Bullet Trains for America?

The Obama administration has revived the dream of building high-speed rail lines to rival those of Japan and Europe, but the tracks are littered with political and financial obstacles.

BY MARK REUTTER

Over the rice paddies and tin-roofed villages of coastal China, thousands of sleek, prestressed concrete bridge pylons are rising into place like a giant row of dominoes, at a pace that rivals the frenzied advance of the track layers who completed America's first transcontinental railroad in 1869. The "transcon," which linked the existing railroads of the East with California, was considered the greatest construction feat of its era. As more track was laid across the United States, wagon trains and stagecoaches faded from the scene, and railroads became the 19th-century's dominant carrier of passengers and goods.

China has embarked on a program that at first glance looks like a return to the past, but is viewed by government planners as vital to the country's fast-growing economy. After two decades of highway construction, the focus has shifted to public transportation, with the equivalent of $1 trillion allocated to expand and improve the railway network. The most audacious element of China's plan is to build 8,000 miles of high-speed railways by 2020. The first segment is already under construction between Beijing and Shanghai: 820 miles, comparable to the distance from New York to Chicago. When the line opens in 2012, trains on elevated rights of way will race at speeds as fast as 235 mph between the two cities, cutting the trip time from 12 hours to four and a half. Eventually, China wants to connect its rail network to a "supertrain" line to Europe that, carrying both passengers and export goods, would help secure the nation's future as a global powerhouse.

Since entering service in Japan in 1964, fast trains have been gaining in speed and popularity. The first Shinkansen, or bullet train, traveled between Tokyo and Osaka at a maximum of 130 mph. The latest-generation Shinkansen runs at a top speed of 188 mph, and its ancestor is now in a museum. France launched Europe's first high-speed railroad between Paris and Lyon in 1981, the Train à Grande Vitesse ("train of great speed"), better known as the TGV. Today,

Mark Reutter, a former Woodrow Wilson Center fellow, wrote "The Lost Promise of the American Railroad," which appeared in the Winter 1994 issue of the *WQ*, and can be found online at www.wilsoncenter.org/Train.pdf. He edited *Railroad History* for eight years and is the author of *Making Steel: Sparrows Point and the Rise and Ruin of American Industrial Might* (2005, rev. ed.).

A bullet train streaks along rails south of San Francisco—but it's only an artist's conception. Although California voters have approved $9 billion in construction bonds to begin work on high-speed rail, the state's financial crisis is making it difficult to translate vision into reality.

trains doing 125 MPH or more zip across 13 European countries as well as Russia, South Korea, Taiwan, and Turkey. In the Middle East, Saudi Arabia recently let contracts for a European-style supertrain between the western port of Jeddah and the religious centers of Mecca and Medina, while Israel has a new Tel Aviv-to-Jerusalem line in the works and Iran is upgrading its main lines out of Tehran to standards exceeding 120 MPH.

By these measures, America's passenger trains are slowpokes. Even Amtrak's self-declared high-speed Northeast Corridor between Boston and Washington does not qualify as high speed by world standards (defined by the International Union of Railways as regular operation at or above 155 MPH on new or renovated track or 124 MPH on older track). The Acela Express reaches 150 MPH on a short stretch of reconditioned track in Rhode Island, but otherwise is forced to go much slower because of aging infrastructure. Overall, Acela trains average only 67 MPH between Boston and New York City. South of New York, Acela trains operate at a top speed of 125 MPH and an average of 77 MPH. Compare this with the 217 MPH maximum and 146 MPH average of Spain's 386-mile line between Madrid and Barcelona, and the gap between U.S. and European railroads becomes apparent.

This gap only widens in the rest of Amtrak's 22,000-mile nationwide network. Outside of the Northeast Corridor, there are only four routes where Amtrak trains can run faster than 79 MPH: Los Angeles-San Diego, New York City-

More than 100,000 workers are building the Beijing-Shanghai high-speed rail line, which will move passengers at speeds of up to 235 MPH.

