

REPORT ON HIGH SPEED RAIL

APRIL 2023



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2. Executive Summary

Post-WWII America shifted its focus in infrastructure from public transit towards the federal interstate highway system and domestic aviation systems for passenger travel, leaving only a skeleton of America's once-proud rail network to maintain America's critical freight lines and supply chain. At the same time, high-speed rail (HSR) has been adopted throughout the world, providing efficient, environmentally friendly, and comfortable passenger transportation that is particularly suited for densely populated areas. The United States is the only large developed economy still racing to catch up in public transit and infrastructure.

However, high-speed rail investment and development provides more benefits beyond the scope of keeping up with the progress of other countries. The interconnected and efficient nature of HSR transport provides promising economic opportunities, mitigates traffic deadlock, and promotes environmental sustainability through the reduction of carbon emissions. High-speed rail stands at a crucial precipice where it can reinvigorate the country's proud rail legacy and serve as an effective intermediary between long road trips and flights.

This brief evaluates the varying definitions of HSR on the domestic and international stage, the similarities and differences in infrastructural development across the United States and around the world (the European Union, Japan, and China), and public sentiment regarding HSR at home.

To achieve this, we analyze the relevant stakeholders, such as passengers, private companies, governments, and so on to determine the viability of HSR development in the United States. We additionally adopt a discursive approach to examining the benefits and challenges associated with HSR to provide a realistic and accurate picture for its efficacy.

Finally, we summarize the potential economic and environmental implications associated with HSR, including the passage of vital legislation, revision of pre-existing definitions/regulations for HSR, stimulation of public support, and establishment of private/public partnerships to lay down the steels track for a new era of American transportation.

3. Background

3.1 What is HSR?

High-speed rail (HSR) is a mode of passenger rail transportation denoted by the objective of **making rail-based travel more efficient**, comfortable, and accessible. They are defined as any intercity passenger rail transportation that is **time-competitive** with pre-existing transport systems (i.e. conventional trains, cars, flights, etc.).¹ In this sense, HSR is not one form of technology, but **any technology** able to achieve high speeds. Most conventional high-speed rail pairs basic scientific principles of aerodynamics, such as **minimizing air resistance** with **specially dedicated tracks** that are able to support specially-designed trains. However, conventional tracks are also often upgraded to provide cheaper upgrades, so **two forms of HSR exist**: new systems and upgraded conventional systems.² Other factors generally associated with HSR include dedicated rail tracks, high-frequency service, and more advanced train technology. These features combine to create a transportation system that is **fast, efficient, cost-effective**, and **environmentally friendly**, making HSR an attractive alternative to other forms of transportation, such as flights or driving.

Because HSR does not focus on a specific technological innovation, it is usually up to **governments to regulate and define HSR transport**. This is crucial for funding and advancing certain HSR projects, as both the US and other international actors will often specifically appropriate funding for High-speed rail and other passenger rails separately. The most frequent method by which governments define HSR by its speed. However, this creates a problem when multiple actors from the same country use **different speeds to define HSR**.

For example, the US Department of Transportation makes High-speed rail grants to any project that was within the 100-150mph range, while the US Federal Code defined HSR as any line or rail project with an average speed above 125mph. These contradictory cases leave scenarios where the same rail line will be regulated and funded differently by different government actors. For this paper, **we will define high-speed rail as any railway that has the capacity to move at speeds above 185 miles per hour**.³ This is because the current Amtrak Acela line, which previously had Acela trains traveling at a maximum of 145mph, have been **upgraded by new bullet trains** in 2022 which have a max speed of

¹ Yaghoubi, Hamid. 2019. "Introductory Chapter: High-Speed Railways (HSR)." High-Speed Rail, June. IntechOpen. doi:10.5772/intechopen.86070.

² "High-Speed Railway." Encyclopedia. <https://encyclopedia.pub/entry/12473>.

³ U.S. Congress, House, American High-Speed Rail Act, HR 1845, 117th Cong., 1st sess., introduced in House March 11, 2021, <https://www.congress.gov/bill/117th-congress/house-bill/1845/text?r=9&s=1>.

186 mph.⁴ Figure 1 shows the definitions that various government agencies, congressional legislation, and research institutions use, compared to the definitions that the EU and China have adopted for their HSR systems and ours.

Fig. 1: Definitions of “High-speed” Rail Systems

	100	125	150	175	200	225
US DOT		Dept. of Transportation 110-150mph				
US Code		US Federal Code More than 125mph				
US CRS		US Congressional Research Service Above 150mph; lower is Higher Speed Rail				
US FRA	US FRA 90-110mph	US FRA (Regional) 110-150mph	US Federal Railroad Administration (Express) Above 150mph; dedicated to passenger service			
1991 HR2950	Intermodal Surface Transportation Efficiency Act of 1991 “90 miles or more per hour are occurring or [...] in the future” (23 USC §104(d)(2)(C))					
1993 HR1919		High-Speed Rail Development Act of 1993 “sustained speeds of more than 125 miles per hour” (49 USC §26105)				
2008 S.294		Passenger Rail Investment and Improvement Act of 2008 “speeds of at least 110 miles per hour” (49 USC §26106(b)(4))				
China		China 124mph-154mph*	China Defined as 155mph+ (250km/h)			
EU		EU 124mph-154mph*	European Union New lines are 155mph+ (250km/h)			
SPRING		SPRING’s “Higher Speed Rail” 110-185mph			SPRING’s “High Speed Rail” 185+mph	

*: This definition applies to lines that were upgraded from conventional rail

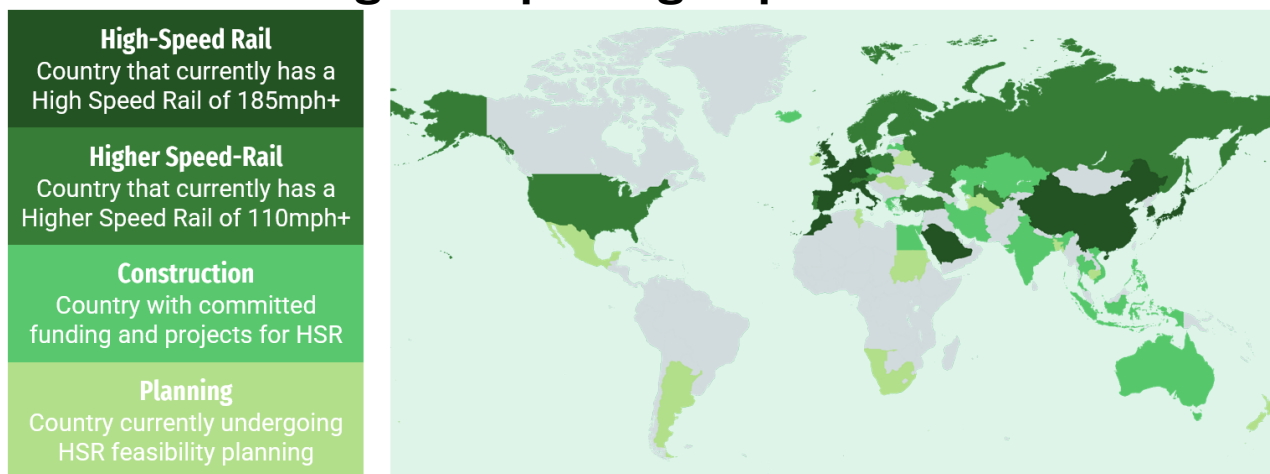
3.2 HSR Around the World

High-speed rail has been implemented in countries around the world, and has been much more successful than the United States’s current attempts to construct new HSR. In many of these countries, HSR has **revolutionized public transportation** and eliminated the need for flights for intercity travel. We will expand upon **three regions** in particular: **Japan**, the origin of HSR, the **European Union**, which boasts a vast HSR network and is similarly

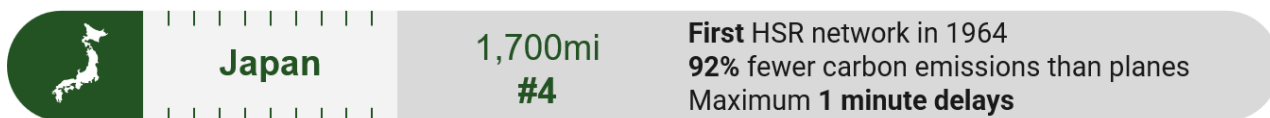
⁴ Lazo, Luz. “Inside the Plant Building the Fastest Passenger Trains in America.” The Washington Post. WP Company, September 24, 2022.
<https://www.washingtonpost.com/transportation/2022/09/22/amtrak-acela-high-speed-trains/>.

developed to the US, and **China**, which rapidly grew its HSR network to the largest in the world in just two decades. We review the impact that these HSR networks have on their respective regions and examine lessons that may be learned from government actions.

Fig. 2: Map of High-Speed Rail



The map shows countries with current HSR and Higher-Speed Rail using the SPRING definition. Data is sourced in March 2023 from OpenRailwayMap⁵



The **origin of all high-speed rail** was Japan's Shinkansen, first operating in 1964.⁶ It travels at 200 miles per hour across 22 of Japan's major cities, serving 320,000 passengers on a typical weekday.⁷ Until 2011, it was the **world's busiest passenger railway** before being surpassed by China's massive countrywide network, which will be discussed further.

The Shinkansen was not only the first rail network of its kind, but it was one of HSR's greatest success stories: it produces **92%**

List of Shinkansen Lines:
(click on each line for more details)

Tokaido Shinkansen

Train Categories:
Nozomi, Hikari, Kodama

Sanyo Shinkansen

Train Categories:
Mizuho, Nozomi, Sakura, Hikari, Kodama

Tohoku Shinkansen (and Yamagata and Akita Shinkansen)

Train Categories:
Hayabusa, Hayate, Yamabiko, Nazuno, Komachi (Akita), Tsubasa (Yamagata)

Hokkaido Shinkansen

Train Categories:
Hayabusa, Hayate

Joetsu Shinkansen

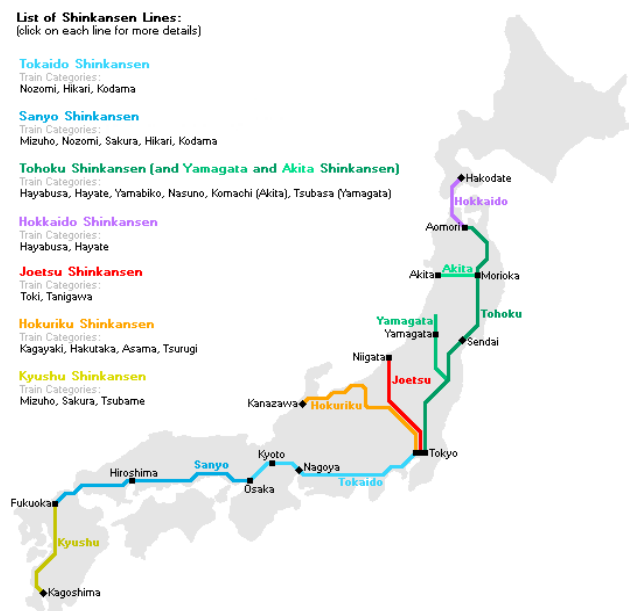
Train Categories:
Toki, Tanigawa

Hokuriku Shinkansen

Train Categories:
Kagayaki, Hakutaka, Asama, Tsurugi

Kyushu Shinkansen

Train Categories:
Mizuho, Sakura, Tsukame



⁵ OpenRailwayMap. <https://www.openrailwaymap.org/>.

