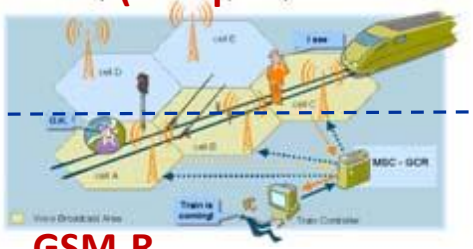
SCC (Command and Control System)

ATC
Automatic Train Control



ETCS (European Traffic Control System)

TLC
Telecommunication



GSM-R

Efficiency and development

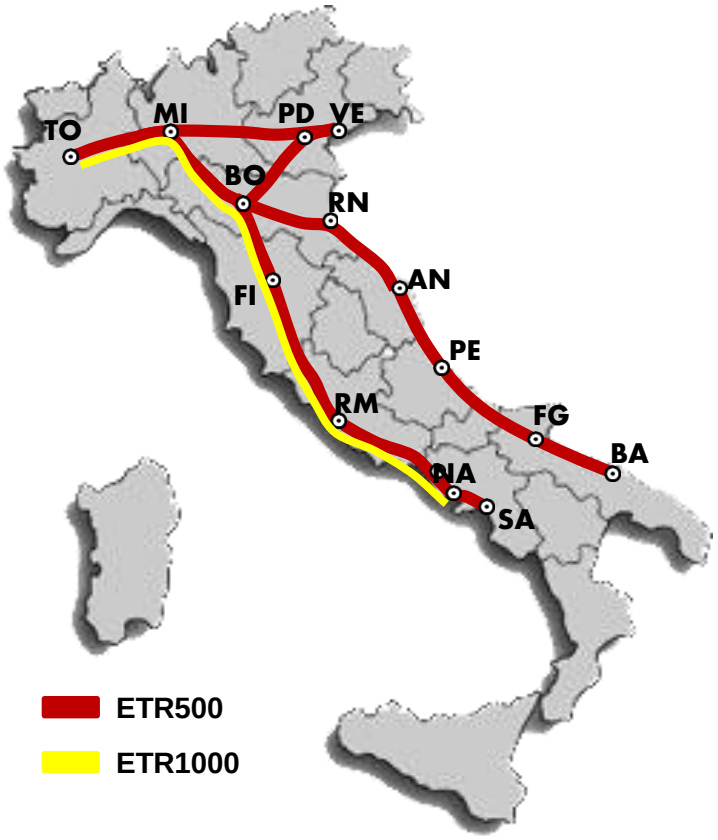
ACC Multi-station
Central computerised device

Train Diagnostics

High Speed services

The Italian *"Arrows"*: FrecciaRossa e FrecciaArgento

Frecciarossa: trains



FRECCIAROSSA

ETR1000 - ETR500

Max. speed: 400 (ETR1000) - 360 km/h (ETR500)

Commercial speed: 300 km/h (350 possibly Dec. 2016)

8 cars
457 places
4 levels of service:
EXE, BSN, PRE, STD

11 cars
574 places
4 levels of service:
EXE, BSN, PRE, STD

Frecciarossa: network

116 daily links

- TO-SA: **90** trains/day
- VE-SA: **14** trains/day
- Milano-Venezia: **8** trains/day
- Milano-Adriatica: **4** trains/day

