California High-Speed Train Project

Ridership Peer Review Panel: First Meeting
January 10, 2011
Sacramento
1) Clearly ridership is always a challenging topic.
2) Skeptics use ridership issue to cast doubt on the project, as it is difficult to challenge or disprove.
3) We need to build credibility to ensure successful future for the project.
4) Senate Transportation Committee indicated their agreement to having a Peer Review Panel established.
5) The involvement of UC –ITS is paramount to ensure that the differences which apparently exist are addressed.
6) I want honest and open discussions on the way forward.
Project Status Update
800-mile system (520 miles in phase one)
- Operating speeds: 110-125 mph in urban areas; 220 mph in rural areas
- 100% clean electric power
- Safely grade-separated
- Reliable, easy way to travel
- Environmental benefits
- Job creation
- Economic strength
Phase 1 sections

- San Francisco-San Jose
- San Jose-Merced
- Merced-Fresno
- Fresno-Bakersfield
- Bakersfield-Palmdale
- Palmdale-Los Angeles
- Los Angeles-Anaheim
Phase 2 sections
+ Altamont

- Los Angeles-San Diego (via Inland Empire)
- Merced-Sacramento
- Altamont Corridor Rail Project
Funding

➢ January 2010 $2.25 billion “Track 2” funding received
  • USDOT earmarked $400 million for TJPA
  • $194 million to be used for PE/NEPA/CEQA
  • Remaining $1.656 billion available for D-B – matched by state funds = $3.3 billion

➢ October 2010 award of another $715 million
  • 30 percent match with state funds

➢ December 2010 award of another $616 million that other states “sent back”
  • 50 percent match with state funds

➢ Federal funds matched with state and local funding is currently available =

$5.5 billion
THE FIRST STEP TO A TRUE HSR SYSTEM
Beginning in the Central Valley

Initial construction

Up to 124 miles from north of Fresno near Madera to north of Bakersfield— a choice that:

- Meets the letter of state and federal law
- Gives the greatest flexibility to build both north and south as funding becomes available
- Constitutes the backbone of a system that will reach across the whole state
THE FIRST STEP TO A TRUE HSR SYSTEM
Beginning in the Central Valley

Consider:

- The interstate highway system started in Missouri

- Critics called the Golden Gate the bridge that couldn’t be built

- Western Union in 1878, regarding the telephone: “too many shortcomings to be seriously considered as a practical form of communication”

- President of Digital Equipment Corp in 1977: “there is no reason for any individual to have a computer in their home”

An artist’s vision of what the area surrounding Fresno’s high-speed rail station could become
**Funding CHALLENGE**

- **Need for ongoing funding rather than annual appropriations**
  - Recognizing the nature of long-term infrastructure projects
  - California’s need: rate of $1.5 billion per year

- **National Commitment**
  - Partnership opportunities with other corridors
  - Florida, Texas, Northeast, Midwest

- **Private investment will materialize...**
  - ...only when our federal government has shown the same level of commitment that the voters of California have
Concession O&M: Model of the new “Ferrari-red” trains from private Italian investor/operator NTV

The Nola Maintenance Facility

International station development examples

A PROVEN APPROACH
Public-private partnerships around the world
Oversight and Organization

California High-Speed Rail Authority

- legislature
- CHSRA Board
- Language of Prop 1A
- Independent peer reviews
- Department of Finance
- Recovery Act built-in oversight
- Project Management Oversight
**Peer Reviews**

- **Independent Peer Review:**
  - Experts on finance, foreign rail
  - Appointed by Finance, Controller, Treasurer, BT&H
  - Independent of Authority; reports to the Legislature

- **Ridership Peer Review:**
  - Panel of modeling/forecasting experts from private sector and academia
  - Participate in the refinement of existing CHSRA ridership model

- **Operations and Maintenance Peer Review:**
  - Offered our foreign MOU partners opportunity to give input
  - Rail operators have begun responding

- **Seismic Design Peer Review:**
  - Offered our foreign MOU partners with seismic experience opportunity to give input
Program Status One Year from now

CHSRA will have:

- Completed Final EIR/EIS documents + 15 percent design for first construction section, awaiting execution of NOD/ROD
- Negotiated Cooperative Agreement with FRA to fund first design-build contract
- Issued RFP to prospective D-B teams for first D-B contract
- Prepared state appropriations request and financing plan for use of Prop 1A funds
**NEXT STEPS**

- **2012**
  - ✔ EIR/EIS process complete in all Phase 1 sections, construction
- **2017**
  - ✔ Construction completion of first ARRA section
- **2018-20**
  - ✔ Start of operations
Ridership Issues
Over 35 years of national and international experience
Largest travel demand forecasting firm in the U.S.
Pioneered many of the most significant advances in the travel demand forecasting profession
Practical worldwide experience
  – 16 statewide and 30+ urban models
  – High-speed rail models in both the U.S. and abroad
Model Research, Training, and Technical Guidance