Albany, Philadelphia-Harrisburg, and a 100-mile segment in Michigan. Elsewhere, trains are restricted to 79 MPH because locomotives and track are not equipped with signal systems that prevent collisions. After accounting for speed-restricted curves, snail-like crawls through junctions, stops for opposing trains, and other obstacles thrown in their path, Amtrak trains average no better than 50 MPH between terminals—and much less if unscheduled delays are counted. The result is that train service is slower today than it was in the 1940s, when "streamliners" touted for their speed—such as the Super Chief, 20th Century Limited, Denver Zephyr, and Hiawatha—routinely topped 90 to 100 MPH between station stops. While the rest of the world has advanced, America's passenger rail has stalled, if not reversed direction.

If President Barack Obama has his way, American passenger rail will pick up speed again. Earlier this year, he called for the creation of a national high-speed rail network. The idea is not to lay track coast to coast, but to focus on heavily populated corridors where short distances between cities let fast trains compete effectively with cars and planes. President Obama allocated $8 billion from the economic stimulus package and requested $5 billion more from Congress through 2014, which would be used as seed money for improved rail service.

Ten corridors, ranging in length from 200 to 600 miles, have been designated as potential high-speed routes. These routes would serve city clusters that currently have no through passenger service (such as Miami-Orlando-Tampa), as well as corridors that have built up ridership on conventional Amtrak trains (such as New York-Albany-Buffalo and San Diego-Los Angeles-San Luis Obispo). State governments have subsidized Amtrak trains for years, but attempts to add faster and more frequent service have been thwarted by lack of money and, sometimes, by resistance from Amtrak itself. As an Illinois state senator in the 1990s, Obama witnessed firsthand the state's frustrating attempts to refurbish Amtrak's slow and threadbare service between Chicago and St. Louis.

The $8 billion program bypasses Amtrak and

will provide funds directly to selected state and regional agencies. The plan follows the precedent of the Interstate Highway System, initiated by President Dwight D. Eisenhower in the 1950s, for which states planned and built the highways according to standards set by the federal government, which picked up 90 percent of the tab. For high-speed rail, though, private investors will also be sought. "This is not some fanciful, pie-in-the-sky vision of the future," Obama observed in introducing his plan. "It's been happening for decades. The problem is it has been happening elsewhere, not here."

AMERICAN INTERCITY rail service is slower today than it was in the 1940s.

While maybe not a pie-in-the-sky project, instituting high-speed rail—or even getting train speeds back to 1940s standards—will be a tall order requiring years of commitment and vastly more than $13 billion to pull off. Given Americans' well-known penchant to jump in a car or head for the airport to get where they're going, how realistic is Obama's plan?

Backers cite many gains to be reaped: relieving traffic congestion, promoting economic development, improving safety, and creating jobs for the tens of thousands of workers who will construct and operate the system. Saving energy and cutting greenhouse-gas emissions also are key selling points. Diesel-powered trains use 27 percent less energy per passenger mile than cars and 21 percent less than airliners, according to the Oak Ridge National Laboratory. If high-speed rail lines were operated with nonpolluting electric locomotives, they could reduce carbon dioxide emissions by as much as two million tons annually, according to the Center for Clean Air Policy. "Not since the implementation of the Interstate Highway System have we been afforded such a momentous opportunity to change how this country moves forward," Edward G. Rendell, governor of Pennsylvania and chairman of the National Governors Conference, told Congress last June.

Not so fast, say critics. According to Randal O'Toole of the Cato Institute, a Washington think tank, high-speed rail is a "mirage" that would do little to reduce highway traffic congestion or improve the environment. He and others argue that most congestion involves travel within cities rather than between them, and O'Toole contends that high-speed rail in any event "won't take more than three or four percent of cars off the highways it parallels." At best, supertrains would replace commuter airlines, and at worst, the lines would cause a long-term drain on public finances at a time when the United States is in dire fiscal straits.

