

California High Speed Rail Initiative



Joshua Pearson

Amy Peterson

Mark Wagner

List of Actors:

- Fiona Ma, Chair of the Legislative High Speed Rail Caucus for last two years
- Shinkansen High-Speed Rail
- California High Speed Rail Authority
- Former California Governor Gray Davis
- Current California Governor Arnold Schwarzenegger
- San Francisco Bay Area's Metropolitan Transportation Commission
- Sen. Jim Costa, D-Fresno
- Sen. Tom McClintock, R-Simi Valley

Timeline of Events

- 1964 – Shinkansen High-Speed Rail opens in Japan to coincide with Olympic Games
- 1980s – Promoters in California begin to push high-speed rail
- 1990s – Formation of California High Speed Rail Authority
- 2000 – CHSRA introduces plan for system providing connections between major cities and population centers
- September 2002 - Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century presented to the California legislature
- November 7, 2006 – Date bond issue is to go before voters
- June 2006 – California legislature and Gov. Schwarzenegger move to delay vote on proposition to November 2008.

Japanese High Speed Rail

The Shinkansen high-speed rail system required five years to construct and was intended to coincide with the 1964 Olympic Games in Tokyo. This was not a coincidence, as the unveiling of the Shinkansen system and the Olympic Games were intended to promote the international image of Japan.^[1]

Another high-speed line, the Sanyo Shinkansen, opened in 1967, leading the way for the planning of a national Shinkansen network. By 1973, construction plans for five additional lines as well as basic plans for twelve other lines had been approved. In spite of the large numbers of approvals, a \$50 billion price tag on the five lines, combined with the oil shock national

recessions, delayed construction of the lines until 1989. Driving up the cost of construction were high petroleum prices, which also decreased available revenue, further delaying construction of the lines.^[1]

Some of the new Japanese high-speed rail lines use a combination of narrow- and wide-gauge lines on the same structure, allowing for standard and future technologies to use the system. This combination limits the speed of some of the bullet trains, but allows for further upgrades. An example of this can be seen in the case of the 1998 Winter Olympics in Nagano, which saw the opening of another rail line extension.^[1]

Likewise, the Japanese have attempted to upgrade all of the aspects of the Shinkansen system since its inception in 1964. Some of the major improvements include computerized crew training systems, expanded capacity through the use of double-decker cars, lower weight and increased strength of the rail cars, conservation of energy through regenerative brakes, aerodynamic design of the trains, use of tilt trains, mechanized maintenance of the tracks and the application of electronics in mechanical systems management.^[1]

Types of High Speed Rail

Two basic technologies exist with regards to high-speed rail: maglev and enhanced conventional. Maglev is short-verse for 'magnetic levitation,' which has been employed in Shanghai, China since 2003. The maglev system in Shanghai is capable of reaching speeds of 400 km/h, or 250 mph.^[1]

Maglev technology is different from traditional railroads in regards to propulsion systems. However, the concept of linking cars together to form trains, standard tracks, land acquisition, station management and scheduling will likely derive from traditional railroad ideals. Currently, China is planning to expand its maglev system, but a price tag of nearly \$1 billion per train may limit the implementation of those plans.^[1]

Alternatively, rail service can also be enhanced through improved conventional service. Improvements could include technological enhancements for the train, as well as better right-of-way conditions such as dedicated, linear lines. This has been the path taken by modern high-speed rail lines such as the Shinkansen, in Japan, and the Train à Grande Vitesse (TG) that runs between Paris and Lyon, France. Both of these lines have been further expanded since their original inception.^[1]

California High Speed Rail

Transportation in California is a critical issue facing the state. Given the ever-expanding population, the need for fast, reliable transportation between major cities and population centers is becoming more and more important. Starting in the 1980s, promoters in California began to push the concept of high-speed rail for the state as an alternative to crowded airports and congested freeways. High-speed rail systems had already seen success in Asia and Europe.^[3]

By the 1990s, high-speed rail had gained enough interest to inspire the creation of the California High-Speed Rail Authority (CHSRA). The Authority was charged with designing the high-speed rail system for the state. In 2000, the CHSRA introduced plans for a system providing

connections between major population centers including Los Angeles, the San Francisco Bay Area, the Inland Empire (western, urbanized areas of Riverside and San Bernardino counties), Orange County, San Diego and Sacramento.^[3]

In September 2002, the Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century was presented to the California legislature as Senate Bill 1856. The bill was intended to provide for the issuance of \$9.95 billion in general obligation bonds, \$9 billion of which would be used concurrently with available federal funds for the planning and construction of a high-speed train system. The other \$950 million would be spent to improve other railroad services that would connect to the high-speed rail system. The bond issue was initially meant to go before voters as a proposition in the November 7, 2006 general election. However, in June 2006, the California legislature and Gov. Schwarzenegger moved to delay the vote on the bond issue until November 2008.^[3]

Physical Characteristics

Shown here is a map of the planned route for the California High-Speed Rail System:



