

## *High-Speed Rail Is Not “Interstate 2.0”*

by Randal O’Toole

No. 113

September 9, 2009

### **Executive Summary**

The administration has likened President Obama’s high-speed rail plan to President Eisenhower’s Interstate Highway System. Yet there are crucial differences between interstate highways and high-speed rail.

First, before Congress approved the Interstate Highway System, it had a good idea how much it would cost. In contrast, Congress approved \$8 billion for high-speed rail without knowing the total cost, which is likely to be at least \$90 billion.

Second, highway users paid for interstate highways, whereas high-speed rail will be almost entirely subsidized by general taxpayers who will rarely use it.

Third, interstate highways connect all 48 contiguous states and major metropolitan areas. The FRA’s high-speed rail plan consists of six unconnected networks that reach only 33 states and less

than two-thirds of the nation’s 100 largest urban areas.

Fourth, the average American traveled 4,000 miles on interstates in 2007. High-speed rail proponents optimistically estimate that the average American would ride the FRA’s high-speed rail system less than 60 miles per year.

Finally, interstate highways improved social welfare by increasing highway safety. In contrast, far from saving energy and reducing pollution, high-speed rail would actually increase energy consumption and greenhouse gas emissions.

For all these reasons, the United States government should not fund high-speed rail. The \$8 billion in high-speed rail stimulus funds should be invested in safety improvements, not in new trains and new routes that will add to future taxpayer obligations.

*Randal O’Toole is a senior fellow with the Cato Institute and author of The Best-Laid Plans: How Government Planning Harms Your Quality of Life, Your Pocketbook, and Your Future.*

**Whereas the vast majority of Americans use the interstates, use of high-speed rail would be confined to a wealthy elite.**

## **Introduction**

When President Obama announced his vision for high-speed rail in the United States, the White House stated that the plan “mirrors that of President Eisenhower, the father of the Interstate Highway System, which revolutionized the way Americans traveled.”<sup>1</sup> A former Federal Railroad Administration official called the plan “Interstate 2.0.”<sup>2</sup>

Yet there are several crucial differences between high-speed rail and the Interstate Highway System. Most importantly, before Congress approved the legislation that created the Interstate Highway System in 1956, it had a good idea of how much the roads would cost, how the country would pay for them, and who they would serve. In contrast, neither President Obama nor the FRA have ever offered any estimates of how much their high-speed rail plan would cost, how it would be financed, or who would ride the trains.

A close look at the data reveal that high-speed rail would not be a revolution but more of a counterrevolution: a step backwards to a time when only the wealthy had mobility and when low- and middle-class people worked hard to keep the wealthy mobile. For the mobility and other benefits it would produce, high-speed rail would be many times more expensive than the interstates. And while the vast majority of Americans use the interstates, use of high-speed rail would be confined to a few elites.

## **The Cost of High-Speed Rail**

Although the Federal Railroad Administration has not released any estimates of the cost of high-speed rail, several states have. Cost assessments must recognize that the FRA is actually proposing two very different technologies.

In most of the country, the vision calls for “moderate-speed rail,” that is, upgrading existing freight lines to allow passenger trains to run up to 110 mph. These would be conventional Amtrak trains powered largely by conventional diesel locomotives.

In 2004, the Midwest Regional Rail Initiative, a consortium of state departments of transportation, estimated that upgrading existing tracks to 110-mph standards would cost an average of \$2.4 million per mile.<sup>3</sup> (All of these costs include locomotives, rail cars, and stations, as well as new tracks or upgrades to existing tracks.) Adjusting this amount to allow for increases in construction costs since 2004 results in an average cost of \$3.5 million per mile.<sup>4</sup>

The entire FRA plan calls for about 8,500 miles of moderate- and high-speed rail routes in the United States. At \$3.5 million per mile, this would cost nearly \$30 billion. The \$8 billion that Congress has already approved and \$5 billion that the administration has requested over the next five years would not pay for even half of this.

In California and possibly Florida, however, the FRA plan calls for building entirely new tracks suitable for operating trains faster than 120 miles per hour. In 2005, the Florida High Speed Rail Authority estimated that construction of a rail line powered by gas-turbine locomotives would cost between \$22 million and \$27 million per mile.<sup>5</sup> Using the midpoint of this range and adjusting for increases in construction costs since 2005 brings the average cost to \$31 million per mile. At this price, the entire FRA corridor from Tampa to Miami via Orlando would cost \$11.1 billion.

In 2008, the California High-Speed Rail Authority estimated that a 490-mile initial segment from San Francisco to Anaheim would cost \$33 billion, or about \$67 million a mile.<sup>6</sup> California is proposing to run trains at higher speeds than Florida was considering (220 mph vs. 125 mph), but the main differences in costs are due to California’s more mountainous terrain and the infrastructure needed to electrify the trains. At this price, California’s San Francisco–Anaheim line, with branches to Sacramento, Riverside, and San Diego, would cost \$52 billion.