"Taxpayers and politicians should be wary of any transportation projects that cannot be paid for out of user fees," O'Toole warns. But roads and airports are paid for only in part by those who use them through gasoline taxes and other user levies. For example, airline ticket tax receipts cover airport construction costs, but the costs of safety measures and a portion of air traffic control—more than $2.5 billion per year—are subsidized by all taxpayers, including those who never fly. Intercity trains are likewise subsidized out of tax revenues from the whole population. Last year, Amtrak earned 72 percent of its costs from ticket receipts and received about $1.2 billion in direct federal subsidies.

While there are important issues to be debated about the costs and benefits of high-speed railroads, the numbers on both sides of the equation are notoriously slippery. And longer-term benefits can be impossible to anticipate. Yet the fundamental choice facing the United States is about the longer-term future. The decisions made today about transportation will literally shape the American landscape and economy for decades to come, and in ways that are difficult to predict with any precision. Even the most farsighted planners behind the Interstate Highway System did not anticipate the extent to which the new roads they built would help spawn a burgeoning suburbia, with its far-flung office and industrial parks, edge cities, and immense shopping malls and

commercial areas.

High-speed rail doesn't simply proceed from point A to point B; it has the potential to energize the cities and towns where it stops in between. The normal practice is to locate intermediate stations in populated areas roughly 50 miles apart. In Europe, high-speed railroads have generated the most growth in provincial cities, as once remote districts benefit from their newfound closeness to hubs such as Paris and Berlin. In a century that will demand more compact, energy-efficient development, high-speed rail has the potential to establish a new superstructure for growth.

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Specialists generally agree that high-speed railways earn a high percentage of their costs when carefully planned. But do fast trains repay their total investment? In a 2009 survey of high-speed lines in Japan and Spain, the U.S. Government Accountability Office reported that Japan's core Shinkansen routes fully repaid the initial investment and debt related to their construction. However, three high-speed lines built in the 1990s, when Tokyo was trying to stimulate the economy through very liberal funding of public works, recovered only 10, 52, and 63 percent of their construction costs through ticket sales. In Spain, the original high-speed line between Madrid and Seville has been profitable on an operating basis, but has not yet repaid its original construction costs. Other studies indicate that France's TGV system operates at a profit, while Germany's and Italy's high-speed trains share in the subsidies given to the railway system by the government.

Critics have rightly pointed out that attempting to extrapolate the economic performance of the Shinkansen or TGV in the United States is a dubious exercise. For one thing, expensive gasoline and expressway tolls make driving a much less attractive option overseas. On the other hand, critics have steadfastly refused to look at high-speed rail outside the context of Amtrak or to recognize the phenomenon of "induced" traffic—the traffic that seems to spring up, seemingly from nowhere, when superior technology is introduced. This capacity for growth is a recurring theme of modern transportation dating back to when steamships replaced sailing vessels and jet aircraft overtook propeller planes. The deciding factor is speed or fluidity of movement. And the more customers, the lower the cost per passenger mile.

The debate is confusing in part because few Americans know what fast trains really are, much less how they can best operate. Many people simply assume that Amtrak schedules would magically accelerate if, say, some bullet-shaped trains were placed on the track and their motors revved up.

It's not that simple. High-speed trainsets are only as good as their supporting infrastructure: right of way, track quality, and propulsion. Requirements for each component become more exacting as the speed of a train increases. Take the matter of track quality. Freight and conventional passenger trains can operate safely with relatively large discrepancies between the level of one rail and the other. The Federal Railroad Administration (FRA) permits a maximum discrepancy of 1.25 inches for 79 MPH operation. But the French require discrepancies of no more than 0.16 inches for the TGV, and the FRA standard for 120 MPH along the Northeast Corridor is 0.5 inches. "There is nothing impossible about such requirements," Louis S. Thompson, a former FRA official, has written. "Satisfying them is, however, expensive."

