Passenger Rail in California and What We Can Learn from the NEC

Al Engel

Vice President, High Speed Rail

Presented at:

Confernce on;

" Realizing the Vision of a High Speed Rail System in California"

University of California, Center for Environmental

Public Policy

UC Berkeley

May 2, 2011

Basic facts about Amtrak

- **Chartered by Congress as national intercity passenger railroad; opened for business on May 1, 1971**
- **20,000 employees operate a 21,100 mile system**
- 60% of trains operate at top speeds in excess of 90 mph (145 kph)
- **The *Acela Express* is the fastest train in North America**
  - **Top speed of 150 mph (241kph)**
  - **Recovers 169% of operating expense**
- **Amtrak covers about 76% of operating costs with ticket revenue; total revenue covers 85% of operating costs**

Amtrak services

Northeast Corridor (NEC)

- 150 mph *Acela* and 125 mph Regional services
- Links New York, Boston, and Washington (electrified)
- 457 mi route, 153 of 308 daily Amtrak trains operate on some portion of the NEC
- Positive train control system in use

Short distance trains/corridors (86-750 mi)

- Services range from 59 mph operations in unsignaled territory up to 110 mph w/automatic train stop and/or cab signals
- 2-32 daily trains, depending on route (most diesel)
- 15 states provide operating support for Amtrak services

Long Distance Trains (up to 2,438 mi)

- Fifteen trains, most daily (two tri-weekly trains)
- Most include sleeping and dining car service
- 1 train in each direction, diesel-powered for most or all of route

Amtrak California

- Amtrak operates approximately 70 daily intercity trains in California
  - Capitol Corridor
  - Pacific Surfliner
  - San Joaquin
- Amtrak California (Amtrak-branded) bus service
  - 14 Contractors
  - 22 Routes
  - 230+ Daily Schedules
- Already a vigorous, healthy transportation system
  - *Surfliner* carries more passengers than *Acela* during some summer months
  - Will provide vital connectivity for the high speed rail system

Amtrak's Intercity Presence in California

- Amtrak operates three corridor routes in partnership with Caltrans:

		Ridership		Revenue		On Time Performance	
Route Name	Endpoints	FY09	FY10	FY09	FY10	FY09	FY10
Pacific Surfliner 350 miles	San Luis Obispo – Los Angeles – San Diego	2.59 million	2.61 million	$46.5 million	$49.5 million	84.5%	74.8%
Capitol Corridor 168 miles	Auburn – Sacramento – San Jose	1.59 million	1.58 million	$22.1 million	$22.8 million	93.6%	97.8%
San Joaquin 415 miles	Bakersfield – Sacramento/Oakland	929,000	977,000	$27.8 million	$31.3 million	85.6%	92.5%

Caltrans provides bulk of operating support; has funded the majority of the capital improvements, and manages connecting buses and marketing.

Results: CA home to 2nd, 3rd & 6th busiest Amtrak routes nationwide, and it has the highest Amtrak usage of any state in the country!

San Diego

Suisun- Fairfield

Amtrak's Intercity Presence in California

- Amtrak Operates four long distance routes in California: the Coast Starlight (Los Angeles – Seattle), the California Zephyr (Emeryville – Chicago), the Southwest Chief (Los Angeles – Chicago), and the Sunset Limited (Los Angeles – New Orleans).

- California has the most extensive network of Amtrak Thruway buses in the country, with 27 routes feeding passengers to rail stations around the state.
  - Of those routes, 10 serve the central valley, including:
    - Route 1a Bakersfield – San Diego
    - Route 1b, Bakersfield – LA – San Pedro
    - Route 9 Bakersfield – Las Vegas
    - Route 18b Hanford – Visalia

Amtrak's Intercity Presence in California by Station

- Amtrak's California stations had high ridership numbers in FY10
- Los Angeles, Sacramento, and San Diego are the 5th, 7th, and 11th busiest Amtrak stations nationally.

Los Angeles Union Station

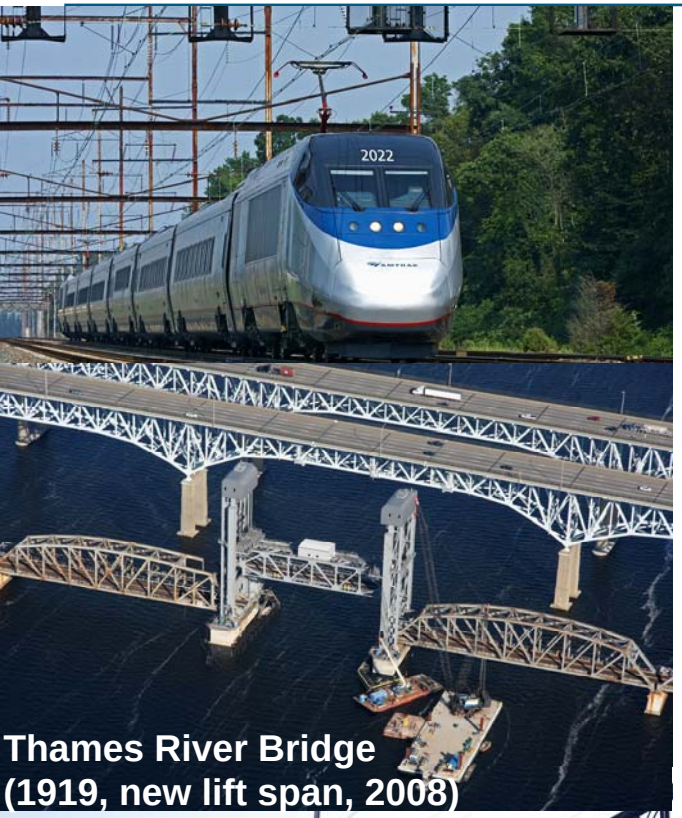
Station	FY10 Ridership (boardings and alightings)
Los Angeles	1,517,342
Sacramento	1,107,220
San Diego	715,043
Irvine	630,190
Emeryville	529,965
Bakersfield	413,172
Fullerton	411,489
Martinez	410,968
Davis	409,611
Solana Beach	408,060
State Grand Total	11,226,636

California's 10 busiest stations and the state total

....there are some real opportunities for HSR development

- **California**
  - **Strong public support; Prop 1A**
  - **CA received $3.77B in HSIPR grants**
  - **Demographics compare well with successful corridors**
- **Midwest**
  - **Several routes have excellent potential**
  - **Work going ahead on upgrading Chicago-St. Louis corridor to 110mph**
- **Northeast Corridor (NEC), Tier 1 earliest completion 2014**
  - **Amtrak "Vision" study Phase II underway**
  - **Philadelphia – New York initial operable segment (2022) continues to be detailed**
  - **Business Plan & Financing Study to be launched by July 2011**

Amtrak's Northeast Corridor (NEC) – what is it?



