

Executive Summary

The United States has embarked on a program of building high-speed rail corridors in the nation's most urbanized corridors and regions. This is a bold step toward meeting the infrastructure needs of the coming century, including providing capacity for economic growth in regions where air and road congestion threaten economic competitiveness and quality of life.

However, given the newness of the program, there is a steep learning curve for states and regions in developing high-speed and even "classic" intercity passenger corridors. This report aims to educate the public and decision makers about the elements of success for high-speed rail as measured by factors that contribute to ridership demand for these services, particularly as they apply to the unique spatial attributes and travel patterns of America.

This report provides the first and only comparative study of close to 8,000 existing and proposed rail rights of way (of fewer than 600 miles in length) and their relative ability to attract passengers. In doing, the analysis reveals which regional corridors are best suited for high-speed rail in the United States, based on factors that have contributed to rail ridership in other systems around the world. Our approach evaluates and scores each corridor based on parameters related to regional population, employment concentrations, transit accessibility, air travel markets, and composition of employment sectors, among others. Those corridors receiving the highest scores in our analysis are most suited to attract ridership and should be the focal point of federal investments.

The federal government has defined three categories of high-speed rail in the United States: Core Express Corridors, Regional Corridors, and Emerging/ Feeder Routes, to reflect the great variety of regional characteristics and suitability for passenger rail nationwide. This is not a "one size fits all" program. While not every corridor in the country may be able to generate sufficient demand to justify Core Express Corridors at this time, incremental investments in corridors suited for Regional and Emerging/ Feeder service can meet important transportation needs while building markets for passenger rail that may someday justify investments in Core Express Corridors.¹

¹ The Federal Railroad Administration define Core Express corridors as those with dedicated tracks reaching speeds of 125-150 miles per hour serving major population centers. A table of FRA definitions is on p. 7.

Research Findings

- High-speed rail works in very specific conditions, primarily in corridors of approximately 100–600 miles in length where it can connect major employment centers and population hubs with other large and moderate-sized employment centers and population hubs. Such corridors exist primarily in the nation's 11 megaregions, where over 70 percent of the nation's population and productivity (as measured by regional GDP) is concentrated.
- Some of the most promising rail corridors for attracting ridership in the United States are in corridors of less than 150 miles. These shorter corridors, such as New York-Philadelphia, Los Angeles-San Diego, and Chicago-Milwaukee, can anchor investments in longer, multi-city corridors and be priced to attract both high-speed commuting and intercity trips.
- Very large cities are potentially powerful generators of rail ridership. The presence of a very large city on a corridor with medium-size and smaller cities has greater impact than connecting medium cities of the same size for generating ridership.
- Composition of the workforce within a metro region may have significant implications on regional intercity travel. People who work in knowledge industries, such as those in the financial sector, tend to be more mobile and travel more for business than those in industrial sectors.

Recommendations

- The federal government should adopt a quantitative approach to evaluating rail investments across the country in line with clear objectives for the national rail program. This paper presents one such approach that can be used to evaluate corridors against a set of factors based on national data, such as population, employment, and travel data.
- The federal government should prioritize capital investments in corridors with the greatest opportunity to attract ridership and thus offset operating costs.

- The United States lacks recent data on long distance automobile travel, the most common mode for trips of up to 1,000 miles. The last study of this kind, the 1995 American Travel Survey is outdated and of limited use. A new American Travel Survey should be initiated, making use of mobile and GPS technologies, while protecting privacy data. Updated, national, long distance, travel data is necessary to improve forecasts for high-speed rail ridership, which today are often based on outdated data and assumptions.

Study Design

This study evaluated 7,870 rail corridors of less than 600 miles against data for variables that contribute to passenger rail ridership. These variables include: population, employment, transit ridership, population and employment within areas served by transit, air ridership along the corridor, and highway congestion.

The data was collected spatially, using geographic information systems (GIS) analysis, by establishing 2-mile, 10-mile, and 25-mile service areas for the intercity rail station in each metropolitan area along the rail corridor, or in the absence of a train station, the center of the central business district of the metropolitan area. Data was collected for every metropolitan area along the route for a dozen variables, shown below.

A score was then computed for each rail corridor on a per-mile basis, based on the sum of a weighted average of these dozen criteria. Scores range from 0 – 20.15.

TABLE 1
Criteria Used to Develop Corridor Score

Primary Factors: Weighted 3X

Regional Population (25 Mile)	(RP)
Employment CBD (2 Mile)	(ECBD)

Secondary Factors: Weighted 2X

Transit Connectivity Employment	(TCE)
Transit Connectivity Population	(TCP)
City Population (10 Mile)	(CP)
City Employment (10 Mile)	(CE)
Regional Population Growth Factor	(RPGF)
Regional Air Market	(RAM)

Tertiary Factors: Weighted 1X

Commuter Rail Connectivity Population	(CRP)
Corridor Traffic Congestion	(CTC)
Share of Financial Workers	(SF)
Share of Workers in Tourism Industry	(ST)

