Case Study 8: California High Speed Rail Initiative:

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Source: http://www.calhighspeedrail.org/contact
List of Actors

- Fiona Ma, Assemblywoman and 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
- Assemblywoman Cathleen Galgiani
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
- 1996 – 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 for 2004 General Election
- June 2004 – Gov. Schwarzenegger pushed back the Proposition to the 2006 Ballot due to budget concerns
- June 2006 – California legislature and Gov. Schwarzenegger move to delay vote on proposition to November 2008 General Election
- November 4, 2008 – Date bond issue goes before voters and passes
Shinkansen HSR

- Construction finished in 1964
- Opening coincides with 1964 Olympic Games in Tokyo
- Sanyo Shinkansen opens in 1967
- 1973 – construction for five lines planned, along with basic plans for 12 more lines.
- Construction costs delay lines until 1989
Shinkansen HSR

- Uses narrow- and wider-gauge tracks
  - Limits speed of trains
  - Allows for later upgrades of system
- All aspects of system have been continuously upgraded
  - 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
  - Application of electronics in mechanical systems management
Types of High-Speed Rail

- Two basic technologies exist:
  - Maglev (magnetic levitation)
  - Enhanced conventional
- Maglev currently used in Shanghai; able to reach 250 mph, or 400 km/h
- Enhanced conventional
  - Technological enhancements for the train
  - Better right-of-way conditions – dedicated lines
  - Path taken by Shinkansen, TGV, and the CHSRA
California High Speed Rail

- Transportation in California is a critical issue facing the state.
- Ever-expanding population
- Greater need for fast, reliable transportation between major cities and population centers
California High Speed Rail

- **1980s** – promoters in California begin to push the concept of high-speed rail for the state as an alternative to crowded airports and congested freeways.
- **Rationale:** high-speed rail systems had already seen success in Asia and Europe.
- **1996** – high-speed rail gained enough interest to inspire the creation of the California High-Speed Rail Authority (CHSRA)
California High Speed Rail

- Authority charged with designing the high-speed rail system for the state.
- 2000 – CHSRA introduces plans for a system providing connections between major population centers including Los Angeles; San Francisco Bay Area; Inland Empire (western, urbanized areas of Riverside and San Bernardino counties); Orange County; San Diego and Sacramento
California High Speed Rail

- September 2002 – Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century
  - Intended to provide for the issuance of $9.95 billion in general obligation bonds
  - $9 billion used concurrently with available federal funds for planning & construction of HSR system
  - $950 million spent improving other rail services connecting to HSR system
California High Speed Rail Map
Physical Characteristics

- California High-Speed Rail will...
  - encompass ~800 miles and
  - run from San Diego up to Sacramento w/deviations to Irvine in the So. portion and San Francisco in the No. portion of the state

- 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
Pacheco Pass

- Route alternative serving San Francisco and San Jose termini. Selected for many reasons, including:
  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.
     - Operational benefits result in greater frequency and capacity.
     - Provides a superior connection between the South Bay and Southern California.
     - Fewer stations between the major metropolitan areas.
     - Minimizes Logistical Constraints.
Pacheco Pass

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.
Costs & Funding

- Current CHSRA 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.
Costs & Funding

- Capital costs developed by the Authority representative of:
  - All aspects of implementation of the proposed HST system, including construction, right-of-way, environmental mitigation, and design and management services.
  - Construction costs include procurement and installation of line infrastructure, facilities, systems and removal or relocation of existing infrastructure.
  - Right-of-way costs (estimated costs to acquire properties needed for construction)
  - Agency costs (administrative costs estimated in terms of add-on percentages to construction costs)
  - Contingency is added based on the total construction and right-of-way costs.
Costs & Funding

- Without state support for construction, the system will not be built.
- CHSRA claims that 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.
- Revenue surplus 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).
Costs & Funding

- CHSRA actively pursuing a multi-track financing strategy for the planning, design and construction phases of the project,
- Includes three tiers:
  - State and local funding
  - Federal funding
  - “P3”- public-private partnerships
Costs & Funding

- State and local funding comes in the form of a $9.95 billion general obligation bond
  - Proposition 1A on California’s November 2008 ballot.
  - Measure successfully passed
  - 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.
  - 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.
Altamont Pass
Why use Bonds?

- California - High Taxed State
- Increase in taxes have a negative view
- Bonds are limited to a specific time frame
- Taxes often continue after project is finished
- Bonds also help limit usage to capital costs
Why use Bonds?

- Type of Bonds
  - Traditional Revenue Bonds
  - Budget Related Bonds
  - General-Fund Supported Bonds
  - General Obligation Bonds
Why use Bonds?