Thames River Bridge
(1919, new lift span, 2008)

Canton Viaduct (1835)

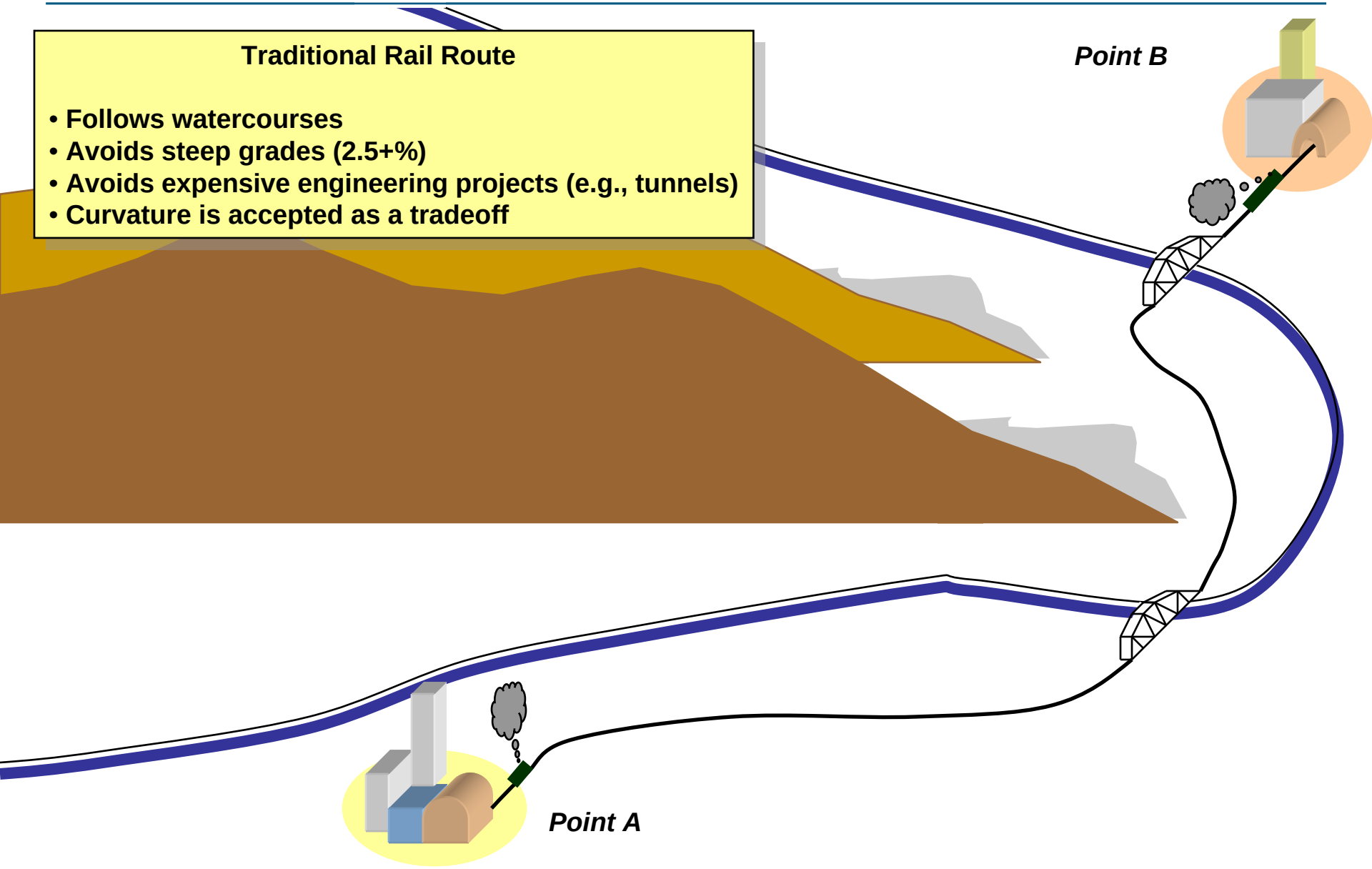
- 457 mile electrified rail connection linking Washington, New York, and Boston
  - 363 miles Amtrak-owned
  - Carries more than 2,300 daily trains (about 153 of them Amtrak trains
  - Maximum speeds
    - 150mph north of New York
    - 135mph south of New York
- The NEC was developed by Amtrak atop an existing rail route, taken over in 1976
  - Route dates in places to the 1830s
  - Was badly deteriorated when Amtrak took over
  - Series of rehabilitation programs transformed the South End in the 1970s-80s, North End in the 1990s

Developing the NEC

The Northeast Corridor - Yesterday and Today		
	Pre-Amtrak (1976)	Today
Amtrak passenger-miles	1.08 billion	1.7 billion
North End top speed	90 mph	150 mph
South End top speed	110 mph	135 mph
Total daily passenger trains	1,199	1,999
Amtrak share of train mileage	69.3%	57.9%
Commuter share of train mileage	30.7%	42.1%
Best DC-NYC trip time	2:59	2:42
Best Boston-NYC trip time	4:24	3:25
Electrified segments	DC-New Haven	Whole route

- Improvement programs accomplished incrementally, over a period of years
- Eventual cost of improvements totaled about $4.7B
  - $2.13B NECIP (mostly South End)
  - $2.6B NHRIP (mostly North End)
- Amtrak worked closely with the FRA during this process
  - Finding the technology to support the service was a key task
  - Standards and regulatory development proceeded in parallel
  - Learned as we went