⁶ "The Shinkansen Turns 50: The History and Future of Japan's High-Speed Train." *nippon.com*, 30 May 2020, www.nippon.com/en/features/h00078/

⁷ JRailPass. "History of the Shinkansen: 50 Years of the Japanese Bullet Train." *Japan Rail Pass Travel Blog | JRailPass*, 25 Jan. 2019, www.jrailpass.com/blog/shinkansen-bullet-train-history.

fewer carbon emissions than airplanes, the next best alternative, and produced **hundreds of millions of dollars worth of economic growth** across each of Japan's many prefectures.⁸ The Shinkansen system, whose rail network is depicted above,⁹ is world-renowned for having the most efficient system in the world; **nearly every single Shinkansen train runs on time**. Over the past six years, the average delay for each Shinkansen train remains under a minute each year.¹⁰

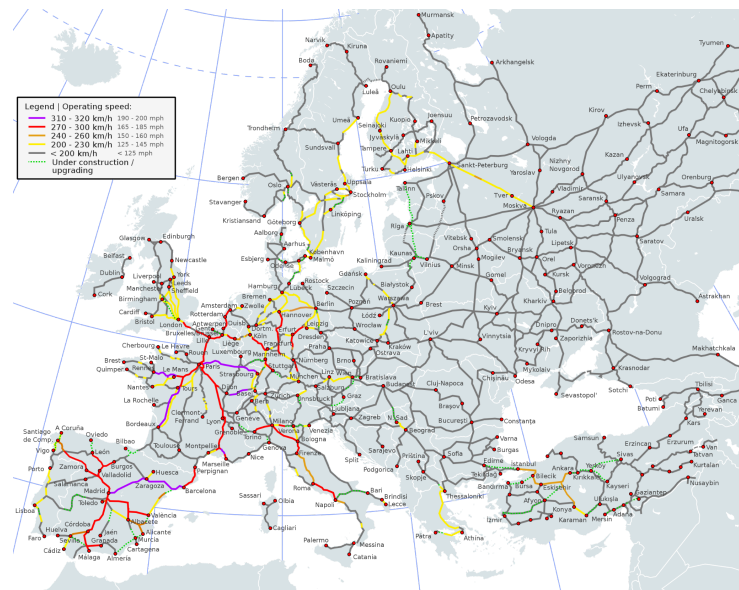


**European
Union**

**7,200mi
#2**

International HSR network
Facilitated **cooperation** and **development**
Tripling in size to meet the EU "Green Deal"

A unique example of HSR is in Europe, where transportation innovation **transcended borders** to build a continent-wide system and HSR network. Since France first made high-speed rail available to riders in 1981, other countries like Germany and the United Kingdom soon followed suit.¹¹ The European Union aided the process of building HSR, and it made maintaining a high-speed rail system one of its goals.¹² For example, the EU placed €25 billion into a project to **connect the disparate Italian and French systems** together. Currently, the EU is looking into funding and **supporting the planning stages of a new HSR network** to connect Romania and Hungary to the EU system.



Similarly to Japan, European investment in high-speed rail has led to **economic growth** and a more **eco-friendly alternative** to air travel. Europe's networks will only be expanding, as rail industry leaders announced last June their plans to **double rail usage by 2030** and

⁸ Flynn, Connor. "What Japan's Bullet Train Can Teach Us About the Future of Transportation - Planet Home." Planet Home, 17 Aug. 2021, planethome.eco/what-japans-bullet-train-can-teach-us.

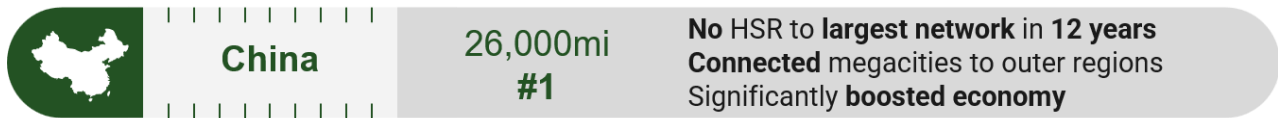
⁹ Pahwa, Anmol. "Shinkansen: Transforming Japan." The World of Transportation Science, September 13, 2022. <https://the-world-of-transportation-science.blog/2019/08/10/the-wonders-of-shinkansen/>.

¹⁰ Arba, Alexandru. "JR Central: Average Delay of Shinkansen Trains 2021." Statista, October 24, 2022. <https://www.statista.com/statistics/1267031/jr-central-high-speed-train-tokaido-average-delay/>.

¹¹ "High-Speed Rail History – UIC - International Union of Railways." UIC - International Union of Railways, 23 Aug. 2021, uic.org/passenger/highspeed/article/high-speed-rail-history.

¹² Environmental and Energy Study Institute (EESI). *Fact Sheet | High Speed Rail Development Worldwide | White Papers | EESI*. www.eesi.org/papers/view/fact-sheet-high-speed-rail-development-worldwide.

triple the network's size by 2050 as part of the EU's bid to meet their "Green Deal" **carbon-neutral by 2050 objective**.¹³ Europe's achievements are impressive, as they have achieved a level of collaboration between completely different countries, bridged competing national objectives, and worked through obstacles to build a vast HSR network, detailed in the map above.¹⁴



China now has the **largest high-speed rail system in the world**,¹⁵ but just **over a decade ago, China did not have a single line of high-speed rail**. Born from a once measly network of just one train between Beijing and Tianjin, China's high-speed rail system is the most dominant in the world due to **strong investment** from the government. Equipped with the world's fastest trains, with top speeds of 217 miles per hour, the network carries **twice as many passengers** as China's domestic airlines, and **will carry more rail passengers than the rest of the world combined by 2025**.¹⁶



Government intervention was a large contributing factor to the prominence of China's network. Because China's government sought to promote **unity** between the many distant regions of China, it invested billions upon billions of dollars into the network to make it what it is today.¹⁷ Furthermore, China's huge construction sector and natural resources industry benefited from the vast amounts of steel, labor, and production that were

¹³ Jones, Ben. "Europe Wants a High-speed Rail Network to Replace Airplanes." CNN.com, CNN, 6 July 2022, www.cnn.com/travel/article/europe-high-speed-rail-network/index.html.

¹⁴ "High Speed Railroad Map of Europe." Wikimedia Commons. https://commons.wikimedia.org/wiki/File:High_Speed_Railroad_Map_of_Europe.svg.

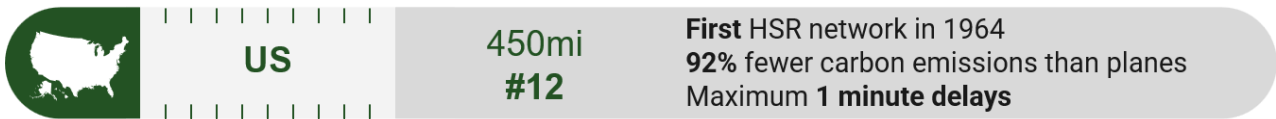
¹⁵ "Rail Map of PRC." Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Rail_map_of_PRC.svg.

¹⁶ Environmental and Energy Study Institute (EESI)

¹⁷ Davis, River. "China, Japan Race to Dominate Future of High-speed Rail." *Bloomberg*, 23 Nov. 2020, www.detroitnews.com/story/business/autos/mobility/2020/11/23/china-japan-race-dominate-future-high-speed-rail/6400217002.

required for an HSR network of previously unimaginable proportions.¹⁸ Money spent on HSR **boosted the domestic manufacturing and natural resource industries** and **grew Chinese GDP** as the country connected massive urban centers together. Now, the government is investing in the new Maglev train, which utilizes magnets to maintain an unmatched top speed of 270 miles per hour, trying it out in certain routes.

3.3 HSR in the United States



The development of HSR in the United States has been limited due to a **lack of political support** and the resulting **lack of funding**. Currently, the only operating high-speed rail in the United States is Amtrak’s **Acela**, which travels across America’s **Northeast Corridor** between Washington D.C. and Boston and carried 3.5 million passengers in 2016.¹⁹ There are projects to build HSR in other regions of the country by actors other than the federal government; those have faced many construction delays but are still making progress slowly. The figure below details current statuses for nine out of the eleven federally designated HSR corridors.

Fig. 3: Summary of Current Federal HSR Corridors

Northeast		Northeast	New train fleet increasing speeds in 2023
		New York	Approved in May 2021, construction starting in 2023
		Pennsylvania	Currently no plans
West		California	Anticipated first track completed in 2028
		Pacific North	MoU ratified to bring HSR signed by WA, OR, BC in 2022
Southeast		Texas	Texas Central Company ceased operating in 2023
		Florida	Brightline PPP, further expansion planned for HSR
		Southeast	Current service improvements for DC to NC
Midwest		Chicago Hub	Feasibility plans in OH, MN and WS expanding rail

¹⁸ “How China Builds High-Speed Rail for Less.” International Railway Journal, September 5, 2018. https://www.railjournal.com/in_depth/how-china-builds-high-speed-rail-for-less/.

¹⁹ Rail Passengers, “Amtrak Fact Sheet: Acela Service.” Rail Passengers Association, 2020, <https://www.railpassengers.org/site/assets/files/3480/1.pdf>



Northeast

Corridor is **457mi**
Proposed **427mi** HSR

Largest megaopolis in the world
Contains **most concentrated** HSR demand
Home to existing **Acela** segment of HSR

The tri-state region and the Northeast as a whole have been the target of **Amtrak's high-speed rail development**. The congestion caused through traditional forms of transportation such as cars, trains, and the subway has made delays in travel time a norm; consequently, Amtrak's **Acela** high speed rail line serves as an affordable way to avoid congestion for many passengers.