- Bonds will be repaid over 30 years
- Roughly $2 paid for $1 borrowed
- Estimation of $650 million paid a year
Costs & Funding

- 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
  - Would also require the creation of new grant allocation programs designed specifically for high-speed trains.
Costs & Funding

- CHSRA’s finance team anticipates that commitment of state and federal dollars will attract private sector funding.
- 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
Benefit: Job Creation

- Employment: 35.0% increase with rail vs. 33.9% increase without (a difference of about 50,000 jobs)
- Population: 32.0% increase with rail vs. 30.8% increase without (a difference of about 70,000)

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

- Travel from Los Angeles to San Francisco
  - 2½ hours by HSR for $55 one-way
  - 6 hour car trip for $87 one-way
  - 2-3 flight time for $250 round trip

- Increased feasibility of a single California vacation encompassing both north and south which may also induce tourists to lengthen their visits

- Tourism supports other markets such as
  - Hospitality
  - Restaurant
  - Retail
  - Entertainment
  - Museums
  - Other cultural institutions
Disadvantage: Comparison of Costs

- Overall air is the least expensive
- High speed rail and highways are about tied
- Most of the cost of high speed rail comes from infrastructure (capital costs)

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

Note: $/pktp, highways assume 1.5 passengers per car; all transfers are subtracted out
Disadvantage: Projected Costs
CHSRA vs. Due Diligence Report

- CHSRA projections of costs, revenues, and pollution reduction are exaggerated in favor of high speed rail

<table>
<thead>
<tr>
<th></th>
<th>CHSRA</th>
<th>Due Diligence Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ridership: 2030: Base, Intercity Only</td>
<td>65,500,000</td>
<td>23,400,000</td>
</tr>
<tr>
<td>Annual Ridership: 2030: Base, Intercity + Commuter</td>
<td>88,000,000</td>
<td>No Projection</td>
</tr>
<tr>
<td>Annual Ridership: 2030: High, Intercity Only</td>
<td>96,500,000</td>
<td>31,100,000</td>
</tr>
<tr>
<td>Annual Ridership: 2030: High, Intercity + Commuter</td>
<td>117,000,000</td>
<td>No Projection</td>
</tr>
<tr>
<td>Capital Cost: Entire System (2008$): Low*</td>
<td>$54,300,000,000</td>
<td>$65,200,000,000</td>
</tr>
<tr>
<td>Capital Cost: Entire System (2008$): High*</td>
<td>$81,400,000,000</td>
<td>$81,400,000,000</td>
</tr>
<tr>
<td>Capital Cost: Phase I (2008$): Low</td>
<td>$33,100,000,000</td>
<td>$39,700,000,000</td>
</tr>
<tr>
<td>Capital Cost: Phase I (2008$): High</td>
<td>$49,600,000,000</td>
<td>$49,600,000,000</td>
</tr>
<tr>
<td>Operating Cost: Phase I (2008$): Low</td>
<td>$1,100,000,000</td>
<td>$1,430,000,000</td>
</tr>
<tr>
<td>Operating Cost: Phase I (2008$): High</td>
<td>$1,760,000,000</td>
<td>$1,760,000,000</td>
</tr>
<tr>
<td>Fastest Non-Stop Express Travel Time: LA-SF</td>
<td>02:38</td>
<td>03:41</td>
</tr>
<tr>
<td>Greenhouse Gas Reduction (Tons of CO₂): 2030**</td>
<td>1,770,000</td>
<td>630,000</td>
</tr>
<tr>
<td>Share of California 2020 Goal</td>
<td>1.0%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Cost per CO₂ Ton Reduced: Low</td>
<td>$1,949</td>
<td>$7,409</td>
</tr>
<tr>
<td>Cost per CO₂ Ton Reduced: High</td>
<td>$2,409</td>
<td>$10,032</td>
</tr>
<tr>
<td>Times CO₂ IPCC $50-per-Ton Ceiling: Low</td>
<td>39</td>
<td>148</td>
</tr>
<tr>
<td>Times CO₂ IPCC $50-per-Ton Ceiling: High</td>
<td>48</td>
<td>201</td>
</tr>
<tr>
<td>Net Profit: 2030: Phase I: Optimistic Midpoint</td>
<td>No Projection</td>
<td>($350,000,000)</td>
</tr>
<tr>
<td>Net Profit: 2030: Phase I: Pessimistic Midpoint</td>
<td>No Projection</td>
<td>($3,590,000,000)</td>
</tr>
<tr>
<td>Unmet Capital Need: Phase I</td>
<td>No Projection</td>
<td>$7,600,000,000 to $33,100,000,000</td>
</tr>
<tr>
<td>Unmet Capital Need: Entire System</td>
<td>No Projection</td>
<td>$28,800,000,000 to $64,900,000,000</td>
</tr>
</tbody>
</table>

