



ERTMS DEPLOYMENT IN ITALY



Italy, as an early investor in ERTMS, distinguishes itself by the use of ERTMS Level 2 on the main national axis, from Turin to Salerno. This allows for mixed traffic (passengers and freight) on what is nationally called a “High Speed, High Capacity” network. In most sections of it, ERTMS level 2 is the sole signalling system - without any fall-back system and without trackside signals – resulting in considerable savings in infrastructure and maintenance costs.

ERTMS has helped gain significant market share for rail transport in Italy, and the completion of the High Speed is expected to bring further economic and social benefits. Additionally, construction on the new high-speed rail lines connecting Milan to Venice and Genoa is advancing.

For the **Milano-Venezia line**, the Milan-Brescia section is already operational, while the Brescia-Verona section is on track for activation in 2026 (PNRR target). The subsequent Verona-Padova section is delivered by functional lots (Verona - Bivio Vicenza first; Vicenza crossing next; Vicenza - Padova in later stages. Once finished, travel time between Milan and Venice is expected to be reduced to about 2 hours. ¹

Regarding the **Milano-Genova line**, construction is currently in progress, with completion expected by 2026. These projects are intended to significantly improve connectivity and reduce travel times between these major Italian cities.



What is the status of ERTMS deployment in Italy?

Italy has been heavily investing in High Speed lines since the early 2000's. The construction of the first ERTMS-equipped lines commenced in 2004. RFI (Rete Ferroviaria Italiana), the Italian Rail Infrastructure Manager, opted for **ERTMS Level 2 as the sole signalling system** on its new High Speed lines. This approach avoids fallback systems and trackside signals, thereby reducing infrastructure and maintenance costs:

- Rome-Naples** route (203 km) since December 2005
- Turin-Novara** route (85 km) since February 2006
- Padova-Mestre** (25 km) since March 2007
- Napoli-Salerno** (29 km) since 2008
- Milan-Bologna** route (198 km, including “passante”) since December 2008
- Bologna-Florence** (80 km) since December 2009
- Novara-Milan** (40 km) since December 2009
- Treviglio – Brescia** (40 km) since December 2016
- Monza-Chiasso** (40 km) since June 2020

As of 31 December 2022, 1.071 km of High-Speed network have been equipped with ERTMS without overlapping the national signalling systems and without lateral signal lights. ²

¹ <https://www.fsitaliane.it/it/opere-strategiche/linea-av-ac-brescia-verona-padova.html>

² https://www.fsitaliane.it/content/dam/fsitaliane/en/Documents/investor-relations/financia-statements/2024/FS_ENG_RFA_2024_ANNUAL_FINANCIAL_REPORT.pdf

RFI has initiated an accelerated plan to deploy ERTMS across the entire national railway network by 2036. This project involves a total investment of €15 billion and is aimed at equipping Italy's entire railway infrastructure with the most advanced train separation system.³

10.236 km of the Italian network is characterized by being part of the TEN-T network. Italy is crossed by four core European corridors:



Mediterranean Corridor



Baltic-Adriatic Corridor



Rhine-Alpine Corridor



Scandinavian-Mediterranean Corridor

The completion of high-speed rail corridors in December 2009 made it possible to travel between Milan and Rome in under three hours. Today, high-speed trains cover the 297-mile (478 km) journey in approximately 2 hours and 50 minutes.⁴

Further Enhancements to the Italian Railway Network

To further enhance the railway network, the construction of the new Florence Belfiore High-Speed Station is underway, with completion expected by 2028. Once operational, this station will optimize high-speed rail connections through Florence.

Italy has made significant advancements in its high-speed rail infrastructure, with several new stations inaugurated in major cities along key corridors:



Rome Tiburtina: This new intermodal high-speed station was inaugurated on November 29, 2011.



Turin Porta Susa: Opened on January 14, 2013, this station serves as a major hub in Turin.



Bologna Centrale Underground High-Speed Station: The upgraded underground section was inaugurated on June 9, 2013.



Reggio Emilia AV Mediopadana: Inaugurated in June 2013, this station enhances connectivity in the Emilia-Romagna region.



Napoli Afragola: Opened on June 6, 2017, this station serves the Naples metropolitan area.



Furthermore, two lines—**Naples-Bari** and **Palermo-Catania-Messina**—both part of the Scandinavian-Mediterranean Corridor, are under development in southern Italy. The Naples-Bari line aims to reduce travel times and enhance regional connectivity.