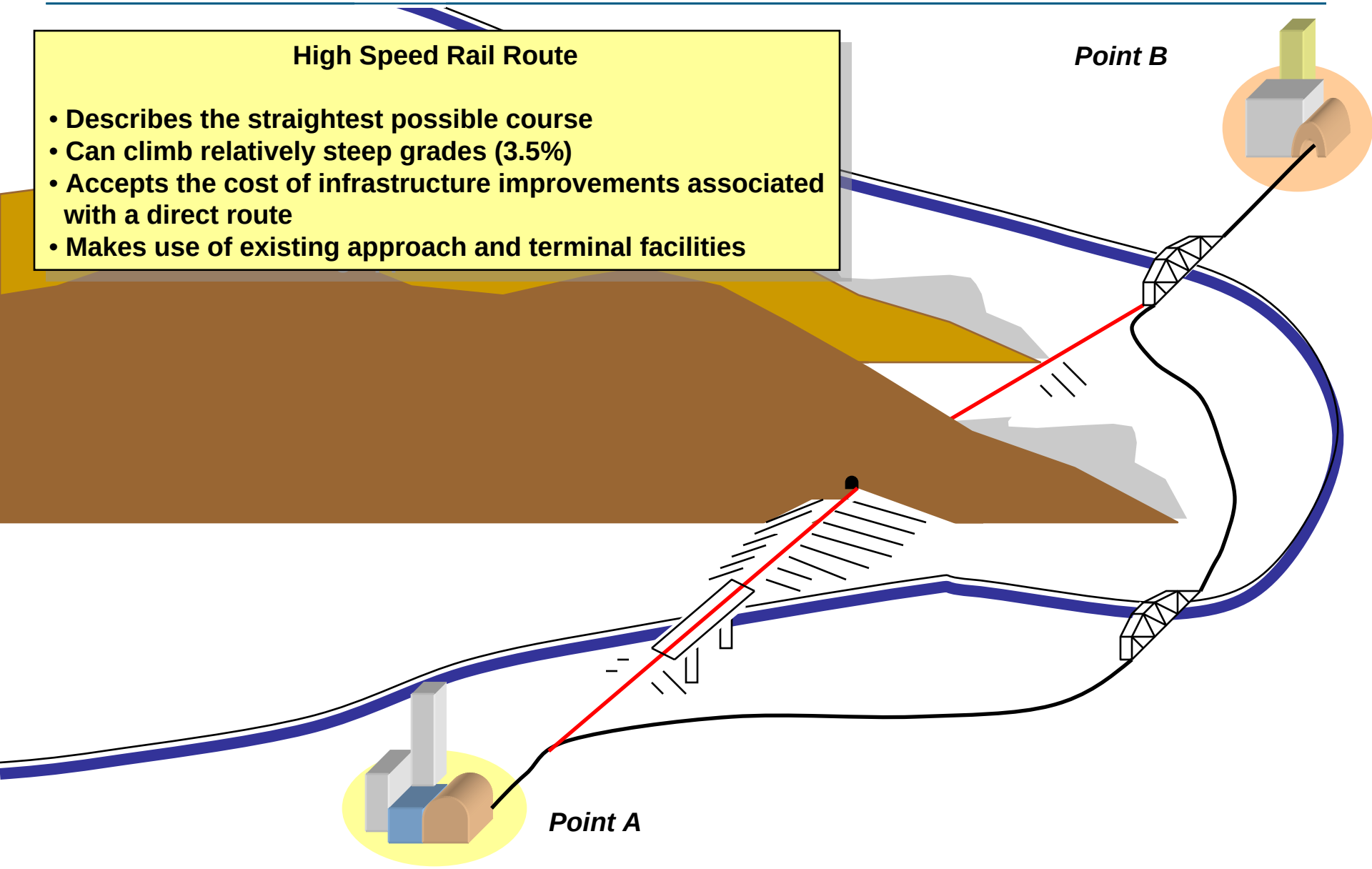
How rail service evolves



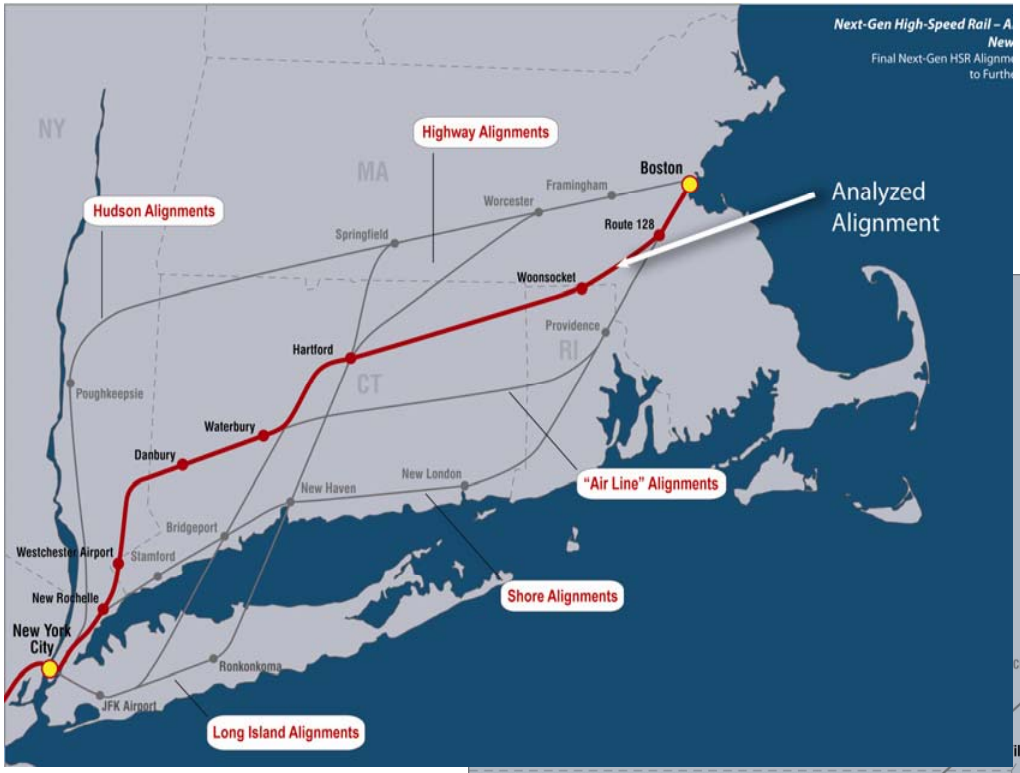
How rail service evolves

High Speed Rail Route

- **Describes the straightest possible course**
- **Can climb relatively steep grades (3.5%)**
- **Accepts the cost of infrastructure improvements associated with a direct route**
- **Makes use of existing approach and terminal facilities**