Travelling time

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

No - stop links

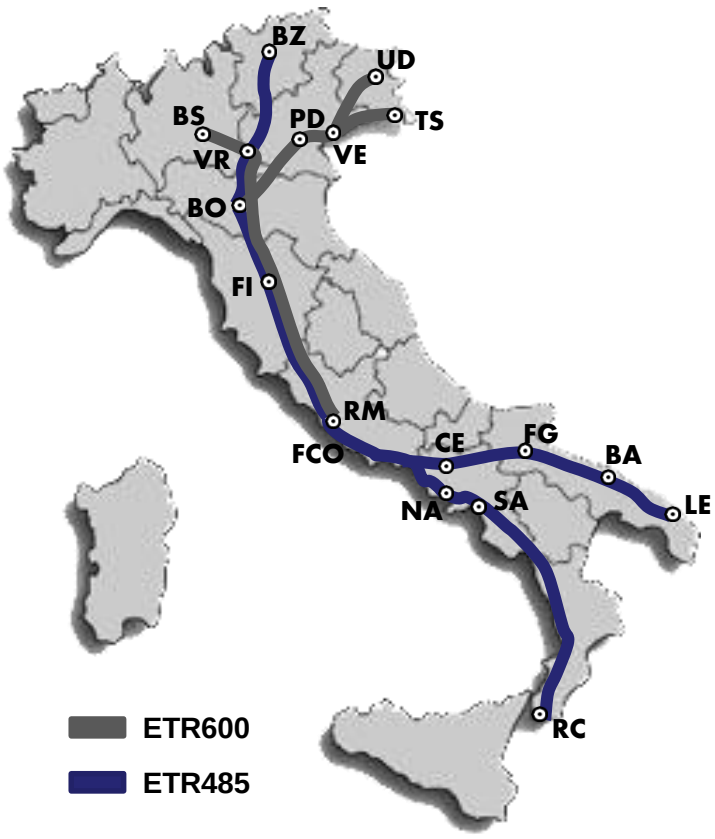
- **2h 45’ Rome Tib. – Mi Rog.**
- **2h 59’ Rome Term. – Milan C.le.**

✓**Easy learning timetable** **(00, 15, 30)**

✓**Comfortable seats**

(seats are spaced 98 cm apart, 20 cm more than air seats distance)

Frecciargento: trains



FRECCIARGENTO

ETR600 & 610 (12 trains), **ETR485** (15 trains)