Past advancements and federal investments have targeted **upgrades** in infrastructure along the Acela line, as the region is the current target of varying funds and modernization efforts including the development of **new HSR trains** that will boost the speed of the Acela line to **above 185mph** without changing the tracks.²⁰ To increase capacity and improve reliability, Amtrak is constructing a new platform at New Carrollton Station and increasing the number of high-level platforms at Baltimore Penn Station to allow for greater operability of train service.²¹

Other regions across the Northeast also have active HSR projects intended to improve the development of HSR. Currently, the **Gateway Project** is an announced development proposal by Amtrak to alleviate bottlenecks on the Northeast Corridor by adding new routes. Planned to come by 2030, Gateway is currently undergoing feasibility review. After 14 years of feasibility planning, New York State's **Empire Project** is currently being debated with five competing proposed projects by the New York Department of Transportation.²²



California

2033 Phase 1: **520mi**
Phase 2: **800mi**

Connecting **San Francisco** to **L.A.**
Encountering delays from **cost overruns**
Remains popular with citizens

The next most promising prospect for a government-funded high-speed rail in the United States has been in California, where the state government began construction of a network in **2015** under the state-operated **California HSR Authority**.²³ Due to a myriad of

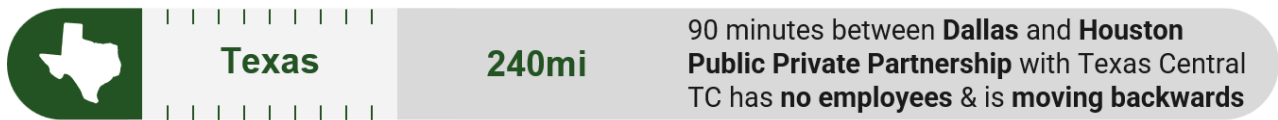
²⁰ "The next Generation of Acela." Amtrak. <https://www.amtrak.com/next-generation-acela>.

²¹ "Amtrak Next Generation High-Speed Rail Infrastructure Improvements." Amtrak. <https://www.amtrak.com/infrastructure-improvements>.

²² (WGRZ), Author: Nate Benson. "Lawmakers Split, but Advocates Support \$6B 'High Speed' Rail Plan by NYSDOT." wgrz.com, March 17, 2023. <https://www.wgrz.com/article/travel/lawmakers-split-advocates-support-high-speed-rail-plan/71-fd5412df-5ff1-44fe-9af0-ac9ed1261578>.

²³ "About California High-Speed Rail." *California High-Speed Rail Authority*, hsr.ca.gov/about/high-speed-rail-authority.

factors including external barriers, cost increases, and political opposition, the project has encountered delays which are set to create its first **operational line by 2029**.²⁴



A southern prospect for a government-run high-speed rail is Texas, which has existing rail service in almost every major city including El Paso, Houston, Dallas-Fort Worth, and Austin.²⁵ While there is already a plan underway to build a high-speed rail between Dallas and Houston, class-action lawsuits about property struggles, along with delays for over a decade have limited the project, with state officials losing hope in the project. Although a **Public Private Partnership** existed between Texas and the **Texas Central** company, which ceased operations in 2023.

3.4 Domestic Sentiment

HSR and transportation infrastructure has broad support from all Americans across the aisle, especially from **millennials** and **Generation Z** citizens,²⁶ who are generally environmentally conscious in a society where advocacy is derived from protests and policy-making efforts in the wake of natural disasters (i.e. wildfires in California, hurricanes across the Caribbean & Atlantic seaboard, earthquakes around the world, et cetera) as well as problematic, environmentally damaging policy (i.e. the Willow Project). Amid the trend of climate consciousness, the new administration has been working towards creating high-speed rail domestically, with the Secretary of Transportation, Pete Buttigieg, calling for the creation of an HSR system.²⁷

Policy action has proved possible with the introduction of the American High-Speed Rail Act (**H.R.1845**) in the 2021-2022 session of the 117th United States Congress.²⁸ In March

²⁴ Saul Gonzalez, "Remember California's High-Speed Rail Project? It's Still Very Much a Reality in These Central Valley Communities", KQED.org, KQED, May 9 2022
<https://www.kqed.org/news/11913317/remember-californias-high-speed-rail-project-its-still-very-much-a-reality-in-these-central-valley-communities>

²⁵ "Statewide Railroad Map." *Texas Department of Transportation*, 2021,
<ftp.txdot.gov/pub/txdot-info/tpp/maps/texas-railroad-map.pdf>.

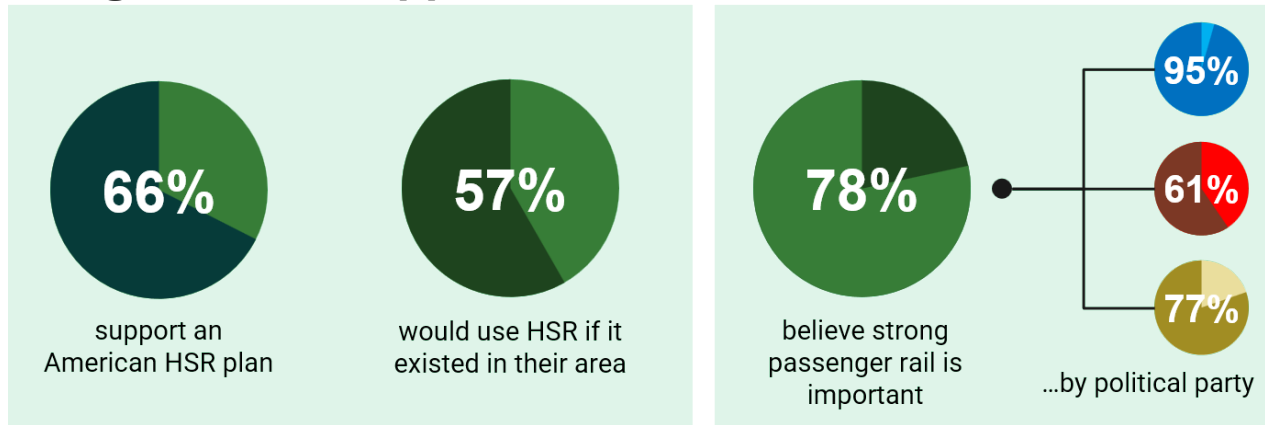
²⁶ Birenbaum, Gabby. "Gen Z's Dream of High-speed Rail and Green New Deal Infrastructure." *Vox*, 10 Mar. 2021, www.vox.com/2021/3/10/22303355/gen-z-high-speed-rail-biden-map-meme-buttigieg.

²⁷ Matt McFarland, "Secretary Pete Buttigieg wants fast trains. He'll have to succeed where Obama couldn't," *CNN*, CNN, February 9 2021, March 22 2023,
<https://www.cnn.com/2021/02/09/economy/pete-buttigieg-high-speed-rail/index.html>.

²⁸ Congress.gov. "Text - H.R.1845 - 117th Congress (2021-2022): American High-Speed Rail Act." March 12, 2021. <https://www.congress.gov/bill/117th-congress/house-bill/1845/text>.

of 2021, 71 Representatives and 4 Senators signed onto the bill, showing broad legislative support for an ambitious \$41 billion investment into high/higher-speed rail over 5 years.²⁹

Fig. 4: Public Support of American Rail Infrastructure



The concept of high-speed rail and rail transportation in general is lucrative among Generation Z and the youth demographic, an increasingly valuable section of the voter base who are beginning to see representation in the United States Congress. Rep. Maxwell Alejandro Frost (FL-10), the first Generation Z Congressman, lauded the Japanese Shinkansen rail system for its minimal delays and interconnectedness to other modes of transport while on a Congressional delegation visit to East Asia in March 2023.³⁰ Frost additionally expressed support for Brightline expansion in Central Florida through the Sunshine Corridor,³¹ an ambitious rail connection initiative conjoining the Orlando International Airport, the Orange County Convention Center, and other critical areas in the region.³²

²⁹ "Moulton, Boyle, DelBene, and Doyle Introduce the American High-Speed Rail Act." *U.S. Congressman Seth Moulton*, 11 Mar. 2021,

moulton.house.gov/press-releases/moulton-boyle-delbene-and-doyle-introduce-the-american-high-speed-rail-act.

³⁰ Frost, Maxwell. "An Area That the Japanese Have Really Led on Is Public Transportation. We Got to Tour the Bullet Train (Shinkansen)! I'm a Huge Rail Stan and the Entire Operation Blew My Mind." *Twitter*, 25 Feb. 2023, twitter.com/MaxwellFrostFL/status/1629615305403277313.

³¹ Frost, Maxwell. "I'm Excited About the Future of Central Florida Rail Because of the Extension of Brightline and the Sunshine Corridor. The Concern I Have Is That the Rest of Our Public Transit Won't Be Connected to the Stations. I'll Be Fighting for Resources to Help Our Bussing." *Twitter*, 25 Feb. 2023, twitter.com/MaxwellFrostFL/status/1629615305403277313.

³² A Proposed Alternative Alignment for Rail in Central Florida. "Central Florida Sunshine Corridor." *ArcGIS StoryMaps*, 30 Jan. 2023, storymaps.arcgis.com/stories/4020c1c20b9b4ab98a6acc6cc4a072cd.

4. Stakeholder Analysis

4.1 Stakeholders in HSR

As high-speed rail continues to become integrated into the transportation systems of many countries abroad, a rampant interest in updating our own transportation infrastructure has grown in the United States. The once strong and foundational system of transport structures have started to age and deteriorate as time passes on. Yet with the current passenger rail service, America's vision of leading the world with high-speed rail is a Herculean task. Currently, only 33.9 miles of the current passenger railway is capable of handling speeds of more than 150 miles per hour.³³

Across the world, the integration of high-speed rail has grown immensely popular with more than **30 countries** worldwide having lines in operation, under construction, or in consideration.³⁴ The United States has neglected the creation of a federal high-speed rail system, and so a nationwide project let alone a fully developed country-wide rail system has never been attempted.