Source: <http://www.cahighspeedrail.ca.gov/library/default.aspx>

The California High-Speed Rail will encompass approximately 800 miles and will run from San Diego up to Sacramento with deviations to Irvine in the southern portion and San Francisco in the northern portion of the state. The cities and locations included in the route (from south to north) are: San Diego, University City, Escondido, Murrieta, Riverside, Ontario Airport, Industry, Los Angeles, Norwalk, Anaheim, Irvine, Burbank, Sylmar, Palmdale Airport, Bakersfield, Visalia/Tulare/Hanford (potential), Fresno, Downtown Merced, Downtown Modesto, Stockton, Sacramento, Gilroy, San Jose Diridon, Redwood City/Palo Alto, Millbrae-SFO, San Francisco Bay Terminal.^[2]

One of the specific route decisions involved the Pacheco Pass alternative serving San Francisco and San Jose termini. The Pacheco Pass was selected for many reasons, including^[2]:

1. The Pacheco Pass minimizes impacts on wetlands, waterbodies, and the environment.
2. The Pacheco Pass best serves the connection between the Northern and Southern California.
 - a. Operational benefits result in greater frequency and capacity. San Francisco and San Jose would be served with one high-speed train alignment along the Caltrain corridor providing the most frequent service to these destinations.
 - b. Provides a superior connection between the South Bay and Southern California. The Pacheco Pass enables the shortest connection to be constructed between the South Bay and Southern California with the quickest travel times between these markets.
 - c. Fewer stations between the Major Metropolitan Areas. The core purpose of the high-speed train system is to serve passenger trips between the major metropolitan areas of California.
 - d. Minimizes Logistical Constraints. The Pacheco Pass avoids construction issues and logistical constraints through the Tri-Valley and Alameda County.
3. The Pacheco Pass best utilizes the Caltrain corridor.
4. The Pacheco Pass alternative would enable the early, incremental implementation of the entire Caltrain Corridor section between San Francisco, San Jose, and Gilroy.
5. The Pacheco Pass is strongly supported by the Bay Area region, cities, agencies, and organizations.

Financing and California Proposition 1A

The most current estimated cost to build the 800-mile system is about \$45 billion. Once built, the system will not require operating subsidies and will generate over \$1 billion in annual profits. The capital costs developed by the Authority are representative of all aspects of implementation of the proposed HST system, including construction, right-of-way, environmental mitigation, and design and management services. The construction costs include procurement and installation of

line infrastructure (e.g., tracks, bridges, tunnels, grade separations, and power distribution); facilities (e.g., passenger stations and storage and maintenance facilities); systems (e.g., communications and train control); and removal or relocation of existing infrastructure (e.g., utilities and rail tracks). The right-of-way costs include the estimated costs to acquire properties needed for construction of the HSR infrastructure. Agency costs associated with administration of the program (e.g., design, environmental review, and management) are estimated in terms of add-on percentages to construction costs, and a contingency is added based on the total construction and right-of-way costs. The unit costs for implementing high-speed trains are well known based on foreign experience and from other major construction projects in California – and have been extensively peer reviewed.^[2]

Without state support for construction, the system will not be built. However, unlike other forms of transportation, once the system is constructed, it will not continue to be a burden to taxpayers. Users of the system will cover the operations and maintenance of the system with their fares. Moreover, the significant revenue surplus (greater revenues than operating costs) will attract the private sector to pay for part of the capital costs, and the direct benefits of the system will greatly outweigh the costs (by at least 2 times as much). The California High-Speed Train Project is an exceptionally commercially viable project.^[2]

The California High-Speed Rail Authority is actively pursuing a multi-track financing strategy for the planning, design and construction phases of the project, including three tiers: state and local funding, federal funding and “P3”- public-private partnerships.^[2]

State and local funding comes in the form of a \$9.95 billion general obligation bond (Proposition 1A) on California’s November 2008 ballot. The Safe, Reliable-Speed Passenger Train Bond Act for the 21st Century, more commonly referred to as Proposition 1A was initially introduced by Sen. Jim Costa (D) in September 2002. The Senate Bill 1856 asked for \$9 billion in bond sales for the construction of the HSR system from San Francisco to Los Angeles and \$950 million for the improving and connecting existing rail passenger rail lines. If approved, the projections state that limited operation would have begun by 2008.^[4] However, Sen. Tom McClintock (R), forced legislation to take the measure off of the November 2004 ballot and was successful. The issue was kept alive by legislation delaying the Proposition until the 2006 general election.^[2]

Once again, as the November 2006 election approached, opposition arose to the proposition. California had experienced a large budget deficit and support for the Proposition was scarce. Governor Schwarzenegger had failed to include significant funding in the Transportation budget, but did authorize \$14.3 million for initial engineering studies. In addition, scheduled for the 2006 General Election was large Infrastructure Bond Proposition which did not focus on funding for the HRS proposal. It was thought that voters would not support the Infrastructure Bond proposition and the HSR Bond proposition. Therefore the California HSR proposition was again delayed to more years until November 2008.