- CS staff play leadership roles in key Transportation Research Board (National Academy of Sciences) modeling committees
- CS has developed and delivered modeling training courses for U.S. DOT
- CS has written numerous modeling technical guidance documents for U.S. DOT

I believe we have a professional organization working on this issue
California High-Speed Rail Ridership and Revenue Forecasting Model

- Model has been an appropriate tool to support environmental and planning-level analysis to date.
- New model enhancements will support investment and operating/design decisions
Response to ITS Review

- Initial review generated 30 questions
- Issues discussed in the final report
  - Division into short and long trips
  - Assigning all business travel to peak period
  - Treatment of panel dataset
  - Constraining the headway coefficient
  - Absence of an airport/station choice model
  - Calibration of constants in mode choice models
  - Constraining of coefficients
- A complex system of models
- Data, models, calibration, and sensitivity

We need to consider any meaningful recommendation from other professionals
Commitment to Improve Ridership Forecasting

- Letter to Sen. Lowenthal in August promised to:
  – produce forecasting ranges for the HST system,
  – refine forecast models to improve sensitivity,
  – develop independent forecasts of critical inputs,
  – conduct a rigorous risk analysis,
  – integrate peer review into the forecasting work

- Next we will explain how we are planning to perform this work:
  – in the short term for the update to the business plan
  – fully and rigorously in the next two years
Existing model a good base for improvements

- Based on extensive data on travel and demographic characteristics of California
- Developed by Cambridge Systematics, one of the leading practitioner firms in the field
- Professionally accepted standards used in carrying out the modeling and analysis
- Detailed enough to allow realistic testing of alternative alignments, station locations, & service levels
- Open and transparent to allow outside review
Ridership & Revenue Peer Review Panel

- Will guide & advise the Authority and the forecasting team on updates and improvements to models.
- To be a mix of experienced professional practitioners and academically respected modelers/experts. Will report to the Authority CEO.
- Prof. Frank Koppelman, Professor Emeritus Northwestern University, has agreed to chair the panel.
- Others include
  - Mr. Billy Charlton, SF County;
  - Prof. Eric Miller, University of Toronto;
  - Prof. Kay Axhauser, Inst. Fuer Verkehrsplanung/Transportsysteme Switzerland
  - Prof Ken Small, University of California, Irvine
Next Steps

- Use existing model for:
  - Environmental and outreach process
  - The High-Speed Rail Authority business plan
- Engage independent Peer Review group to:
  - Evaluate stability/reliability of work done thus far
  - Guide model updates
  - Support Risk analysis / Sensitivity analysis work which will enhance ridership modeling acceptance by Stakeholders
- CS to Implement model enhancements
- Support ridership predictions for “Minimum Operable Segment [MOS]”
Improvements to business plan forecasts

- Update HST stations and service levels to reflect environmental and operational work of last 12 months
- Review and update key inputs to reflect changes evident from 2005 to present – for example:
  - Population / economic growth
  - Airline competitive response, fuel costs
  - Potential added markets (airport access, tourism)
- Initial analysis of forecast sensitivity using reasonable ranges of possible variation from the central values
Model Enhancements

- Update model to 2008 conditions
  - Revised socioeconomic and network data
  - Changes in long distance travel patterns
  - Revalidation of model to current travel conditions
- Refine model to address more complex questions
  - Parking pricing and constraints
  - Differential peak/off-peak pricing
  - Integrated rail services/Express and local service mix
Risk Analysis Framework

- Model sensitive to a range of inputs
  - Population and employment forecasts
  - Levels of service and cost of travel
  - Properties of the model - coefficients and constants
- Uncertainty analysis to ridership and revenue
  - Sensitivity runs to evaluate “what if” scenarios
  - Evaluation of internally consistent growth scenarios
  - Range of forecasts to assess downside risk and upside potential
Model Enhancements
Reflecting the ITS Review

- Peer review group
  - Literature review and model properties
  - ITS question about the value of the headway coefficient
- Station choice model
  - Develop a model to allocate trips by airport/station
  - ITS recommendation for a refined model-based approach
- Time of day model
  - Split trips by purpose and time of day to address pricing
  - ITS recommendation for a more refined procedure to travel markets
### Ridership and Revenue Forecasting
**FY 2010/2011 Budget Constrained Schedule**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Environmental and Outreach Support</td>
<td>10 11 12 1 2 3 4 5 6 7</td>
<td>8 9 10 11 12 1 2 3 4 5 6</td>
<td>7 8 9 10 11 12 1 2 3</td>
</tr>
<tr>
<td>2. Business Plan Update with Initial Risk Assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model Updates, Refinements, and Forecasts</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Peer Review</td>
</tr>
<tr>
<td>4. New traffic, transit and travel pattern data</td>
</tr>
<tr>
<td>5. Model Updates for 2008, 2020, 2035, 2050 (Baseline socioeconomic forecasts and networks, streamlined procedures)</td>
</tr>
<tr>
<td>6. Model Refinements (Refined analytic capability and model revalidation)</td>
</tr>
<tr>
<td>7. Independent Risk Based Analysis</td>
</tr>
</tbody>
</table>