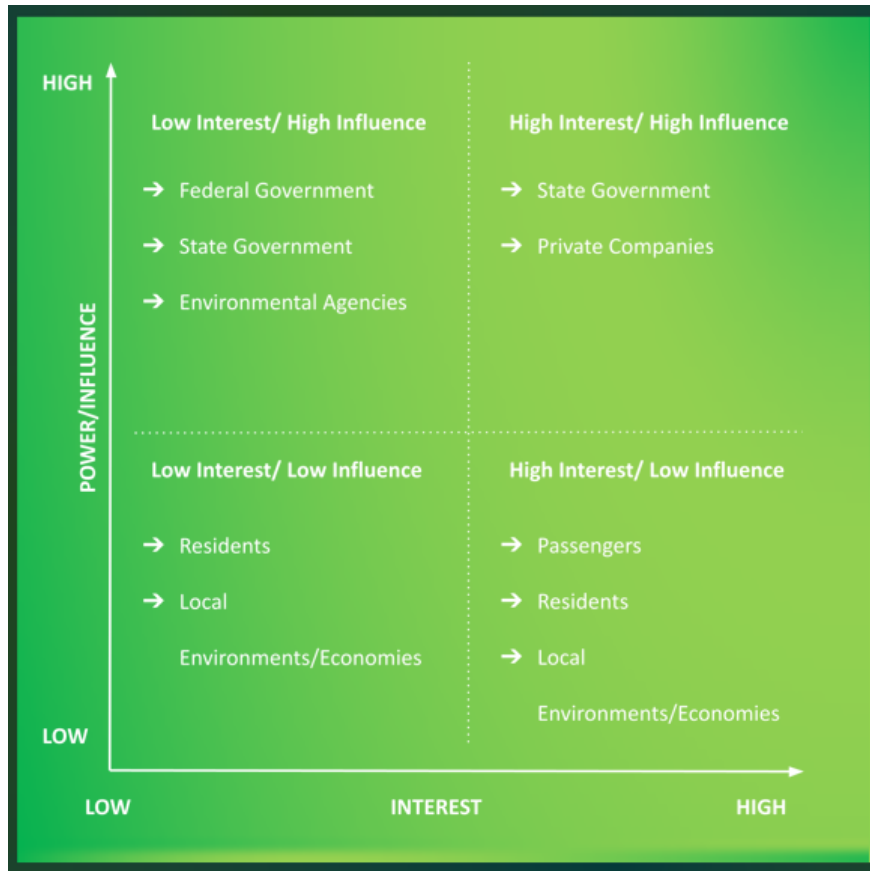
However there is a growing trend of interest among Americans for an updated rail system.³⁵ According to a nationwide survey, **two-thirds of Americans** responded that they would use high-speed rail if the service became available. With increasing legislation being passed to revamp infrastructure within the country, the possibility of a modern and efficient transportation system has sparked attention. Seeing this positive trend of growing interest, we conducted a stakeholder analysis to fully understand the different groups involved in each infrastructure project. Among these groups, we identified **four key actors**: passengers, federal and state governments and agencies, private companies, and residents living in the proximity of the railway. Each of the four groups have either interest and/or influence over the founding and construction of a high speed railway. Attached below is a graph to differentiate the different actors and their involvement:

³³ Atkins, Raymond, et al. "High-Speed Rail in the United States: A Golden Opportunity." *Global Railway Review*, 5 May 2021, www.globalrailwayreview.com/article/122442/high-speed-rail-united-states-opportunity/.

³⁴ Environmental and Energy Study Institute (EESI)

³⁵ American Public Transportation Association. "Two-Thirds of Americans Are Likely to Use High-Speed Rail in America If Available, according to Survey." *Prnewswire.com*, 24 Sept. 2015, www.prnewswire.com/news-releases/two-thirds-of-americans-are-likely-to-use-high-speed-rail-in-america-if-available-according-to-survey-300148591.html.

Fig. 5: Power, Influence, and Interest of Stakeholders



4.2 Passengers

Each day, more than 76% of Americans commute to work³⁶ with the average commute time per day reaching 52.2 minutes to and from work.³⁷ However, in many parts of the country, particularly cities facing congestion, this number increases exponentially. As the target audience of the project, high-speed rail's principle goal is to serve the people of the United States by decreasing the travel time from destinations while also providing a convenient and affordable experience. For many Americans, congestion and long distance traveling has become an issue that cannot be ignored. In 2021 alone, the average American **lost 36 hours** due to congestion, a collective **3.4 billion hours**.³⁸ The

³⁶ Richter, Felix. "Cars Still Dominate the American Commute." *World Economic Forum*, 19 May 2022, www.weforum.org/agenda/2022/05/commute-america-sustainability-cars.

³⁷ Helling, Brett. "Average US Commute Times by City and State [2023 Update]." *Ridester.com*, 31 Mar. 2023, www.ridester.com/average-us-commute.

³⁸ INRIX. "Americans Lost 3.4 Billion Hours due to Congestion in 2021, 42% below Pre-COVID." *Inrix*, 2021, inrix.com/press-releases/2021-traffic-scorecard/.

level of congestion varied depending on city location, with residents of cities like New York and Chicago losing more than 100 hours.

With the passage of The Infrastructure Investment and Jobs Act, increased popularity has thrust high-speed rail into the spotlight. A new poll released by the Rail Passengers Association (RPA) found that the population has an increased interest towards enhancing the current rail system. Among those living in congested areas, **82% of respondents** emphasized a need for an updated rail network.³⁹ Even those living in the outskirts of cities responded positively to an adoption of the railway. With the Biden administration seeking to focus spending on domestic projects, high-speed rail could come to the forefront of current infrastructure initiatives.

In our analysis of each stakeholder, we classified passengers as **high interest but low influence**. Despite a large interest among the people to expand our current infrastructure system, the amount of power left at the people's discretion to conduct the operation is minimal and overpowered by the government. Still, transportation infrastructure remains the foundation for daily transportation. Each day, millions of people utilize transportation systems across the country to travel to various destinations. Faster travel enables people to move further distances at less time, spending less time on transit. It also allows people living in rural areas to have access to goods and services located in urban centers. Improving infrastructure would be a fundamental change to daily transportation –increasing the happiness but also productivity of people.

4.3 Federal and State Governments

The government maintains the **largest influence** over infrastructure projects in the United States. Starting at the federal level, the government has the ability to channel large sums of money and coordinate large projects. The 2021 Infrastructure Investment and Jobs Act directed \$110 billion of funding to repair and rebuild roads and bridges as well as reauthorized transportation programs up to 2026.⁴⁰ The goal of this project and others like it is to reduce congestion and increase the speed of transportation of people, goods, and services to various destinations, but also to increase affordability. Another target of expanding infrastructure projects is increasing the amount of potential jobs and

³⁹ Rail Passengers Association. "78% of Americans Want Increased Investments in Passenger Rail in the U.S. | Rail Passengers Association | Washington, DC." Railpassengers.org, 21 Mar. 2022, railpassengers.org/happening-now/news/releases/new-poll-78-of-americans-want-increased-investments-in-passenger-rail-in-the-u.s/.

⁴⁰ The White House. "UPDATED FACT SHEET: Bipartisan Infrastructure Investment and Jobs Act | the White House." *The White House*, The White House, 2 Aug. 2021, www.whitehouse.gov/briefing-room/statements-releases/2021/08/02/updated-fact-sheet-bipartisan-infrast-structure-investment-and-jobs-act/.

economic benefits that can spillover to communities nearby. In terms of high-speed rail specifically, due to lack of sufficient interest and inefficient funding and regulation, the government has never focused on it. Although interest has been on the rise, lobbyists and congressional disagreement delay focus on a nationwide railway system.

State governments also conduct infrastructure projects mainly through collected tax dollars. However tax dollars per state are limited, and depending on the state's population and economic output, **state by state high-speed rail progress differs drastically**. In populated urban centers such as California and the Tri-state area, modern rail improvements and projects have started to form with rising services like Amtrak providing services through the Northeast. On the other hand, rural states in the Midwest have made little to no progress in construction.

As a result, federal funding remains the backbone for infrastructure projects across the United States. Back in the 1950s, the construction of the Interstate Highway proved how adequate funding and government involvement are key. Under the Eisenhower administration, funds were financed through a federal bond to each state.⁴¹ However, state and local governments had to contribute seventy percent of the cost.

We classified the government as both **low and high interest**. At the federal level, current issues including record high inflation, the debt ceiling, recovery from COVID, as well as foreign issues have taken precedence over infrastructure spending. The federal government is not focused on developing an HSR system. On the other hand, at the state level, several have taken interest in developing high-speed rail, especially in California. However, state and local governments need federal support and coordination.

This trend of low federal interest may change as recently, high-speed rail has come to the attention of policymakers. However, with only the current increase in interest, it may not be enough. With the alarming need of replacing outdated bridges, improving existing structures would not only satisfy the people and help stimulate more economic growth, but it would also put the United States at a massive advantage over other nations. As other countries seek to construct and improve their transportation systems into high-speed rails, the aging American infrastructure must come into the government's attention. The various benefits of implementing a high speed rail would allow the United States to gain an edge over other nations due to already mature economic systems. Reducing congestion and updating inefficiencies is not an issue to be overlooked, and

⁴¹ U.S. Senate. "U.S. Senate: Congress Approves the Federal-Aid Highway Act." *Senate.gov*, 12 Dec. 2019, www.senate.gov/artandhistory/history/minute/Federal_Highway_Act.htm#:~:text=The%20Eisenhower%20administration%20proposed%20financing,70%20percent%20of%20the%20cost.

with the government acting as the primary funder of infrastructure, government support is key.

4.4 Private Companies

Despite lack of adequate attention from the government, private companies have shown a **high interest** in creating high-speed rail services, with several states having privately owned rail systems in progress. In recent years, the private sector has contributed to the rise of America's strong freight railway system. Due to the elimination of government regulation, private investment facilitated the creation of a resilient, productive, and innovative service, delivering goods at a fast and reliable pace. The success in the freight railways have caused a spillover of private interest into passenger rail, providing a model to create a nationwide rail network. Currently private investors are seeking construction and investment of high-speed rail lines in states including the tri-state area, California, Florida, North Carolina, Nevada, Texas, and Maryland.⁴²

However, due to legality reasons many proponents of infrastructure projects require federal approval. To construct an interstate rail line, the Federal Surface Transportation Board must approve a multi-year permit in order for construction to begin. Coupled with environmental regulations, many investors have been discouraged from committing capital to high-speed rail when return on investment can take years to return.

Nonetheless, new potential has emerged if the public and private sector strive to collaborate as opposition against high-speed rail has historically resulted from state and local legislation that prevent and delay projects. However if the federal government partners with private companies, it would speed up the construction process and increase capital investment.

4.5 Local Communities

Although high-speed rail has garnered high interest from both potential passengers, as well as governments and private actors, a main concern remains within the communities that would be affected if the railway were to be constructed in their proximity.