The entire FRA plan, then, would cost about \$90 billion. On a per-mile basis, this cost is greater than the 46,800-mile Interstate Highway System, which cost about \$425 billion in 2008 dollars.<sup>7</sup> While true high-speed

rail would cost between \$31 and \$67 million per mile, the interstates cost less than \$10 million per mile. While the average cost of moderate-speed rail would be \$3.5 million per mile, the interstates cost just \$2 million per lane mile.<sup>8</sup>

If Congress and the states manage to find \$90 billion to build the FRA system, the costs are unlikely to stop there. The system contains important gaps, including Dallas-Houston, Jacksonville-Orlando, and Los Angeles-Las Vegas. None of the Rocky Mountain states are included, but Colorado's Rocky Mountain Rail Authority is promoting high-speed rail there. Since well over half of the \$90 billion cost of the FRA plan is for California, which has less than 10 percent of the route miles, elected officials in other states are likely to demand that they get true high-speed rail, too.

One lesson that can be learned from Japan's high-speed rail system is that a politically driven transportation system ends up building far more than is economically rational. Japan's first high-speed rail line, from Tokyo to Osaka, actually made money because it connected Japan's three largest metropolitan areas, which had a combined population of more than 40 million people when the route opened in the mid-1960s (and more than 60 million today).<sup>9</sup> But Japanese politicians pressured the government-owned, but profitable, Japanese National Railways to build more lines into remote locations.

By 1987, the Japanese National Railways had debts of \$350 billion (adjusted for inflation).<sup>10</sup> By comparison, General Motors' debt when it went bankrupt was only \$35 billion.<sup>11</sup> The Japanese government absorbed the debt, privatized the railroad, and sold the high-speed lines to private companies for less than half a penny for every dollar spent to build them, even without adjusting for inflation.<sup>12</sup> Since then, Japan has continued to build high-speed rail and lease the lines to private railroads at rates that will never recover the construction costs.<sup>13</sup> The subsidy to new construction in 2008 alone was almost \$30 billion.<sup>14</sup>

This suggests that high-speed rail is an expensive slippery slope that is hard to exit. If

Texas, the Midwest, Colorado, and other states demand true high-speed rail, the same as California, the total cost of the rail system could exceed \$550 billion.<sup>15</sup>

## The Financial Plan

When Congress created the Interstate Highway System, it debated whether it should pay for highways using tolls or taxes on gasoline, tires, trucks, and autos.<sup>16</sup> While the latter was selected, everyone agreed that users, not general taxpayers, would pay the cost. In fact, gasoline taxes and other user fees covered 100 percent of the cost of the Interstate Highway System.

In contrast, no one expects that high-speed rail fares would come close to paying for the costs of building and operating the rail lines. The California High-Speed Rail Authority anticipates that fares would exceed the costs of operating its rail line by enough to cover 19 to 22 percent of the capital costs.<sup>17</sup> But this is based on an extremely optimistic projection that the lines would attract more than three times as many riders as Amtrak currently carries in its Boston-to-Washington corridor, even though the Amtrak corridor has more people than the California corridor is projected to have when the trains are in service.<sup>18</sup>

The Midwest Regional Rail Initiative estimates that its moderate-speed trains would eventually—though not right away—earn enough revenue to pay for their operating costs, but not enough to pay any part of the capital costs.<sup>19</sup> Like the California plan, the Midwest plan optimistically projects that increasing top speeds from 79 to 110 mph—which means increasing average speeds from about 45 to about 65 mph—would attract four times as many riders as Amtrak currently carries on these routes.

In actual practice, Amtrak fares cover operating costs only on its premium-priced high-speed Acela trains between Washington and Boston. Other Boston-to-Washington trains lost more than \$11 per passenger in 2001, and the Boston-to-Washington corridor as a whole

**High-speed rail is an expensive slippery slope that is hard to exit.**

**The average American would ride high-speed rail less than 60 miles a year, which is equal to about one round trip every eight years.**

lost \$2 per passenger. In that same year, 110-mph trains in other Amtrak corridors lost between \$8 and \$72 per passenger.<sup>20</sup> This suggests that California's high-speed trains might come close to covering their operating costs, but moderate-speed trains in other parts of the country are not likely to do so.

In short, while the Interstate Highway System was paid for out of user fees, all or nearly all of the capital costs and at least some of the operating costs of the FRA rail system would have to be covered out of general tax dollars. The fact that user fees are not going to cover these costs is a strong indication that the system is unnecessary and wasteful.

## How Many Would Ride?

As noted by the Obama White House, the Interstate Highway System truly did revolutionize American travel. Before the interstates, Americans were already using automobiles for more than 70 percent of their travel. But the interstates allowed that travel to be faster, safer, and more wide-reaching.

