Italy is located in Southern Europe bordering Austria, France, Slovenia, and Switzerland and is primarily on a peninsula extending into the Mediterranean Sea. It has a population of 61.2 million (ranks 23rd in the world) and is designated as 68 percent urban. The largest city is Rome, the country’s capital, with 3.357 million, followed by Milan with 2.962 million people. The GDP of $1.8 trillion ranks as the 11th largest economy and the GDP per capita of $30,100 ranks 45th. Italy currently has almost 925 km (574 miles) of high-speed rail lines, with an additional 400 km (250 miles) planned for future development. The above map displays the International Union of Railways (UIC) map of Italy’s current and proposed high-speed rail network.
**SYSTEM DESCRIPTION AND HISTORY**

Like many European countries, Italy has an extensive passenger rail network stretching across the country with a long history of transporting people by way of conventional train service. Several sources indicate that in 1981, as a result of the poor quality on the conventional line between Rome and Florence, Italy opened the first high-speed line segment in the country. The UIC *High-Speed Lines in the World* indicates that two additional segments between Rome and Florence opened for high-speed service in 1984 and 1992. The following table shows these and other currently operational and planned high-speed line segments, according to the UIC. A major advancement to the Italian high-speed network occurred in 2006 with the opening of the line segment between Rome and Naples. A portion of this segment diverted high-speed operation away from the conventional track onto dedicated high-speed track, which greatly reduced the travel times. With further development of the high-speed network Italy now has 923 km (574 miles) of rail lines designated for high-speed rail operations.

**UIC Table of Italy’s High-Speed Rail Lines**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Milan-Bologna</th>
<th>Bologna-Florence</th>
<th>Turin-Milan</th>
<th>Rome-Naples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridges &amp; Viaducts</td>
<td>39%</td>
<td>5%</td>
<td>80%</td>
<td>40%</td>
</tr>
<tr>
<td>Tunnels</td>
<td>1%</td>
<td>90%</td>
<td>1%</td>
<td>30%</td>
</tr>
<tr>
<td>Earthwork</td>
<td>60%</td>
<td>5%</td>
<td>19%</td>
<td>20%</td>
</tr>
</tbody>
</table>

**ECONOMICS AND FINANCE**

The Italian State Railway, Ferrovie dello Stato (FS) controls both passenger and freight rail operations in the country. Following the European Union (EU) directive to separate rail infrastructure ownership and operations, Italy maintained FS as a holding company in government ownership and established the following subsidiaries:

- Rete Feroviaria (RFI) – Rail infrastructure and management company.
- Treno Alta Velocita (TAV) – High-speed line planning and constructing company.
- Trenitalia – Train operating company, including divisions for both freight and passenger operations.

A concession was awarded to TAV in 1991 to build and operate high-speed lines between Milan and Naples and between Turin and Venice. At that time it was envisioned that the high-speed network would be completely new infrastructure separate of the conventional lines. In 1996 the vision changed to one where the network would be more integrated into the existing network. At the time of the concession, TAV was 60 percent owned by private interests. That 60 percent was acquired in 1998 by FS after private shareholders became disinterested in providing the required capital for high-speed development. As a result, TAV became a full subsidiary of FS.

High-speed rail development has been largely funded and financed through government grants and guaranteed loans from government subsidiary Infrastructure SpA. Thompson and Tanaka (2011) also include EU grants and Euro—
pean Investment Bank (EIB) loans as sources of funding. The access charges published by RFI are characterized in that same report as non-discriminatory, complex, and distinct from other EU countries. They note that the access charge income is expected to cover approximately 18 percent of the total financial costs.

**Italy High-Speed Rail Operators**

Trenitalia, the state-owned rail operating company, operates three high-speed rail services in Italy:

- **Frecciarossa** – The newest service operates between Turin and Salerno at operational speeds up to 300 km/h (185 mph).
- **Frecchiargento** – These tilting trains are capable of operating on both the high-speed rail network and on the conventional rail network. The tilting trains provide high-speed operations up to 250 km/h (155 mph).
- **Frecciabianca** – Traveling up to 200 km/h (125 mph), these trains travel on traditional rail lines and connect destinations not served by the other two high-speed services.

In addition to Trenitalia, a new private high-speed rail operating company, Nuovo Transporto Viaggiatori (NTV), began providing high-speed rail service in April 2012 to the major Italian cities, with its Italo service. The following section describes the NTV service in more detail.