The streamlined Super Chief, shown here in 1937, ran at more than 90 MPH on portions of its route between Chicago and Los Angeles—far faster than Amtrak's current service. In the 1940s, the 10 fastest passenger trains in the world were all American diesel-powered streamliners.

The freight railroads that own the track that Amtrak uses for its passenger trains (except along the Northeast Corridor, which Amtrak owns) have little incentive to upgrade track to high-speed standards. The current track works just fine for them. In fact, many railroads reconfigured their track after Amtrak was formed in 1971, relieving private railroads rocked by the bankruptcy of the Penn Central Railroad of the need to operate passenger trains. Banked curves, which kept the centrifugal force on passengers to a tolerable level at high speed, were flattened to better accommodate slow-moving freights. Amtrak now must brake for curves that streamliners once navigated with ease.

Because a railroad built today will probably still be in operation 150 years from now, rights of way should be engineered for maximum speeds from end to end. Overseas, where many high-speed trains run on dedicated tracks, they are. (In Japan and most of Europe, passenger trains are dominant and railroads carry a relatively small proportion of all freight—the reverse of the situation in the United States. Europe's freight railroads are hampered by national differences in signaling systems and other technologies.) The sharpest curves permitted for trains operating over 170 MPH are a close approximation of a straight

line. Grades are typically restricted to one percent, or a one-foot rise or fall per 100 feet of distance. "Together, the limits on curvature and gradient mean that high-speed rail requires extensive land acquisition and expensive cutting, filling, bridging, and tunneling, especially in hilly areas," Thompson noted. Expanding such corridors through heavily populated areas presents environmental hazards and NIMBY (not in my backyard) challenges, not to mention costs ranging up to $50 million a mile.

HOW MUCH IS SPEED WORTH? Each minute saved in transit is likely to generate one percent more passengers.

In deciding which high-speed projects to fund, the federal government will need to choose between two types of propulsion systems. Freight railroads—and, by extension, Amtrak—use diesel locomotives. The initial cost of diesel power is far less than that of electric propulsion, which requires overhead electric lines and trackside transformers. While today's diesel locomotive produces 70 percent less pollution than its 1980 counterpart, electric power uses less energy, emits no pollution, and offers faster acceleration than diesel engines, an advantage at high speeds. Electricity is the standard propulsion for the TGV and other overseas railways, but in the United States it is only available along the Northeast Corridor. Electrifying just one of the high-speed corridors proposed for the Midwest, the 300-mile Chicago-St. Louis line, would cost $1.2 billion, according to TranSystems, a transportation planning firm.

So how much is speed worth? Without a doubt, fast trains attract more passengers. A general rule of thumb is that every minute saved in transit is likely to generate one percent more customers. But does there come a point where increments of speed are not worth the extra outlays of money? This question will be critical to the ultimate success of President Obama's railroad plan.

The administration has outlined a "three-track investment strategy" to divide up the $8 billion in seed money. The first track is not really high speed at all. It would provide money for incremental "shovel-ready" projects that could nudge up the speed and frequency of conventional diesel-powered trains. Many states are angling for these federal dollars. The goal of North Carolina's grant submission is 85 MPH service between Charlotte and Raleigh as part of the effort to implement faster rail service along a 450-mile corridor between Washington, D.C., and Charlotte. Oregon wants to upgrade track and crossings so trains between Portland and Eugene can average 65 MPH.

The second type of project, known as "emerging high-speed rail," would boost train speeds to the 110–125 MPH range on existing freight lines. The Association of American Railroads currently requires dedicated track for passenger trains running at 90 MPH and over. An agreement relaxing this policy to permit shared-use trackage could reduce expenses. Still, retrofitting freight lines will not be easy or cheap. A coalition of midwestern governors hopes to use stimulus money to develop lines out of Chicago with train speeds of 110 MPH. Wisconsin plans to rehabilitate a rail link between Milwaukee and Madison, at a cost of $600 million. This is part of a plan to reduce a trip between Chicago and St. Paul, now eight hours, to five and a half hours. Refurbishing the Chicago-St. Paul route would cost $2 billion, not counting the price of new trains.