NEC Next Generation High Speed Rail



NYC – Boston Alignment

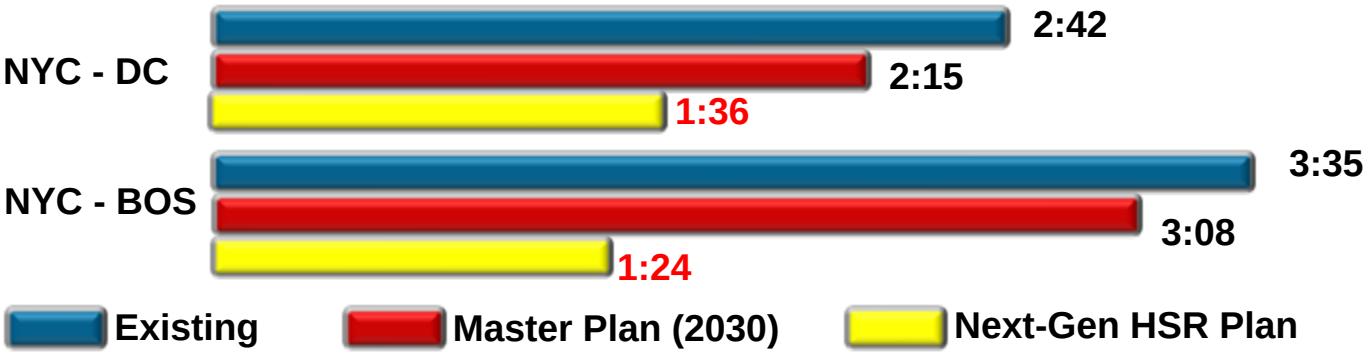
- **Diverges north of New Rochelle to serve Conn. and RI**
- **Converges with NEC alignment at Rt. 128 station in Mass.**

NYC - Washington

- **Substantially parallels NEC**
- **New stations in Baltimore and Philadelphia more centrally located**

Next-Gen High-Speed Rail : Dramatic Trip Time Reduction

- **World-Class High-Speed Network:**
  - Dedicated 2 - track alignment; 220 mph equipment
  - 40% - 60% travel-time reductions in key markets
  - Boston – Washington DC: from 6:30 to 3:20



- Higher frequency

Service Departures (Each Direction)

	Current	Next-Gen HSR
Hourly	1	3-4
Daily	10-15	53-73

- Higher average speeds

Average Speeds (Super Express)

	Current	Next-Gen HSR
NYC - BOS	104 kph	238 kph
NYC - DC	136 kph	220 kph

Amtrak is working to realize the vision of a greater NEC

Route:	Stations Served:
Super Express (4 stops)	• Boston • New York • Philadelphia • Washington (via Next-Gen alignment)
Standard Express (18 stops, A/B stop pattern)	As above, other stops will include: • Hartford • Danbury • Newark • Wilmington • Baltimore (via Next-Gen alignment)
Shoreline Express (11 stops)	Boston – New York (via NEC alignment) serving: • Providence • New Haven • Stamford Direct service to New York – Washington (via Next-Gen alignment)
Keystone Express (6 stops)	New York – Philadelphia (via Next-Gen alignment) Keystone Corridor to Harrisburg

Quantum Leap in Ridership

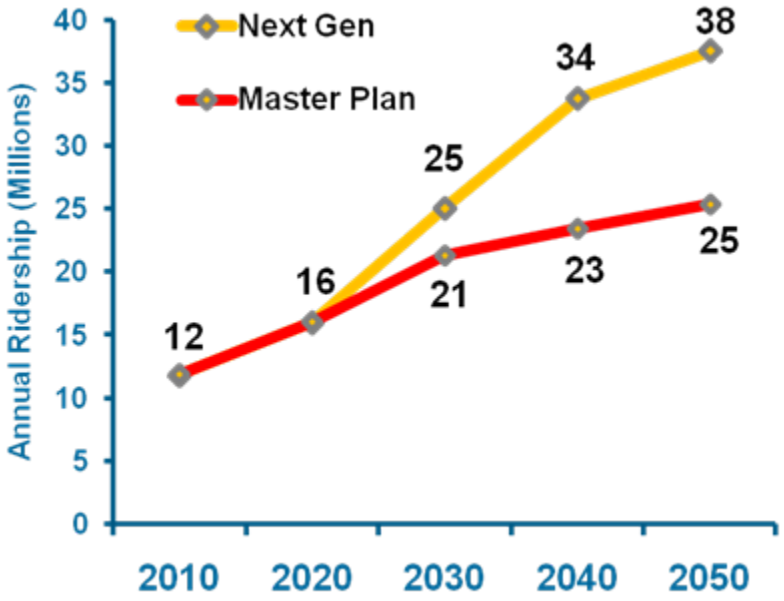
- **Huge ridership growth over Master Plan:2020 to 2040**
  - **Master Plan**:
    - 16 million to 23 million (+46%)
  - **Next-Gen HSR Plan**:
    - 16 million to **34 million (+111%)**

- **Major growth in premium service's share of NEC ridership (2040)**
- **Result: Next-Gen HSR Plan would raise revenues more than ridership**