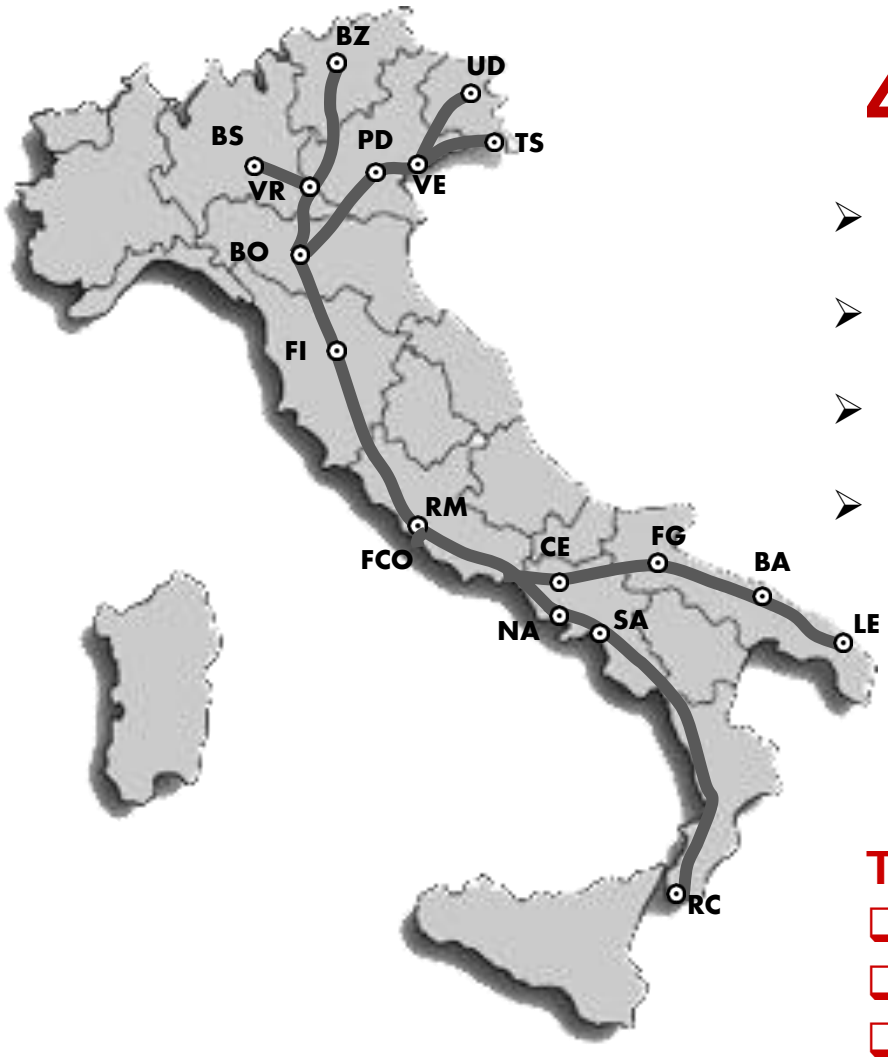
Max. speed: 280 km/h

Commercial speed: 250 Km/h

7 cars
432 places (412 for ETR610)
2 levels of service:
I class / II class

9 cars
489 posti
2 levels of service:
I class / II class

Frecciargento: network



44 daily links

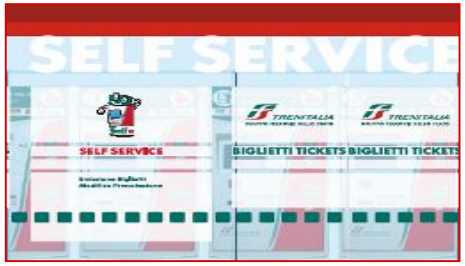
- Roma- Venezia/UD/TS: **22** trains/day
- Roma-Verona/Brescia/Bolzano: **14** trains/day
- Roma-Puglia: **6** trains/day
- Roma-Calabria: **2** trains/day