Proposition 1 was officially placed on the November 2008 ballot for voter approval. In the intervening years as the Proposition was delayed, a decision was reached that the Pacheco Pass would be the route used out of San Francisco instead of the Altamont Pass. Assemblywoman Cathleen Galgiani proposed rewording Proposition 1 to increase the flexibility in the spending of bond money and not limited the funding only to the Pacheco Pass route.^[5] This would open the

door for more discussion on the final alignment of the HSR line. It was also thought there would be more support if the language of the Proposition was not so restrictive in setting the SF to LA line as the priority. Assemblywoman Galgiani represents the California 17th Assembly district which includes the alternative route of the Altamont Pass. With this change Proposition 1 was taken off of the ballot and Proposition 1A was added.

Proposition 1A successfully passed, likely making California the first state in the nation with intercity high-speed train travel. The bond measure would fund the state's portion of the construction cost of the project from Anaheim/Los Angeles through the Central Valley to San Francisco. The bond will also infuse local transportation agencies with nearly \$1 billion for improvements to local and regional passenger rail projects that complement and connect with the high-speed train system. Local funds are anticipated where the high-speed train system shares corridors with existing services (such as Caltrain between San Francisco and San Jose and Metrolink between Los Angeles and Anaheim), and to help finance high-speed train station areas. It should be noted that in the six years since the Proposition was proposed, there has not been a change in the amount of funding requested even though the estimated cost of the project has risen.^[2]

Federal matching funds are expected to account for a significant portion of the construction cost. Federal funding would come in part from existing program funding sources, but would also require the creation of new grant allocation programs designed specifically for high-speed trains. On October 30, 2007, the United States Senate passed the Passenger Rail Investment and Improvement Act of 2007. This bill (H.R. 2095) was signed by President Bush on October 16, 2008 and creates a framework to provide a direct means of funding high-speed trains that had not existed at the federal level. Since the Proposition 1A's passage, there has not been any announcement made for the amount of federal funds for the project.^[2]

The CHSR Authority's finance team anticipates that the commitment of state and federal dollars will attract private sector funding. The Authority's finance team has targeted a broad array of public-private partnership opportunities, including project debt financing, vendor financing, system operations and private ownership.^[2]

In March 2008, the Authority announced the release of a Request for Expressions of Interest (REFI) for Private Participation in the Development of a High-Speed Train System in California. Through the responses to the REFI, the Authority gained a better understanding of how the Project and State can benefit from private sector participation while also garnering an appreciation for key considerations that may encourage or dissuade private sector participation, such as phasing, timing and risk. The Authority sought input from respondents as to potential interest in participating in the development aspects of a high-speed train system, including perspectives on project delivery methods and private project financing.^[2]

Why Use Bonds?

California is already one of the highest taxed states. Asking for an increase in taxes would likely not lead to support for funding High Speed Rail. Taxes often times do not have a termination date. Even after the completion of the project, the likelihood of the tax being rescinded is not guaranteed. The tax could continue on. California has traditionally used bonds to fund capital

costs of large infrastructure projects.^[6] Bonds are not a good funding source to fund operational costs on a system.^[6] Since the California High Speed Rail Authority states operational and maintenance costs will be funded by the revenue gained by tickets sales, the bonds will only be available for construction costs.

The type of bonds that will be used to fund the HSR will be General Fund Supported Bonds specifically General Obligation Bonds. These bonds are typically paid off over a long time, in this case 30 years. They are paid off using California’s General Fund which is made up of tax revenue and guaranteed by the state’s taxing agency.^[7] These bonds also require voter approval. Roughly the repayment of the bonds is for every \$1 borrowed requires \$2 paid back, \$1 of the original fund and \$1 interest.^[7] Payments of the bonds would roughly be around \$650 million a year for the life of the bonds.

The Impacts of High Speed Rail

Cost of Rail

Table 1: Intermodal Comparison of Long Run Average Costs (Levinson, Gillen, Kanafani, Mathieu, 7-2).

Cost Category	Air System	High Speed Rail	Highways
Infrastructure: Construction and Maintenance	\$0.0182	\$0.1290	\$0.0120
Carrier: Capital Cost	\$0.0606	\$0.0100	\$0.0000
Carrier: Operating Cost	\$0.0340	\$0.0500	\$0.0000
External: Accidents	\$0.0004	\$0.0000	\$0.0200
External: Congestion	\$0.0017	\$0.0000	\$0.0046
External: Noise	\$0.0043	\$0.0020	\$0.0045
External: Pollution	\$0.0009	\$0.0000	\$0.0031
User: Fixed + Variable	\$0.0000	\$0.0000	\$0.0860
User: Time	\$0.0114	\$0.0440	\$0.1000
TOTAL	\$0.1315	\$0.2350	\$0.2302

note: \$/pkt, highways assume 1.5 passengers per car; all transfers are subtracted out

Table 1 compares the internal, external, user, and total costs between air, high speed rail, and highway systems of transportation. Comparison shows that “the internal, or private, monetary costs comprising infrastructure, carrier, and vehicle operating costs are clearly highest for rail” with \$0.19/pkt (passenger kilometer travelled), then air with \$0.11/pkt and finally highway with \$0.12/pkt^[10].