Most controversial among the people is the effect on land development. Developments of high-speed rail have destroyed the farmland of many agricultural plots. Notably in California,⁴³ the construction of a state-wide high-speed rail route seized the land of

⁴² Global Railway Review

⁴³ Vartabedian, Ralph. "High-Speed Rail Route Took Land from Farmers. The Money They're Owed Hasn't Arrived." *Los Angeles Times*, Los Angeles Times, 10 June 2019, www.latimes.com/local/california/la-me-bullet-train-cash-20190610-story.html.

farmers across the state. In fact for every 1 kilometer of track laid, 12 acres of farmland are put to waste.⁴⁴ In rural areas where agricultural production is the core of the state, constructing high-speed rail attempts to attract opposition from rural residents. To make matters worse, eminent domain is often utilized to take away the property of rural residents, with a continuous delay in compensation.⁴⁵ Farmers are forced to take matters into their own hands and spend out-of-pocket costs to compensate for lost production, road replacement, and fix destroyed irrigation systems. With consideration that such a large scale infrastructure project can take years to establish, the importance of agricultural production and improved infrastructure has remained controversial. Furthermore, many residents are also concerned with the impact on property prices – transportation systems can cause an influx in the price of residential land and property, making housing prices increase and the cost of living rise.

On the contrary, economic benefits are also seen as attractive for local economies. Investment into the region increases the interconnectedness of the region, stimulating housing and commercial development.⁴⁶ An increase in accessibility of the region can also promote economic growth with an influx of migration into the region.

In spite of potential residential rejection, residents have **little influence** over the construction of infrastructure. Due to high national support and increasing governmental and private interest, opposition from the people will be likely overlooked.

4.6 Environmental Opportunity Costs

In response to the potential construction of a high-speed railway, a central argument regarding the environmental impacts of construction has remained controversial. High-speed rail is a double edged sword – arguably both environmental damage can occur as well as future emission reduction.

With climate change on the rise, an important feature of policy agendas is solving the current warming crisis. A key transition countries are undertaking include switching to renewable energy, cutting down on processes that require fossil fuels. The potential of a

⁴⁴ Fraser, Kaitie. "Ontario's Proposed High Speed Rail a 'Disadvantage' for Rural Communities, Says OFA." *CBC*, 23 Apr. 2018, www.cbc.ca/news/canada/windsor/ontario-federation-agriculture-proposed-high-speed-rail-disrupt-wildlife-1.4629941.

⁴⁵ Vartabedian

⁴⁶ Steer Davies Gleave. "Local Economic Benefits of Station Investment Rail Delivery Group Stations Strategy Group Report." *Steer Davies Gleave*, 2018, www.raildeliverygroup.com/files/Publications/2018-03_local_economic_benefits_of_station_investment.pdf

high speed railway could cut carbon dioxide emissions by 1.26-3.62 gigatons by 2050⁴⁷, as it is on track to replace services such as trains, cars, and planes that accounts for 21% of global emissions.⁴⁸ As one of the world's top polluters,⁴⁹ the need for the United States to eradicate damaging and wearing infrastructure to support the green transition is critical.

On the contrary, concerns about the timeframe of construction. Arguably, due to the many legal barriers and delays, completion for a full railway could take years to come to fruition. The amount of emissions emitted during this time by construction could accumulate and harm the environment.

However, the alternative of keeping the world of current transportation is not keeping up strong. Although many attempts have been made to reduce congestion, replace fuel with supposedly cleaner fuel, the status quo is not reflecting current climate change efforts – not enough is done. In our analysis of each stakeholder, environmental agencies ranked with **high influence** due to the potential they have to stop harmful infrastructural processes. Any increase of regulation in environmental standards for companies and construction could potentially discourage investment. However, little to minimal objection has occurred from these agencies, a large part due to the lack of attention and progress of high-speed rail in the country. But at the same time provides opportunities for new capital investment, due to the lack of attention for agencies. Critically, the government can strive for increased environmental regulations while also pushing forward the initiative for a high-speed rail, a critical climate solution that can quickly scale down current emissions.

4.7 Key Findings and Takeaways

In our analysis of each stakeholder involved in the construction of a high-speed rail, we ranked them through two different metrics: influence and interest. Through our research we came to find that among various stakeholders, there is an overall increase in interest among those who directly benefit from the railway, whereas there was a low interest among those who would be negatively impacted by a potential construction. Namely, passengers and private companies came to be the ones who would garner more benefits,

⁴⁷ Project Drawdown. "High-Speed Rail @ProjectDrawdown #ClimateSolutions." Project Drawdown, 6 Feb. 2020, drawdown.org/solutions/high-speed-rail#:~:text=Impact,come%20from%20Asia%2C%20especially%20China.

⁴⁸ Ritchie, Hannah. "Cars, Planes, Trains: Where Do CO2 Emissions from Transport Come From?" *Our World in Data*, 6 Oct. 2020, ourworldindata.org/co2-emissions-from-transport.

⁴⁹ Climate Trade. "Which Countries Are the World's Biggest Carbon Polluters? - ClimateTrade." *ClimateTrade*, 17 May 2021, climatetrade.com/which-countries-are-the-worlds-biggest-carbon-polluters/.

such as increased accessibility and improved infrastructure for the country at large, as well as profitable future returns.

At the same time, those who inhabited land that was prone to construction as well as nearby neighborhoods expressed concerns of the passenger railway inflicting damage to local neighborhoods. Alongside these concerns, are also the worries of environmental organizations who are focused on the amount of environmental damage construction can entail.

Despite these concerns, the majority of influence doesn't lie in the hands of the locals nor the environmental activists, rather in the hands of the federal and state governments, who have expressed mixed interest. Although there is a growing interest at the federal level to expand infrastructure to improve current structures as well as catch up to other nations, the allocation of federal funding among different states as well as funding from different state budgets continue to install barriers. However, with the rising concerns and popularity of the railway system, private companies are also ramping up interest and investment for potential projects. Questions about potential federal and private sector collaboration have also emerged into the picture, providing potential and endless partnerships in the near future.

In summation, our analysis has concluded that influence on the construction isn't necessarily dependent on the interest of the stakeholder. Rather combined with other factors, the question of when and how practical a nationwide high-speed passenger railway will come into play, needless to say that the growing interest in installing improved and accessible transportation has come to both the public and government's eye.

5. Benefits of HSR

5.1 Summary of Benefits

High-speed rail attracts massive benefits from both its development and the end result of its implementation. As it is developed, high-speed rail spurs investment into the declining American manufacturing industry to create tens of thousands of jobs and boost the United States economy through government and private investment. When it is implemented, high-speed rail revitalizes individual cities and connects entire regions on an accessible and convenient network. In addition, it gives the car-centric transportation system of the United States a greener alternative to save the environment.

5.2 Buy America's Manufacturing Renaissance

One of the priorities of the Biden Administration has been to bring onshore manufacturing and industry back from China to make the domestic supply chain more resilient from foreign shocks and less dependent on goods that could easily harm the American economy through new tariffs which might be placed in the ongoing U.S.-China trade war.

Beyond the domestic and global politics of maneuvering for manufacturing, U.S. high-speed rail offers a mechanism for which American manufacturing can be invested in and revitalized, boosting the economy. This happens in the steel industry through the Buy America Act. The Buy American Clause requires the federal government to buy American-made iron, steel, and manufactured goods wherever possible. This means a high-speed rail network that would spur significant investment into the American steel industry when steel is bought domestically for a high-speed rail network.

Overall, all of this money spent on manufacturing has two crucial implications:

Firstly, investment would cause economic growth and avoid monetary crises. Every dollar invested into manufacturing yields a return of 2 dollars and 74 cents, whereas every 1 billion dollars invested creates 24,000 jobs. This would alleviate the current manufacturing disaster, which is set to cost the United States \$1 trillion by 2030.⁵⁰ Instead of a crisis, funding for high-speed rail would create the jobs needed to sustain the economy through recession for the next 50 years.⁵¹

⁵⁰ "Creating Pathways for Tomorrow's Workforce Today: Beyond Skills in Manufacturing." *Deloitte Insights Manufacturing Institute*, www.themanufacturinginstitute.org/wp-content/uploads/2021/05/DI_ER-I-Beyond-reskilling-in-manufacturing-1.pdf.

⁵¹ PROK 09 J.D. University of Denver Sturm College of Law, B.A. (2004) University of Colorado at Boulder

Secondly, this would save the American manufacturing industry. Restoring growth and competitiveness in manufacturing through high-speed rail investment could raise American GDP by more than 15 percent across the next decade. By reviving this industry, high-speed rail would provide a massive boost to the economy at large.

5.3 Reviving Cities and Agglomerating Megaregions

The failing economic situation of cities around the United States as a result of declining Tax Revenues, increased costs of maintenance, and dwindling investment from the private sector has led to a massive slump in infrastructural investments. This has resulted in a vicious cycle, where cities are unable to keep up with the demands for infrastructure upgrades and maintenance, leading to a further decline in economic activity and reduced tax revenues. The situation is further exacerbated by the lack of political will to implement measures that could potentially alleviate the issue, such as tax hikes or changes to budget priorities. As a result, cities are facing a growing gap between the resources they have available and the resources needed to ensure the continued functioning and growth of their infrastructure to continue moving into the 21st century.⁵²

The implementation of high-speed rail offers three distinct advantages that can help to reverse this trend across cities. First, with attracting outside investment by providing a boost to local economies. One of the largest issues with the dwindling infrastructure of cities across the U.S. is the sheer lack of dwindling investments in the private sector. The construction of HSR lines can result in increased investment within a city, as improved connectivity and reduced transportation costs make the city more attractive to businesses.⁵³ As a result, most cities would see increased job growth and economic activity, which would serve as a catalyst for investment from private corporations. Data has proven that the boost to the local economy brought about by the construction and operation of a high-speed rail line can create a positive feedback loop, attracting more investment as the economy continues to grow.

Private investment through high-speed rail would bring a few key advantages. Aside from outside investment's direct impact on job growth and decreasing unemployment rates, cities would undergo likely stimulated economic growth through the development of new industries and businesses, leading to a more diverse and resilient economy. Furthermore,

[Joshua D. Prok, Article: High Speed Rail: Planning and Financing the Next Fifty Years of American Mobility, *Transportation Law Journal*, Spring, 2009, 36 *Transp. L. J.* 47]

⁵² "Infrastructure." *Association of Washington Cities*, wacities.org/data-resources/state-of-the-cities/infrastructure.