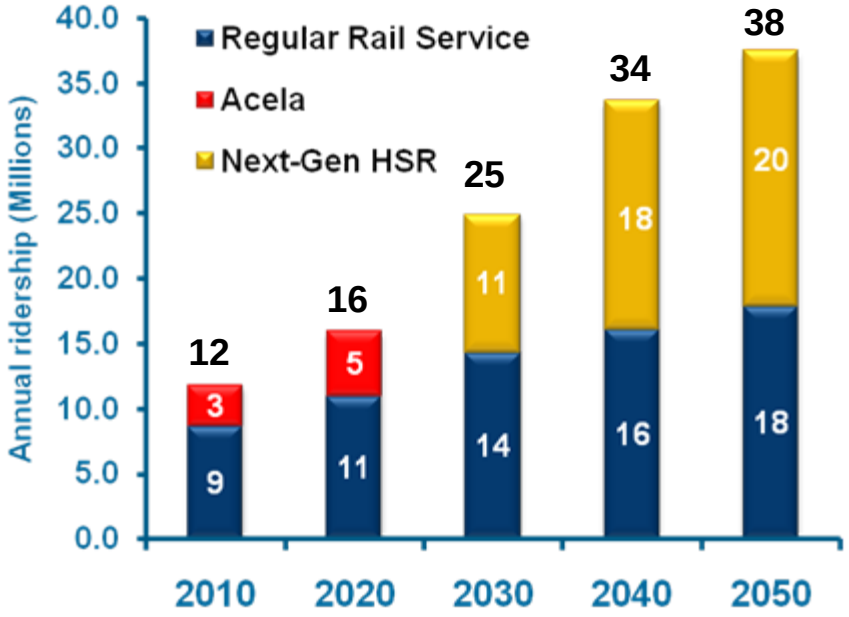
Premium Ridership (2040)

- Master Plan (Acela): 6.5 million (28%)
- Next-Gen HSR Plan: **18 million (52%)**

Next-Gen Compared to Master Plan



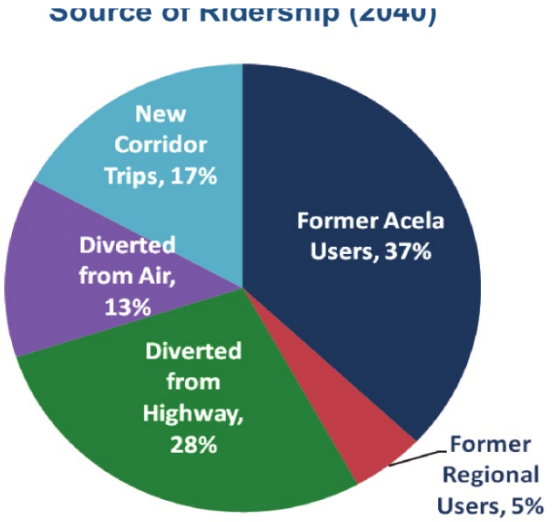
Ridership by Type of Service



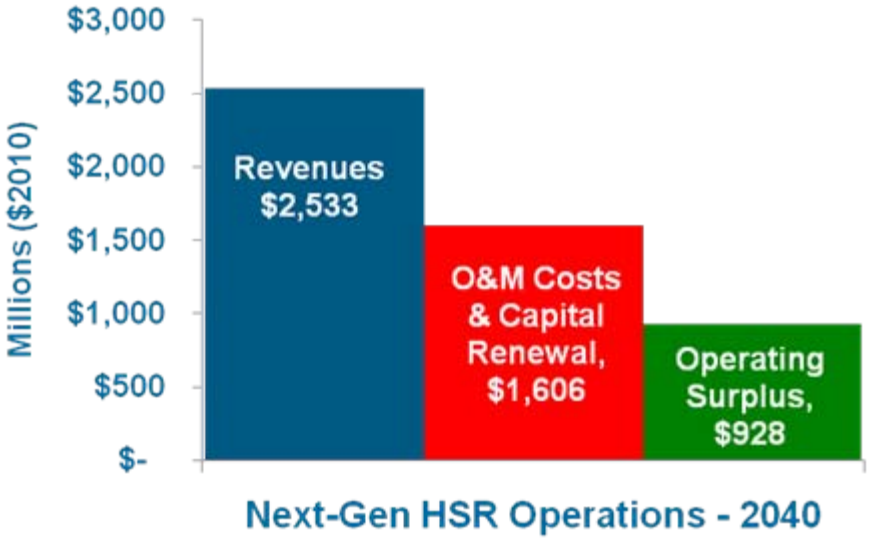
Operating Surplus Exceeds $900 Million

•Employment Opportunities:

- 44,000 full-time jobs annually over 25 years for construction
- 120,000 permanent jobs
- 7,100 new rail operations jobs



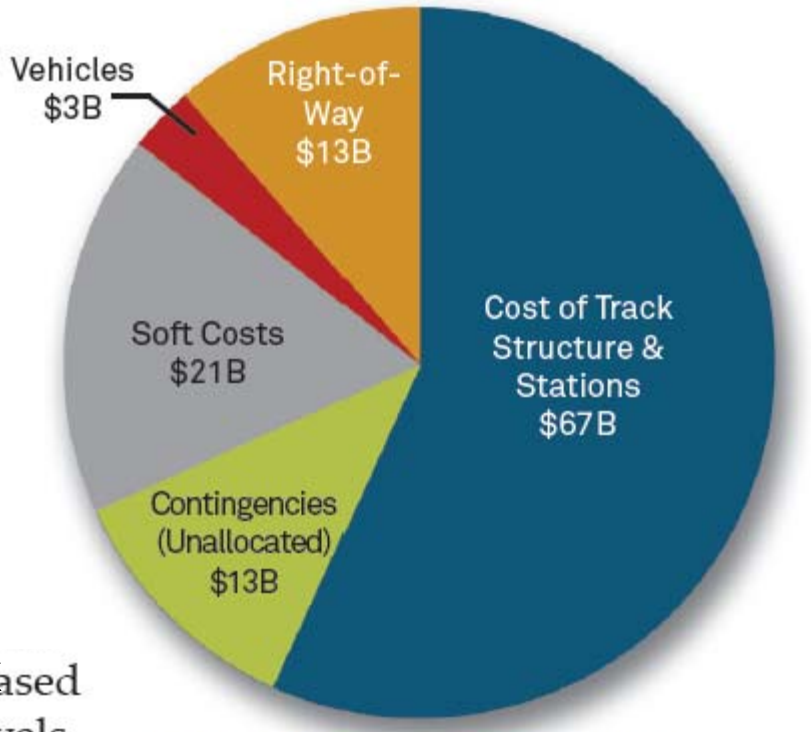
- **Next-Gen HSR operations generates $928 million annual surplus**
- **Costs include:**
  - O&M costs
  - Capital Renewal (infrastructure & rolling stock): long-term equipment & capital repair



