High-Speed Rail

International, USA and California

HSR Viability in California

May 3, 2011

By

Hon. Rod Diridon Sr.

Chair Emeritus
Intercity and High Speed Rail Committee
American Public Transit Association

Chair Emeritus
California High Speed Rail Authority Board

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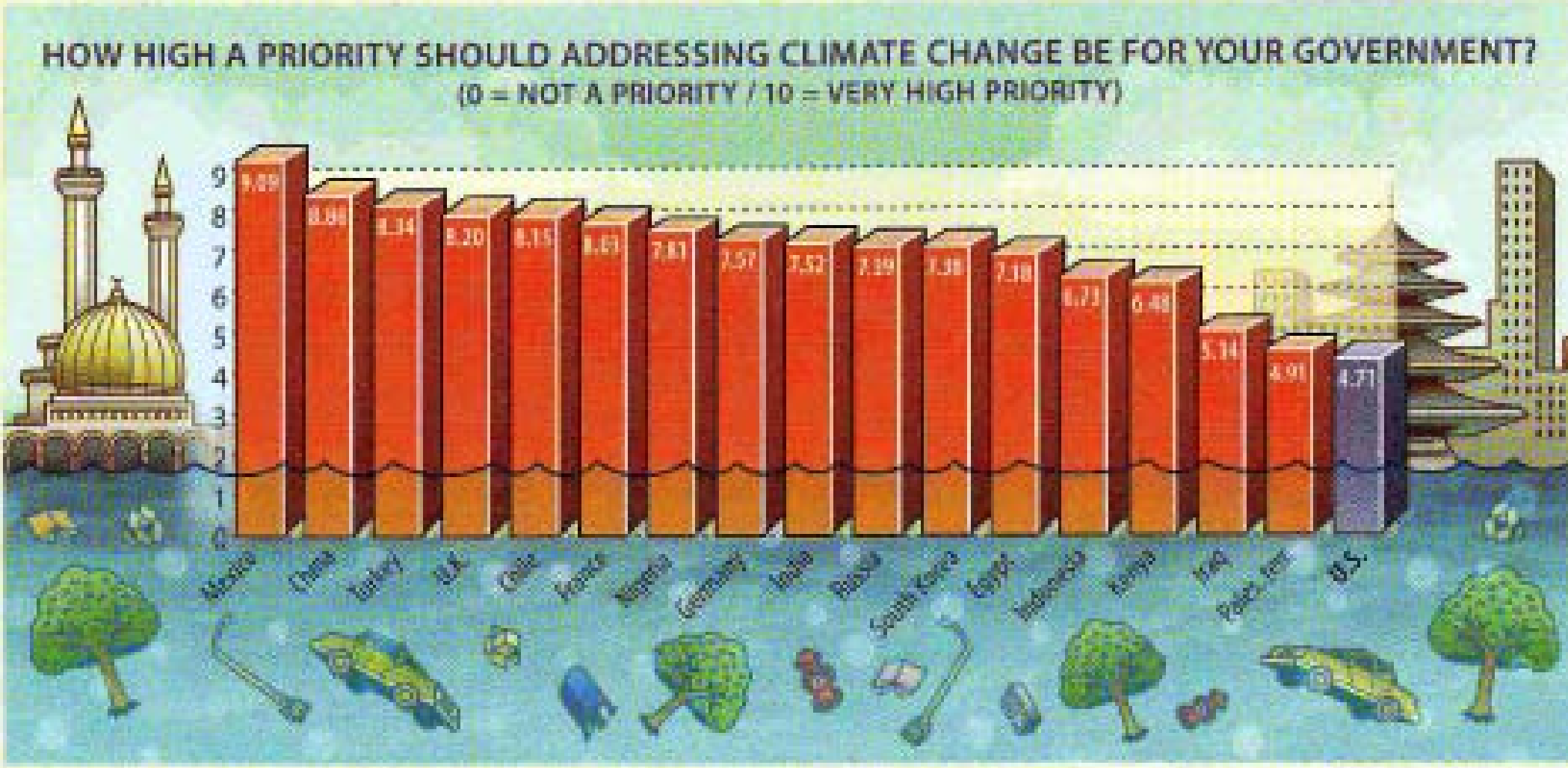
WHAT, US WORRY?

U.S. representatives to the United Nations climate-change conference in Copenhagen may want to go incognito. It now appears unlikely that the Senate will pass a strong climate-protection bill in time for the pivotal December summit. Moreover, the slacker mentality that grips Congress extends to the general populace: A survey of 19 countries by the University of Maryland's Program on International Policy Attitudes finds that Americans rank dead last when it comes to backing action on climate change. Most other nations show strong popular support for tough government action. Despite Britain's already substantial efforts, 77 percent of Britons think their government should do even more. At the opposite end of the spectrum, only the residents of the Palestinian territories and Iraq are as lackadaisical as us. —Paul Raube