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

Maggiore

trambus open

- **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

ITALO trains

AGV FLEET

EVO FLEET

On delivery from December 2017

.italo

The .italo trains

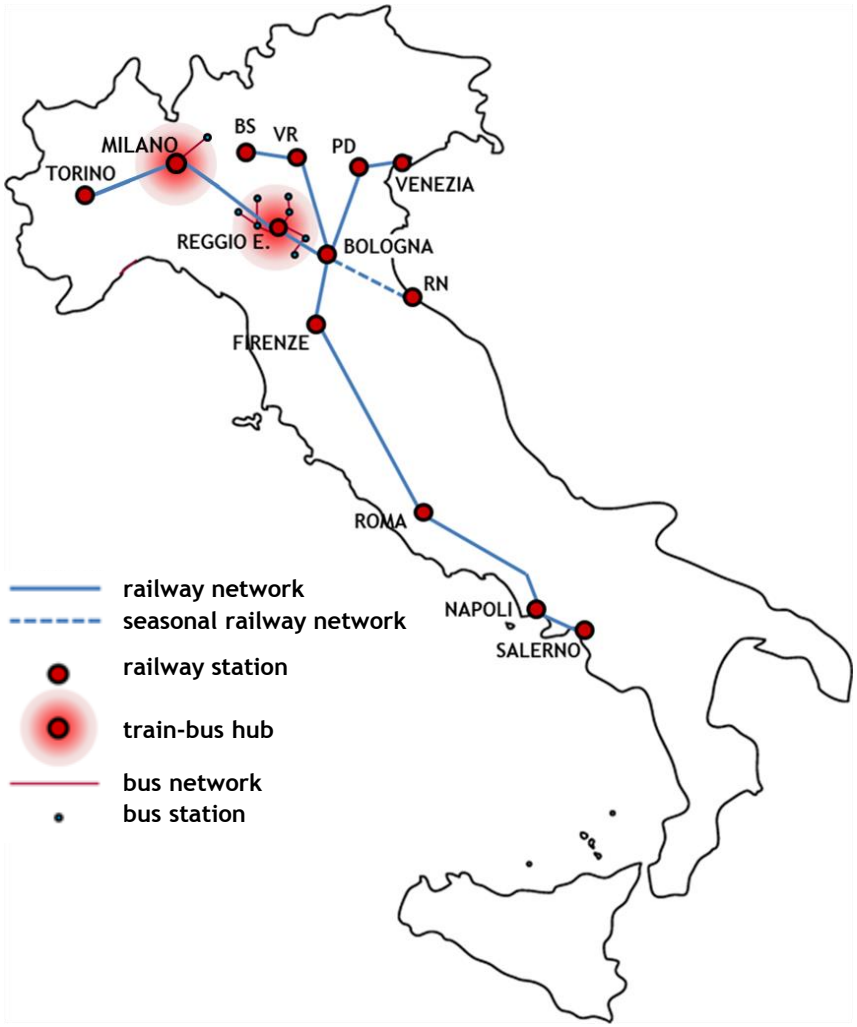
ntv
Nuovo Trasporto Viaggiatori

WINTER 2011	21 APRIL 2012	SUMMER 2013
		
Start of NTV's TEST	**Start of no-stop service**	**NTV fully operative**
		

50 TRIPS EVERYDAY
12,3 MILLION KILOMETERS PER YEAR
2 Millions of Passengers in the first year

.italo

ITALO network in 2016



2016 *versus* 2015

- **Entrance into main stations:** Torino Porta Nuova, Milano Centrale and Roma Termini
- **Daily services increase**: from 48 to 56 per day
- **Additional trains on peak hours:**
  - ✓ Milano-Roma (2 trains per hour)
  - ✓ Bologna-Firenze-Roma (2 trains per hours)
- **New markets:** new services launched from Brescia/Verona to Roma/Napoli
- **Increase in performances:** from 12,4 to 13,8 million trains-km (+12%)
- **New intermodal services (train & bus) launched:** 26 daily services on Reggio Emilia and 6 daily services on Milano

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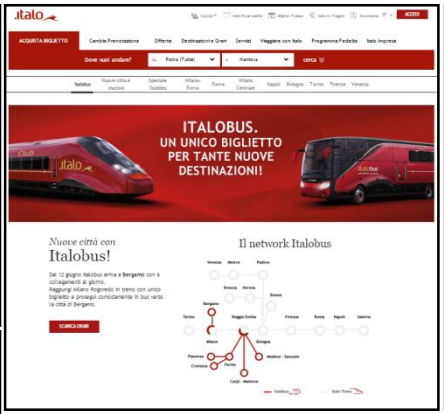
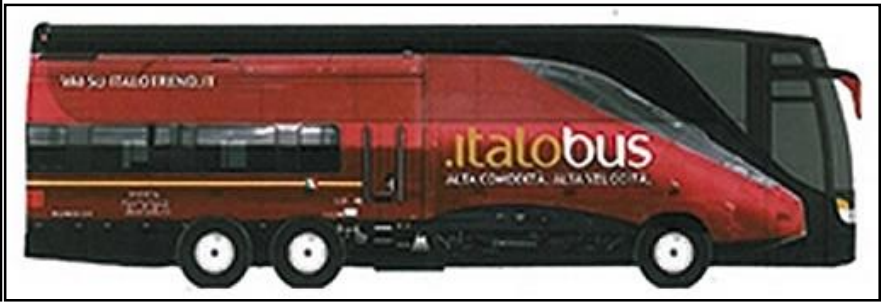
ITALO services





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ITALO network development from 2012 to 2015

	2012 Apr-Dec	2013	2014	2015
Train-km	4,2 mln	11,6 mln	11,9 mln	12,1 mln
Passengers carried	2,05 mln	6,20 mln	6,56 mln	9,15 mln
Load factor	47%	51%	52%	72%

Apr 2012 – Feb 2013
Operational ramp-up

- ***April 28th 2012*** *= ITALO trains came into operation*
- ***March 2013*** *= completion of AGV-575 entire fleet delivery*