In 1956, the year Congress passed the law funding the interstates, Americans drove about 3,700 miles per capita. By 2004, driving exceeded 10,000 miles per capita for the first time.<sup>21</sup> Today, the interstates alone carry more than one trillion passenger miles of travel per year, which is more than 24 percent of all driving and more than 20 percent of all passenger travel.<sup>22</sup> Highway fatality rates dropped from 60 per billion miles of driving in 1956 to less than 14 per billion in 2007, partly because the interstates are so much safer than other highways.<sup>23</sup>

The interstates also carry half of all heavy truck traffic, which means they move about 16 percent of all freight shipped in the United States.<sup>24</sup> In 2007, the average American traveled 4,000 miles and shipped 2,000 ton-miles of freight over the interstates.<sup>25</sup>

One reason why the interstates are so heavily used is that they go so many places. As of 2007, interstates directly served all 50 states and more than 330 of the nation's 440 urban

areas of more than 50,000 people—not to mention thousands of smaller cities and towns. This means that well over two out of three Americans live and work within a few minutes' drive of an interstate freeway.<sup>26</sup>

In contrast, when combined with the existing Boston-to-Washington corridor, the FRA high-speed rail plan would reach only 33 states. Trains would stop in only 65 of the nation's 100 largest urban areas. For most people in smaller urban areas and towns, the only access to high-speed trains would be by driving to a major city. Even many people in urban areas served by high-speed rail would be closer to airports than downtown rail stations.

As a result, high-speed rail lines would move a relatively insignificant amount of passenger travel. A recent report compiling all of the often-optimistic projections of high-speed rail ridership estimated that the FRA high-speed rail lines would carry 20.6 billion passenger miles of travel in 2025—less than 2 percent of what the interstates carried in 2007.<sup>27</sup>

The average American would travel on the FRA system less than 60 miles a year.<sup>28</sup> If the average trip is 225 miles long, the average American would take a round-trip on the FRA system only about every eight years. Since California would have very-high-speed trains, Californians would ride high-speed rail more than the rest of the country, but still less than 300 miles per person per year.<sup>29</sup>

These low numbers are confirmed by data from France and Japan, the two nations that have invested the most in high-speed rail. Though popular with American tourists, the average residents of France and Japan ride the TGVs (*train à grande vitesse*) and bullet trains less than 400 miles per year.<sup>30</sup> Given the greater geographic expanse and lower population densities of the United States, it seems unlikely that the nation as a whole would ever approach that level of per-capita ridership.

Table 1 shows that, when the capital costs are amortized over 30 years at 7 percent interest, interstates are about 10 times more cost-effective than high-speed rail. The difference is even starker when it is recognized that users

**Table 1**  
**Interstate and High-Speed Rail Costs, Per Passenger Mile**

	Capital Cost (\$billions)	Amortized Cost (\$billions)	Passenger Miles (billions)	Cost Per Passenger (cents)
Interstate highways	425	33.9	1,034.4	3.2
Moderate-speed rail	27	2.1	12.7	27.3
California high-speed rail	52	4.2	7.9	32.6

Source: See text.

Note: The interstate highways are 10 times more cost-effective at moving people than high-speed rail.

pay for the interstates while general taxpayers would pay for the rail lines.

Table 1 shows only capital costs. In 2008, a banner year for Amtrak, the railroad's operating costs averaged 58 cents per passenger mile. Passenger fares covered less than 32 cents per passenger mile. Some of the difference was covered by Amtrak's rents of its tracks and property to other railroads and commercial and retail users, but federal and state operating subsidies still amounted to 19 cents per passenger mile.<sup>31</sup>

By comparison, Americans spent \$1.07 trillion on automotive transportation in 2007, including new and used cars, parts, repairs, maintenance, insurance, fuel, tolls, motor fuel and various transportation taxes.<sup>32</sup> Travel in autos, light trucks, and motorcycles totaled 4.47 trillion passenger miles in 2007, for an average cost of 24 cents per passenger mile.<sup>33</sup> Federal, state, and local governments spent \$55.6 billion in general funds on roads in 2007,<sup>34</sup> along with \$124 billion in gasoline taxes and other highway user fees. The public fund subsidy for roads, which is mostly to local roads and not the highway system, was partly offset by the \$22.5 billion in highway user fees diverted to nonhighway purposes.<sup>35</sup> But even if the diversions are ignored, highway subsidies amounted to only a little more than a penny per passenger mile.

In short, passenger rail operating costs are more than twice as great as automobile operating costs, and the subsidies are more than 15 times as great. Rail proponents expect that high-speed trains would attract more riders

than conventional trains, but their operating costs would also be greater, so it is likely that costs and subsidies per passenger mile would be similar to those of Amtrak today.

## Who Would Ride?

Who would be among the lucky few to enjoy heavily subsidized high-speed train rides? One answer can be found by comparing fares in Amtrak's New York–Washington corridor.

At the time of this writing, \$99 will get you from Washington to New York in 2 hours and 50 minutes on Amtrak's high-speed train, while \$49 pays for a moderate-speed train ride that takes 3 hours and 15 minutes. Meanwhile, relatively unsubsidized and energy-efficient buses with leather seats and free Wi-Fi cost \$20 for a trip that takes 4 hours and 15 minutes between the two cities. Airfares start at \$119 for a 1-hour flight.