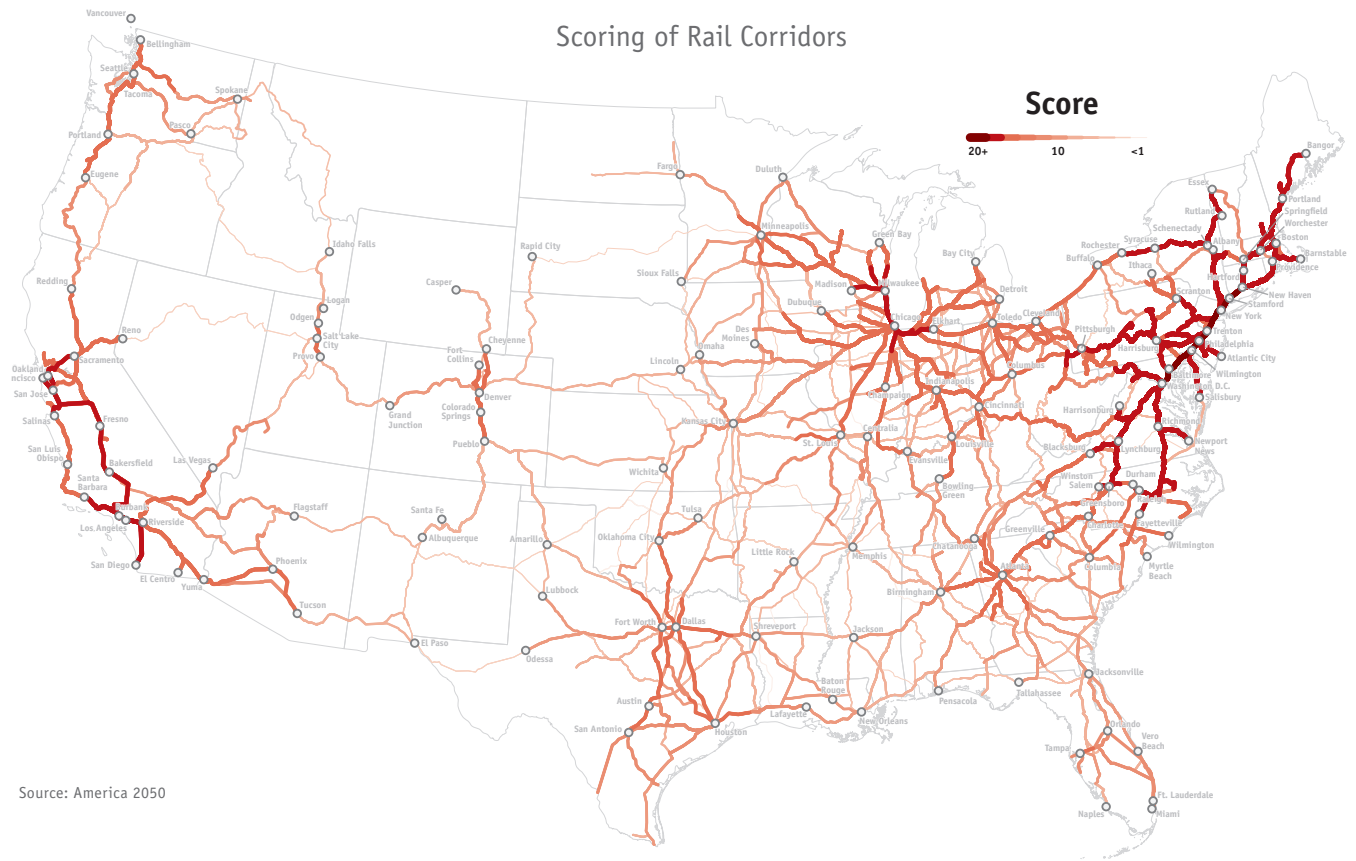
Regional Profiles of Rail Corridors

1. The **Northeast Megaregion**, encompassing the major cities along the northeastern seaboard, leads the nation in virtually every parameter evaluated in this study, from population, density, employment, share of knowledge workers, to transit connectivity. The highest ranking corridor in this study is Washington to New York with a score of 20.15 – also the most heavily traveled rail corridor in the nation. Boston to New York follows close behind with a score of

19.87. Off the mainline Northeast Corridor, the highest scoring corridors in the Northeast Megaregion are: Albany-New York (19.29), Washington-Richmond (18.31), and Philadelphia-Harrisburg (18.07).