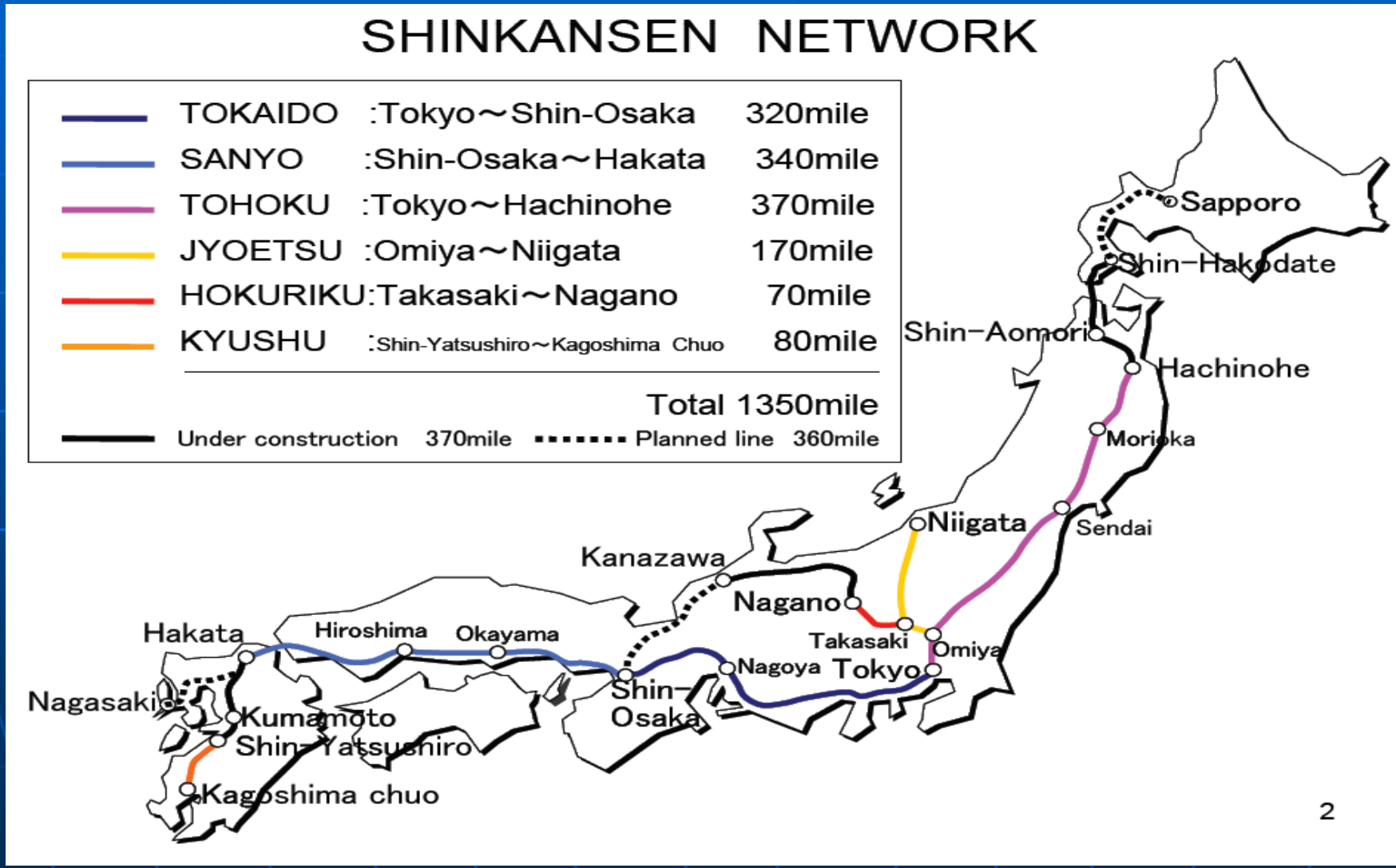
High Speed Rail System in Asian Countries

- Korea: KTX
- Japan : Shinkansen
- Taiwan: HSR 700T
- China: CRH Systems

High Speed Rail in Japan
Shinkansen System

- Opened in 1964
- Total Service Mileage: 1,350 miles
- Operated by 4 Japan Railway Companies
- Total Fleet approx. 4,000 cars
- Max. 12 Trains during peak hour
- Up to 350 km/h operation

High Speed Rail in Japan
Route Map



High Speed Rail in Japan
New Train set N700 Series

High Speed Rail in Korea
KTX

- Korean High Speed Rail:

- Between Seoul and Busan
  - TGV based design.
  - Total 46 train sets:
    - 12 trains by Alstom
    - 34 trains by Hyundai-Rotem
    - Max Speed: 300 km/h


Seoul
Chonan
Taejon
Taegu
Kyongju
Pusan
Korea

High Speed Rail in Taiwan

- Opened: January 5, 2007
- Total length: 345 km
- Max Speed: 300+ km/h
- 12 car trains, total 30 train sets