High-speed rail plans in other parts of the country propose similar fare premiums. Midwest high-speed rail fares “will be competitive with air travel,” says the Midwest High Speed Rail Initiative, and will be “up to 50 percent higher than current Amtrak fares to reflect improved services.”<sup>36</sup>

Few who pay their own way will spend five times as much for a high-speed train ticket to save less than 90 minutes of their time—and those who value their time that highly would spend another \$20 for a plane ticket that would save them an additional hour. Rail advocates respond that high-speed trains have an

**Amtrak's high-speed train from New York to Washington costs \$99, while for just \$20 you can ride a relatively unsubsidized bus with leather seats and free WiFi.**

advantage over flying when adding the time it takes to get between downtowns and airports. Yet less than 8 percent of Americans work in downtowns.<sup>37</sup> Who are they? Bankers, lawyers, government officials, and other high-income people who hardly need taxpayer-subsidized transportation.

## The Environmental Cost of High-Speed Rail

When announcing his high-speed rail vision, President Obama promised high-speed rail would provide “clean, energy-efficient transportation.”<sup>38</sup> Many people assume that trains use significantly less energy and produce less pollution and greenhouse gas emissions than other forms of travel. In fact, passenger rail’s environmental benefits are negligible and costly.

Amtrak claims its trains are more energy-efficient than driving, but it bases this claim on an assumption that the average automobile has just 1.6 occupants.<sup>39</sup> In fact, autos tend to carry more people in the intercity travel that would compete with high-speed rail. An independent analysis for the California High-Speed Rail Authority found that intercity autos average 2.4 people.<sup>40</sup> This makes Amtrak only 8 percent more energy efficient than light trucks and 15 percent *less* energy efficient than cars.

As a Department of Energy report concluded in 2000, “intercity auto trips tend to be relatively efficient highway trips with higher-than-average vehicle occupancy rates—on average, they are as energy-efficient as rail intercity trips.” Moreover, the report added, “if passenger rail competes for modal share by moving to high-speed service, its energy efficiency should be reduced somewhat—making overall energy savings even more problematic.”<sup>41</sup>

This explains why the Florida High Speed Rail Authority’s analysis of a Tampa-Orlando rail line concluded that “the environmentally preferred alternative is the No-Build Alternative” because it “would result in less direct and indirect impact to the environment.”<sup>42</sup> An

objective analysis of other high-speed rail proposals would reach the same conclusion.

Not all analyses agree with this assessment. The FRA’s high-speed rail plan claims that its trains would reduce carbon dioxide (CO<sub>2</sub>) emissions by 6 billion pounds (2.7 million metric tons) per year.<sup>43</sup> This was based on an analysis by the Center for Clean Air Policy that assumed that:

- Auto fuel prices would remain low, leading cars in 2025 to be only a little more energy-efficient than today.<sup>44</sup> Considering recent spikes in fuel prices and Obama’s new fuel-economy standards, the average car on the road in 2025 is likely to be considerably more fuel-efficient than today.<sup>45</sup>
- The average automobile on the road carries 1.6 people.<sup>46</sup> As previously noted, occupancies for intercity travel are closer to 2.4.
- Airline energy efficiencies would grow by 0.6 percent per year.<sup>47</sup> In fact, airline energy efficiencies have grown by 3.2 percent per year since 1970.<sup>48</sup> Considering new technologies now in development, there is every reason to believe that aircraft energy efficiencies will grow much faster than 0.6 percent per year.<sup>49</sup>
- The average high-speed train in every corridor would operate at 70 percent of passenger capacity.<sup>50</sup> Yet, in 2008, the average Amtrak train operated at only 51 percent of capacity; Amtrak’s moderate-speed trains in the Boston-Washington, Los Angeles-San Diego, and Philadelphia-Harrisburg corridors all operated at 34 to 48 percent of capacity.<sup>51</sup>

These are examples of what Danish planning professor Bent Flyvbjerg calls “optimism bias.”<sup>52</sup> Such bias, says Flyvbjerg, explains why large public works projects almost inevitably cost more and produce smaller benefits than originally promised. In addition, nearly 1 billion pounds of the projected annual reduction of CO<sub>2</sub> were from the Boston-to-Washington Corridor, which is not part of the FRA plan.<sup>53</sup> That means the

**A Department of Energy report found that intercity auto trips are as energy-efficient, per passenger mile, as Amtrak.**

plan itself is projected to save only 2.3 million metric tons per year.

Substituting more realistic assumptions greatly changes the results. In the 19 years between 1975 and 1994, automobile fuel economies increased by 33 percent and commercial airline economies increased by 44 percent.<sup>54</sup> If they achieve similar efficiencies in the 19 years between 2006 and 2025, and if the average auto carries 2.4 people in intercity travel and the average high-speed train fills only 51 percent of its seats, then rather than save 2.3 million metric tons of CO<sub>2</sub> per year, high-speed trains would instead add 220,000 metric tons of CO<sub>2</sub> to the atmosphere each year. Moreover, not building high-speed rail would save huge amounts of energy and millions of tons of CO<sub>2</sub> that would otherwise be used and released during construction.