In general rail systems have high internal costs, which is due to a high initial cost to build infrastructure. These costs are high because rail systems can only serve customers along points on the track whereas air and highway systems can serve many customer markets. To make up for high fixed costs, high speed rail systems must achieve a high level of ridership. However, ridership is difficult to estimate prior to building the high speed rail system and is oftentimes

overstated. One report claims that the California High Speed Rail Association’s “2030 ridership projections are absurdly high—so much so that they could well rank among the most unrealistic projections produced for a major transport project anywhere in the world”^[9]. The projections for California’s high speed rail are higher than ridership in Japan and France, countries which favor high speed rail systems much more than California. The authors of this report claim that an accurate estimate of ridership in 2030 is 23.4 million riders, compared to the CHRSA’s estimate of 96.5 million. For this reason, building the high speed rail system in California might be risky.

In Table 1, if user costs are added to the internal costs, the results are “per passenger-km. costs of \$0.124 for air; \$0.233 for rail; and \$0.198 for highway”^[10]. In this case rail is still more expensive than air or highway transportation. Only when external costs are considered does high speed rail seem more cost effective. Per passenger-km, the external costs are \$0.002 for high speed rail, \$0.0043 for air, and \$0.0045 for highway systems^[10]. Relative to the total cost of the system, the external costs are small. If there is little sensitivity to the external costs then clearly high speed rail is the least cost effective. In contrast, as consumers groups become more sensitive to external costs, such as pollution and noise, high speed rail may be considered more cost effective. Consequently, the real cost of transportation systems depends on the weight given to each type of cost^[10]. Because of this “one can confidently conclude that air transportation is a less expensive means of providing intercity transportation in the context of the California corridor, even when taking social costs into consideration”^[10].

Table 2: Summary of CHSRA and Due Diligence Report Projections (Cox and Vranich, 140)

	CHSRA	Due Diligence Report
Annual Ridership: 2030: Base, Intercity Only	65,500,000	23,400,000
Annual Ridership: 2030: Base, Intercity + Commuter	88,000,000	No Projection
Annual Ridership: 2030: High, Intercity Only	96,500,000	31,100,000
Annual Ridership: 2030: High, Intercity + Commuter	117,000,000	No Projection
Capital Cost: Entire System (2008\$): Low*	\$54,300,000,000	\$65,200,000,000
Capital Cost: Entire System (2008\$): High*		\$81,400,000,000
Capital Cost: Phase I (2008\$): Low	\$33,100,000,000	\$39,700,000,000
Capital Cost: Phase I (2008\$): High		\$49,600,000,000
Operating Cost: Phase I (2008\$): Low	\$1,100,000,000	\$1,430,000,000
Operating Cost: Phase I (2008\$): High		\$1,760,000,000
Fastest Non-Stop Express Travel Time: LA-SF	02:38	03:41
Greenhouse Gas Reduction (Tons of CO ₂): 2030**	1,770,000	630,000
Share of California 2020 Goal	1.0%	0.4%
Cost per CO ₂ Ton Reduced: Low	\$1,949	\$7,409
Cost per CO ₂ Ton Reduced: High	\$2,409	\$10,032
Times CO ₂ IPCC \$50-per-Ton Ceiling: Low	39	148
Times CO ₂ IPCC \$50-per-Ton Ceiling: High	48	201
Net Profit: 2030: Phase I: Optimistic Midpoint	No Projection	(\$350,000,000)
Net Profit: 2030: Phase I: Pessimistic Midpoint	No Projection	(\$3,590,000,000)
Unmet Capital Need: Phase I	No Projection	\$7,600,000,000 to \$33,100,000,000
Unmet Capital Need: Entire System	No Projection	\$28,800,000,000 to \$64,900,000,000
Note:		
*Entire system cost. Includes Missing Phase. Does not include Implied Phase		
**CHSRA greenhouse gas reduction adjusted to account for improved automobile and airline fuel efficiency.		

Table 1 compares ridership, costs, travel time, pollution reduction, and profit projections of the CHRSA and the report done by Cox and Vranich. This table shows that many of the CHRSA projections might be embellished in order to make the high speed rail appear less costly, more environmentally friendly, and more profitable. If the estimates of the due diligence report are correct, then building a high speed rail system in California could prove to be burdensome to its citizens.