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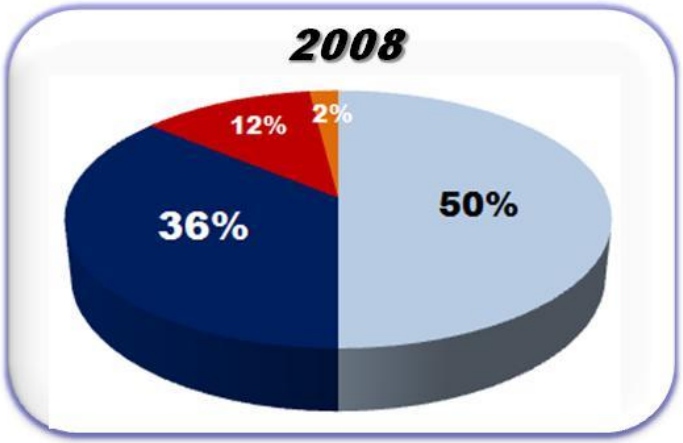
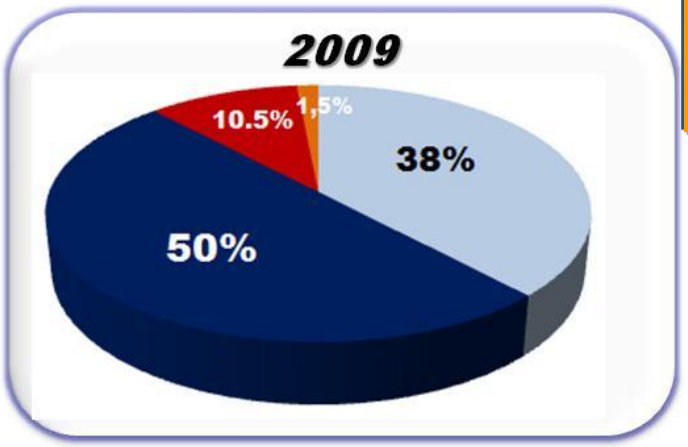
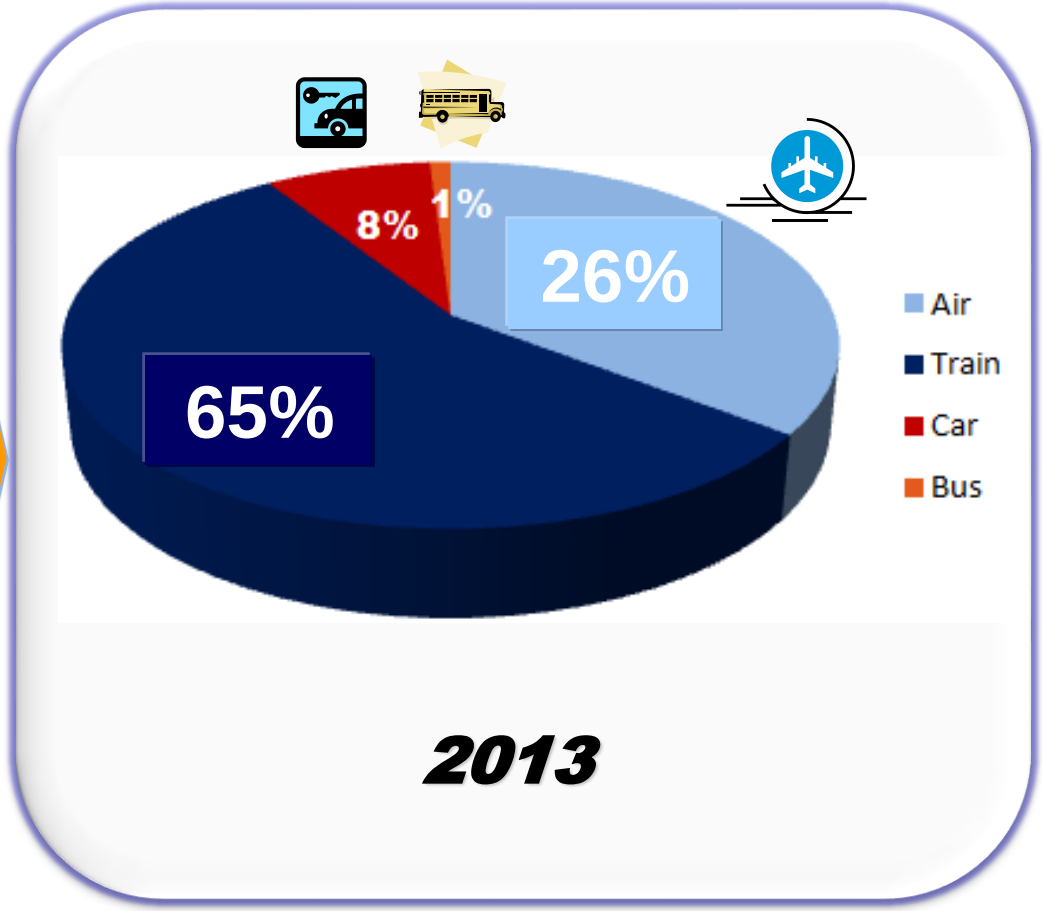
The Italian HS: The MODAL SPLIT…