**Europe’s First Private High-Speed Rail Operator**

A consortium that includes Ferrari and the French National Railway Corporation (SNCF) began work in 2008 to develop the first privately operated high-speed rail service in Europe. Beginning in April 2012, the company, NTV, offered the Italo service to 9 Italian cities at 12 stations at speeds up to 300 km/h (185 mph). Using updated versions of the French TGV, the Automotrice Grande Vitesse (AGV) trains are advertised for passenger comfort. NTV also describes its trains as being constructed mostly from recycled materials; designed to reduce maintenance costs by 15 percent; and lighter than comparable trains, which reduces energy consumption by 10 percent.

Sources: TGA; Trenitalia Website; Economic Analysis of High-Speed Rail in Europe; NTV Website
RIDERSHIP AND TRANSPORTATION SYSTEM IMPACTS

The high-speed network in Italy has steadily grown in annual passengers since accounting for 2.19 million passengers in 1995, as shown in the table below. The system now carries more than 33.4 million passengers annually.

<table>
<thead>
<tr>
<th>Year (thousands)</th>
<th>Passenger-Km (millions)</th>
<th>Passenger-miles (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>2,190</td>
<td>1,100</td>
</tr>
<tr>
<td>1996</td>
<td>3,348</td>
<td>1,300</td>
</tr>
<tr>
<td>1997</td>
<td>6,916</td>
<td>2,438</td>
</tr>
<tr>
<td>1998</td>
<td>10,897</td>
<td>3,638</td>
</tr>
<tr>
<td>1999</td>
<td>13,050</td>
<td>4,464</td>
</tr>
<tr>
<td>2000</td>
<td>15,510</td>
<td>5,086</td>
</tr>
<tr>
<td>2001</td>
<td>18,785</td>
<td>6,763</td>
</tr>
<tr>
<td>2002</td>
<td>18,010</td>
<td>7,078</td>
</tr>
<tr>
<td>2003</td>
<td>19,092</td>
<td>7,431</td>
</tr>
<tr>
<td>2004</td>
<td>20,712</td>
<td>7,925</td>
</tr>
<tr>
<td>2005</td>
<td>21,906</td>
<td>8,550</td>
</tr>
<tr>
<td>2006</td>
<td>23,236</td>
<td>8,912</td>
</tr>
<tr>
<td>2007</td>
<td>23,430</td>
<td>8,818</td>
</tr>
<tr>
<td>2008</td>
<td>23,882</td>
<td>8,878</td>
</tr>
<tr>
<td>2009</td>
<td>33,377</td>
<td>10,746</td>
</tr>
</tbody>
</table>

Albalate and Bel (2010) point out that the high-speed rail services are generally in competition with road transportation, since the distances between the city pairs is not significant enough for air service.

Rome High-Speed Train Stations

The UIC report *High Speed and the City* documents how high-speed rail stations relate to city planning and development through a series of case studies. One of the case studies examined in this report is Rome. It notes that the Rome metropolitan area population is approximately 4.1 million people. The population density within the city is calculated as 2,132 people per square kilometer (5,558 people per square mile). Rome was one of the lighter density cities examined. For comparison, other city densities include Paris with 1,971 people per square kilometer (5,138 people per square mile) and Tokyo with a density of 14,254 people per square kilometer (37,158 people per square mile).

There are three train stations in Rome servicing high-speed trains, with the Rome Termini station the focus of the UIC *High speed and the City* report. It indicates that high-speed service began at the Rome Termini station in December 2005 with the Rome – Naples link. Listed as under construction in the report but later completed in November 2011, the newly renovated Rome Tiburtina station is designed to be the main high-speed train station in...
Rome, relieving the Rome Termini station of some of the congestion there and reducing the high-speed train service time between Rome and Milan to 2 hours 45 minutes, a reduction of 15 minutes for those trains previously served through Rome Termini station. The new private high-speed operator NTV operates the Italo service through the Rome Tiburtina and Ostiense stations, with the Ostiense station serving the south and southwest parts of Rome. Trenitalia timetables show high-speed services out of both Termini and Tiburtina stations.

The Tiburtina station is characterized in reports as a hi-tech railway station, not only conceived as train terminal, but also as a meeting place for shopping, wellness and leisure. The newly redeveloped and expanded station maintains approximately 10,000 square meters (107,639 square feet) of the space for commercial activities. The plan for this station also included 10 hectares (24.7 acres) around the station that is to be “new green areas for cultural, social, recreational and sport services as well as with cycling tracks for the inhabitants of the neighborhood.”