Effects on other Modes of Transportation

Supporters of high speed rail claim that it will help reduce traffic and congestion in air and highway systems. However, in the case of highways this reduction will keep the customer’s cost about the same. Figures 1 and 2 compare the projections of the CHRSA to that of Cox and Vranich for the change in vehicle miles with and without high speed rail. The CHRSA predicts “that HSR would reduce future volumes (2030) on corridor roadways by 2.5%” whereas Cox and Vranich predict the impact would only be 0.8% ^[9]. In terms of cost reduction, the CHRSA estimates that building alternatives to high speed rail, in the form of highways and aviation, will cost about \$82 billion. However, the report by Cox and Vranich claims that this is exaggerated and in reality the high speed rail will only reduce highway costs by about \$0.9 billion ^[9].

Figure 1: CHSRA Projection for the Change in Auto Travel for 2000-2030 (Cox and Vranich, 108).

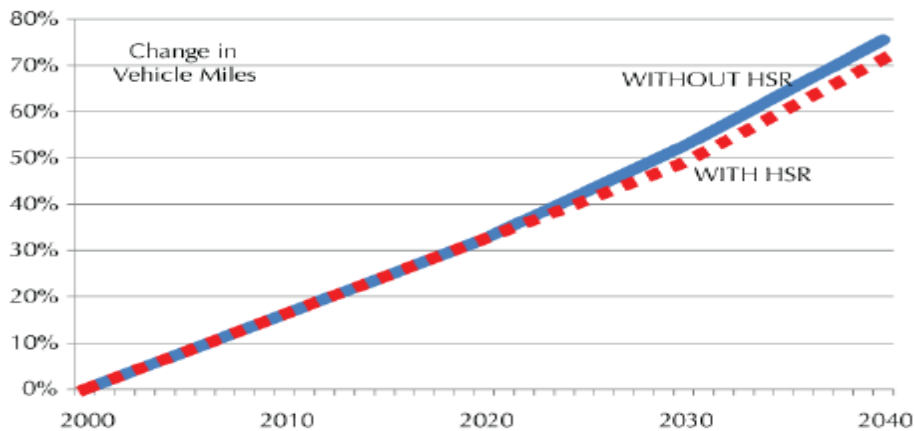
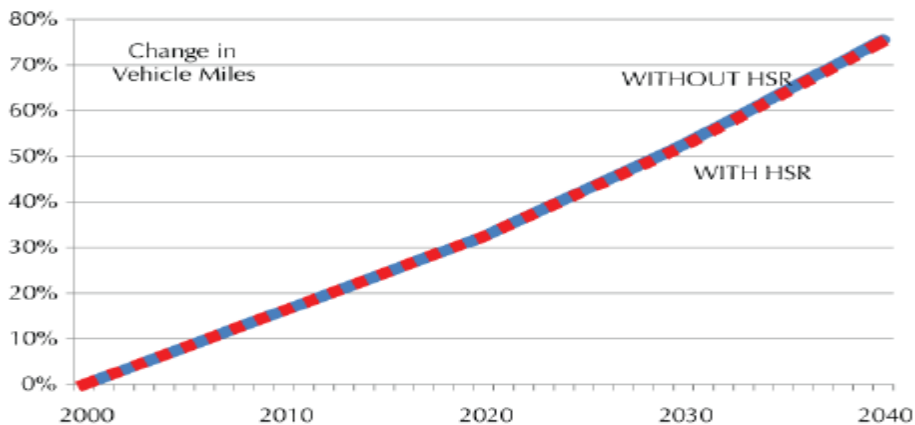


Figure 2: Due Diligence Projection for the Change in Auto Travel for 2000-2030 (Cox and Vranich, 108).



Currently “air travelers spend more time on the ground than in the air” due to checking in, passing through security, taxiing, collecting baggage, and travel to and from the airport. Because of this, supporters argue that high speed rail will save time in many instances. Moreover, supporters argue that overall high speed rail will be a less frustrating transportation experience. This may be true but still the question remains of whether high speed rail will absorb a significant amount of air traffic.

Initially, the CHSRA predicted air traffic volume on the corridors of the high speed rail to rise 75% between 2000 and 2030. This estimate was used to predict the level of congestion on airlines and thus the level of congestion relief that the high speed rail can provide. However, passenger volumes between California airports have decreased by 11.9% since 2000, largely due to the 9/11 terrorist attacks. When interstate flights are included, overall passenger volume in California is still down 10% since 2000. This is in contrast with the rest of the United States that has seen an 11.4% increase in air passenger volumes. In light of this, “if airline volumes were to increase at the projected 2005 to 2030 rate from their 2007 level, the 2030 volume would be only 36 percent above 2000, less than one-half of the CHSRA projected 75 percent increase”^[9].

The CHSRA predicts the high speed rail will draw between 60 and 95% of air passengers in the Los Angeles and San Francisco Bay area by 2030. This is a high estimate considering that the high speed rail system between Tokyo and Osaka only attracts 80% of air passengers in a country that has much higher highway costs, higher air fares, and a strong rail system^[9]. Moreover, these predictions are likely too high considering their predictions on air traffic are also high. In addition, past experience of high speed rail in Japan and France indicate that aviation will remain strong after a high speed rail system is in place and so the rail in California is unlikely to have much of an effect on air transportation.

