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Do the Locomotive

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Fifty years after the first rapid train began its scheduled service, this comfortable, safe, and efficient mode of transport still has not caught on in North America.



Fifty years after the first high-speed train began its scheduled service in Japan, it is remarkable how this superior alternative has not caught on in North America. Among modern affluent nations, only the United States and Canada notably lack rapid trains (Acela's pitiful performance doesn't count). And yet for any pair of large cities connected by hourly and roughly hour-long shuttle flights, a rapid train is a better option: downtown to downtown in one-and-a-half to two hours in a comfortable seat, compared to taxi rides to airports, herding through security screenings, more frequent weather and other delays, and countless technical glitches.

Due to their expensive construction and the need for mass ridership, rapid trains are not for moving people from Minneapolis to Milwaukee or from Winnipeg to Regina, but the four obvious North American choices include the northeastern megalopolis (Boston-New York-Philadelphia-Washington), Houston-Dallas, San Francisco-Los Angeles, and Toronto-Ottawa-Montreal.

As a frequent flyer and a frequent rider of rapid trains, I cannot imagine why anybody would prefer the combination of North American airlines and security gauntlets to easing into a seat that reclines without causing outbursts by fellow passengers, looking out from a large window, and reading or eating while countryside flows past at 300 km/h. Cost is invariably mentioned as the greatest obstacle to high-speed trains, as if riding cars and flying were enviably cheap alternatives. If Spain and China can afford to join the 21st (well, actually the 20th century) of rapid trains is it not high time that the United States and Canada finally follow? If there is a welcome role for governments then it is in investing in infrastructure that will secure decades-long benefits (think of the economic and social payoff of the U.S. interstate system launched under Eisenhower).

In addition, high-speed trains have a low environmental impact. No form of land transportation is more energy-efficient than a modern rapid train. Japan's *shinkansen* line from Tokyo to Osaka requires 80 percent less energy per passenger-kilometer than driving, and carbon-dioxide emissions per seat average just 4.2 kg on the Tokyo-Osaka trip, compared to about 50 kg when flying the same distance in a commercial jetliner.

The Japanese rapid trains' safety record is particularly impressive when one considers their frequency, the number of passengers, and the potential risks on the busiest *Tokaido* line between the country's two largest cities: with up to 323 trains a day, 140 million riders in a year, and nearly 6 billion riders in 50 years, and with the entire route susceptible to frequent earthquakes and to seasonal typhoons that bring heavy winds, rains, and flash floods. And yet not a single train has ever derailed, no two trains have ever collided, and there has not been a single fatality in half a century of operation. As for the reliability (and think again about the challenges of the lengthy typhoon season), infrequent delays on the *Tokaido* line now average 36 seconds! This was accomplished without Japanese engineers breaking any new technical ground. Their achievement was in improving and combining proven techniques — ranging from steel wheels, electric motors, pantographs, and regenerative brakes to light aluminum car bodies, aerodynamic shapes, and centralized operation control — into a remarkably reliable system.

A half-century later, Japan's pioneering achievement of introducing the first rapid train remains notable for the boldness of the idea and for its near-flawless execution. On October 1, 1964, a streamlined train pulled out from Tokyo's main railway station heading for Osaka, 320 miles to the southwest. The Olympic Games, widely seen to mark the full postwar return of Japan to the community of modern nations, were to start in nine days, and the *shinkansen* was finished, after five years and five months of construction, just in time to illustrate the technical prowess of a rebounding nation.

Japan's plans for a bullet train had been derailed by World War II, and had to be re-evaluated in the light of postwar advances and, starting in 1958, the introduction of commercial jet flights. Moreover, in 1956, when Japan's National Railways (JNR) began a feasibility study, the country was still fairly poor, having reached its pre-war GDP level only in 1954. In per capita terms, it was still poorer than in 1939. The World Bank's loan covered less than 15 percent of the original budget and, as with so many megaprojects, the actual cost was double the initial estimate, leading to the resignation of the project promoters, the JNR's president and vice president for engineering, in 1963.

But looking back it is hard to be critical, as speed, safety, and reliability have combined in an enviable performance record. In 1964, the maximum speed on the Tokyo-Osaka line was 210 km/h and it took four hours to reach Osaka; the next year it was down to three hours and ten minutes; in 1992, the new, faster Nozomi trains (instantly recognizable due to their 15-meter-long aerodynamic noses and wing-shaped pantographs, with speeds up to 300 km/h) cut it to two hours and 30 minutes; and a further 5 minutes were gained by the latest N700 version. But the realities of a densely populated nation intervene: the fastest trains must go slower in many sections in order to reduce noise where the line transects inhabited areas.

Half a century after the first *Tokaido* ride, rapid trains connect the Japanese capital with most of the regions on the main island, Honshu, and also go to Kyushu, Japan's southernmost island. Europe, the birthplace of trains, hesitated for a while but it eventually became an enthusiastic builder of rapid trains, most notably France's *Train à Grande Vitesse*, Spain's *Alta Velocidad Española*, Germany's *Intercity*, and Italy's *Frecciarossa*. And during the last decade China's expanding network of rapid trains became the world's longest (about 11,000 km, or twice the distance across the United States) and it also includes the longest direct link between Beijing and Guangzhou (with the same seat in the same train for nearly 2,300 km).

By the time this celebratory essay will be published I will be again in Japan, standing at the platform of Tokyo's central station, waiting for a sleek Nozomi (so much more aerodynamic than the first 0 series with its bulbous noses), leaving the world's largest megalopolis, watching the tea gardens of Shizuoka glide by, stopping briefly in Nagoya, and arriving in Kyoto. I will be among the first 5 million riders (the average is now about 390,000 a day) who will start the 51st year of a what is a fundamentally 19th-century invention elevated to high

performance during the latter half of the 20th century and ready to serve, with unsurpassed safety and reliability, for decades during the 21st century.

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***FURTHER READING:* Smil also writes "How Green Is Europe?" "The Natural Gas Boom: Questions and Complications," "Hoping for China's Success," "Germany's Energy Goals Backfire," and "Memories of Peak Oil."**

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