High Speed Rail in Taiwan
Route Map

Created by Mineta Transportation Institute

High Speed Rail in Taiwan
HSR 700T Series

Created by Mineta Transportation Institute

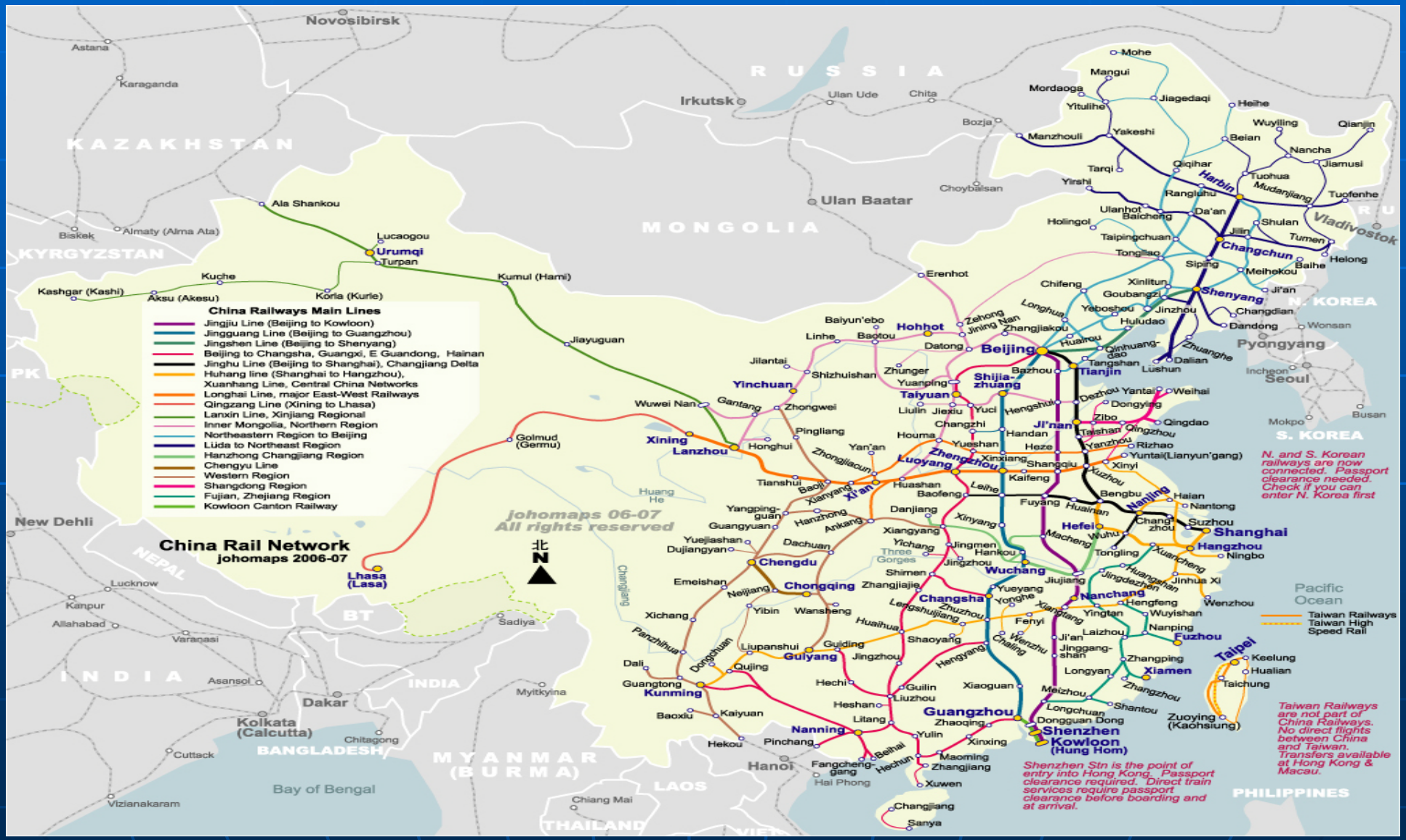
High Speed Rail in China

- Mid to Long Range Rail Transportation Improvement Plan is on-going.

  200 – 250 km/h Lines: 11,000 km, mostly dedicated for passenger, some freight.

  360 km/h Lines: 13,000 km, dedicated for passenger services

High Speed Rail in China Route Map



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Harbin
Shenyang
Beijing
Tianjin
Jinan
Xian
Zhengzhou
Xuzhou
Nanjing
Shanghai
Wuhan
Changsha
Zhuzhou
Taipei
Kaohsiung
Guangzhou
Shenzen
China

European HSR

Major players:

- Spain
- France
- Germany
- Italy

Other countries with HSR:

- Holland
- Belgium
- England

Units:	200 kph	-	125 mph
	250 kph	-	155 mph
	300 kph	-	186 mph
	350 kph	-	217 mph


Oulu
Tampere
Oslo
Turku
Helsinki
St Petersburg
Stockholm
Tallin
Göteborg
Riga
Glasgow
Edinburgh
Kobenhavn
Gdansk
Vilnius
Moskva
Dublin
Hamburg
Minsk
Amsterdam
Berlin
Hannover
Poznan
Warszawa
Bristol
London
Brux
Köln
Praha
Katowice
Krakow
Kiev
Lux
Ffft
Nürnberg
Paris
Strasbg
Wien
Bratislava
München
Budapest
Nantes
Zürich
Krakow
Chisinau
Ljubljana
Lyon
Milano
Zagreb
Bordeaux
Torino
Bologna
Beograd
Sarajevo
Bucuresti
Coruña
Vitoria
Toulouse
Nice
Sofia
Vigo
Marseille
Pristina
Podgorica
Zaragoza
Skopje
Roma
Tirana
Istanbul
Porto
Valladolid
Barcelona
Madrid
Napoli
Thessaloniki
Ankara
Sivas
Bursa
Valencia
Lisboa
Sevilla
Alicante
Izmir
Konya
Kayseri
Malaga
Athinai

Europe 2025

RENFE Spain

1st HSR 1992

- **Lines built :**

	Distance	Trip time	old alignment
• Madrid - Seville:	472 km	2hr 15min	6 hr
• Madrid - Barcelona:	635 km	2hr 38min	7 hr
• Madrid – Valladolid:	180 km	1hr	
• Cordoba - Malaga:	170 km	1hr	

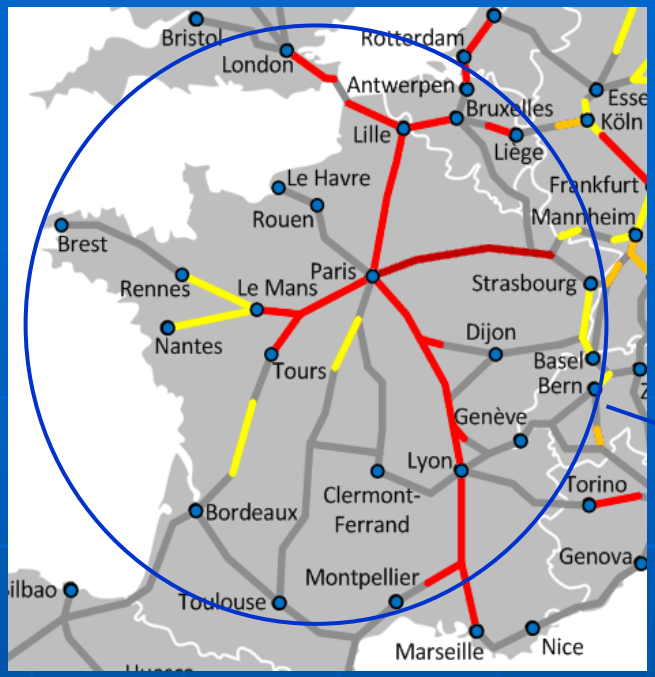
- **Under construction**
  - Barcelona Perpignan (French border) 340 km

Spain: Rolling Stock for >= 300 kph

AVE S 100 →

← AVE S 102

AVE S 103
(ICE-3) →



SNCF France

1st HSR 1981

Approximately 3 hrs travel time

	Distance	Trip time	old
Lines built : alignment			
• Paris - Lyon:	427 km	2hr	3hr 50min
• Paris - Tours:	282 km	1hr 10min	2hr 15min
• Paris - Calais:	329 km	1hr 30min	3hr
• Lyon - Marseille:	251 km	1hr 40min	3hr
• Paris - Metz:	300 km	1hr 25min	2hr 45min
• Paris - London:	(480 km)	2hr 15min	6hr 30min
• London – Bruxelles	(~350 km)	2hr	5hr
Under construction			
• Dijon – Mulhouse	425km	(2012)	
• Metz – Strasbourg	96 km	(2014)	
• Tours – Bordeaux	303 km	(2015)	

France: Speed records

- **Long distance**: 1067 km in 3hr 29min → average speed 305 kph! (TGV Réseau: Calais to Marseille May 26; 2001)
- **Top speed:** 574.8 kph (April 3rd; 2007)

Train-Consist:

•Two TGV-EST locomotives and two powered Jacobs bogies (AGV).