Capital Investment Costs

- **$117 Billion (in $2010)**
  - Equivalent of $4.7 Billion annually over 25 years of construction
  - $172 million/km for infrastructure, stations, facilities
  - 55 train sets @ $51 million each

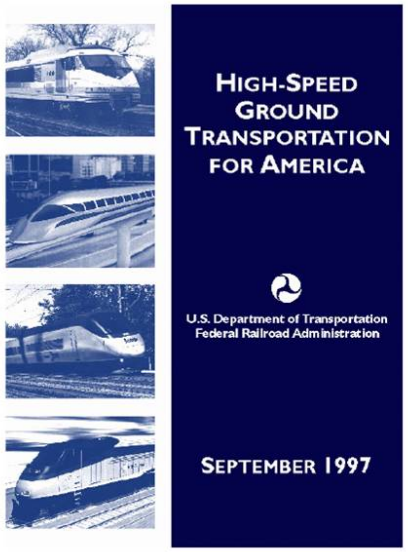
- **Phasing of Construction**
  - Four phases over the 2015 to 2040 period
  - Phases 1-3 (2015 – 2030): New York to Washington
  - Phase 4 (2024 – 2040): New York to Boston



Projected Capital Construction Costs: $117 Billion ($2010)

Positive Return On Investment

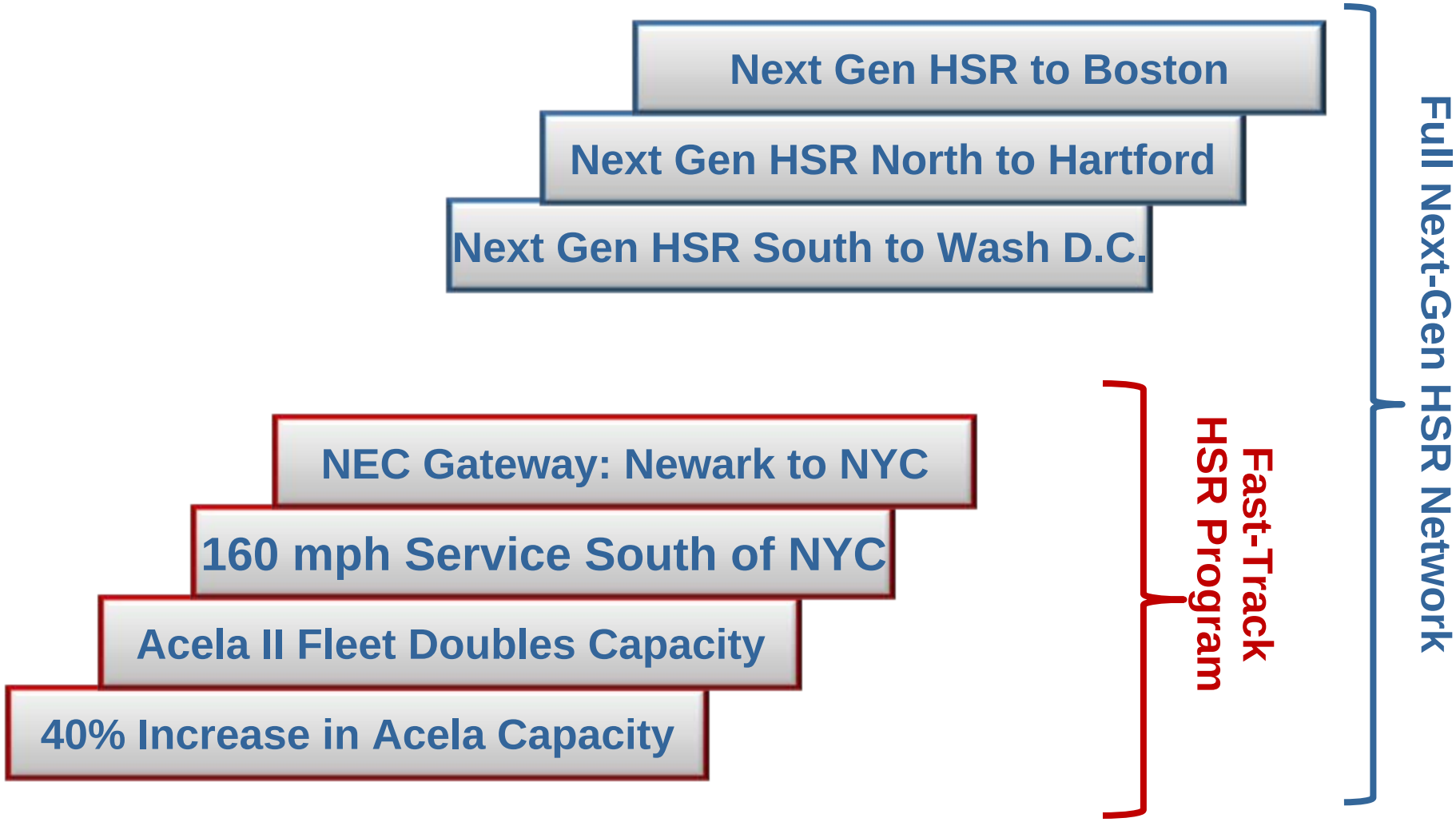
- **Next-Gen HSR system Benefits (financial, economic, social) exceed Costs by 2-to-1**
- **Even at conservative 7% discount rate reaches 1.1 B/C**
- **Similar to 1.03 B/C value for NEC HSR in FRA 1997 Study**



Benefit / Cost Ratio of Next-Gen HSR Investment

		Billions of Dollars
Project Cost	$	72.8
Credit for Residual Project Value	$	20.3
Credit for Avoidable Master Plan Costs	$	8.3
Net Project Cost	$	44.2
Benefits of Investment		
Travel Time & Costs & Safety	$	16.1
Energy and Emissions	$	1.3
Economic Productivity Benefits	$	23.8
Operating Surplus	$	11.0
Highway and Air System Benefits	$	21.6
Commuter Systems and Use Benefits	$	26.5
Total Benefits of Investment	$	100.2
Benefits / Cost Ratio		2.27

