

In 2008, California voters approved a proposition for a new High Speed Rail (HSR) that would run from Los Angeles to San Francisco. The railway would allow commuters to trade an expensive flight or long car ride for a three-hour train ride from urban center to urban center with several stops in between. Since 2008, though, opposition to the high speed rail has grown each year. Most of those opposed to the project cite the rising project costs as their primary concern; when originally proposed, the project was expected to cost the state \$44 billion, but new estimates suggest that the total cost will be closer to \$77 billion. This is a sharp increase for a project that has only just begun and many expect this estimate to continue to rise. In spite of this increase, California's proposed HSR is a project that should not be abandoned. The cost of the project will be high, but the benefits far outweigh the costs as the HSR would bring California into the modern age.

The increase in the total estimated cost of the HSR is significant but not surprising. Major engineering projects similar to this one (though this is the first high speed railway constructed in the US) often have a high-price tag that steadily increases as the project progresses. This project, though, faces additional costly challenges due to difficult terrain and the location of the railway along major fault lines. These factors were likely considered in the original project cost estimate, but have proven to be more difficult to work around than engineers initially anticipated. Furthermore, the growing opposition to the project has led to a number of lawsuits being filed by citizens and corporations against the California government. The lawsuits themselves can be costly for the state due to legal fees and settlements, but even more costly is the delay they can cause for the overall project timeline.

As civil engineers, we are encouraged to consider not only the costs of a project though, but the potential benefits of a project to citizens. To understand these potential benefits of the HSR completion (and consequences of project abandonment), one must look no further than two of the most successful transportation projects in the world: France's *Train à Grande Vitesse* (or the "TGV") and Japan's Shinkansen railway system. Opened in 1964 to the public, The Shinkansen was the first and only major high speed railway in the world before the completion of the TGV in 1981. Since their completion, both railways have transported billions of passengers and have been met with great success.

Like the California HSR, both the TGV and the Shinkansen railways connect major urban centers in France and Japan via bullet trains, allowing citizens to travel quickly and affordably from one city to another. In doing so, the railways have afforded French and Japanese citizens the option to live outside of city center without having to deal with a laborious daily commute. This has led to a reduction in urban congestion, rising costs of housing, and the dangers of the heat island effect in cities located near a railway station. For California's residents, the new HSR will address the same issues in addition to the incredible housing shortage in the Bay Area and the Los Angeles Metro Area. The construction of railway stations throughout the Central Valley will encourage residents to seek more affordable housing options in less populated areas along the railway route.

Additionally, Californians must consider the environmental benefits of the HSR. In 2010, the California Air Resources Board announced a new plan to reduce the state's greenhouse gas emissions by 40% below 1990 levels¹. This goal, which is both ambitious and admirable, simply cannot be met without the completion of the electric-powered HSR. Two of the greatest sources of greenhouse gases in California are planes and cars. The HSR has been designed to reduce the need for both by offering California residents an efficient and clean energy alternative. In fact, the California High Speed Rail Authority estimates that Californians will travel 10 million fewer miles by car every day once the HSR is completed and airlines will offer up to 93 fewer flights each day².

The impact of this reduction in flight and automobile miles cannot be overstated. With greenhouse gas emissions contributing to climate change and, consequently, the rise of sea levels, major flooding and droughts, and severe storms, civil engineers have a responsibility to do whatever they can to reduce greenhouse gases and promote sustainable construction. Therefore, Californians must stop asking themselves if the HSR should be completed and begin asking how additional funding can be raised to ensure that the railway is completed as soon as possible.

There are several potential solutions to the HSR's funding problem, but the best solution is for the California High Speed Rail Authority to form a Public Private Partnership with a major private engineering firm. Although these types of partnerships are often controversial in the engineering world, only a major private engineering company (or several) could provide the state with the additional project funding required without dramatically increasing taxes. Additionally, such a partnership could help keep the project on schedule and on budget because private companies are not typically delayed by funding shortages and are more motivated to stay on budget because doing so will allow them to maximize their profit.

Although controversial, the new California High Speed Railway is a project that should not be abandoned. The costs will of the project will be great, but the social and environmental benefits of the project will certainly be greater.

¹ California Air Resources Board. "California Issues Proposed Plan to Achieve Groundbreaking 2030 Climate Goals." *News Release*, 20 Jan. 2017

² State of California. "High-Speed Rail Environmental Benefits." *California High-Speed Rail Authority*