2. The **Great Lakes Megaregion** includes a “hub and spoke” network of rail corridors emanating from the Chicago hub. Behind only New York, Chicago has the second densest business district in the nation with more than half a million jobs within two miles of Union Station and a robust regional rail system serving 70 million passengers a year. The population growth rates of regions in the Great Lakes are slower than the nation as a whole. The Great Lakes has a strong regional air market (defined as flights shorter than 600 miles) with seven markets of more than 500,000 passengers a year connecting to Chicago. The top ranking corridors in the Great Lakes are: Chicago-Milwaukee (19.38); Chicago-Indianapolis (17.38); Chicago-Detroit (16.80); Chicago-Cincinnati (16.40); and Chicago-St. Louis (16.19).
3. **California and the Southwest**, including the Arizona Sun Corridor, includes some of the largest and fastest growing regions in the nation. Planning for a new, dedicated high-speed rail system is underway to connect Northern and Southern California – two populous regions that also share the largest regional air market in the country and heavy highway congestion on the highway corridor connecting them. Six of eight large metros in California and Arizona have rail transit systems, while San Francisco and Los Angeles also have commuter rail. The major cities of Arizona – Phoenix and Tucson – are smaller, less densely populated, and lacking in extensive transit service, resulting in lower rankings than their California counterparts. The highest ranking corridors in California and the Southwest tend to be short corridors connecting to Los Angeles, including Los Angeles-San Diego (19.62); Los Angeles-Riverside (19.43); Los Angeles-Santa Barbara (18.96); San Francisco-Sacramento (18.21); Los Angeles-San Francisco (17.98); Los Angeles-Las Vegas, NV (16.94); and Phoenix, AZ – Tucson, AZ (16.37).
4. **Florida**: Aside from California, Florida is the only region in the nation currently pursuing a new, dedicated high-speed rail system. While Florida’s population, employment, and transit characteristics are not near the top of national statistics, other exogenous factors positioned the state at the front of the line for federal high-speed rail dollars: project readiness and public ownership of the right-of-way between Tampa and Orlando. The state’s largest regions are smaller and more decentralized, but their projected population growth rates are notable. Florida’s four largest cities, Miami, Orlando, Tampa, and Jacksonville, are all expected to grow at a rate of at least 30 percent over the next 30 years, with Orlando projected to grow at 60 percent. The lower scores for Florida corridors reflect the lack of a single dominant city, such as Los Angeles, Chicago, or New York, to act as a magnet for intercity trips. However, tourist destinations such as Disney World and the Orlando Convention Center, connected by high-speed rail, could act as significant generators of rail ridership not accounted

Scoring of Rail Corridors



Source: America 2050

for by our methodology. The top corridors in Florida are: Tampa-Miami (13.93) along the proposed HSR Route; Tampa-Orlando (13.63); Sebastian/Vero Beach-Miami (12.96).

5. **Texas and the Gulf Coast:** The largest Texas cities are highly decentralized, stretching over large areas, with low density in their cores. Texas population growth rates are high (the four largest cities are each expected to grow by more than 50 percent), and their populations have very low transit accessibility. Texas has invested heavily in road infrastructure in the last decade, adding over 1,000 lane miles of highways while traffic congestion has worsened in that same time period. Texas has a relatively large short haul air market, with 4.4 million passengers in 2008 moving between Dallas and other points in the Texas Triangle and Gulf Coast. The highest scoring Texas corridors in our study are: Dallas-Houston (16.12); Dallas-Austin (14.86); San Antonio-Dallas (14.75); Oklahoma City-Dallas (14.32).
6. **Piedmont Atlantic Megaregion:** Population centers in the Piedmont Atlantic Megaregion tend to be relatively low density and fast growing. Atlanta, Georgia has the largest rail transit system in the megaregion, with 13.2 percent of its population and 34 percent of its jobs located within the transit accessible zone. Charlotte, North Carolina has a new light rail system that only serves a small portion of the metropolitan region. While Atlanta Hartsfield is the nation's largest airport, most of its flights have destinations outside the megaregion. The top scoring corridors in this region are: Birmingham-Atlanta (15.93); Atlanta-Charlotte (15.68); Washington, DC-Charlotte (15.16); and Charlotte-Raleigh (14.84).

7. **Cascadia:** The Cascadia megaregion's primary corridor connects Eugene, Oregon to Vancouver, British Columbia across the Canadian border. Seattle and Portland, the megaregion's two major U.S. cities, are medium size in population, but relatively compact with transit systems that serve 31 percent and 58 percent of the jobs in Seattle and Portland, respectively. Ridership on Amtrak Cascades service has quadrupled from 1994 to today. Washington State has been active in planning a long-term vision for regional rail service in the Cascades corridor and was awarded more than \$600 million by the federal government in 2010 to begin incremental improvements to the rail corridor. Portland-Seattle was the highest scoring stretch of this corridor with a score of 17.68, not including Vancouver because of the lack of equivalent Canadian data. It was followed by the Portland-Eugene segment of the same corridor, which scored 15.42.
8. **Front Range – Intermountain West:** With the exception of medium-sized Denver, the cities of the Front Range are relatively small. Their size, combined with the far distance and mountain terrain between them, makes high-speed rail a difficult financial proposition for the small number of passengers it would likely serve. On the other hand, the regions are growing rapidly, and Denver and Salt Lake City are notable because they have recently invested in expanding and improving their regional rail and transit systems. In the Salt Lake City region, the linear, 100-mile rail corridor between Ogden and Provo provides some intercity service, though it is designed as a regional commuter system, reflecting that region's needs. The top scoring corridor in the region is Denver-Pueblo (17.13), followed by Denver-Cheyenne (15.51); and Provo-Ogden (14.90).