… a revolution

Modal split Milan – Rome (%)







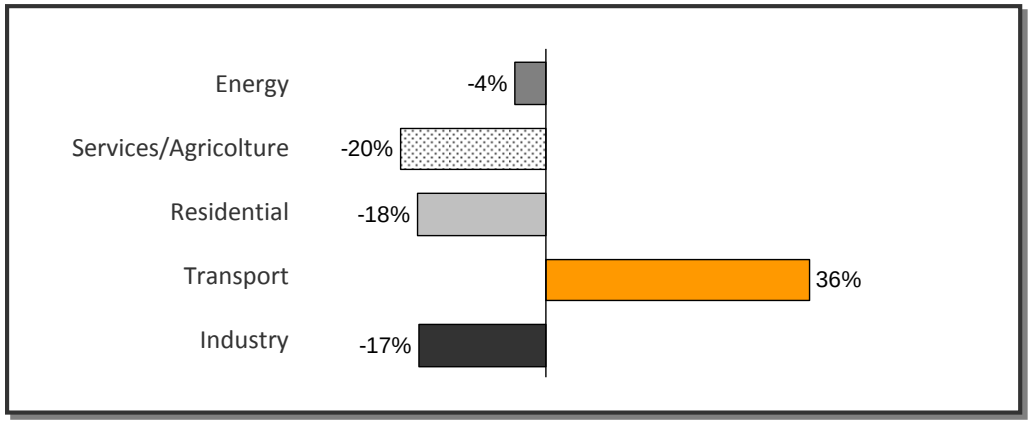
Trend Pax e Pax * km HSR

	2011		2012		2013		2014		2015	
	Mpax	GPax * Km	Mpax	GPax * Km	Mpax	GPax * Km	Mpax	GPax * Km	Mpax	GPax * Km
Trenitalia	23,4	8,6	25,1	9,1	26,2	9,5	29,1	10,4	31,2	11,09
NTV	0	0	2,05	0,89	6,2	2,63	6,56	2,76	9,15	3,97
Total	23,4	8,6	27,15	9,99	32,4	8,13	35,65	13,16	40,3	15,06