Even if all the Center for Clean Air Policy's optimistic assumptions proved correct, high-speed rail would not be a cost-effective way of reducing greenhouse gas emissions. McKinsey and Company estimates the United States can cut its greenhouse gas emissions in half by 2030 by investing in technologies that cost no more than \$50 per metric ton of abated emissions.<sup>55</sup> But if high-speed rail costs \$90 billion, then the cost per metric ton averages well over \$3,000. For every ton abated through the use of high-speed rail, more than 60 tons of abatement could have been carried out using more cost-effective programs that reduce CO<sub>2</sub> at a cost of \$50 a ton or less.

People who truly want to save energy should focus on intercity buses, which are far more energy efficient than high-speed rail, and on improving the energy efficiency of auto driving.<sup>56</sup> Traffic congestion wastes nearly 3 billion gallons of fuel per year, and low-cost solutions to congestion, such as traffic signal coordination, could save far more energy at a tiny fraction of the cost of high-speed rail.<sup>57</sup>

## Conclusion

High-speed rail is a technology whose time has come—and gone. What might have been

useful a century ago is today merely an anachronism that would cost taxpayers tens or hundreds of billions of dollars yet contribute little to American mobility or environmental quality.

The most ardent supporters of high-speed rail predict that the FRA plan would carry the average American less than 60 miles per year, and in most places outside of California the average would be even less. By comparison, the average American travels by automobile more than 15,000 miles per year. The environmental benefits of high-speed rail are similarly miniscule, and when added to the environmental costs of building high-speed rail lines the net result is certainly negative.

Given high costs and tiny benefits, the real impetus behind high-speed rail for some is the desire to change Americans' lifestyles. High-speed rail is a part of the administration's "livability agenda," which involves increasing the share of families living in multi-family housing while discouraging new single-family homes, and increasing the share of travel on transit and intercity rail while discouraging driving. As Transportation Secretary Ray LaHood recently admitted, the purpose of this campaign is to "coerce people out of their cars."<sup>58</sup> History shows that such behavioral programs are costly and produce few environmental or social benefits.<sup>59</sup>

Based on these findings, states should apply for their share of the \$8 billion in stimulus money solely for safety improvements to existing rail lines, such as better crossing gates. They should not plan to purchase new locomotives and railcars for passenger service that would be both expensive to operate and harmful to the environment. Nor should the Federal Railroad Administration commit the federal government to funding expensive new high-speed lines such as the proposed lines in California or Florida.

The United States can do many things to improve transportation networks in cost-effective ways that save energy, reduce accidents, and cut toxic and greenhouse gas emissions. High-speed rail is not one of those things.