What has stirred the most excitement and controversy is the development of trains capable of 200 MPH over exclusive, built-from-scratch lines. The most ambitious project comes from the state that gave rise to the freeway. Trains have made a steady and little-noticed comeback in the Golden State. The San Diego-Los Angeles-San Luis Obispo corridor is the nation's second busiest intercity rail line, sur-

passed only by the Northeast Corridor. Last year, it carried three million riders.

Now the California High-Speed Rail Authority has developed plans for an 800-mile line between Sacramento and San Diego. Trains would operate at a top speed of 220 MPH, making the trip between Los Angeles and San Francisco in 2 hours, 40 minutes; the line would attract as many as 100 million riders a year. Last November, California voters approved the sale of $9 billion in bonds for construction. But another $35 billion will be needed. With the state government mired in a fiscal crisis, California's ability to finance the project has been cast into doubt. The authority is seeking $1.3 billion in federal stimulus money to match hoped-for state aid in order to fund preliminary construction.

Several other states are vying for federal dollars for fast trains. In Florida, advocates are trying to revive plans for a TGV-type railroad linking Tampa, Orlando, and Ft. Lauderdale/Miami. Florida asked for $1.5 billion in stimulus funds to build the first leg between Tampa and Orlando International Airport, to be matched by $1 billion in private investment. In Texas, a fast train has been proposed linking Houston, San Antonio, and Dallas.

In 1955, as plans for the 40,000-mile Interstate Highway System were taking shape at the Eisenhower White House, *Fortune* magazine pointed out that "the administration has a highway plan with but one major flaw—it costs money." A huge amount of money, in fact. First estimated at $27 billion, the price of the interstate system soon ballooned to $40 billion (about $280 billion in today's dollars).

Attempts to pay for highways with tolls were successful only in the heavily traveled urban Northeast, where roads such as the New Jersey Turnpike had been completed. In the Midwest, a tollway between Pittsburgh and Chicago was financially viable, but in Texas, promoters of the Sam Houston Turnpike Corporation found it impossible to float bonds. About four-fifths of President Eisenhower's proposed interstate network was stopped in its tracks due to insufficient funds. Eventually, the administration and Congress developed a "pay as you go" system that relied on federal and state user fees on gasoline and other motor fuels to finance the program, and interstate construction got under way.

President Obama is faced with a similar challenge. Given the fiscal plight of states and the growing federal deficit, government alone probably cannot finance 10 high-speed corridors that ultimately might cost a total of $200 billion or more. The creative use of private capital will be needed to proceed. In Florida, for example, railcar equipment makers have pledged to help finance the first phase of the Tampa-Miami corridor, and private operators are expected to bid for the right to operate the line. In the 19th century, the federal government gave land grants to private investors to jump-start railroad projects. Similar grants of real estate or other benefits, such as access to rights of way along rail lines for building fiber-optic and utility lines, could help spur investment in high-speed projects.

In his effort to redirect America's transportation priorities, Obama said he was inspired by an earlier project that changed the course of the country. The transcontinental railroad was an example of "bold action and big ideas" during a period of "economic upheaval and transformation," he reminded a joint session of Congress in February. Despite the crushing costs of the Civil War, President Abraham Lincoln authorized a 1,700-mile railroad between Omaha and Sacramento. Because no state governments existed in the lands to be traversed, the federal government subsidized private businessmen, led by Leland Stanford of California and the Ames brothers of Massachusetts, by giving them public land as well as cash bonds for every mile of track completed.

Lincoln did not live to see the ceremonial golden spike driven into a crosstie in a barren corner of the Utah Territory on May 10, 1869, which joined the Union Pacific and Central Pacific railroads and ushered in what economic historian Walt Rostow called the "takeoff period" of the American economy. But the moment was captured by a telegraph operator who sent a message to a waiting nation that might be repeated someday if Obama's railway initiative gains traction. It simply said, "DONE." ■