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.
Disadvantage: Effects on Other Modes of Transportation

CHSRA Projection for the Change in Auto Travel for 2000-2030 – 2.5% reduction

Due Diligence Projection for the Change in Auto Travel for 2000-2030 – 0.8% reduction
Disadvantage: Projected Pollution Reduction

<table>
<thead>
<tr>
<th>City Pairs</th>
<th>Distance (miles)</th>
<th>Time</th>
<th>CO₂ Saved per Trip (lbs.)</th>
<th>Ticket Price (est.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Francisco to Los Angeles</td>
<td>432</td>
<td>2:38</td>
<td>324</td>
<td>$55</td>
</tr>
<tr>
<td>San Francisco to San Diego</td>
<td>616</td>
<td>3:56</td>
<td>462</td>
<td>$70</td>
</tr>
<tr>
<td>San Francisco to Anaheim</td>
<td>456</td>
<td>2:57</td>
<td>349</td>
<td>$58</td>
</tr>
<tr>
<td>San Francisco to Bakersfield</td>
<td>284</td>
<td>1:51</td>
<td>213</td>
<td>$43</td>
</tr>
<tr>
<td>San Francisco to Fresno</td>
<td>188</td>
<td>1:20</td>
<td>141</td>
<td>$32</td>
</tr>
<tr>
<td>San Francisco to Merced</td>
<td>131</td>
<td>1:14</td>
<td>98</td>
<td>$30</td>
</tr>
<tr>
<td>San Francisco to Sacramento</td>
<td>284</td>
<td>1:53</td>
<td>213</td>
<td>$40</td>
</tr>
<tr>
<td>San Francisco to San Jose</td>
<td>48</td>
<td>0:30</td>
<td>36</td>
<td>$10</td>
</tr>
<tr>
<td>San Francisco to SFO</td>
<td>14</td>
<td>0:13</td>
<td>10</td>
<td>$8</td>
</tr>
<tr>
<td>San Jose to Los Angeles</td>
<td>384</td>
<td>2:09</td>
<td>288</td>
<td>$51</td>
</tr>
<tr>
<td>San Jose to San Diego</td>
<td>567</td>
<td>3:39</td>
<td>425</td>
<td>$66</td>
</tr>
<tr>
<td>San Jose to Burbank</td>
<td>374</td>
<td>2:17</td>
<td>280</td>
<td>$50</td>
</tr>
<tr>
<td>San Jose to Bakersfield</td>
<td>236</td>
<td>1:34</td>
<td>177</td>
<td>$38</td>
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<tr>
<td>San Jose to Fresno</td>
<td>140</td>
<td>1:03</td>
<td>105</td>
<td>$28</td>
</tr>
<tr>
<td>San Jose to Merced</td>
<td>83</td>
<td>0:45</td>
<td>62</td>
<td>$26</td>
</tr>
</tbody>
</table>

- This accounts for operating costs but not capital costs
Disadvantage: Reducing Pollution

- Intergovernmental Panel on Climate Change believes reducing 1 metric ton of CO$_2$ emissions will cost between $20 and $50.

- Using high speed rail to reduce 1 metric ton of CO$_2$ emissions will cost between $2000 and $10,000.
Disadvantage: Effects on Parks

- Farmland severance - when the placement of rail through one farmland divides the land one or more pieces of land

- Increase in sporadic noise pollution in relatively quiet rural areas

- The rail might impact between 140 and 180 parks

This area of Henry Coe State park could be in the path of the High Speed Train.

Photo courtesy of Coe Advocates
Discussion Questions

- What can the planners of the high speed rail in California learn from the Los Angeles Metro and the Bus Riders Union case study?

- Are general obligation bonds or sales taxes more fair to the consumer? To the taxpayer? To the operators?

- As Governor of California, would you support this HSR initiative in light of its inherent costs and potential benefits?
Discussion Questions

• Should high speed rail be advertised as a means to reduce CO$_2$ emissions when it is so costly to build?

• How important is the effect of HSR on 140-180 parks, protected open spaces, and wildlife refuge areas relative to other potential environmental results?

• How reasonable is it to assume that the HSR in California will absorb much of the ridership from other modes of transportation?
Discussion Questions

- Does this project better serve political motives or public interest?

- In light of this, what areas (if any) in the U.S. might benefit from a HSR system?

- The CHSRA uses the Shinkansen as a model. How reasonable is this comparison?