**Those who want to save energy should focus on intercity buses, which are far more energy-efficient than rail.**

## Notes

1. "President Obama, Vice President Biden, Secretary LaHood Call for U.S. High-Speed Passenger Trains," White House, Washington, DC, April 16, 2009, [tinyurl.com/d4whzy](http://tinyurl.com/d4whzy).
2. John D. Boyd, "Former FRA Chief Urges High-Speed Push for Rail Plan," *Journal of Commerce Online*, June 5, 2009, [tinyurl.com/m8sp5q](http://tinyurl.com/m8sp5q).
3. *Midwest Regional Rail System Executive Report* (Frederick, MD: Transportation Economics and Management Systems, 2004), pp. 13, 15, [tinyurl.com/5mxdrb](http://tinyurl.com/5mxdrb).
4. "Construction Cost Indices," Washington State Department of Transportation, Olympia, WA, 2009, [tinyurl.com/m9p3cd](http://tinyurl.com/m9p3cd); "Results of FasTracks 2009 Annual Program Evaluation," Denver Regional Transit District, 2009, p. 3, [tinyurl.com/mzlxpu](http://tinyurl.com/mzlxpu); "Highway Cost Index Report for May, 2009," Texas Department of Transportation, Austin, TX, 2009, pp. 3-4, [tinyurl.com/mhvmj5](http://tinyurl.com/mhvmj5).
5. *Final Environmental Impact Statement Florida High Speed Rail Tampa to Orlando* (Washington: Federal Railroad Administration, 2005), p. S-24, [tinyurl.com/6ysffl](http://tinyurl.com/6ysffl).
6. *California High-Speed Train Business Plan* (Sacramento, CA: California High-Speed Rail Authority, 2008), p. 19.
7. "An \$850 Billion Challenge," *Washington Post*, December 22, 2008, page A1, [tinyurl.com/74t9ey](http://tinyurl.com/74t9ey).
8. *Highway Statistics 2007* (Washington: Federal Highway Administration, 2008). Table HM-48 reports that the Interstate Highway System has 212,782 lane miles.
9. "Japan: Metropolitan Areas and Core Cities: 1965 to 2000," [demographia.com](http://demographia.com), [tinyurl.com/l7h7lb](http://tinyurl.com/l7h7lb).
10. "Company History," East Japan Railway Company, Tokyo, 2005, [tinyurl.com/cjxhtd](http://tinyurl.com/cjxhtd).
11. Chris Isidore, "GM's \$35 Billion Albatross," [CNNMoney.com](http://CNNMoney.com), January 30, 2009, [tinyurl.com/atb2wg](http://tinyurl.com/atb2wg).
12. *Best Practices for Private Sector Investment in Railways* (Manila: Asian Development Bank, 2006), p. 13-3, [tinyurl.com/cwjehk](http://tinyurl.com/cwjehk).
13. Mitsuhide Imashiro, "Changes in Japan's Transport Market and Privatization," *Japan Railway and Transport Review*, September 1997, pp. 51-52.
14. Mitsuo Higashi, "JR East's Shinkansen Transport Strategy," presentation to the Forum for Global Cities Conference, December 8, 2008, p. 16, [tinyurl.com/dkvl7](http://tinyurl.com/dkvl7).
15. This was calculated using an average cost per mile of \$50 million and a total of 11,300 miles, which includes the FRA system plus Dallas-Houston, Jacksonville-Orlando, Los Angeles-Las Vegas, and the Colorado Rocky Mountain rail system.
16. Dan McNichol, *The Roads That Built America: The Incredible Story of the U.S. Interstate System* (New York: Sterling, 2006), pp. 104-106.
17. *California High-Speed Train Business Plan*, p. 21.
18. *Ibid*, p. 18.
19. *Midwest Regional Rail System Executive Report* (Frederick, MD: Transportation Economics and Management Systems, 2004), p. 13, [tinyurl.com/5mxdrb](http://tinyurl.com/5mxdrb).
20. "An Action Plan for the Restructuring and Rationalization of the National Intercity Rail Passenger System," Amtrak Reform Council, Washington, 2002, Appendix V, p. 96, [tinyurl.com/nv94x9](http://tinyurl.com/nv94x9). In calculating these numbers, state subsidies are not considered "revenues."
21. *Highway Statistics Summary to 1995* (Washington: Federal Highway Administration, 1996), table VM-201; *Highway Statistics 2004* (Washington: Federal Highway Administration, 2005), table VM-2; *Historical Statistics of the United States: Colonial Times to 1970* (Washington: Census Bureau, 1975), series A-29; "Annual Estimates of the Resident Population for the United States," Census Bureau, 2009, [tinyurl.com/mfy92y](http://tinyurl.com/mfy92y).
22. *Highway Statistics 2007* (Washington: Federal Highway Administration, 2008), table VM-2; *National Transportation Statistics* (Washington: Bureau of Transportation Statistics, 2009), table 1-37.
23. *Highway Statistics Summary to 1995*, table FI-200; *Highway Statistics 2007*, table FI-20.
24. *Highway Statistics 2007*, table VM-1; *National Transportation Statistics*, table 1-46a.
25. *Highway Statistics 2007*, table VM-1; *National Transportation Statistics*, table 1-46a.
26. *Highway Statistics 2007*, table HM-71.
27. "High Speed Rail and Greenhouse Gas Emissions in the U.S.," Center for Clean Air Policy and Center for Neighborhood Technology,