⁵³ Lu, Yue, et al. "The Influence of High-speed Rails on Urban Innovation and the Underlying Mechanism." *PLOS ONE*, vol. 17, no. 3, Public Library of Science, Mar. 2022, p. e0264779. <https://doi.org/10.1371/journal.pone.0264779>.

Private investment can also enhance the quality of life for residents, as it creates new job opportunities, improves public services, and supports the development of new cultural and recreational amenities. This can make the city more attractive to businesses and residents, further stimulating economic growth and investment. Private investment can also lead to improvements in the city's infrastructure, as businesses and investors seek to build and maintain facilities that meet their needs. This can result in upgrades to transportation, communications, and energy systems, as well as the construction of new buildings and public spaces.

Secondly, in addition to helping individual cities, high-speed rail would make cities more interconnected with each other. The most commonly used forms of transportation right now between cities in the United States, such as automobiles, planes, and low-speed rail, tend to be slow, inconvenient, and expensive. High-speed rail would bring physically distant cities closer together by providing an affordable, easy, and fast way to get from city to city along this nationwide network.

Past experience shows how this would necessarily happen. The bullet trains in China have allowed residents of both remote cities and urban population centers to utilize the network in traveling between cities in easier ways than ever before, decongesting the roads and revitalizing the growth of all the cities on the network. The gross domestic product and wages in connected cities grew at a rate twice as fast as unconnected cities, with them experiencing the same amount of economic growth while only having half the amount of total population growth.⁵⁴ The interconnection of the high-speed rail network pushes for increased investment, expanding labor markets, and allows for economically beneficial transportation between these cities like never before.

Thirdly, high-speed rail provides the means for workers to find employment. Right now, adequate transportation that is affordable and takes workers to their place of employment is a massive concern that is creating unemployment for workers and labor shortages for cities. This is solved by giving laborers and employers the option for a high-speed rail to connect the remote and the urban regions of the world. By reducing travel times between cities and increasing the degree of connectivity between them, high-speed rail will make jobs more accessible and convenient. In Japan, the Shinkansen

⁵⁴ Zheng, Siqi, and Matthew E. Kahn. "China's Bullet Trains Facilitate Market Integration and Mitigate the Cost of Megacity Growth." *Proceedings of the National Academy of Sciences of the United States of America*, vol. 110, no. 14, National Academy of Sciences, Apr. 2013, <https://doi.org/10.1073/pnas.1209247110>.

decreased travel times by an average of 45 minutes and increased the accessibility of cities by between 25 and 45 percent.⁵⁵

5.4 The Environment

Currently, the cars that most Americans drive themselves around in are environmentally devastating, yet have no good alternative. High-speed rail is a far greener mode of transportation, which can minimize the emissions that are so devastating to the planet.

The fuel source of both existing and planned high-speed rail projects are all electrical, which are both 3 to 4 times more efficient and emit less than the internal combustion engines that power most automobiles.⁵⁶ By offering another option to car drivers, we not only reduce individual emissions, but prevent the congestion that exacerbates them by keeping carbon-emitting cars in standstill traffic. Overall, passenger vehicles account for nearly a fifth of the United States' carbon emissions.⁵⁷

The impacts of climate change cannot be understated. Every day, droughts and storms become more severe, sea levels rise and risk coastal communities, animals lose their habitats, and air quality continually worsens, jeopardizing the health of citizens.⁵⁸

Overall, by transitioning to a far more renewable form of transportation, the United States can improve air quality and slow down the global warming devastating the planet. California's high-speed rail is set to reduce carbon dioxide emissions by 102 metric tons within its first 50 years of operation.⁵⁹ This is a change needed for a greener future.

⁵⁵ Liu, Liwen, and Ming Zhang. "High-speed Rail Impacts on Travel Times, Accessibility, and Economic Productivity: A Benchmarking Analysis in City-cluster Regions of China." *Journal of Transport Geography*, vol. 73, Elsevier BV, Dec. 2018, pp. 25–40. <https://doi.org/10.1016/j.jtrangeo.2018.09.013>.

⁵⁶ Tutton, Mark. "How Green Is High-speed Rail?" *CNN*, 19 Nov. 2011, www.cnn.com/2011/11/18/world/how-green-is-hsr/index.html.

⁵⁷ "Car Emissions and Global Warming." *Union of Concerned Scientists*, 18 July 2014, www.ucsusa.org/resources/car-emissions-global-warming.

⁵⁸ United Nations. "Causes and Effects of Climate Change | United Nations." *United Nations*, www.un.org/en/climatechange/science/causes-effects-climate-change.

⁵⁹ "High-Speed Rail Project — California Climate Investments." *California Climate Investments*, [www.caclimateinvestments.ca.gov/hsr#:~:text=Estimated%20greenhouse%20gas%20\(GHG\)%20emissions,High%2DSpeed%20Rail%20Sustainability%20Report](http://www.caclimateinvestments.ca.gov/hsr#:~:text=Estimated%20greenhouse%20gas%20(GHG)%20emissions,High%2DSpeed%20Rail%20Sustainability%20Report).

6. Challenges Facing HSR

6.1 Population Density

Lower population density compared to other nations in Europe and Asia make HSR a less viable option for transportation. While other nations have cities that are densely populated, America's land is frequently more suburban and rural with the New England megaregion being an exception: an average square mile in America will cover 87 people per square mile.⁶⁰ On the other hand, Japan is at 863, China is at 378, France is at 319. That difference is significant as less population density translates into less ridership, preventing HSR's environmental benefits and requiring the federal government to find other financing alternatives. The extensive land that HSR would have to cover is one reason why China and Brazil have both slowed down HSR production.⁶¹ Lower population density also necessitates that train stops cannot fully replace American automobiles or aviation.⁶² For instance, in dense cities, the average resident can reach four times as many jobs with a car than transit. On the other hand, in less developed cities,⁶³ automobiles are still needed because public transportation is not extensive and convenient enough.

6.2 Eminent Domain

Unlike nations like China, stringent eminent domain processes make U.S. federal infrastructure plans a nightmare. The federal government is required to buy up land from private landowners and provide fair compensation.⁶⁴ Yet, this is tenuous. For instance, as California was constructing their High-Speed Rail (CHSR), the state government has yet to correctly compensate farmers' land who had been seized.⁶⁵ The land burden would be particularly high, especially since high-speed rail covers a nationwide distance and rail track must be relatively straight for such high speeds.⁶⁶ As a result, the federal

⁶⁰ Millsap, Adam A. "Biden's High-Speed Rail to Nowhere." *Forbes*, 15 Apr. 2021, www.forbes.com/sites/adammillsap/2021/04/15/bidens-high-speed-rail-to-nowhere/?sh=140b7663108c.

⁶¹ Barone, Michael. "High-speed Rail Plan Doesn't Make Sense for U.S." *The Columbus Dispatch*, 14 Oct. 2011, www.dispatch.com/story/opinion/cartoons/2011/10/14/high-speed-rail-plan-doesn/23575423007.

⁶² O'Toole, Randall. "The High-Speed Rail Money Sink: Why the United States Should Not Spend Trillions on Obsolete Technology." *Cato Institute*, 20 Apr. 2021, www.cato.org/policy-analysis/high-speed-money-sink-why-united-states-should-not-spend-trillions-obsolete

⁶³ "Why Doesn't the United States Have High-Speed Bullet Trains Like Europe and Asia?" *Forbes*, 11 Mar. 2017, www.forbes.com/sites/quora/2017/03/11/why-doesnt-the-united-states-have-high-speed-bullet-trains-like-europe-and-asia/?sh=54084cfbc080.

⁶⁴ *Eminent Domain - the Basic Law | Stimmel Law*. www.stimmel-law.com/en/articles/eminent-domain-basic-law.

⁶⁵ Vartabedian

⁶⁶ McArdle, Megan. "Why The United States Will Never Have High-speed Rail." *Washington Post*, 12 Feb. 2019, www.washingtonpost.com/opinions/2019/02/13/why-united-states-will-never-have-high-speed-rail.

government would need to tear down buildings between stations and rail tracks. Added on top of large bureaucratic hurdles and potential lawsuits, an HSR in America could take decades of planning and management even before the first track was laid.⁶⁷

6.3 Car Culture

Nearly seven decades after Eisenhower's Interstate System, car culture and suburban sprawl has taken place within America. Americans enjoy an automobile's flexibility, comfort, and convenience. For instance, EESI reports that the "total automotive marketing spending in the United States is about \$35 billion per year and climbing." The result is that even after the creation of a HSR, many Americans would still prefer the automobile as a core part of American culture.⁶⁸ Additionally, "over two of out of three Americans live a few minutes' drive of an interstate freeway" but people living in rural and suburban areas would need to drive to a major city or station to access High-Speed-Rail.⁶⁹

6.4 Political Disputes

In order for High-Speed Rail to be implemented in the first place, it would likely need support for both parties due to both the Republicans and Democrats gaining control of parts of the legislative branch. Indeed, according to Bloomberg, the GOP currently has a majority stake in the house right now with 222 seats compared to the Democrats controlling both the Senate and the executive branch.⁷⁰

Although HSR is considered popular amongst Democrats, they are less favorable with GOP politicians and voters due increased government spending and upfront costs.⁷¹ In fact, historically, the Republican Party has been particularly active in this regard, constantly criticizing the feasibility of a plan and often synonymizing it with socialism. The GOP have either directly opposed or have an unclear stance on the issue.⁷² For

⁶⁷ Gordon, Aaron. "The U.S. Is Not Ready for High Speed Rail." *VICE News*, 19 Apr. 2021, www.vice.com/en/article/3aqz8y/the-us-is-not-ready-for-high-speed-rail.

⁶⁸ Conley, Nicholas. "The Real Reason the United States Has No High-Speed Rail Network." *Grunge*, 3 Feb. 2023, www.grunge.com/155798/the-real-reason-the-united-states-has-no-high-speed-rail-network.

⁶⁹ O'Toole, Randall. "The High Cost of High-Speed Rail." <http://www.americandreamcoalition.org/transit/HSRinTX.pdf>, Aug. 2009, www.americandreamcoalition.org/transit/HSRinTX.pdf.

⁷⁰ Murphy, Paul. "Congressional Balance of Power: Republican Majority the House." *Bloomberg Government*, 7 Dec. 2022, about.bgov.com/brief/balance-of-power-republican-majority-in-the-house.

⁷¹ New Poll: 78% of Americans Want Increased Investments in Passenger Rail in the U.S. | Rail Passengers Association | Washington, DC. Mar. 2022, railpassengers.org/happening-now/news/releases/new-poll-78-of-americans-want-increased-investments-in-passenger-rail-in-the-u.s.

