2012

The Japanese Shinkansen

Popular Mechanics

8/20/2012

The Japanese Shinkansen, or bullet train, has been one of the world's most successful high speed railways. (Photograph by Ren Zhenglai/Xinhua/WPN)

Gazing at the verdant blur of mountains zipping by noiselessly as you ride on the Japanese Shinkansen (bullet train) is enough to make anyone fall in love with high-speed train travel. When you couple that appeal with concerns about energy consumption and global warming, a mass-transit rail system that can whisk passengers along at speeds in excess of 300 mph seems like an obvious solution to today's transportation woes.

But high-speed railways are outsized mega projects with multi-billion-dollar budgets that can rival those of space programs. So constructing them isn't simply a matter of next-gen tech--it's also about money and political will. To wit, this year a magnetic levitation line planned for Munich, Germany, was squelched at the eleventh hour when officials balked at cost--not of the maglev setup itself but rather at the billions of dollars it would take to tunnel under the center of the city.

Nevertheless, from China to California, there are dozens of other high-speed-rail plans moving forward--including some unveiled late this summer. Even airlines like Air France-KLM that are struggling with the high cost of jet fuel are looking to launch their own super-rail services in the next couple of years. But how fast will these trains go--and how fast will they be finished? Here's an in-depth reality check on the next big rail projects from around the world.

1. Beijing to Shanghai Project

Top Speed /// 236 mph | Distance /// 819 miles

Technology /// high-speed steel wheel

The Plan /// If anyone has doubts about the future of high-speed rail construction, he need only look to China. In August, the government completed its 217-mph Beijing-Tianjin Intercity Rail in time for the Summer Olympics, enabling athletes and spectators to travel between events in the two Chinese cities in under 30 minutes (versus the 70 minutes it took on conventional trains).

Buoyed by the success of that $31.6 billion line, the Chinese have started construction of a much more ambitious high-speed line to connect the capital with Shanghai. The plan is to bump up the train's speed to 236 mph, which would surpass that of the just completed Olympics line and push it past the top speed of the latest Japanese Shinkansen train. It would also turn what is now a 12-hour train trip into a four-hour ride, according to China's Ministry of Railways. The ministry claims the railway will handle 80 million passengers a year and be the longest single high-speed railway in the world when completed.

Estimated Cost /// Unknown | Estimated Completion Date /// 2012

2. Shanghai to Hangzhou Maglev

Top Speed /// 311 mph | Distance /// 124 miles

Technology /// magnetic levitation

The Plan /// The world's only commercially operational maglev train now runs from Shanghai's Pudong International Airport 18.6 miles to the city's suburbs (it doesn't

make it to the city center). Floating on air, it has a comfortable cruising speed of 248 mph and can reach speeds above 300 mph without straining. It hasn't been a financial success, however, because it doesn't reach very far or travel to popular areas. Plans have been in place for years to extend the maglev line over 100 miles to reach the tourist city of Hangzhou and the nearby Expo 2010 site.

While China is keen on extending its technological bragging rights, it now looks doubtful that this maglev line will be running in time for the Expo. The Shanghai-Hangzhou line was delayed last year by a new round of community protests from residents who fear the electromagnetic radiation the train may generate and by others seeking more money for their land. Now, the maglev extension is facing another impediment: budgetary competition from the steel-wheel Beijing to Shanghai line described above.

Estimated Cost /// $3.22 billion | Estimated Completion Date /// 2014

3. California High-Speed Rail

Top Speed /// 220 mph | Distance /// 800 miles

Technology /// high-speed steel wheel

The Plan /// More than a dozen years in the planning, the next best chance to build the first high-speed rail system in the U.S. is California's high-speed rail initiative. California Gov. Arnold Schwarzenegger has put his political muscle behind it by agreeing to put the issue to the voters on the November ballot as Proposition 1A. Voters will decide whether the state will put up $9.95 billion for the project--its obligation for the construction of the line from Los Angeles to San Francisco (federal and other public funds would make up the balance).

When completed, the trip would take about 2.5 hours, rivaling the time it takes to fly between the two cities. Ultimately, the California High-Speed Rail Authority would like to link all major cities in California. According to state government estimates, it's a superior alternative to expanding airports and constructing 3000 miles of highway that it believes will be needed in the near future at a cost of $82 billion.

Estimated Cost /// $40 billion | Estimated Completion Date /// 2030 (for all 800 miles)

4. Glasgow to London Line

Top Speed /// 200 to 311 mph | Distance /// 522 miles

Technology /// high-speed steel wheel or magnetic levitation

The Plan /// Government officials in the U.K. have been kicking around the idea of a high-speed train for years, but they now seem to be on the brink of moving forward on the first leg: a Glasgow-to-London line. No one has settled on a technology yet, with the French TGV steel-wheel system and German maglev technologies still in

the running. But all parties involved seem to agree that high-speed rail is needed, noting that building a new rail line would take 45 times less land to construct than a new highway and could run through congested cities at up 125 mph without creating undue noise pollution. Indeed, if maglev is chosen it could cut the train trip from 5 hours down to just 2.5.

To date, the project has only garnered about $190,000 in public funds to study the proposal (UK Ultraspeed, the private consortium promoting maglev for the project, is kicking in another $190,000). Furthermore, the Scottish parliament is just beginning its own public inquiry and inviting submissions for mid-October, which is considered to be the first step in a rather lengthy political process.

Estimated Cost /// $47 billion | Estimated Completion Date /// unknown

5. California-Nevada Maglev

Top Speed /// 311 mph | Distance /// 268 miles

Technology /// magnetic levitation

The Plan /// Many proponents of maglev technology think that the best chance of constructing a futuristic, 300-mph-plus train would be to build it mostly across flat desert land. The topography would make it relatively easy to construct and wouldn't require raised rails or expensive tunnels. It would also be easier to gain rights of way across the desert where there is likely to be little community protest. And there's the tantalizing possibility of tapping into solar or wind farms for the system's electrical needs, thus making it a zero-carbon-footprint mode of transportation. What better place to build such a train than between southern California and Nevada? The California-Nevada maglev proposal is supported by a long list of tech companies and others under the aegis of the American Magline Group. The last federal transportation bill earmarked $45 million to do a preliminary study and work on the project, including an environmental impact assessment in the desert.

The initial stage of the line, however, would run between two Los Angeles suburbs from Ontario, Calif., to Orange County for commuters. Eventually the line would continue, stretching all the way to Las Vegas. The consortium claims the system could be built within five years, but that assumes the federal money is there to support it. So far, the Federal Railway Administration has argued against the project, recommending instead that the money go to shoring up existing railways. Moreover, there are several other maglev proposals competing for Federal dollars, including a proposed line in the Baltimore-Washington corridor, an Atlanta to Chattanooga route, and a maglev project for Pittsburgh's international airport.

Estimated Cost /// $12 billion | Estimated Completion Date /// unknown