NEC Stair-Steps to Next-Gen HSR Vision

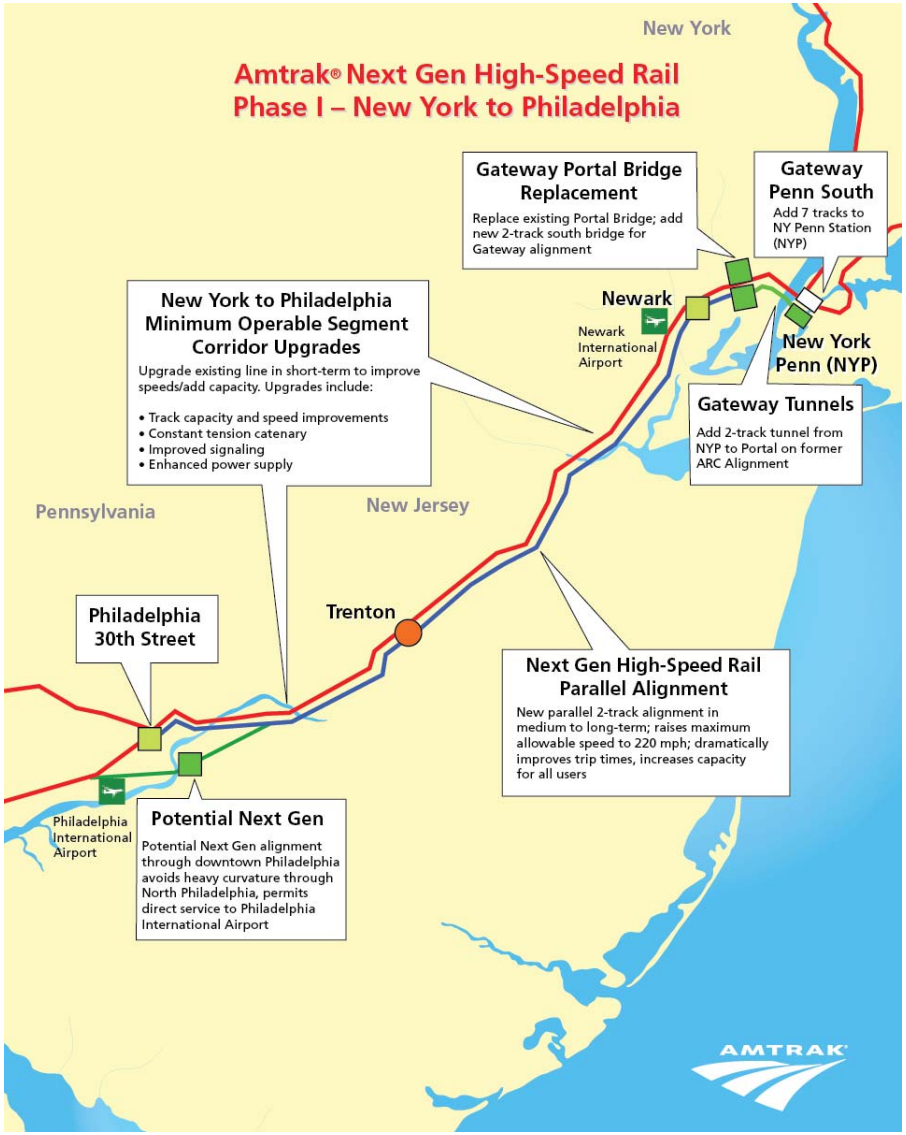


NEC Gateway

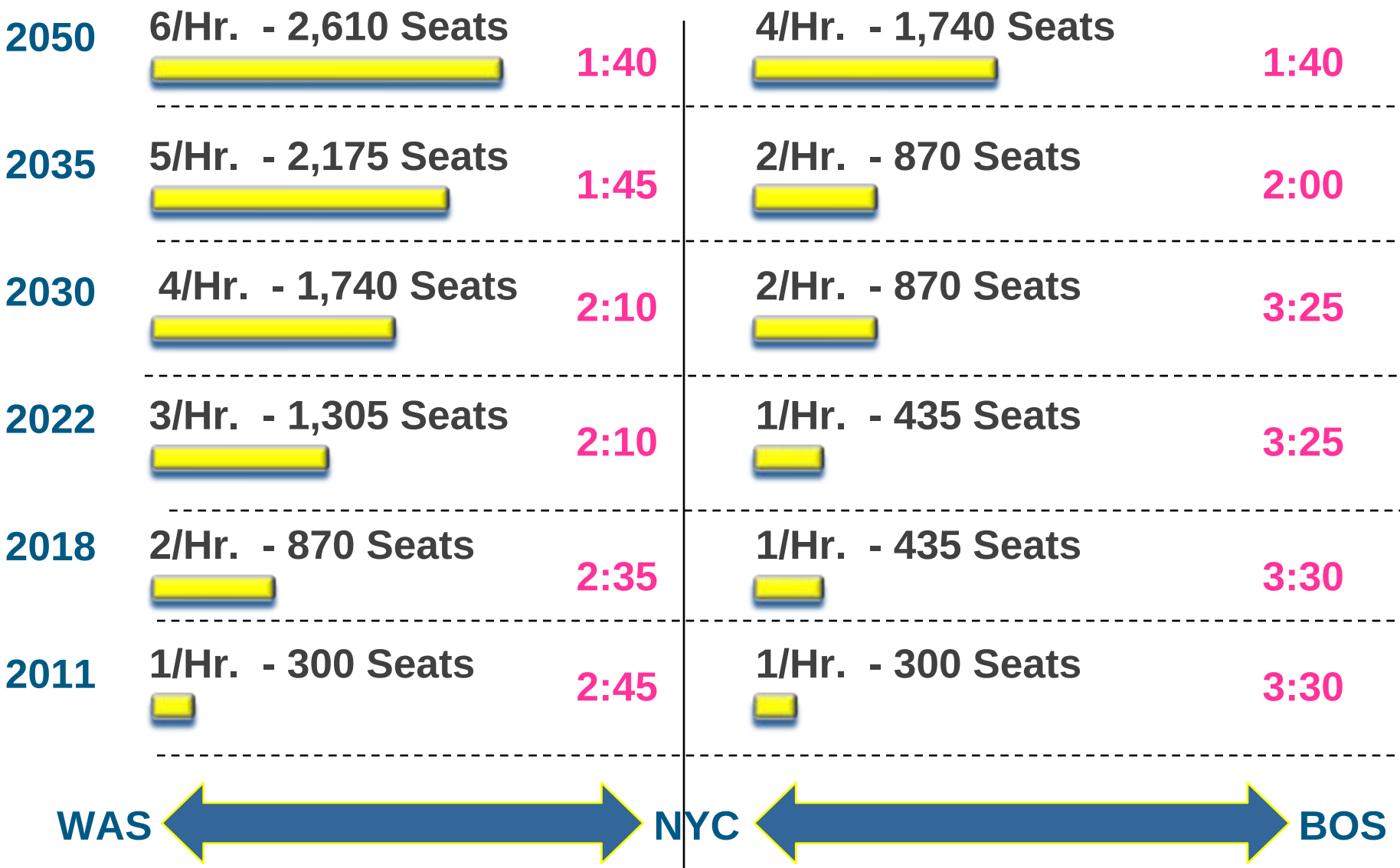
- Keystone of the plan – creating capacity where it's most needed
- Involves major capacity expansion
  - **Add extra tracks between Newark and Penn Station**
  - **Build two new tunnels under the Hudson River**
  - **Build Moynihan Station**
  - **Add extra commuter rail capacity at Penn Station**
- When commuter services get investment, high speed services get operational fluidity