⁷² Freemark, Yonah. "Republican Wave Could Spell Trouble for High-Speed Rail Projects From Coast to Coast." *The Transport Politic*, 22 Sept. 2010,

instance, although the Obama administration sought plans to build a nationwide HSR, new GOP governors in Florida, Ohio, and Wisconsin rejected the money going through their states,⁷³ resulting in a **bureaucratic nightmare and spoiling hopes for the plan.**

In this case, the likely scenario of an HSR implementation would be where Progressive Democrats gain full control of both the legislative and executive branch or both parties come to a bipartisan agreement.

6.5 Lobbying

Because HSR would limit the need for cars and related vehicles, car and oil lobbyists companies are not fond of the idea as it may significantly decrease demand, resulting in losses in revenue.⁷⁴ For instance, **Big-oil, big-aviation, and highway services have opposed HSR at every single level.**⁷⁵

In the early 1990's, for example, Southwest Airlines lobbied against a HSR proposal because they believed it would be destroying "inexpensive" transportation service that airlines are providing.⁷⁶ More recently, as interest resurfaced in 2022 about building a statewide HSR, Gret Abbott, the current Texas Governor, received more than \$4.6 million from the automotive industry (General Motors, Ford, etc.).⁷⁷

6.6 Lengthy Construction Time

The time to build an HSR would be a major issue. Critics argue that while an HSR has plenty of merit for the United States, **the timing**⁷⁸ **simply would not fit the agenda of the United States** which has to grapple with a quick response to issues like climate change

www.thetransportpolitic.com/2010/09/22/republican-wave-could-spell-trouble-for-high-speed-rail-projects-from-coast-to-coast.

⁷³ Jaffe, Eric. "How Republicans Killed America's High-Speed Rail Plan." Bloomberg.com, 4 Nov. 2013, www.bloomberg.com/news/articles/2013-11-04/how-republicans-killed-america-s-high-speed-rail-plan.

⁷⁴ Leff, Gary. "Why the U.S. Can't Have High Speed Rail - View From the Wing." *View From the Wing*, 29 Dec. 2019, viewfromthewing.com/why-the-u-s-cant-have-high-speed-rail.

⁷⁵ Parrish, Meagan. "Why Is There Still No High-Speed Rail Network in America?" *Manufacturing.net*, 18 Mar. 2016, www.manufacturing.net/supply-chain/news/13106226/why-is-there-still-no-highspeed-rail-network-in-america.

⁷⁶ Seitz, Jacob. "Southwest's History of Lobbying Against High-speed Rail Surfaces in Wake of Flight Cancellation Fiasco." *The Daily Dot*, 26 Dec. 2022, www.dailydot.com/debug/southwest-airlines-cancellations-high-speed-rail-lobbying.

⁷⁷ Salinas, Benjamin. "Op-ed: Texas Republicans Need to Stop Sabotaging High-speed Rail." *Texas Signal*, 17 Mar. 2022, texassignal.com/op-ed-texas-republicans-need-to-stop-sabotaging-high-speed-rail.

⁷⁸ Gordon

and infrastructure collapse.⁷⁹ The construction has been continuously backlogged with delays being extremely common.⁸⁰ For instance, as California is building their own HSR to connect San Francisco to Los Angeles, they have experienced backlogs, pushing the time of completion to 2031, nine years to completion.⁸¹

Indeed, from a governmental perspective, this would disincentive investment as governments may prefer other solutions that are quicker and cheaper, although they may provide substantial benefits.

6.7 Alternatives to HSR

Amongst politicians, other alternatives instead of HSR further stand as proposed means for implementation. One of which includes autonomous vehicles.⁸² These vehicles would serve to partially or entirely replace human drives when navigating a car while avoiding hazards. Indeed, due to the elimination of human error, many regard these vehicles as safer, more efficient, and more convenient than traditional cars. In fact, in California, because Gavin Newsom, California's governor, believed that HSR would cost too much and take too long, he instead proposed a self-driving freeway that would serve as a **high-tech superhighway for autonomous vehicles** to promote fast travel at an unrestricted speed limit.⁸³ As such, this would not only gain approval from manufacturing companies, but also car companies that often lobby against HSR. However, despite these benefits, similar to HSR, one of the major issues includes the tremendous cost associated with building additional highway lanes, especially in California where road construction costs 2.5x the national average.⁸⁴ Moreover, in order for the highway to be feasible, it would further necessitate sustained usage, requiring the majority of the population to switch to new, autonomous vehicles.

⁷⁹ Fletcher, Michael. "Plans for High-speed Rail Are Slowing Down." *Washington Post*, 15 Jan. 2012, www.washingtonpost.com/business/economy/plans-for-high-speed-rail-are-slowing-down/2012/01/13/gIQAyYc1P_story.html.

⁸⁰ Fletcher, Michael A. "Plans for High-speed Rail Are Slowing Down." *Washington Post*, 15 Jan. 2012, www.washingtonpost.com/business/economy/plans-for-high-speed-rail-are-slowing-down/2012/01/13/gIQAyYc1P_story.html.

⁸¹ Carlson, Eric. "The California High-Speed Rail Project Illustrates America's Transit Issues." *Planetizen Features*, 22 May 2022, www.planetizen.com/features/117245-california-high-speed-rail-project-illustrates-americas-transit-issues.

⁸² "Autonomous Vehicles Factsheet." *Center for Sustainable Systems*, [css.umich.edu/publications/factsheets/mobility/autonomous-vehicles-factsheet#:~:text=Autonomous%20vehicles%20\(AVs\)%20use%20technology,and%20responding%20to%20traffic%20conditions](http://css.umich.edu/publications/factsheets/mobility/autonomous-vehicles-factsheet#:~:text=Autonomous%20vehicles%20(AVs)%20use%20technology,and%20responding%20to%20traffic%20conditions).

⁸³ Jackson, Kerry. "High-Speed Alternatives to High-Speed Rail." *City Journal*, 7 May 2019, www.city-journal.org/california-high-speed-rail-alternatives.

⁸⁴ Jackson, Kerry. "How We Can Fund California's Roads if Proposition 6 Passes." *Pacific Research Institute*, 17 Aug. 2022, www.pacificresearch.org/how-we-can-fund-californias-roads-if-proposition-6-passes.

7. Implications and Recommendations

7.1 Summary

Federal leadership in a national HSR project is necessary to unite the disparate HSR projects around the United States. Appropriations can match state and local spending dollar-for-dollar and provide the needed funding to connect state projects with corporate and public collaborations to advance projects. Legislations and regulations can establish a way to collaborate with existing freight railroad networks to maintain America's critical supply chain while standardizing HSR development. Furthermore, lawmakers can implement new incentives and encourage ways to create new inroads for foreign and domestic investors. We recommend:

Fig. 6: SPRING Institute Recommendations

Legislative Changes	Public Awareness	Encouraging PPPs
 Match state funding for HSR	 Raise awareness behind HSR	 Expand access to DOT loans
 Redefine HSR for all purposes	 Create subsidies for HSR travel	 Grant right-of-way to PPPs
 Reform grant approval process	 Support other public transit	 Create long-term commitments

7.2 New Appropriations for High-Speed Rail

State governments have led the charge of HSR construction and development. Recognizing the need for additional funding for state-level HSR projects, the 2009 American Recovery Act included provisions that outlined a decentralized layout of High-Speed Rail systems created at local and state levels with funding and support from the Federal government.



The map shows the national vision for high-speed rail in the United States. Data is sourced in April 2009 from the United States Department of Transportation.⁸⁵

In total, \$8 billion was appropriated to states to fund intercity high-speed rail projects that would build a network of HSR corridors and hubs connected to each other with conventional rail, alongside \$1.3 billion for Amtrak to fund existing Amtrak services. The grants paled in comparison to the funding requested from states, totaling over \$57 billion, and roughly equivalent to the allocation of stimulus towards the National Highway system. This was the first and last grant related to the development of HSR in the United States.⁸⁶

Then Vice-President Biden proposed further allocating \$53 billion to construct the national HSR network,⁸⁷ which would have provided the funding for states' needs had it been appropriated in the 2011⁸⁸ or 2012 Congressional budgets.

As President, revisiting a similar level of funding would allow Biden to revitalize American rail. While provisions have been included in the Bipartisan Infrastructure Law to allocate a

⁸⁵ "Vision for High-Speed Rail in America." *FRA*, railroads.dot.gov/elibrary/vision-high-speed-rail-america.

⁸⁶ "ARRA/High Speed Rail Discretionary Grant Program." *US Department of Transportation*, www.transportation.gov/highlights/recovery/arrahigh-speed-rail-discretionary-grant-program.

⁸⁷ "Vice President Biden Announces Six Year Plan to Build National." *whitehouse.gov*, 8 Feb. 2011, obamawhitehouse.archives.gov/the-press-office/2011/02/08/vice-president-biden-announces-six-year-plan-build-national-high-speed-r.

⁸⁸ Cooper, Michael. "Budget Deal Deeply Cuts High-Speed Rail Program." *The New York Times*, 6 Feb. 2013, www.nytimes.com/2011/04/13/us/politics/13rail.html.

whopping \$66 billion investment in passenger rail,⁸⁹ much of the allocation will not end up being spent on HSR. Of the funding:

- \$22 billion for Amtrak to make stations compliant with the Americans with Disabilities Act (ADA) standards and upgrade Amtrak's railcar and locomotive fleet.
- \$24 billion for capital projects **only** along the Northeast Corridor to allow for backlogged infrastructure repair of tunnels, and bridges, alongside station and facility upgrades.
- \$5 billion for freight rail and passenger rail safety projects
- \$3 billion for eliminating railroad crossings

Only the remaining \$12 billion is allocated for projects **not** along the Northeast corridor, further split between state rail and freight rail projects, urban city rail, and HSR projects, with the majority of funding going to backlogged and much-needed repairs and upgrades.

To combat this, the Federal government should implement a new funding scheme matching state-level investment dollar for dollar and committing federal funding and support across the next decade for certain state-level HSR programs. This legislation is not without precedent, as it is important to note that an introduced bill in the 117th Congress, H.R. 867, or the High Speed Rail Corridor Development Act of 2021, proposed 32 billion in total appropriations to be spread over a four-year period from the 2022 to 2025 fiscal years while ensuring that government funding of HSR projects did not exceed over 49% of all funding.

These proposed appropriations fall short of what is needed to ensure that projects across the nation receive the funding they need to complete projects and work past cost overruns.

