Sustainability & High Speed Rail at Amtrak

Prepared For:
High Speed Rail Workshop: Sustainability and the Environment

October 30, 2015
• Overview of the Northeast Corridor

• A Sustainable Approach to High Speed Rail

• Amtrak’s Commitment to Sustainability
THE NORTHEAST CORRIDOR
Northeast Corridor Overview

CRITICAL AND COMPLEX OPERATIONS

- 899 total route miles
- Carries intercity passenger, commuter, and freight trains
- Amtrak is the majority owner and infrastructure manager (546 route miles)
  - 8 commuter railroads depend upon Amtrak for reliable operations
- 66% electrified
- 150,000 daily trips, 260 million annual passengers
- 1,200 bridges and tunnels, many over a century-old
- Introduced high-speed *Acela Express* in 2000
- U.S. prototype of legacy corridor achieving high-performance, high-capacity service
NEC Ridership Gains

*In FY14, Amtrak began counting actual lifted ridership for multi-ride tickets (due to eTicketing), rather than the estimated multi-ride ridership used previously. To ensure accurate comparisons, the FY13 ridership data is re-stated using this same method.

SOURCE: AMTRAK
Rapidly Growing Demand

NORTHEAST POPULATION GROWTH
By 2040, the Northeast Megaregion is projected to add 12 million people (23% growth).

NORTHEAST CORRIDOR RIDERSHIP GROWTH IS PROJECTED TO CONTINUE
Amtrak continues to break revenue and ridership records. This success is projected to continue as annual trips on the NEC will roughly double by 2040.

SOURCE: REGIONAL PLAN ASSOCIATION
PRIIA: A Framework for NEC Investment

- Passenger Rail Investment and Improvement Act (PRIIA) of 2008 requires a cost allocation methodology to eliminate cross subsidies among NEC users and owners.
- An interim cost allocation policy was adopted in December 2014.
- Separate approaches for operations and capital costs, respectively.
- Potentially a new source of revenue to Amtrak for NEC capital investments.
THE VISION FOR HIGH SPEED RAIL
A Sustainable Approach
The Federal Railroad Administration is leading NEC FUTURE to study options for expanding capacity on the NEC with an expected Record of Decision in 2016.
• Amtrak seeking up to 28 high-speed train sets.
• Initial 8 train sets will supplement *Acela* fleet in 2019 timeframe.
• Initial operations at max speed 160 mph (257 kph) with options for 186 mph (300 kph) and 220 mph (350 kph).
• Will increase seating capacity to 400-450 seats.
• Amtrak’s current HSR equipment (Acela) is more energy efficient than planes \textit{on a per seat-mile basis}

• The next generation of HSR currently available on the market (NextGen) is considerably more energy efficient due to:
  – \textit{Increased passenger capacity (more seats)}
  – \textit{Improved aerodynamics}

<table>
<thead>
<tr>
<th>Estimated Energy Consumption on a Per Seat-Mile Basis</th>
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<tbody>
<tr>
<td>Transportation Mode</td>
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<td>----------------------</td>
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<tr>
<td>Acela</td>
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<tr>
<td>NextGen Equipment</td>
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<td>Plane</td>
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</tbody>
</table>
The estimated carbon dioxide (CO₂) emissions from current and future HSR equipment is significantly less than from planes*

* based on predominant energy source per mode (electrical power for Acela and NextGen; Jet A fuel for planes)

<table>
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<tr>
<th>Transportation Mode</th>
<th>Estimated Annual CO₂ Emissions (thousand metric tons)</th>
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<tbody>
<tr>
<td>Acela</td>
<td>44.2</td>
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<tr>
<td>NextGen Equipment</td>
<td>31.9</td>
</tr>
<tr>
<td>Plane</td>
<td>68.1</td>
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</tbody>
</table>
• Moving passengers from other modes to HSR:
  – Reduces congestion
  – Improves land use
  – Encourages use of public transit or walking

• Amtrak’s Acela trainsets recover between 7.5% and 8% of the energy they use through regenerative braking.
  • Amtrak anticipates NextGen trainsets will recover at least as much if not more
THE AMTRAK COMMITMENT TO SUSTAINABILITY
Our Commitment to Sustainability