As part of the case studies, the UIC provides a modal comparison between the focal station and first city. In this case the comparison is between Rome and Milan, a distance of 587 km (315 miles). The following chart provides the estimated travel times and travel cost for the different modes of travel. High-speed train service covers the distance in 3 hours compared to conventional train 6 hours 34 minutes at approximately half the cost.

<table>
<thead>
<tr>
<th>Travel Mode</th>
<th>Travel Time</th>
<th>Travel Fares</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Speed Train</td>
<td>3 hr</td>
<td>89 Euro ($116)</td>
</tr>
<tr>
<td>Conventional Train</td>
<td>6 hr 34 min</td>
<td>46 Euro ($60)</td>
</tr>
<tr>
<td>Car</td>
<td>5 hr 30 min</td>
<td>74 Euro ($96)</td>
</tr>
<tr>
<td>Plane</td>
<td>1 hr 10 min*</td>
<td>206 Euro ($268)</td>
</tr>
</tbody>
</table>

*only includes on-board travel time

Sources: High Speed Rail Passenger Services: World Experience and U.S. Applications; “Ferrari on the Line”; “Ferrari’ train driving high-speed rail renaissance”; High-Speed Rail: Lessons for Policy Makers from Experiences Abroad; HS and the City; Economic Analysis of High-Speed Rail in Europe
BIBLIOGRAPHY

Capacity Survey Results
International Union of Railways (UIC), April 2009
URL: http://www.uic.org/IMG/pdf/1-6-2_20090424_Capacity_survey_result.pdf
Date Accessed: October 5, 2012

Economic Analysis of High-Speed Rail in Europe
URL: http://www.fbbva.es/TLFU/dat/High%20Speed%20Rail_2012_web.pdf
Date Accessed: October 8, 2012

High Speed and the City
Prepared for the International Union of Railways (UIC) by BB&J Consult, September 2010
URL: http://www.uic.org/IMG/pdf/20101117_highspeed_thecity_finalreport.pdf
Date Accessed: June 20, 2012

High-Speed Lines in the World
International Union of Railways (UIC), Updated November 1, 2011
URL: http://www.uic.org/IMG/pdf/20111101_a1_high_speed_lines_in_the_world.pdf
Date Accessed: May 30, 2012
High-Speed Rail: A Study of International Best Practices and Identification of Opportunities in the U.S.
Prepared for the Southwest Region University Center by the Center for Transportation Research at The University of Texas at Austin, August 2011
URL: http://swutc.tamu.edu/publications/technicalreports/476660-00071-1.pdf
Date Accessed: May 30, 2012

High-Speed Rail: Lessons for Policy Makers from Experiences Abroad
Prepared for the Research Institute of Applied Economics by Albalate and Bel at the University of Barcelona, 2010
URL: http://www.ub.edu/irea/working_papers/2010/201003.pdf
Date Accessed: October 25, 2012

High Speed Rail: International Comparisons
Prepared for Commission for Integrated Transport (CFIT) by Steer Davies Gleave, February 2004
URL: http://studio.design.upenn.edu/hsr/sites/default/files/CFIT%202004.pdf
Date Accessed: October 18, 2012

“High Speed Rail Operations, Italy”
Railway-Technology.com website
URL: http://www.railway-technology.com/projects/italy/
Date Accessed: July 12, 2012

High Speed Rail and Sustainability
Prepared for the International Union of Railways (UIC) by Jehanno, Palmer and James with Systra and TRL, November 2011
URL: http://uic.org/IMG/pdf/hsr_sustainability_main_study_final.pdf
Date Accessed: May 30, 2012

High Speed Rail (HSR) in the United States
URL: http://www.fas.org/sgp/crs/misc/R40973.pdf
Date Accessed: August 8, 2012

High Speed Rail Passenger Services: World Experience and U.S. Applications
Prepared by Thompson and Tanaka with Thompson, Galenson and Associates (TGA), September 20, 2011
Date Accessed: May 31, 2012

Maintenance of High Speed Lines
Prepared for the International Union of Railways (UIC) by Goossens with E-RAIL CONSULT, September 2010
Date Accessed: July 11, 2012

The World Factbook
United States Central Intelligence Agency
URL: https://www.cia.gov/library/publications/the-world-factbook/
Date Accessed: May 31, 2012

The World Factbook