³ <https://www.rfi.it/it/news-e-media/comunicati-stampa-e-news/2023/10/4/da-fs-news---strisciuglio--ad-di-rfi---investiremo-15-mld-per-l-.html>

⁴ <https://www.trenitalia.com/it/frecciarossa/collegamenti-frecciarossa/viaggia-tra-roma-e-milano-con-frecciarossa.html>

The **Lyon-Turin international high-speed connection**, featuring a base tunnel beneath the Alps, is another major project under construction. This initiative holds significant European interest, promising benefits for passenger and freight transport across France, Italy, and the broader continent.

For the creation of the Brenner section of the Scandinavian-Mediterranean Corridor, fundamental for freight transport, two projects are of utmost importance:

-  **Upgrading of the Fortezza-Verona line:** This enhancement will improve the connection between Italy and Austria.
-  **Construction of the new Brenner Base Tunnel:** This tunnel will facilitate more efficient transit beneath the Brenner Pass.

The planned **Venice-Trieste high-speed line** aims to boost commercial exchange between Eastern and Western Europe. Additionally, the **Trieste-Divača line**, connecting Italy and Slovenia, is part of the Mediterranean Corridor, along with the Turin-Lyon line.

These projects collectively aim to enhance Italy's high-speed rail network, improving connectivity and fostering economic growth across the region.

How was ERTMS implemented in Italy?

Italy made a significant decision to adopt **ERTMS Level 2 as the sole signalling system for its new high-speed rail lines**, without implementing any fallback system. This strategic choice has led to substantial cost savings, as the trackside equipment can be specifically designed for its dedicated function. As a result, ongoing and related maintenance costs for trackside infrastructure are greatly reduced or eliminated.

What are the benefits brought by ERTMS in Italy?

Italy's adoption of ERTMS has yielded significant benefits for its railway network and society. The inaugural ERTMS line, **Rome-Naples**, experienced a remarkable doubling of passenger numbers within its first year of operation.

ERTMS has proven particularly advantageous for facilitating high-speed travel through Italy's challenging terrains, such as the Alps and Apennines. A notable example is the **Bologna-Florence** route, where 73 km of the 80 km line traverse tunnels. During test runs, a world speed record in a tunnel was achieved at 362 km/h.

In 2015, RFI conducted a technical-economic analysis to assess the benefits of implementing ERTMS over conventional lines. **The study concluded that ERTMS deployment would lead to maintenance savings.** Consequently, RFI developed a strategy to dismantle local signaling systems and implement ERTMS, aiming for a fully operational ERTMS network across all conventional lines.

Modal shift in action: From Sorpasso to preferred transport choice

In the first 50 days of commercial service of the Rome - Milan High Speed line, the airlines connecting Milan Linate Airport with Rome lost a total of 91,000 passengers (almost 2,000 per day, representing 30% of the market). Conversely, the High Speed service has gained 1,600 new passengers per day.

According to a Legambiente report, in 2019 the Italian High Speed line served 170,000 passengers per day. The modal shift “sorpasso” actually happened in 2010, when corridor traffic was dominated by rail transport services (55% share), followed by air (35%) and road 10%. By the end of June 2015, the modal shift kept favouring rail traffic with a 65% share, 24% for air connections and 11% by car. That means, 2 out of 3 trips are made by rail.

As of 2024, the modal shift continues to favor rail traffic, with rail holding a 68% share, air connections at 22%, and road at 10%. This shift has led to a significant reduction in airline seat capacity in the corridor, with several airlines cancelling Rome-Milan connections. Such modal shift translates into considerable CO2 savings. In this respect, RFI estimates that rail transport produces 44g of CO2 emissions per km while cars are at 118g per km, airplanes at 140g per km and trucks are at 158g per km.

What are the benefits brought by ERTMS in Italy?

On 28 April 2012, a major milestone was achieved in the European high-speed rail sector when NTV (Nuovo Trasporto Viaggiatori) launched commercial operations on Italy’s high-speed network. This marked the first time a private company offered high-speed passenger rail services in Europe. With this development, Italy became the first European country to open its high-speed rail market to competition—a pioneering move that has since inspired similar initiatives across the continent.

Since that date, NTV, renamed Italo – Nuovo Trasporto Viaggiatori S.p.A. in 2018, has expanded its services to connect the most populated Italian cities and has heavily invested in a modern Very High Speed fleet. ERTMS has been an essential part of this achievement, with the new Italo services benefiting from state-of-the-art interoperable infrastructure and ERTMS equipment available from no fewer than 7 independent suppliers.



Lines with ERTMS until 2024. Source: Piano Nazionale di Attuazione ERTMS. 2024