**Total: $4,880,000**  
By fiscal year:  
- **$1,090,000** for FY 2010/2011  
- **$2,140,000** for FY 2011/2012  
- **$1,650,000** for FY 2012/2013

- **$690,000** already authorized

- Updated and refined model ready to use
- Independent analysis complete
### Ridership and Revenue Forecasting

#### Accelerated Schedule

<table>
<thead>
<tr>
<th>Analysis with Existing Model</th>
<th><strong>FY 2010/2011</strong></th>
<th><strong>FY 2011/2012</strong></th>
<th><strong>FY 2012/2013</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Environmental and Outreach Support</td>
<td>1 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3</td>
<td>1 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3</td>
<td>1 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3</td>
</tr>
<tr>
<td>2. Business Plan Update with Initial Risk Assessment</td>
<td>1 2 3 4 5 6</td>
<td>7 8 9 10 11 12 1 2 3</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 1 2 3</td>
</tr>
</tbody>
</table>

#### Model Updates, Refinements, and Forecasts

| 3. Peer Review |
| 4. New traffic, transit and travel pattern data |
| 5. Model Updates for 2008, 2020, 2035, 2050 (Baseline socioeconomic forecasts and networks, streamlined procedures) |
| 6. Model Refinements (Refined analytic capability and model revalidation) |
| 7. Independent Risk Based Analysis |

| **Total:** $4,880,000 | By fiscal year | **$1,865,000** | **$2,165,000** | **$850,000** |

- Updated and refined model ready to use
- Independent analysis complete
- **$690,000** already authorized
Ridership in HST Corridors
Population & trains/hour peak direction
Paris – SE France 2009 & forecast California 2030

(Population in millions, trains/peak hour/direction in blue)

Paris Region, 10.4 million
- Besancon, 0.1
- Dijon, 0.2
- Annecy, 0.1
- Grenoble, 0.4
- Geneva, 0.4
- Lyon, 1.4 million
- Macon, 0.1
- Valence, 0.1
- Avignon, 0.3
- Briancon, 0.1
- Marseille, 1.4 million

Greater LA, 19.0 million
- San Diego, 3.5 million
- Bakersfield, 0.6
- Fresno, 0.9
- Merced, 0.3
- Sacramento, 2.5 million

2008 – 31 million riders
11
9
8
3
2
2
2

2030 – 39 million riders
Phase 1+2 – 74 million riders
11
11
11

Urban area population from Demographia World Urban Areas Population & Projections, April 2009; trains per hour from CA Full System and bonjourlafrance.net/france-trains; 1700 hour; March 2009
Population & HS trains/hour peak direction
Madrid – Sevilla & SE, Fall 2010 & forecast California 2030

(Population in millions, trains/peak hour/direction in blue)

**2009 – 11 million riders**
- Madrid, 4.9 million
- Valencia, Alicante, Almeria, each 0.1 million & 1 train
- Granada, 0.1
- Puente Genil, 0.03
- Antequera, 0.04
- Cordoba, 0.3
- Sevilla, 0.7 million
- Huelvas, 0.1
- Cordoba, 0.3
- Ciudad Real, 0.1
- Puertollano, 0.1 million
- Toledo, 0.1

**2030 – 39 million riders**
**Greater LA, 19.0 million**
- San Diego, 3.5 million
- Bakersfield, 0.6
- Fresno, 0.9
- Merced, 0.3
- Sacramento, 2.5 million
- SF Bay Area, 6.4 million

Phase 1+2 – 74 million riders

(Half trains per hour represent one train every two hours.)

Urban area population from Demographia World Urban Areas Population & Projections, April 2009; trains per hour from CA Full System and Renfe on-line reservations system, October 2010
Urban area population from Demographia World Urban Areas Population & Projections, April 2009; trains per hour from CA Full System and Renfe on-line reservations system, October 2010
Comparisons of CA with other HST (cont.)