•12 powered axles of 16 total

•Total power 20 MW!

Next Generation TGV = AGV

- Major differences:
  - Distributed power (EMU rather than locomotive design)
  - Powered Jacobs-Bogie
  - Reduced axle load
  - Permanent magnet motors (synchronous motors)
  - Improved aero-dynamics
  - More passenger space (no locomotive)

DB Germany

1st HSR 1991

Most HSR lines are operated at 250 kph

Only lines with max speed 300 kph are listed here

- **Lines built :**
  - Frankfurt - Köln: 177 km
  - Ingolstadt - Nürnberg: 89 km
- **Under construction**
  - Ebensfeld – Erfurt: 122 km
  - München-Leibzig-Berlin planned opening 2017

Germany: Rolling Stock

Type	Design	Vmax	Trains	In Service
ICE-1	Siemens	280 kph	60	1982
ICE-2	Siemens	280 kph	44	1989
ICE-3	Siemens	330 kph	72	2000

ICE-2

ICE-3

FS Italy

1st HSR 2005 (300kph)

Italy has an extensive alignment of 200+ kph. It had trains running at 200 to 250 kph starting in the 1970ies.

Lines built :	**Distance**	**Trip time**	**note**
• Roma - Napoli:	200 km	1hr 30min	25 kV
• Turin - Novara:	84 km		25 kV
• Milano – Treviglio:	24 km		3 kVdc
• Padua - Mestre:	24 km		3 kVdc

- **Under construction**
  - Milano - Bologna - Firenze

Italy: Rolling Stock

Type	Design	Vmax	Trains	In Service
ETR 500 (P)	Ansaldo/Bombardier	300 kph	60	1982

Congressionally Designated Steel Wheel on Rail Systems

System	Total Cost
New York (Empire)	$1.5
Pennsylvania (Keystone)	$1.3
New England Rail	$2.8
Southeast High Speed Rail	$4.9
South Central Corridor	$2.9
Florida High Speed Rail	$14.4
Midwest Regional Rail	$8.6
Ohio-Cleveland Hub	$3.9
California High Speed Rail	$33.0
Pacific Northwest	$2.4
Gulf Coast	$5.2
Total Costs	$80.9

(All costs in 2007$ Billions)

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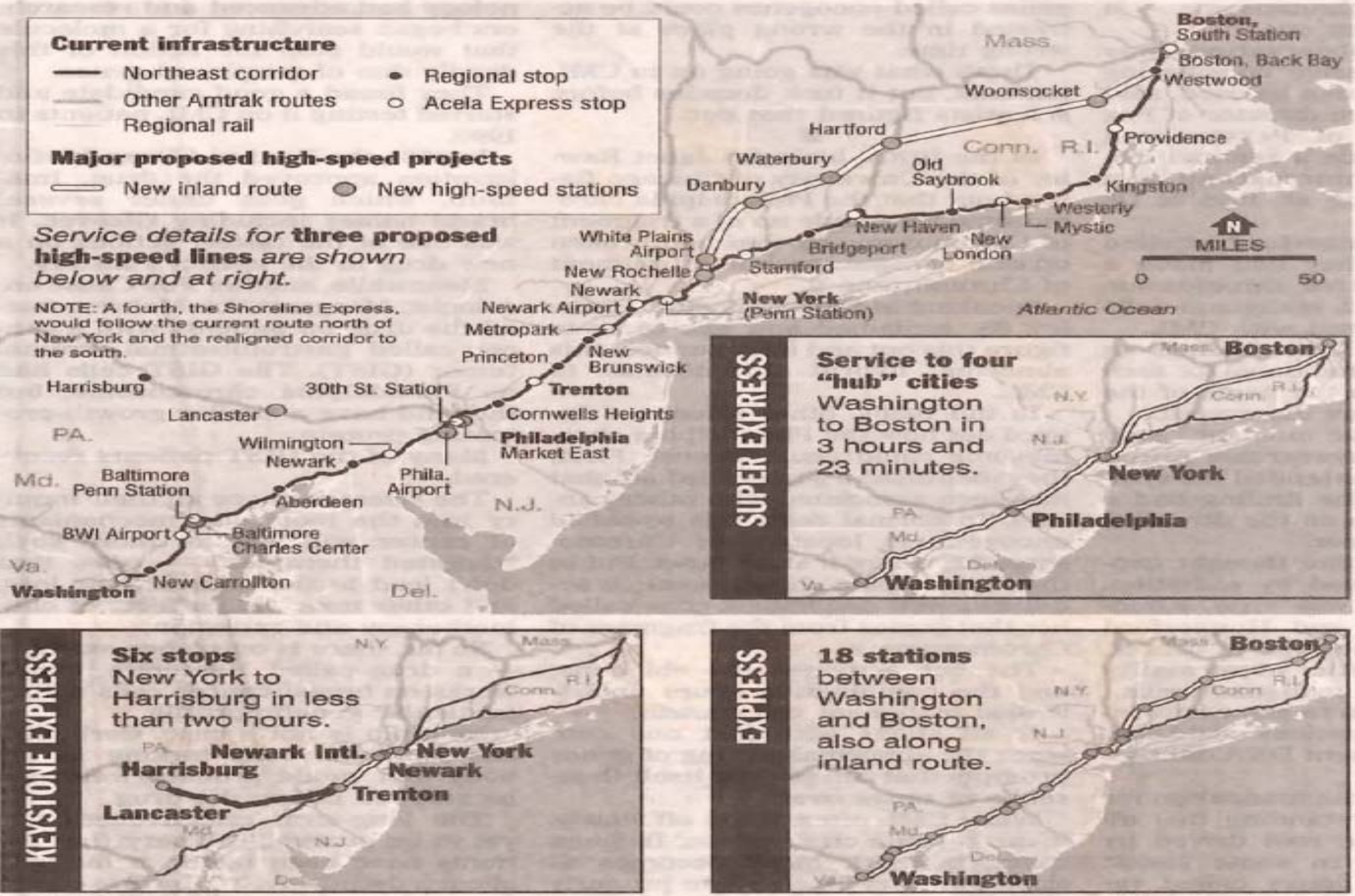
Intermediate and High Speed Rail Corridor Designations