• Sustainability policy approved in July 2013

• Foundation of the Sustainability Program

• Purposes
  – Integrating sustainability into our business decision making processes
  – Supporting achievement of our corporate goals and
  – Recognizing sustainability achievements and initiatives

• Outlines Governance of the Sustainability Program
External Sustainability Commitments

• Chicago Climate Exchange

• APTA Sustainability Commitment

• UIC Sustainability Declaration

• Carbon Disclosure Project
  – Annual GHG Inventory
  – Climate Change Initiatives and Strategies
Gateway Program Principles

Preservation
• Secure critical alignments for future operations
• Undertake design/construction where required
• Preserve existing service to Penn Station

Resiliency
• Rebuild Existing Infrastructure
• Provide resiliency/storm protection
• Bring to State of Good Repair

Capacity
• 100% increase trans-Hudson River
• 38% increase at Penn Station
• Build redundancy for stable operations

• Priority to modular project designs permitting development of program elements with independent utility.
• Advance elements as funding and timing permits.
• Super Storm Sandy inundated East River and Hudson River Tunnel systems with salt water.

• Ongoing damages to internal components go beyond what routine maintenance can fix.

• Tunnel reconstruction requires removal of each tube from service for continuous, extended outages.

• Rebuilding of the existing Hudson River Tunnel cannot begin until the new Hudson Tunnel is completed.
During electric grid outages, NJ TRANSITGRID will power pumps, vent plants and stations; and provide enough electricity to operate limited service:

- Mason traction power station (M&E line), MMC and ROC;
- Amtrak NEC traction;
- Hoboken Terminal
- Signal Power
- Hudson-Bergen Light Rail service; and
- Central power plant will operate 24 hours- a-day; seven-days-a-week; year long.
Vital infrastructure elements on the NEC

- Receives 25hz, single phase, 138kv power from transmission grid fed from power injection points to the west.
- Supplies 12kv traction power for train movements.
- Supplies 3.3kv power for signal system.

Provides electrical traction power and signal power for targeted portions of NEC
Benefits

FTA Resiliency Grant to NJ Transit $409,764,814

• Amtrak will contribute $31 million to the NJ TRANSITGRID Project.
• Design, Construction and Replacement of Substation 41 + new control system for Substation 42.
• Provides 2 new frequency converters of total 50 MW. (2x25)
• Provision of new electrical power supply, off of commercial/regional general grid, protected from commercial electrical grid failures, providing adequate power to allow rail evacuations from NYPS to New Jersey Core Rail Stations.
• Contributes towards NEC electric power supply elements and supply stability.
Sustainability - Station Master Planning

The Amtrak® System

Amtrak Northeast Corridor Infrastructure & Investment Development
• Amtrak has begun to analyze the climate change vulnerability of its assets along the Northeast Corridor (NEC)

• Overall objectives:
  – Establish a vulnerability and adaptation methodology
  – Address future operational challenges
  – Guide capital investment priorities
  – Shape future design and adaptation standards
  – Establish emergency management and security measures

• Phase I was completed in 2014
  – Identified availability & gaps in Amtrak NEC rail asset data
  – Literature review of typical climate change impacts to rail assets and general availability of climate change data for Northeast
  – Comparison of climate change vulnerability assessment methodologies
Sustainability and Climate Change Adaptation

• Phase II Pilot Study was completed in September 2015
  – Focused on a 10-mile section of track near Wilmington, Delaware
  – Focused on climate stressors of sea level rise, storm surge, precipitation, extreme heat and wind.
  – Established a framework and methodology that can be repeated for the rest of the NEC

• Potential next steps
  – Identify NEC-wide Climate Change Impact Zones to prioritize future geographic areas for assessment
  – Prepare organization-wide short-term and long-term adaptation strategy to address climate change risks
  – Develop a specific adaptation plan for the pilot study assets, which could be replicated for vulnerable areas throughout the corridor
  – Promote awareness and educate Amtrak staff on climate change and risks to infrastructure assets
Thank you for your attention