- Washington, 2006, p. B-4. The report projects 25.5 billion passenger miles of travel, but 4.8 billion are in the Boston-to-Washington corridor, which is not part of the FRA plan.
28. Based on 2025 population projections in “National Population Projections,” Census Bureau, 2008, [tinyurl.com/car7xw](http://tinyurl.com/car7xw).
29. Based on 2025 interpolation of Census Bureau state population projections for 2030, [tinyurl.com/yf2qbp](http://tinyurl.com/yf2qbp).
30. High-speed rail passenger kilometers are from “Traffic Volume and Passenger Revenues,” East Japan Railway Company, Tokyo, 2008, [tinyurl.com/daqgpx](http://tinyurl.com/daqgpx); “Transportation Data,” Central Japan Railway Company, Nagoya, Japan, 2008, [tinyurl.com/d4lko8](http://tinyurl.com/d4lko8); and “Results for the Year Ended March 31, 2008,” West Japan Railway Company, Osaka, Japan, p. 29, [tinyurl.com/cuxocc](http://tinyurl.com/cuxocc); *Panorama of Transport* (Brussels, BE: European Commission, 2007), pp. 107, 110, [tinyurl.com/23py4r](http://tinyurl.com/23py4r).
31. “Annual Report 2008,” Amtrak, Washington, 2009, pp. 28 and 33; “Monthly Performance Report for September, 2008,” Amtrak, 2008, p. A-2.2.
32. “National Economic Accounts,” Bureau of Economic Analysis, 2008, table 2.5.5, line 69.
33. *Highway Statistics 2007*, table VM-1.
34. *Highway Statistics 2007*, table HF-10, cell O32.
35. *Highway Statistics 2007*, table HF-10, cells O16 and O17.
36. *Midwest Regional Rail System Executive Report* (Frederick, MD: Transportation Economics and Management Systems, 2004), p. 9, [tinyurl.com/5mxdbr](http://tinyurl.com/5mxdbr).
37. William T. Bogart, *Don't Call It Sprawl: Metropolitan Structure in the Twenty-First Century* (New York: Cambridge, 2006), p. 7. Bogart says less than 15 to 20 percent of metropolitan-area workers work downtown. Since only 80 percent of Americans live in metropolitan areas and less than half of them have jobs, the share of Americans who work downtown is no more than 7.5 percent.
38. “President Obama, Vice President Biden, Secretary LaHood Call for U.S. High-Speed Passenger Trains,” White House, Washington, April 16, 2009, [tinyurl.com/d4whzy](http://tinyurl.com/d4whzy).
39. Amtrak, p. 10; Amtrak’s claim is based on Stacy C. Davis, Susan W. Diegel, and Robert Boundy, *Transportation Energy Data Book: Edition 27* (Oak Ridge, TN: Department of Energy, 2008), tables 2.13 and 2.14.
40. *California High-Speed Rail Final Program EIR/EIS* (Sacramento, CA: California High-Speed Rail Authority, 2005), Appendix 2-F, p. 2-F-1.
41. *Scenarios for a Clean Energy Future* (Oak Ridge, TN: Department of Energy, 2000), Appendix C-3, p. C-3.4.
42. *Final Environmental Impact Statement Florida High Speed Rail Tampa to Orlando* (Washington: Federal Railroad Administration, 2005), p. 2–38, [tinyurl.com/6ysffl](http://tinyurl.com/6ysffl).
43. “A Vision for High-Speed Rail in America: Highlights of Strategic Plan,” Federal Railroad Administration, April 16, 2009, p. 1, [tinyurl.com/dhttzb](http://tinyurl.com/dhttzb).
44. “High Speed Rail and Greenhouse Gas Emissions in the U.S.,” p. 8.
45. This was calculated by assuming that new cars would become more energy efficient on a straight line to Obama’s 2016 targets, and then remain at those targets, while the existing auto fleet would turn over every 18 years.
46. “High Speed Rail and Greenhouse Gas Emissions in the U.S.,” p. 8.
47. “High Speed Rail and Greenhouse Gas Emissions in the U.S.,” p. 8. The report assumed efficiencies would grow at the rates projected by Stacy C. Davis and Susan W. Diegel, *Annual Energy Outlook 2005* (Washington: Department of Energy, 2005), which were 0.6 percent per year.
48. Davis et al., *Transportation Energy Data Book: Edition 27*, table 2.14.
49. “787 Dreamliner,” Boeing, 2008, [tinyurl.com/kouly](http://tinyurl.com/kouly); “Shifting Gears,” *The Economist*, March 5, 2009, [tinyurl.com/ctnsas](http://tinyurl.com/ctnsas).
50. “High Speed Rail and Greenhouse Gas Emissions in the U.S.,” p. 9.
51. “Monthly Performance Report for September 2008,” Amtrak, 2008, p. C-1, [tinyurl.com/njlnhr](http://tinyurl.com/njlnhr); calculated by dividing “contribution per seat mile” by “contribution per passenger mile.”
52. Bent Flyvbjerg, *How Optimism Bias and Strategic Misrepresentation Undermine Implementation* (Trondheim, Norway: Norges Teknisk-Naturvitenskapelige Universitet, 2007).
53. Ibid, p. B-5.

54. Davis et al., *Transportation Energy Data Book: Edition 27*, tables 2.13 and 2.14.
55. *Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?* (Washington: McKinsey, 2008), pp. ix, xiii.
56. "Comparison of Energy Use and Emissions from Different Transportation Modes" (report prepared by M. J. Bradley & Associates for the American Bus Association, Washington, DC, 2007), p. 4, [tinyurl.com/mztgq3](http://tinyurl.com/mztgq3).
57. David Schrank and Tim Lomax, *The 2007 Urban Mobility Report* (College Station, TX: Texas A&M University, 2007), p. 1.
58. Alan Wirzbicki, "LaHood Defends Mass Transit Push," *Boston Globe*, May 21, 2009, [tinyurl.com/ovszpq](http://tinyurl.com/ovszpq).
59. Randal O'Toole, "Roadmap to Gridlock: The Failure of Long-Range Metropolitan Planning," Cato Institute Policy Analysis no. 617, May 27, 2008.

### OTHER STUDIES IN THE BRIEFING PAPERS SERIES

112. **Massachusetts Miracle or Massachusetts Miserable: What the Failure of the "Massachusetts Model" Tells Us about Health Care Reform** by Michael Tanner (June 9, 2009)
111. **Does the Doctor Need a Boss?** by Arnold Kling and Michael F. Cannon (January 13, 2009)
110. **How Did We Get into This Financial Mess?** by Lawrence H. White (November 18, 2008)
109. **Greenspan's Monetary Policy in Retrospect: Discretion or Rules?** by David R. Henderson and Jeffrey Rogers Hummel (November 3, 2008)
108. **Does Barack Obama Support Socialized Medicine?** by Michael F. Cannon (October 7, 2008)
107. **Rails Won't Save America** by Randal O'Toole (October 7, 2008)
106. **Freddie Mac and Fannie Mae: An Exit Strategy for the Taxpayer** by Arnold Kling (September 8, 2008)
105. **FASB: Making Financial Statements Mysterious** by T. J. Rodgers (August 19, 2008)
104. **A Fork in the Road: Obama, McCain, and Health Care** by Michael Tanner (July 29, 2008)
103. **Asset Bubbles and Their Consequences** by Gerald P. O'Driscoll Jr. (May 20, 2008)
102. **The Klein Doctrine: The Rise of Disaster Polemics** by Johan Norberg (May 14, 2008)