- **Tokyo-Osaka Corridor**
  - ~70 million people, roughly 2X California
  - Shinkansen provides 11 trains/hour premier service with 77% more seats than planned for CA in 2030
  - Line at capacity; JR Central maglev 40-mile test track first step in planned second HS line
  - 73 trains in peak on 6-10 tracks Yokohama–Tokyo vs. planned 20 trains in peak on 4 tracks SJ-SF

- **Tokyo – Northern Japan (JR-East)**
  - 25% more people than CA, ¾ in Tokyo
  - Normal peak 10 Shinkansen departures per hour
  - Holiday peak 18 Shinkansen departures per hour
Population & HS trains/hour in peak direction

Tokyo - Osaka today & California 2030

(Population in millions, trains/peak hour/direction in blue)

2008 – 151 million Shinkansen riders, 1.7 billion conventional train riders

Average Tokaido Trainset Capacity
1,300 seats per trainset
15,600 seats per peak hour / direction

SF Bay Area, 6.4 million
Sacramento, 2.5 million
Merced, 0.3
Bakersfield, 0.6
Fresno, 0.9
Greater LA, 19.0 million
8
8
10
11
11
11
27
5 - 9
4 - 16
4
9
27
7-9
9
Metro Tokyo, 34.2 million
Shizuoka, 1.0
Hamamatsu, 1.0
Mishima, 0.5

Tokyo 8.8 million

Yokohama-Kawasaki, 5.0

2030 – 39 million riders
Phase 1+2 – 74 million riders

Average CAHSR Trainset Capacity
800 seats per trainset
8,800 seats per peak hour / direction

San Diego, 3.5 million

Nagoya, 9.2

Kyoto-Osaka-Kobe, 17.2

2008 – 151 million Shinkansen riders, 1.7 billion conventional train riders
Population & HS trains/hour peak direction
Japan-East, Fall 2010

(Population in millions, trains/peak hour/direction in blue)

2009 – 88 million riders

Metro Tokyo, 34.2 million

Tokyo (23 Special Wards), 8.8 million

San Diego, 3.5 million

Greater LA, 19.0 million

2030 – 39 million riders
Phase 1+2 – 74 million riders

Greater LA, 19.0 million

BAKERSFIELD, 0.6
FRESNO, 0.9

2009 – 88 million riders

Metro Tokyo, 34.2 million

TOKYO (23 Special Wards), 8.8 million

SFM Bay Area, 6.4 million

SACRAMENTO, 2.5 million

Average JR East Trainset Capacity
820 seats per train
8,740 seats per hour / direction

Average CAHSR Trainset Capacity
800 seats per trainset
8,800 seats per peak hour / direction

Major metropolitan area population from Demographia World Urban Areas Population Projections, April 2009; Population of other cities from 2005 Population Census; trains per hour from CA Full System and Japan Rail Group Nationwide Timetable, October 2010

(One-third train per hour represents one train every three hours.)
Population & HS trains/hour peak direction (Holidays)
Japan-East, Fall 2010

(Population in millions, trains/peak hour/direction in blue)

2009 – 88 million riders

Metro Tokyo, 34.2 million
- Tokyo (23 Special Wards), 8.8 million
- Omiya, 0.5
- Nagano, 0.6
- Takasaki, 0.5
- Niigata, 1.0
- Yamaegata, 0.5
- Shinjo, 0.04

San Diego, 3.5 million

Greater LA, 19.0 million

- Bakersfield, 0.6
- Fresno, 0.9
- Sacramento, 2.5 million

SF Bay Area, 6.4 million

2030 – 39 million riders
Phase 1+2 – 74 million riders

Average JR East Trainset Capacity
820 seats per train
14,760 seats per hour / direction

Average CAHSR Trainset Capacity
800 seats per trainset
8,800 seats per peak hour / direction

Major metropolitan area population from Demographia World Urban Areas Population & Projections, April 2009; Population of other cities from 2005 Population Census; trains per hour from CA Full System and Japan Rail Group Nationwide Timetable, October 2010
- First HS line (TGV-SE) open in stages ‘82 & ‘84
- HS line extended in stages south to Marseille by ‘01
- TGV Atlantic opened in ’89 & ’91, steadily adding service after
- Services have taken several years to achieve a steady level of riders
Some Team Members

- **Carrie Pourvahidi** is Chief Deputy Director of the Authority.
- **Dan Leavitt**: Deputy Director: Environmental and Planning
- **Shahin Pourvahidi**, Authority Contracts Manager.
- **Vickie Janek**: Contracts administration for the Authority
- **Lisa Toof** (Tel: Mobile: my assistant.
- **Hans van Winkle**, Program Director of our Project Management Team [PMT] (Parsons Brinkerhoff) has Cambridge Systematics as their subcontract.
- **Gregg Albright**: (PMT) Planning and third parties
- **Ken Jong**: (PMT) Director of Engineering
- **Nick Brand** (PMT) direct coordinator of the CS activities.
Thank You again