Created by Mineta Transportation Institute

Amtrak's High-Speed Plan for the Northeast Corridor

On Tuesday, Amtrak detailed a plan for bringing high-speed rail service to the Northeast Corridor by 2040. The plan calls for dedicated high-speed tracks along the entire corridor, as well as a new inland route north of New York. The cost would be about $117 billion.



SOURCE: Amtrak

JOHN TIERNO / Staff Artist

California High-Speed Rail Authority

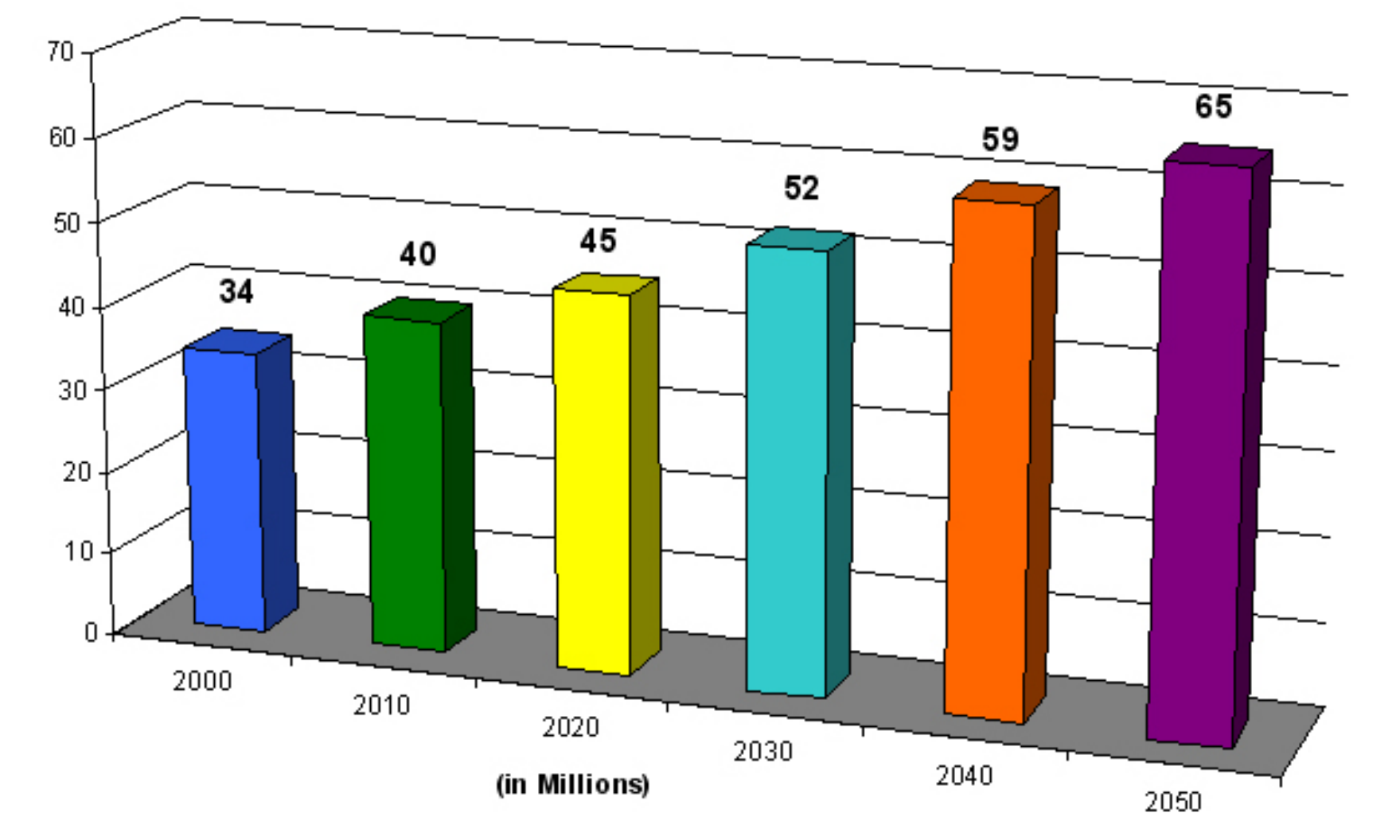
- Authorized by legislation in 1996
- Nine-member authority board - five appointed by Governor, two by State Senate, two by State Assembly
- Budget expended in state/federal funds to date, $400+M
- Program level Environmental Clearance certified on July 9, 2008

CHSRA 2009 Fiscal Summary

- Business plans by Charles River Associates, 2001, studied again by Cambridge Systematics, 2008
- Expected performance, at $55 per direction, of the starter line from Anaheim via Los Angeles, the Central Valley, Gilroy, San Jose, to San Francisco:
  - Completion – 2018-2020
  - Ridership – 45 to 55 million per year
  - Gross revenue - $2.4B
  - Net after O and M - $1.1B

- Design, construction and rolling stock (year of construction values)
  - Federal - $17 to $19B
  - State - $9 B
  - Public/private partnership - $10 to $12B
  - Local cost sharing - $4 to $5 B

