

# High-Speed Rail Experience



# HSR in California

- Why am I here?
- California HSR in Context:
  - Passenger rail service in general
  - HSR around the world
- California HSR project: what happened, why?
- Megaprojects: why can't we do them right?
- What should we learn?

# Why me?

- US DOT team that created Amtrak, ran NECIP (\$10 billion)
- World Bank: all rail lending (60 countries) and led transportation energy efficiency
- TGA transportation consulting worldwide
- 14 years (11 as Chairman) of CA HSR Peer Review Group reporting to Legislature

## U.S. in Context: Major International Rail Passenger Systems

	Total Line Miles (000)	Passengers (000)	Passenger- Miles (000,000)
China	88.5	3,374,950	878,504
Russia	57.0	1,157,214	80,339
India	46.0	8,439,000	718,605
Japan	12.8	9,368,477	166,480
Germany	22.4	2,122,827	49,550
France	18.9	1,238,069	58,469
Poland	12.4	48,869	7,233
<b>U.S. Class I/Amtrak</b>	<b>99.7</b>	<b>32,665</b>	<b>6,475</b>
<b>Canada (VIA)</b>	<b>32.1</b>	<b>5,007</b>	<b>1,054</b>

2018 Data

# HSR Experience: It Works!?

(HSR is >150 mph or so)

- Japan – “Shinkansen” 1964
- France – “TGV” 1981
- Germans – “ICE” 1991
- China – 2008
- Italy, Taiwan, Korea, and others

# Shinkansen



## ■ “Shinkansen” 1964

- Separate system (Std gauge) from Tokyo to Osaka in 1964
- Now covers most major cities
- To date 12 billion passengers, no fatalities from train accidents
- Average delay: 9 seconds!
- Some lines “profitable,” others maybe not
- Old JNR “privatized.” Now 6 companies, 4 profitable.

# France



## ■ “TGV” 1981

- Uses both HSR and conventional lines
- Serves most major cities and connects to UK, Belgium, Spain, Switzerland and Germany
- 3 billion passengers, no fatalities to date
- Some lines “profitable”: SNCF very unprofitable

# Germany



## ■ "ICE" 1991

- Mixed speed system (speeds and lines)
- Germany, Austria, Switzerland, Belgium and Netherlands
- 2 billion passengers
- Major accident 101 fatalities
- DB major financial problem for Germany



# China



## ■ Started service 2008 (!)

- 20,000 miles today, headed for 24,000 or more
- About 15 billion passengers so far
- Multiple objectives, not just “profitability”
- Complex organization
- Financial impact uncertain (very high debt)
- Wenzhou accident, 40 fatalities