A high speed rail system in California should not be built to compete but rather to complement with the air transportation system. An ideal rail system would connect airports and transit systems^[10]. Transferring air traffic to high speed rail will increase the cost of transportation overall because high speed rail is more costly to the consumer, as table 1 displays. So, it would be more effective for the rail system to work in conjunction with other transportation systems. Moreover, opponents of the high speed rail in California argue that the money should be spent on improving transit because “Californians’ problem is not getting from San Francisco to Los Angeles, it’s getting into work each day”^[11]. Investing in transit could more frugally reduce congestion, pollution, and reliance on foreign oil.

Air Pollution

High speed rail systems are generally run on electricity and thus do not directly cause air pollution. Yet, some air pollution may be caused indirectly by high speed rail in the generation of the electricity used to run the rail system^[10]. Some may argue that the pollution costs derived from generating electricity should lie with the high speed rail system. In this case, it would be hard to determine which plants are generating energy for a specific rail system because “the energy used for the high speed rail could be generated at any plant in the Western United States, from hydro-electric, nuclear, or coal, all with very different environmental consequences, and all subject to intense regulation”^[10]. Generating electricity from nuclear power and hydro-electric

power will emit virtually no CO₂. In contrast, generating electricity from coal and fossil-fuels will emit a significant amount of CO₂. So the cost of emitting CO₂ cannot easily be associated with high speed rail systems because determining where the energy supply is coming from is difficult.

Others argue that air pollution costs are properly allocated to the plants generating electricity. In this case, the burden to develop technologies that are more efficient and that create less pollution lies with the companies who are generating the electricity.

Table 3: High-Speed Rail Travel Times, CO₂ Savings, and Prices to/from Select Destinations (Bay Area Council Economic Institute, 14).

City Pairs	Distance (miles)	Time	CO ₂ Saved per Trip (lbs.)	Ticket Price (est.)
San Francisco to Los Angeles	432	2:38	324	\$55
San Francisco to San Diego	616	3:56	462	\$70
San Francisco to Anaheim	456	2:57	349	\$58
San Francisco to Bakersfield	284	1:51	213	\$43
San Francisco to Fresno	188	1:20	141	\$32
San Francisco to Merced	131	1:14	98	\$30
San Francisco to Sacramento	284	1:53	213	\$40
San Francisco to San Jose	48	0:30	36	\$10
San Francisco to SFO	14	0:13	10	\$8
San Jose to Los Angeles	384	2:09	288	\$51
San Jose to San Diego	567	3:39	425	\$66
San Jose to Burbank	374	2:17	280	\$50
San Jose to Bakersfield	236	1:34	177	\$38
San Jose to Fresno	140	1:03	105	\$28
San Jose to Merced	83	0:45	62	\$26

Supporters of high speed rail claim that “electric-powered High-Speed Trains will remove over 12 billion pounds of CO₂ and greenhouse gases, equal to the pollution of nearly 1 million cars”^[11]. Moreover, they claim that “high-speed trains require one-third the energy of air travel and one-fifth the energy of auto travel”^[11]. This is significant because global warming is a considerable problem today. However, opponents of high speed rail claim that there are more cost effective ways to reduce carbon emissions.

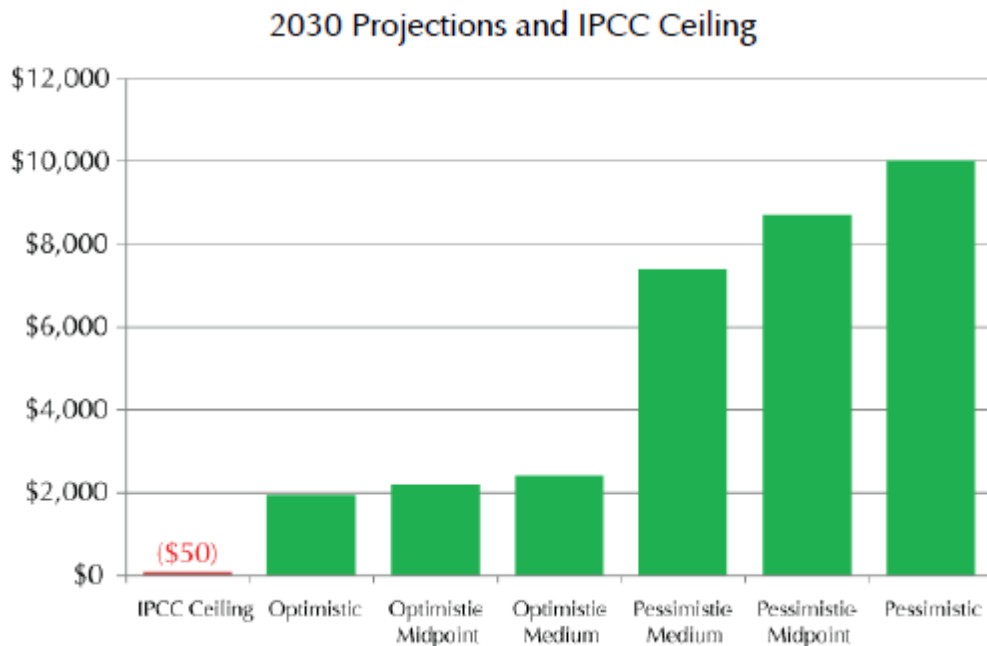
Table 3 displays the projected amount of CO₂ emissions that will be saved and the ticket cost per high speed rail trip, for various city pairs. This shows that there will be a reduction in CO₂ if high