California's Existing & Projected Population



Sources: 1990 and 2000 - U.S. Census Bureau; Projections - CA Dept. of Finance

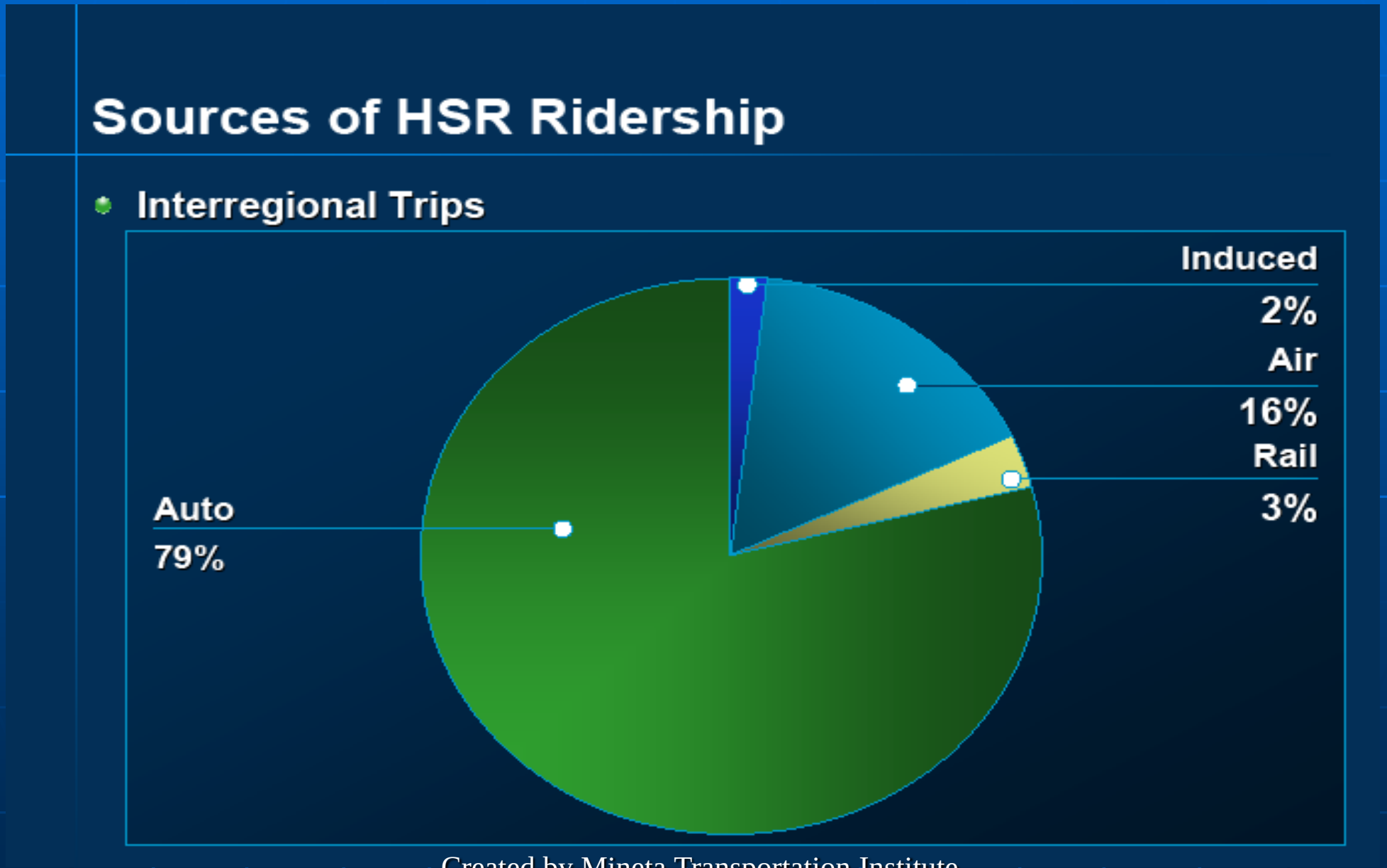
HIGH-SPEED TRAIN TRAVEL TIMES

- High-speed trains will provide Californians with safe, predictable, consistent and competitive region-to-region transportation.

Travel Time (Hrs:Min)									
	Los Angeles	San Francisco	San Jose	San Diego	Sacramento	Fresno	Bakersfield	Riverside	Anaheim
Los Angeles	N/A	2:38	2:09	1:18	2:11	1:24	0:54	0:33	0:20
San Francisco	2:38	N/A	0:30	3:56	1:06	1:20	1:51	3:10	2:57
San Jose	2:09	0:30	N/A	3:27	0:52	0:51	1:21	2:41	2:28
San Diego	1:18	3:56	3:27	N/A	3:29	2:42	2:12	0:48	N/A
Sacramento	2:11	1:06	0:52	3:29	N/A	0:53	1:23	2:43	2:37
Fresno	1:24	1:20	0:51	2:42	0:53	N/A	0:37	1:56	1:43
Bakersfield	0:54	1:51	1:21	2:12	1:23	0:37	N/A	1:26	1:13
Riverside	0:33	3:10	2:41	0:48	2:43	1:56	1:26	N/A	N/A
Anaheim	0:20	2:57	2:28	N/A	2:37	1:43	1:13	N/A	N/A

Optimal Express Trip Times between City Pairs (220 mph [350 kph] maximum speed)

Sources of HSR Ridership
(Interregional Trips)



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California's 2050 population estimated at 60M+ Alternatives to meet that need:

Key variables	**Highway/Airport Alternatives:** **3,000 added lanes/miles of freeway and 2 new international airports**	**California High Speed Rail Alternative:** **790 miles of California High Speed Rail**
Cost	$100 Billion	$40 Billion
Capacity beyond 2050	None	Adequate until 2100
Energy	22 million barrels of petroleum per year more than HSR	Electric power: 1/5 the energy of a car, 1/3 energy of a plane per seat/mile
Pollution	Creates 18 billion more pounds per year of CO_2 than HSR	Base Case
Safety	43,000 people killed and hundreds of thousands injured on US highways in 2007	No fatalities in 45 years of Japanese Shenkansen and more than 25 years of French TGV

ECONOMIC BENEFITS

Like past major infrastructure projects – California's water, university and highway systems – the high-speed train system would be an economic stimulant and smart investment in California's infrastructure.