# China's High-Speed Network

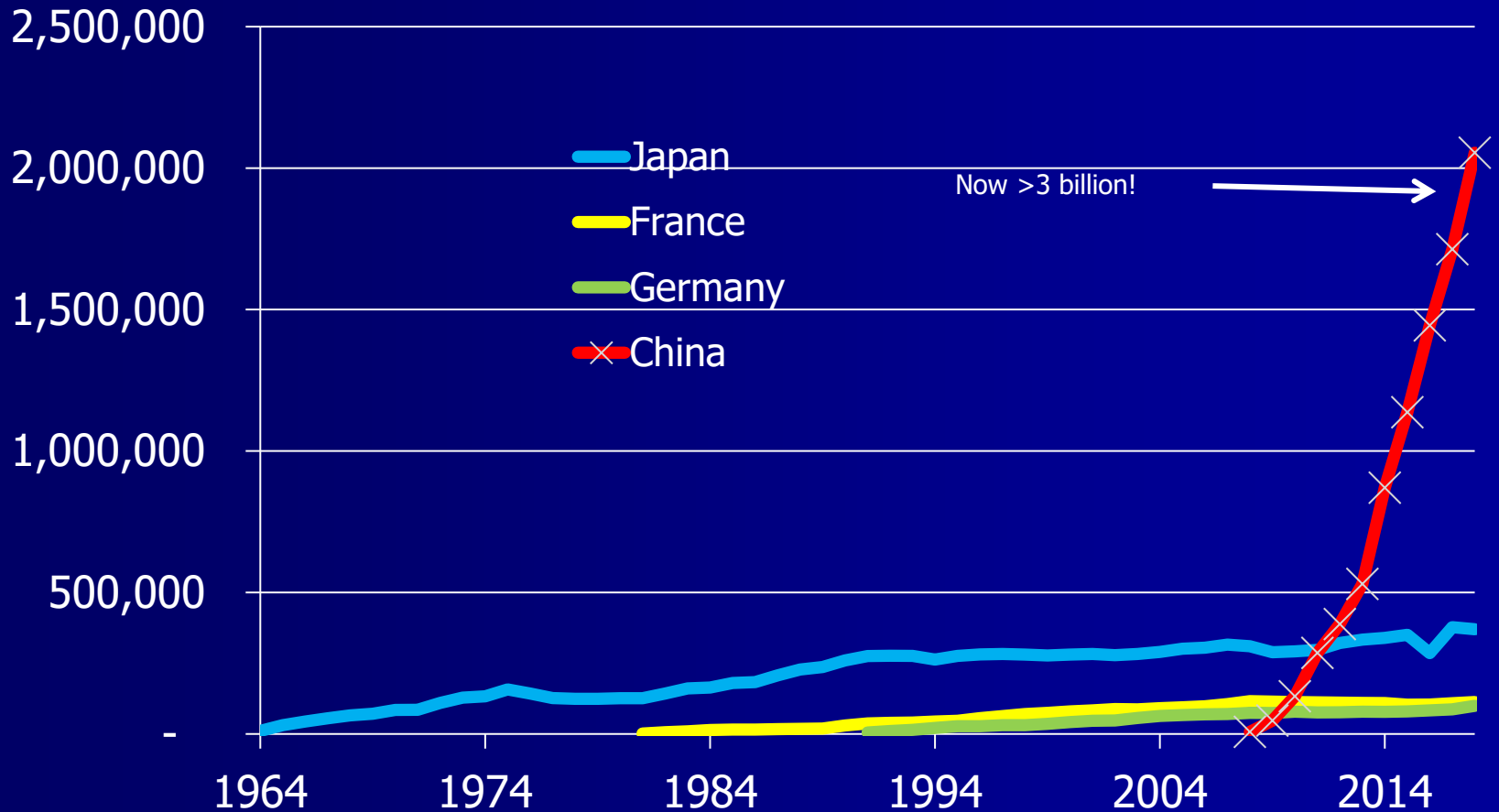


# HSR Systems Worldwide

	HSR Line Miles	Passengers (000)	Passenger- Miles (000,000)
China	18,570	2,054,300	426,745
Russia	380	136,653	3,357
India	-	-	-
Japan	1,800	370,216	61,703
Germany	1,680	99,208	20,620
France	1,680	112,655	37,230
<b>Amtrak (NEC)</b>	<b>450</b>	<b>12,533</b>	<b>2,064</b>
<b>CA HSR (est)</b>	<b>520</b>	<b>39,000</b>	<b>~10,000</b>

2020

# Annual HSR Passengers (000)



# California, Here It Comes!



# HSR Project History

- Studies: 1980 (FRA) through 1996 (CA)
- 2000 BP: first entire system: ¼ % sales tax. Base for Prop 1A
- 2008 BP: Based on Prop 1A. Ph 1 only, Rte. 99. 220 mph, 2hr 40 min SF to LA Union. The "1/3s" mantra. "Bookends"
- 2009 BP: 1<sup>st</sup> Revision, added ARRA (Fed) \$, started in the center,
- 2012 BP: Blended service (not separated) SJ to SF
- 2014 BP: Suspend North, go South
- 2016 BP: Suspend South, go North
- 2018 BP: North to SJ only: possibly some trains to SF. Added Cap & Trade funding (25%)
- 2020 BP: Merced to BKF links: no connection to SJ
- 2022 BP: Additional focus on Merced to BKF, ACE, SJJPA
- **2023 PUR**: Cost increases, further problems