speed rail is used instead of alternative forms of transportation. However, this price does not include the fixed costs of high speed rail in the cost to reduce CO₂ emission levels. Since fixed costs are exorbitant for high speed rail, this is a significant cost left out of the table. When fixed costs are included in the calculation, high speed rail no longer appears to be a cost effective means of reducing CO₂ emissions.

A report by Cox and Vranich claims that the environmental benefits predicted by the California High Speed Rail Association (CHSRA) are grossly exaggerated. State law has instituted laws that require a significant reduction in greenhouse gas emissions. The California Air Resources Board predicts that “HSR would ultimately remove CO₂ emissions equal to only 1.5% of the current state objective” whereas the CHSRA predicted a removal of near 50% of the state’s objective^[9]. Specifically, in report the CHSRA claimed that the high speed rail would reduce CO₂ emission by 5.7 million tons and a presentation given by CHSRA claimed a reduction of 8.7 million tons. In contrast, recent CHSRA data is showing that the reduction will be closer to 3.1 million tons which demonstrates that CHSRA estimates have been exaggerated^[9]. Moreover, the California Air Resources Board claims the reduction will be closer to 2.5 million tons and the report by Cox and Vranich concludes the reduction will be somewhere between .6 and 1.8 million tons – much lower than the CHSRA estimates.

Not only will the high speed rail be unlikely to significantly reduce CO₂ emissions but any effect that high speed rail did have on reducing CO₂ emissions would be excessively costly. The Intergovernmental Panel on Climate change (IPCC) estimates that “for between \$20 and \$50 per ton of reduced greenhouse gases emissions, deep reversal of CO₂ concentrations can be achieved between 2030 and 2050”^[9].

Figure 3: Cost per Ton of CO₂ Removed



In comparison, the cost of high speed rail to achieve the same reduction in greenhouse gases emissions would be between 39 and 201 times as costly. To determine this, Cox and Vranich did a study to determine the cost of reducing greenhouse gas emissions by one ton. As noted, the IPCC has a ceiling cost of \$50 per ton reduced. The study was done under four different scenarios – ranging from optimistic to pessimistic. The results are shown in Figure 3 and show that the cost using high speed rail to reduce emissions by one ton would range from about \$2,000 to \$10,000. This is between 39 and 201 times as costly as the IPCC ceiling of \$50 per ton reduction. The conclusion is that high speed rail would have an insignificant effect on reducing emissions and would come at a high cost ^[9].

Farms and Parks

People in the central valley agricultural lands of California have concerns about farmland severance, which occurs when the placement of rail through one farmland divides the land into separate pieces of land. For example, “on the route from Sacramento to Bakersfield, the system when not adjacent to existing rail corridors would require new alignments traversing farmland areas with the potential to sever the vast majority of parcels traversed due to the curving nature of the alignments” ^[9]. However, the potential impacts of the high speed rail system on farmland are hard to assess because plans for the rail are not yet solidified.

Another worry of people living in rural areas of California is the noise created by the high speed rail system. Compared to urban areas, noise is relatively low in rural areas. So noise from a high speed rail system would most likely be more noticeable in rural areas. Moreover, rather than a constant noise that one can learn to ignore, noise from high speed rails is periodic that is more of a nuisance.

In addition to the rail system potentially causing farmland severance, the rail might also harm between 140 and 180 parks, wildlife refuges, and protected pieces of open land. The federal and California state law requires that “the new transportation projects not harm parks unless there is no prudent and feasible alternative to using that land; and the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use” ^[12]. Some consumer and environmental groups claim that there are viable alternative options to building rail through particular parks.

Job Creation

Supporters claim that the high speed rail will “inject new vitality into California’s economy by creating nearly 160,000 construction-related jobs and 450,000 permanent jobs in related industries like tourism” and “these are American jobs that cannot be outsourced” ^[11]. A report put out by the Bay Area Council Economic Institute compared the projected employment in 2030 if the high speed rail is built to if it were not built. The results show slightly higher projected employment if the rail system is built than if not. A similar comparison looked at the difference in population if the rail is or is not built. Again, projections show that the population will be slightly higher if the rail is built than if not. Table 4 displays the results of these comparisons.