101. **WHO's Fooling Who? The World Health Organization's Problematic Ranking of Health Care Systems** by Glen Whitman (February 28, 2008)
100. **Is the Gold Standard Still the Gold Standard among Monetary Systems?** by Lawrence H. White (February 8, 2008)
99. **Sinking SCHIP: A First Step toward Stopping the Growth of Government Health Programs** by Michael F. Cannon (September 13, 2007)
98. **Doublespeak and the War on Terrorism** by Timothy Lynch (September 6, 2006)
97. **No Miracle in Massachusetts: Why Governor Romney's Health Care Reform Won't Work** by Michael Tanner (June 6, 2006)
96. **Free Speech and the 527 Prohibition** by Stephen M. Hoersting (April 3, 2006)
95. **Dispelling the Myths: The Truth about TABOR and Referendum C** by Michael J. New and Stephen Slivinski (October 24, 2005)
94. **The Security Pretext: An Examination of the Growth of Federal Police Agencies** by Melanie Scarborough (June 29, 2005)
93. **Keep the Cap: Why a Tax Increase Will Not Save Social Security** by Michael Tanner (June 8, 2005)
92. **A Better Deal at Half the Cost: SSA Scoring of the Cato Social Security Reform Plan** by Michael Tanner (April 26, 2005)
91. **Medicare Prescription Drugs: Medical Necessity Meets Fiscal Insanity** by Joseph Antos and Jagadeesh Gokhale (February 9, 2005)
90. **Hydrogen's Empty Environmental Promise** by Donald Anthrop (December 7, 2004)
89. **Caught Stealing: Debunking the Economic Case for D.C. Baseball** by Dennis Coates and Brad R. Humphreys (October 27, 2004)
88. **Show Me the Money! Dividend Payouts after the Bush Tax Cut** by Stephen Moore and Phil Kerpen (October 11, 2004)
87. **The Republican Spending Explosion** by Veronique de Rugy (March 3, 2004)
86. **School Choice in the District of Columbia: Saving Taxpayers Money, Increasing Opportunities for Children** by Casey J. Lartigue Jr. (September 19, 2003)
85. **Smallpox and Bioterrorism: Why the Plan to Protect the Nation Is Stalled and What to Do** by William J. Bicknell, M.D., and Kenneth D. Bloem (September 5, 2003)

84. **The Benefits of Campaign Spending** by John J. Coleman (September 4, 2003)
83. **Proposition 13 and State Budget Limitations: Past Successes and Future Options** by Michael J. New (June 19, 2003)
82. **Failing by a Wide Margin: Methods and Findings in the 2003 Social Security Trustees Report** by Andrew G. Biggs (April 22, 2003)
81. **Lessons from Florida: School Choice Gives Increased Opportunities to Children with Special Needs** by David F. Salisbury (March 20, 2003)
80. **States Face Fiscal Crunch after 1990s Spending Surge** by Chris Edwards, Stephen Moore, and Phil Kerpen (February 12, 2003)
79. **Is America Exporting Misguided Telecommunications Policy? The U.S.-Japan Telecom Trade Negotiations and Beyond** by Motohiro Tuschiya and Adam Thierer (January 7, 2003)
78. **This Is Reform? Predicting the Impact of the New Campaign Financing Regulations** by Patrick Basham (November 20, 2002)
77. **Corporate Accounting: Congress and FASB Ignore Business Realities** by T. J. Rodgers (October 25, 2002)
76. **Fat Cats and Thin Kittens: Are People Who Make Large Campaign Contributions Different?** by John McAdams and John C. Green (September 25, 2002)
75. **10 Reasons to Oppose Virginia Sales Tax Increases** by Chris Edwards and Peter Ferrara (September 18, 2002)
74. **Personal Accounts in a Down Market: How Recent Stock Market Declines Affect the Social Security Reform Debate** by Andrew Biggs (September 10, 2002)
73. **Campaign Finance Regulation: Lessons from Washington State** by Michael J. New (September 5, 2002)
72. **Did Enron Pillage California?** by Jerry Taylor and Peter VanDoren (August 22, 2002)
71. **Caught in the Seamless Web: Does the Internet's Global Reach Justify Less Freedom of Speech?** by Robert Corn-Revere (July 24, 2002)

Published by the Cato Institute, Cato Briefing Papers is a regular series evaluating government policies and offering proposals for reform. Nothing in Cato Briefing Papers should be construed as necessarily reflecting the views of the Cato Institute or as an attempt to aid or hinder the passage of any bill before Congress.



Contact the Cato Institute for reprint permission. Additional copies of Cato Briefing Papers are \$2.00 each (\$1.00 in bulk). To order, or for a complete listing of available studies, write the Cato Institute, 1000 Massachusetts Avenue, N.W., Washington, D.C. 20001. (202) 842-0200 FAX (202) 842-3490.