New York-Philadelphia dedicated HSR Line

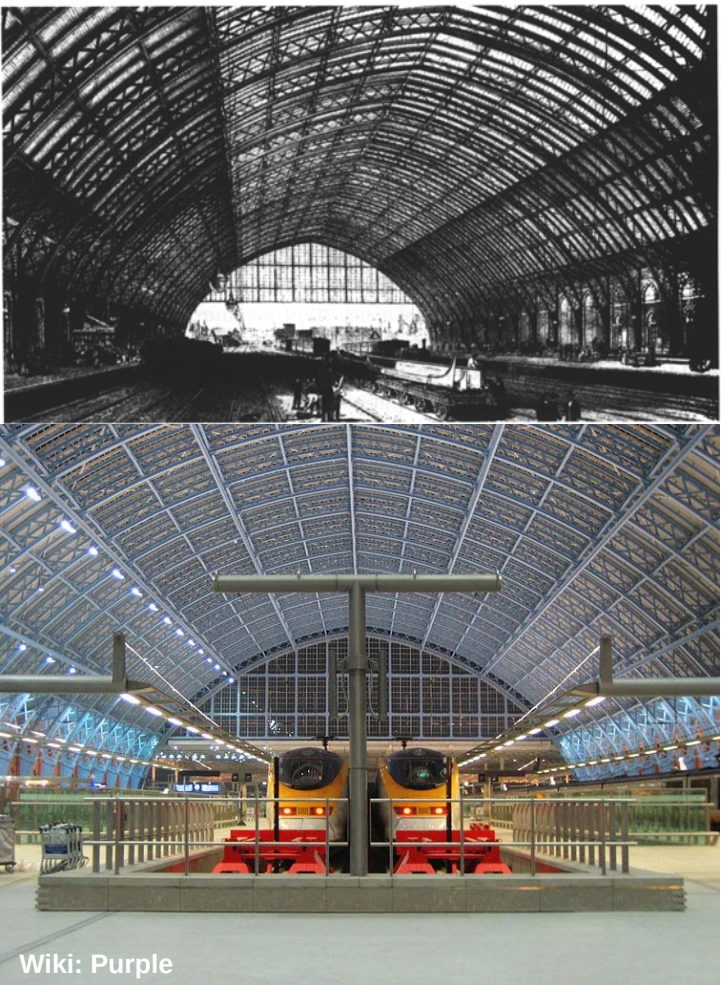
- The HSR development concept:
  - Existing line would be improved to raise speeds to 160 mph (short term)
  - Separate HSR line could be built to facilitate upgrade of existing line; deployed as 220mph express service to launch NextGen HSR
- Successive improvements will:
  - Initial rounds will greatly increase capacity
  - Subsequent rounds will increase speed, provide jumping-off point for later rounds of HSR construction



Phased Gains: Peak Hr. Trains/Seat Capacity (HSR Exp); Trip Time



Key Concepts



St. Pancras Station, London

- Existing system serves as a foundation for development
  - Terminal facilities
  - Suitable segments are upgraded
  - Existing network feeds high speed operations
- Most foreign systems have developed in this incremental fashion
  - France
    - TGV lines use major terminals at endpoints
    - Speeds gradually upgraded as technology permitted
  - Germany
    - High speed equipment preceded high speed lines
    - Gradual introduction of faster track segments allowed ICE trains to realize their capabilities

Opportunities for partnership

- Amtrak is very interested in opportunities for high speed rail partnerships
- We are modernizing our plant – but we are also modernizing our organization and culture
  - Working on programs to develop a more collaborative organization
  - Make maximum use of talent
  - Pass on the core skills and functions as we manage a generational transition
  - Transform the way we deal with business partners, customers, and each other
- We have sought our partners who can work with us in a joint bid on HSR projects

The way ahead

- HSR projects are enormous undertakings – and to succeed, we must organize so that:
  - A consortium of partners can deliver all of the needed capabilities
  - The system itself delivers benefits long before build-out is complete
- Connectivity is vital to success – and a plan that incorporates feeder routes from one or many modes will be much more useful than one that does not
- Amtrak is very interested in pursuing HSR projects
  - We have selected a strong suite of commercial partners
  - We have a lot of experience working with state partners
  - Projects like these represent the future of rail – and can deliver meaningful results that will improve our quality of life

Thank you for your kind attention

Al Engel
Vice President High Speed Rail, Amtrak, U.S.A.

al.engel@amtrak.com