- Creating 160,000 construction-related jobs lasting decades.
- High-speed trains improve California's economy, resulting in an additional 450,000 new permanent jobs by 2035.
- Cost benefit analysis based upon "investment grade" ridership forecasts concluded that the high-speed train system benefits would be more than two times its cost.

California High-Speed Train Project

FLY CALIFORNIA
Without ever leaving the ground.

790 Miles Long

26 Stations

150 Miles of Bridges, Viaducts, and Elevated Structures





35 Miles of Tunnels

610 Grade Separations

510,000 Square Yards of Retaining Walls

110 Power Supply, Switching and Paralleling Sub-Stations

STATISTICS
Statistics

California High-Speed Train Project

FLYCALIFORNIA
Without ever leaving the ground.

215 Million Cubic Yards of Earthwork

9.2 Million Cubic Yards of Concrete

4.5 Million Tons of Steel

1,600 Miles of Track

2,400 Miles of Electrical and Communication Cables

126,000 Construction Jobs

14,000 Operations and Maintenance Jobs

32,000 Engineering and Management Jobs

STATISTICS

Statistics

Anaheim, CA

Fresno, CA

Program Management

Dominic Spaethling

Altamont

Brent Ogden, AECOM

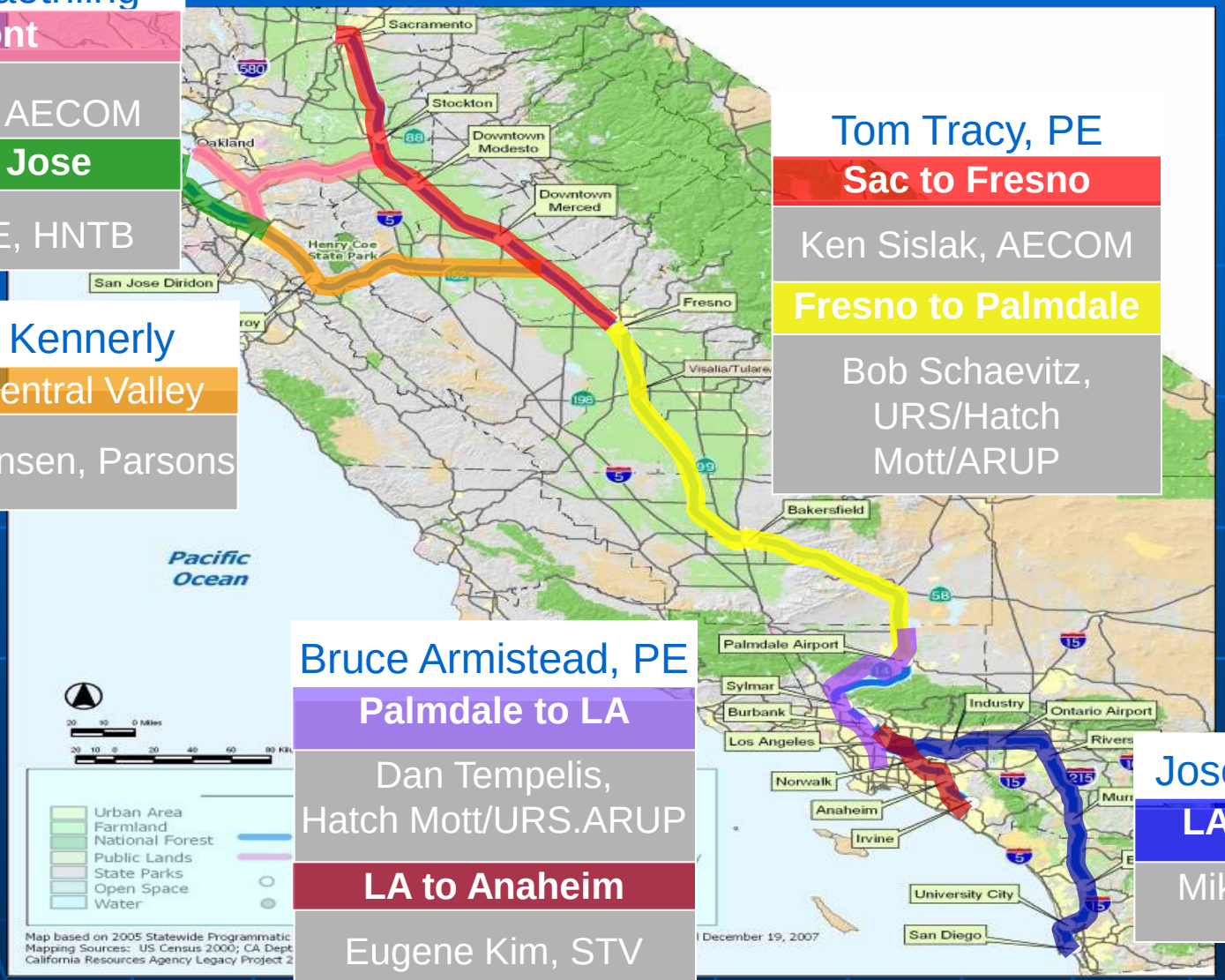
SF to San Jose

Tim Cobb, PE, HNTB

Gary Kennerly

SJ to Central Valley

Dave Mansen, Parsons



Tom Tracy, PE

Sac to Fresno

Ken Sislak, AECOM

Fresno to Palmdale

Bob Schaevitz, URS/Hatch Mott/ARUP

Bruce Armistead, PE

Palmdale to LA

Dan Tempelis, Hatch Mott/URS.ARUP

LA to Anaheim

Eugene Kim, STV

Jose Martinez, PE

LA to San Diego

Mike Zdon, HNTB

Environmental Milestones Schedule - February 2011

	Assigned Weight	5%		15%		5%		12%		13%	33%	5%		10%	2%	100%	
Section/Activity	Plan Feb 11 / Actual/PMT plan % complete	Scoping Report	Board Briefing to Approve Release of the AA Report	Release Preliminary AA Report	Board Briefing to Approve Supplemental AA Report	Release Supplemental AA Report	Checkpoint A	Technical Reports	Checkpoint B	Admin Draft EIR/EIS	15% Design	Draft EIR/EIS	Checkpoint C	Final EIR/EIS	NOD/ROD	Percent Complete Toward NOD/ROD	30% Design
San Francisco - San Jose	Plan	May '09	Apr. 8, 2010	Apr. '10	Jul. 1, 2010	Jul. '10		Sept. '10		Sept. '10	Dec. '10	Dec. '10		July '11	Sept. ' 11		Sept. '11
	Actual / PMT plan Feb 11	Mar. 10 A	Apr. 8, 10 A	Apr. '10 A	Aug. 5, '10 A	Aug. '10 A	May-11	Jun-12	Sep-11	Aug-12	Mar-12	Oct-12	Dec-12	Mar-13	Jun-13		Feb-14
	% Complete	100%		100%		100%		90%		98%	93%	0%		0%	0%	79%	0%
San Jose - Merced	Plan	Oct. '09	May. 6, 2010	May '10	Aug. 5, 2010	Aug. '10		Apr. '11		Apr. '11	Dec '10	Jul '11		Feb. '12	Apr. '12		Mar. '12
	Actual / PMT plan Feb 11	Mar. '10 A	Jun. 3, 2010	June '10 A		Jun-11	May-11	Jul-11	Oct-11	Sep-11	Jun-11	Jan-12	May-12	Sep-12	Nov-12		Jul-13
	% Complete	100%		100%		70%		70%		40%	62%	0%		0%	0%	58%	0%
Merced - Fresno	Plan	Mar. '10	Apr. 8, 2010	Apr. '10	Jun. 3, 2010	June '10		Aug. '10		Aug. '10	Sept. '10	Nov. '10		June '11	Aug. '11		Aug. '11