7.3 Updating Federal Definitions and Regulations

Funding HSR is important but requires the reform of definitions and regulations that currently impact the federal grant process for HSR development to be effective.

Past grants have stipulated the requirement of time-consuming feasibility reviews, developments have been stymied by the lack of right-of-way laws that other infrastructure

⁸⁹ The White House. "FACT SHEET: President Biden Kicks off Major Baltimore Rail Tunnel Project Funded by Bipartisan Infrastructure Law." *The White House*, 30 Jan. 2023, www.whitehouse.gov/briefing-room/statements-releases/2023/01/30/fact-sheet-president-biden-kicks-off-major-baltimore-rail-tunnel-project-funded-by-bipartisan-infrastructure-law.

projects have to expedite their development and reduce costs, and definitions remain unclear on what speed constitutes HSR for federal appropriations and grants.

Separate legislation not related to appropriations has been introduced to resolve some of these issues, including H.R.1845, or the American High-Speed Rail Act of 2021,⁹⁰ in the 117th Congress, have been recommended to resolve these issues. This section recommends specific legislative updates to definitions and grant conditions both present and not present in H.R.1845.

Section 26105 - Definitional Changes

1. Redefine “higher-speed” rail as laid out by Sec. 2 (e) to cover all rail operating from speeds of 110 miles per hour to 185 miles per hour, and
2. Define “high-speed” rail as all rail operating at speeds above 185 miles per hour.

7.4 Increasing Public Support

The mentality of the American public to support new transportation is fundamentally flawed. During the golden age of railroad transport, Zephyr trains roamed the East. Broadway Limited and 20th Century Limited transversed the North. However, public sentiment has shifted after the federal highway acts which swept away old infrastructure like passenger rail and cable cars to usher in individual transportation.

We recommend local-level government policy action and communication which can be effective to improve support for HSR.

1. Increase and support current rail infrastructure and accessibility: Improving the existing light rail passenger networks and making it more accessible to people through subsidies can encourage more people to use light rail and subsequently support upgrades to existing rail transportation including HSR. Other financial benefits or tax breaks can be extended to users of rail transportation.
2. Promote the benefits of rail transportation: Local and federal governments can raise awareness through social media campaigns about the various benefits of rail transportation as bring attention to ongoing legislation that promotes HSR can help gather support for HSR.
3. Partner with other transportation modes: Integrating rail transportation with other modes of transportation, such as buses and bike-sharing, can make it easier for people to use and encourage a shift towards rail. Interconnected systems of

⁹⁰ The United States Congress. “H.R.1845 - American High-Speed Rail Act.” *Congress.gov*, Mar. 2020, www.congress.gov/bills/117/congress/house/bills/1845/text?r=9&s=1.

transport further maximize flexibility in using multiple modes to travel and commute.

7.5 Promoting Private/Public Partnerships

We recommend promoting public-private partnerships (PPP/P3) to help spur faster growth and development of High-Speed Rail networks. These PPPs have the benefit of funding and driving faster growth of HSR while splitting risks and alleviating part of the burden of the state and federal government to completely fund and drive the project.⁹¹

The Congressional Research Service reports three primary benefits which emerge from PPPs:⁹²

1. Splitting costs of HSR completion and construction with a private entity
2. Allowing private entities which may be better suited to run stations and other facilities to more efficiently operate
3. Sharing and transferring risks associated with the construction, maintenance, and operation of the in-progress and completed HSR project

By splitting these risks, proponents argue that the cost of HSR is split among enough stakeholders to justify the cost of investing in and sustaining a new HSR project.⁹³

PPPs already have a proven track record in American rail networks, where freight and passenger rail operators cooperate with and receive investment from both public and private entities to ensure the strength of the American rail network. Indeed, PPPs have been on the rise since 2018,⁹⁴ when the Federal Transit Administration under the Trump administration published new rules and guidance on PPPs intended to encourage the practice.⁹⁵ Even though Trump's infrastructure plans ultimately stalled due to a lack of any significant federal funding to back up any PPP offers,⁹⁶ PPPs have been on the rise since then.

⁹¹ "Public-Private Partnerships (P3)." *Build America Bureau*, 27 July 2021, www.transportation.gov/buildamerica/p3.

⁹² Congressional Research Service. Public-Private Partnerships (P3s) in Transportation. 26 Mar. 2021, sgp.fas.org/crs/misc/R45010.pdf.

⁹³ Association of American Railroads. Freight Rail Public-Private Partnerships Benefit America. Oct. 2022, www.aar.org/wp-content/uploads/2020/07/AAR-Public-Private-Partnership-Fact-Sheet.pdf.

⁹⁴ "U.S. Transit Agencies Likely to Step up Use of Public-private Partnerships, Industry Execs Say." *Progressive Railroading*, www.progressiverailroading.com/passenger_rail/article/US-transit-agencies-likely-to-step-up-use-of-public-private-partnerships-industry-execs-say-56056.

⁹⁵ "Private Investment Project Procedures." *Federal Register*, 30 May 2018, www.federalregister.gov/documents/2018/05/30/2018-11385/private-investment-project-procedures.

⁹⁶ "Public-Private Partnerships: The Only Road to Trump's Infrastructure Plan?" *Buchanan Ingersoll & Rooney PC*, 20 Mar. 2018, www.bipc.com/public-private-partnerships-the-only-road-to-trumps-infrastructure-plan.

For example, in 2021, a PPP was formed between the Virginia government, Amtrak, the Virginia Railway Express, and the publicly-traded CSX Corporation, a landowner in infrastructure and other property, to invest more than \$3.7 billion dollars into alleviating rail congestion in Virginia and Washington D.C., and to split passenger and freight lines in the East Coast.⁹⁷ Internationally, a PPP was initiated by the Portuguese government when seeking to connect their HSR network with the rest of the European continent. A study demonstrated that the Portuguese PPP made the implementation efficiency of new HSR infrastructure improve, but faced challenges in connecting between different countries, an issue the United States does not have.⁹⁸

However, risks still exist that deter private companies from seeking large PPPs with current state infrastructure projects in the US. Of particular note is the political risk and timeframe that comes with HSR PPPs, which usually span more than a decade.⁹⁹ Indeed, a review by the Harvard Kennedy School quantifies that corporations made 48 announced and 40 completed transactions totaling \$60.7 billion dollars between 2005 and 2014,¹⁰⁰ none of them to do with HSR, even as significant support was drummed up for HSR around 2011 and 2012.¹⁰¹

To alleviate these potential risks, we offer three potential solutions:

1. First, we encourage state and federal legislators to appropriate funding which includes overflow funds in case of political turnover
2. Second, we recommend that HSR secure already existing or create new right-of-way passages for rail which can assist in fast-tracking the development of HSR rail lines and alleviate fears that development plans can be stalled
3. Third, the Department of Transportation should implement greater transparency and access to TIFIA and RRIF loans by the Build America Bureau to increase access to and facilitate the development of new P3 projects.¹⁰²

⁹⁷ Marsh, Joanna. "CSX, Amtrak and Virginia Formalize Public-private Partnership." FreightWaves, 31 Mar. 2021, www.freightwaves.com/news/csx-amtrak-and-virginia-formalize-public-private-partnership.

⁹⁸ González-Medrano, Mario, and Tomás García Martín. "Analysis of Public-private Partnership Models in High-speed Railway Transport in Portugal." *Transportation Research Procedia*, Elsevier BV, Jan. 2021, <https://doi.org/10.1016/j.trpro.2021.11.005>.

⁹⁹ Patel, Shaunak. "Could Public-Private Partnerships Have Solved Trump's Infrastructure Problem? | Syracuse University." SYR-UMT, 30 Nov. 2022, onlinegrad.syracuse.edu/blog/infrastructure-public-private-partnerships.

¹⁰⁰ *US Infrastructure Public-Private Partnerships: Ready for Takeoff? – KENNEDY SCHOOL REVIEW*. 16 June 2015, ksr.hkspublications.org/2015/06/16/us-infrastructure-public-private-partnerships-ready-for-takeoff.

¹⁰¹ Arena, Richard. "Funding High-Speed Transportation in America With Public-Private-Partnerships." *Mass Transit Magazine*, 30 May 2012, www.masstransitmag.com/rail/article/10714851/funding-highspeed-transportation-in-america-with-public-private-partnerships.

¹⁰² Build America Bureau

While not all-encompassing, these loans and incentives will help draw more competitive bids and contracts to create new PPPs for new HSR projects across the US.

8. Conclusion

High-speed rail in the United States has vast potential to succeed in modernizing and improving America's transportation infrastructure network, with the potential to upgrade older lines, cut ridership times, and tackle a growing emissions problem in the transportation sector. However, HSR faces challenges to its implementation, including other poor transportation support infrastructure, long construction times, and lack of funding.

While the government is a crucial stakeholder with the power to fund and push through state and national high-speed rail legislation, other stakeholders hold key power and support to help make HSR a reality. Commuter sentiments reflect a broad support of better infrastructure as a whole, and interest in a better HSR network as an alternative to lengthy car transportation or air travel. When done right with the support of local communities and a growing support base of younger Millennial and Generation Z citizens, commuters have the power to help HSR projects become reality. State governments looking to leverage popular support should seek to integrate HSR travel with existing public transportation systems and offer other subsidies to adoption.

There will no doubt be challenges to HSR, if California's delayed and costly ongoing HSR rail project is any indicator. However, popular support in California remains for the project, and with sufficient funding from state and federal stakeholders as well as consistent and clear definitions regarding appropriations for HSR, California can be the first of many HSR success stories around the country. Action is needed to reach this goal.

HSR's potential extends beyond revolutionizing national public transit infrastructure. HSR has the potential to contribute to the revitalization of the American manufacturing industry through creating new jobs and demand for steel and other goods necessary for creating high-tech railcars. By extending the possible transit and work range of commuters, HSR opens new opportunities for work and employment across the US, and offers a promising method to alleviate current passenger utilization on America's critical freight rail infrastructure network. Opportunities exist for further expansion of an even larger national HSR network through PPPs between government and private companies, and HSR is a promising solution to bring America into the twenty-first century.



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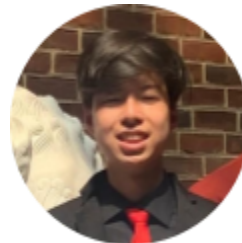


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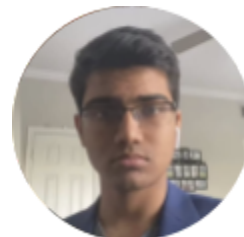
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