Table 4: Year 2030 Employment and Population: County and Bay Area Totals (Bay Area Council Economic Institute, 10)

County	Employment			Population		
	2005 Conditions	2030		2005 Conditions	2030	
		No Project	High-Speed Train		No Project	High-Speed Train
Alameda	953,937	1,247,413	1,259,563	1,451,065	2,038,482	2,051,196
Contra Costa	508,854	763,445	769,521	1,017,644	1,543,053	1,549,526
San Francisco	779,357	975,823	983,634	741,025	796,208	809,680
San Mateo	522,830	717,526	723,835	701,175	814,065	821,063
Santa Clara	1,323,920	1,769,498	1,785,181	1,705,158	2,152,963	2,183,649
Bay Area Total	4,088,898	5,473,705	5,521,734	5,616,067	7,344,771	7,415,114

Not only will the high speed rail create jobs in California but it might also allow cities greater access to a larger workforce. With the rail system, people will be able to travel further, faster. This means that people who live outside a city may be able to take the rail into the city for work^[8]. In contrast, the rail could contribute to suburbanization, where people to move further from the city but still be able to get to work in the same amount of time.

Tourism

The Bay Area Council Economic Institute report also claims that the high speed rail will increase tourism to San Francisco due to more efficient access to Southern California. Thus building the rail expect people will be able to “travel from Los Angeles to San Francisco in about 2½ hours for about \$50 a person” and in contrast “with gasoline prices today, a driver of a 20-miles-per-gallon car would spend about \$87 and six hours on such a trip”^[11]. The increased tourism would “support activity in the hospitality, restaurant, retail and entertainment sectors, as well as museums and other cultural institutions”^[8].

Besides San Francisco, other cities may have increased tourism as well, depending on the activities available. For example, San Jose might also experience increased tourism. Northern California might also see increased tourism from citizens of Northern California. In addition, there is a “greater feasibility of a single California vacation encompassing both north and south may also induce tourists to lengthen their visits, with added benefits for the hotel and restaurant sectors”^[8].

Works Cited:

1. Garrison, William Louis, and David M. Levinson. The Transportation Experience : Policy, Planning, and Deployment. New York: Oxford UP, Incorporated, 2005.
2. "The Official Site of California's Proposed High-Speed Train System." California High Speed Rail Authority. 2008. California High Speed Rail Authority. 09 Nov. 2008 <<http://www.cahighspeedrail.ca.gov/>>.
3. IGS Library Staff. High-Speed Rail in California. Dec. 2007. Institute of Governmental Studies - University of California. 09 Nov. 2008 <<http://igs.berkeley.edu/library/hthighspeedrail.htm>>.
4. California Senate. Senate Bill 1851. Sept 2002. Official California Legislative Information. 10 Nov. 2008 <http://info.sen.ca.gov/pub/01-02/bill/sen/sb_1851-1900/sb_1856_bill_20020919_chaptered.pdf>
5. California Assembly. Assembly Bill 3034. Aug 2008. Official California Legislative Information. 10 Nov. 2008 <http://info.sen.ca.gov/pub/01-02/bill/asm/ab_3001-3050/ab_3034_bill_20020918_chaptered.html>
6. Orleans, Valerie. Sate Bonds: What Are They? How Do They Work?. Feb 2004. Office of Public Affairs- California State Fullerton. 11 Nov. 2008 <<http://campusapps.fullerton.edu/news/people/2004/erickson/erickson2.html><
7. Office of Legislative Analyst. An Overview of State Bond Debt. Nov 2004. California Secretary of State. 11 Nov. 2008 <http://www.sos.ca.gov/elections/bp_nov04/an_overview_of_state_bond_debt.pdf>
8. Bay Area Council Economic Institute. California High-Speed Rail: Economic Benefits and Impacts in the San Francisco Bay Area. October (2008). http://spur.org/misc_docs/BayAreaHSRstudy.pdf
9. Cox, Wendell and Joseph Vranich. The California High Speed Rail Proposal: A Due Diligence Report. Reason Foundation, Citizens Against Government Waste, and Howard Jarvis Foundation. September (2008). <http://www.hjta.org/files/pdf/highspeedrail_prop.pdf>
10. Levinson, David, David Gillen, Adib Kanafani, and Jean-Michel Mathieu. The Full Cost of Intercity Transportation - A Comparison of High Speed Rail, Air and Highway Transportation in California, UCB-ITSRR-96-3, Institute of Transportation Studies, University of California at Berkeley, Berkeley, CA, June (1996). <<http://www.its.berkeley.edu/publications/UCB/96/RR/UCB-ITS-RR-96-3.pdf>>

11. "Tuesday, November 4, 2008 – Official Voter Information Guide." 2008 California General Election. 05 Nov. 2008.< <http://www.voterguide.sos.ca.gov/argu-rebut/argu-rebutt1a.htm>>
12. "Impacts on Protected Land." 2006 California High Speed Rail Land Impacts. 05 Nov. 2008 <<http://www.hsrandimpacts.org/impacts.html>>