	Actual / PMT plan Feb 11	Mar. 10 A	Apr. 8, 2010	Apr. '10 A	Aug. 5, '10 A	Aug. '10 A	Feb. 3 '11 A	Sept '10 A	May-11	Sept. '10A	Jan-11	Jun-11	Oct-11	Dec-11	Feb-12		Dec-11
	% Complete	100%		100%		100%		100%		100%	87%	75%		0%	0%	82%	0%
Fresno - Bakersfield	Plan	Mar. '10	Dec. 3, 2009	Mar. '10	Jun. 3, 2010	June '10		Sept. '10		Sept. '10	Aug. '10	Jan. '11		July '11	Sept. '11		Aug. '11
	Actual / PMT plan Feb 11	Mar. 10 A	Jun. 3, 2010	June '10 A	Sept. 10 A	Sept. '10 A	Feb. 3 '11 A		May-11	Sept. '10 A	Feb-11	Jun-11	Oct-11	Dec-11	Feb-12		Dec-11
	% Complete	100%		100%		100%		93%		100%	99%	66%		0%	0%	85%	2%
Bakersfield - Palmdale	Plan	Mar. '10	Aug. 5, 2010	Aug. '10	Oct. 7, 2010	Nov. '10		Sept. '11		Sept. '11	Nov. '11	Dec. '11		June '12	Sept. '12		Sept. '12
	Actual / PMT plan Feb 11	Mar. '10 A	Sep'10 A	Aug. '10 A	Sept'10 A	Jun-11	May-11	Jan-12	Sep-11	Mar-12	Dec-11	Jun-12	Oct-12	Feb-13	Apr-13		Dec-13
	% Complete	100%		100%		16%		6%		1%	30%	0%		0%	0%	33%	0%
Palmdale - Los Angeles	Plan	June '09	May. 6, 2010	May '10	Aug. 5, 2010	Aug. '10		Oct. '10		Oct. '10	Oct. '10	Jan. '11		Aug. '11	Oct. '11		June '12
	Actual / PMT plan Feb 11	Mar. 10 A	Jul. 8 '10 A	Jul. '10 A		Mar-11	May-11	Nov-11	Sep-11	Dec-11	Oct-11	Mar-12	Jul-12	Oct-12	Jan-13		Sep-13
	% Complete	100%		100%		90%		63%		60%	81%	0%		0%	0%	67%	0%
Los Angeles - Anaheim	Plan	Aug. '09	Not	Apr. 24, 2009	Jun. 3, 2010	June '10		Sept. '10		Sept. '10	Aug '10	Jan. '11		July '11	Sept. '11		July '11
	Actual / PMT plan Feb 11	Mar. 10 A	Applicable	Apr. 24, 09 A	Jul. 8, '10 A	July '10 A	May-11	Jul-12	Sep-11	Sep-12	Jun-12	Nov-12	Mar-13	Jun-13	Sep-13		May-14
	% Complete	100%		100%		100%		85%		90%	93%	0%		0%	0%	78%	0%
Los Angeles - San Diego	Plan	June '10	Jul'10	Jul. '10	Jan. 6, 2011	Jan. '11		Aug. '12		Aug. '12	Aug. '12	Feb. '13		Sept. '14	Dec. '14		Sept. '14
	Actual / PMT plan Feb 11	June '10 A															
	% Complete	100%		90%		0%		0%		0%	0%	0%		0%	0%	19%	0%
Merced - Sacramento	Plan	Feb. '10	Feb. 3, 2011	Feb. '11	May. 5, 2011	May '11		Sept. '11		Sept. '11	Oct. '11	Jan. '12		Nov. '12	Mar. '13		Nov. '12
	Actual / PMT plan Feb 11	Apr. '10 A															
	% Complete	100%		20%		19%		0%		0%	0%	0%		0%	0%	9%	0%
Altamont Corridor	Plan	Feb. '10	Nov. 4, 2010	Dec. '10	Mar. 3, 2011	Mar. '11		Nov. '11		Nov. '11	Dec. '11	Mar. '12		Sept. '12	Dec. '12		Nov. '12
	Actual / PMT plan Feb 11	Mar. 10 A															
	% Complete	100%		95%		0%		0%		0%	2%	0%		0%	0%	20%	0%

Blue text = Actual dates

Red text indicates a date change from last months MPR

"PMT Plan Feb 11 dates" reflect target dates agreed between the Authority and PMT based on working agreements with environmental review and approval agencies

Phase 2 Sections will be rescheduled over the next few months

Contact Information

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