# Project Evolution

Business Plan	Length (Miles)	Capital Cost Est. (2022 \$ billions)	Cost/Mile (\$2022 millions)	Passengers (millions)	First Year of Ph 1 Operation
2000	501	27.8	55.4	40	2020
2008	520	42.6	82.0	55	2020
2009	520	43.5	83.6	41	2020
2012	490	68.5	139.9	37	2034
2014	490	63.9	130.3	35	2040
2016	520	64.3	123.7	41	2040
2018	520	74.2	142.6	39	2040
2020	520	80.4	154.7	39	2040
2022	520	100.0	192.3	39	2040
<b>2023 PUR</b>	<b>520</b>	<b>130+</b>	<b>250.0</b>	<b>31</b>	<b>2040</b>

# The Funding Gap From Then to Now

(\$ 2022 billions)

	2009 BP	2023 PUR
<b>Estimated Cost</b>	34	130
<b>Funding Available</b>		
<b>Prop 1A Bonds</b>	9.0	9.0
<b>Cap and Trade (2030)</b>	--	4.5 - 8.8
<b>Federal (ARRA and 2010)</b>	3.5	3.5
<b>Private Sector</b>	8.5	--
<b>Planned Funding</b>	21.0	17.0-21.3
<b>GAP based on Planned Funding</b>	<b>13.0</b>	<b>108.7-117.0</b>
<b>Potential Additions</b>		
Cap and Trade (2050)		10.0 - 20.0
Federal		~2.0
New State		?
<b>Remaining Unfunded GAP as of now</b>		<b>86.7 -105.0</b>



# Where Are We Now?

- Merced to BKF only: environment/engineering for extensions
- Caltrain electrification almost done, LA Union through tracks and grade Xings funded and underway by local authorities
- Planned connection to ACE at Merced
- SJJPA to operate HSRA service from Merced to BFK (avoid deficit) with connection to Sacramento ("San Joaquins")
- 97% overrun on existing contracts so far: 2-5 yr. delays
- Major cost unknowns (tunneling, electrification, rolling stock): no experience on about >60% of the project
- New Federal money (if any) not defined
- **New State financing source needed beyond the CV.**

# How Did This Happen to Us?

- “Optimism Bias” (scope, schedule and budget): dishonesty versus delusion. Promoters lacked knowledge
- Major interests have very short-term objectives (Labor, Contractors)
- Unclear legislation -- diffuse and conflicting political/social objectives
- “Aspirational” funding plan (the “1/3s”). Net result, inadequate and unstable funding made effective management impossible
- Passage by Proposition: inadequate review, “orphan” when trouble came, poor understanding of project magnitude
- “Free” ARRA money deadline forced decisions (poor contracting, construction started prematurely and in the middle)
- Management too thin (over-dependence on consultants)
- Litigation, especially NEPA and CEQA (costly delays and changes)  
“NIMBYism is destroying the State” (Newsom)
- Wholly inadequate executive and legislative oversight

# So, What Should We Learn?

- Look gift horses in the mouth: **visions aren't projects**
- Ensure planning and system performance objectives are valid and accepted
- Place extreme emphasis on initial review and planning and don't do projects by Proposition
- Provide reliable and adequate funding: if you can't fully pay for it, don't start it
- Need competent, adequate and stable internal management team without undue reliance on consultants
- Streamline the litigation environment
- Need to reassess the project, **re-align objectives with credible funding and greatly improve oversight**

# Two Quotes That Say It All

- “News that the Transbay Terminal is something like \$300 million over budget should not come as a shock to anyone. We always knew that the initial estimate was way under the real cost. Just like we never had a real cost for the Central Subway or the Bay Bridge or any other massive construction project. So get off it. In the world of civic projects, the first budget is really just a down payment. If people knew the real cost from the start, nothing would ever be approved. The idea is to get going. Start digging a hole and make it so big, there’s no alternative to coming up with the money to fill it in.” Willy Brown
- “We have met the enemy, and he is us.” Pogo

The right direction. Incremental improvements, carefully targeted for maximum value. Focus on trip time, not max speed. Make sure that there is enough money for solid and continuing operational support, not just construction. Focus benefits on riders, not consultants, contractors and construction unions. Make sure the host railroad(s) are on board. Bring money and be patient.