The Italian HS: ENVIRONMENT

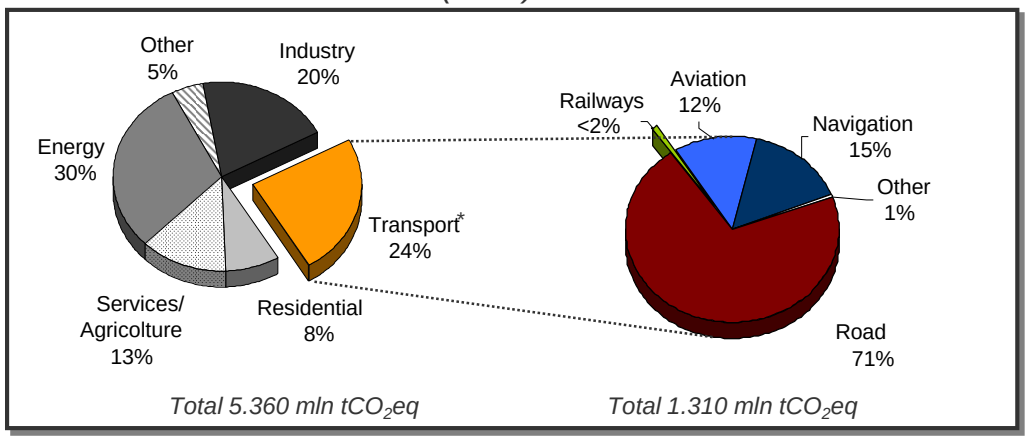
Positive effects on GHG (GreenHouse Gas) Emissions

GHG Emissions: UE - 27 (1990-2007)



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.

GHG Emissions: UE - 27 (2007)



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*

The Italian HS: ENVIRONMENT

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 CO_2 saving, because Frecciarossa service produces in average 72% CO_2 emission less a plane and 60% CO_2 less than a car.

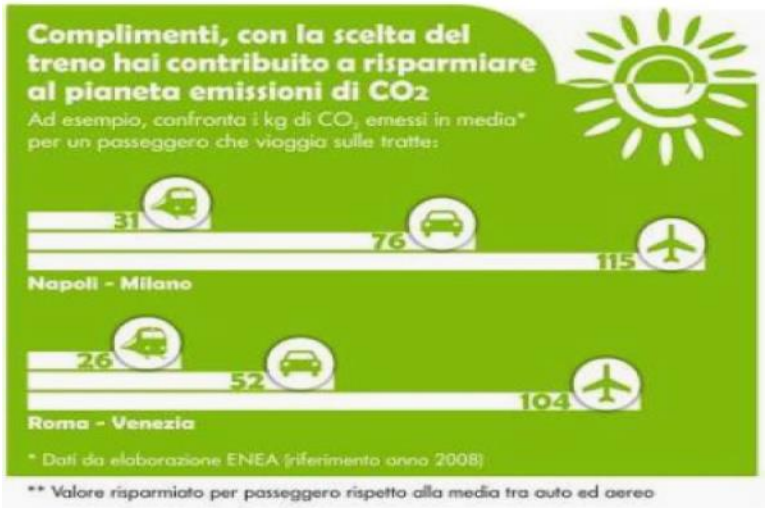
Note: see also for more info the Econtransit and Ecopassenger Website on:
http://www.ecotransit.org/ and http://www.ecopassenger.org/

The Italian HS: ENVIRONMENT

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)



The Italian HS: Regional impact

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

Milan- Bologna route	2008	2009	2010	Increase
Number of passes	n.a.	1.345	1.956	45%
> 3 days/week passengers	3,9%	6,5%	6,7%	72%

The Italian HS: Urban Renewal

Positive effects on real estate market

City	Station Area	Difference
Napoli	Afragola	
+2,6%	+34,8%	32,2%
Bologna	Centrale	
+26,4%	+38,4%	12,0%
Milano	Rogoredo	
+27,5%	+34,5%	7,0%
Roma	Tiburtina	
+29,4%	+34,5%	5,1%
Torino	Porta Susa	
+24,0%	+27,7%	3,7%
Reggio E.	Stazione	
+24,7%	+28,5%	3,8%

Increase on real estate price in HS service Cities (% 2003-2009)

The Italian HS: an opportunity

Mobility

- Increase of transport production (especially metropolitan areas)
- Journey time reduction
- Specialized lines
- Modal split increase
- Advantage for regional transport on conv. lines

Freight

- Capacity increase
- Comm. speed increase
- Logistic and HUB Development

Environment

- Modal shift
- Urban development
- Metropolitan urban centers decongestion
- Reducing air pollution and CO_2 emissions

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