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The Future of Transportation in the Northeast Corridor, 2007-2025:

Rail Transportation

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1. Introduction

The Northeast Corridor links the southernmost portion of Maine with Virginia, along the Atlantic Coast of the United States. The entire corridor, which represents some of the most densely populated regions of the country, is comprised of over 42 billion people (15% of total U.S. population), boasts a \$1.99 trillion economy (2005), and leads the nation in the financial, media, healthcare, and higher education sectors.¹

In terms of transportation, the Corridor is home to some of the most congested roadways, air, and railway infrastructure in the country, both with regard to passengers and freight. Moreover, along the Corridor, there is very limited ability to expand transportation capacity, particularly in terms of highways and airspace.

With almost half of all the transit riders in the country and over three-quarters of all the rail commuters, the opportunities for rail to play a vital connecting role for passenger travel along the Northeast Corridor are tremendous.² A fast, efficient, and reliable intercity rail service could help address congestion problems in the air by providing a ground-based alternative to air travel for trips shorter than 500 miles, and could alleviate highway congestion (where the bulk of current freight movements take place in the corridor) by making rail attractive for trips of more than 100 miles. Such a system could also generate economic benefits along the Northeast Corridor by more closely linking cities in a way that would make possible intercity commuting on a regular basis, allowing businesses to draw off a much larger base for their employees and allowing employees to look for jobs beyond their immediate urban centers. However, for this to become a reality, much needs to happen both financially and, more importantly, politically.

While arguably the best intercity service in the nation, the Northeast Corridor's intercity rail system still falls short of the region's global competitors in Europe and Asia in terms of reliability, efficiency, and travel times. While France recently tested a high-speed train that can reach maximum speeds of 357 miles per hour (mph), and Shanghai's Maglev system zips along easily at 268 mph (with higher maximum speeds), and while Japan's soon-to-be older generation *Shinkansen* reaches speeds of 186 mph, the NEC's Acela – the flagship of intercity passenger rail in the United States – brings up the rear with maximum authorized speeds of only 150 mph on only 33.9 miles of the entire length of the corridor.³ In fact, maximum authorized speeds are 90 mph or below for over half (127.1 out of 226.9 miles) the section between New York City and Boston, and the highest maximum authorized speed on the New York City-Washington, DC length is only 135 mph (and again only for a portion of the entire line). Indeed, to provide a frame of reference, even if trains could run at maximum speed for all segments along the length of the line between New York City and Boston, they would only average 82 mph.⁴ Further, because of the number of station stops, because trains need to decelerate and accelerate around curves and when entering and leaving stations, and because on any given day there may be additional speed restrictions, actual speeds are often significantly slower.

To address these deficiencies and bring the Northeast [rail] Corridor (NEC) to a level of service which not only entices passengers from automobile and air, but also is recognized by our global competitors as true high-speed rail, several things need to happen. First, at the very least the corridor needs to be brought up to a state of good repair. Second, policy decisions (and corresponding funding to support them) need to be made that would allow for a true high-speed intercity rail system that is both closely linked with the aviation industry, and is supported by transit networks in the cities it connects.

This paper provides a historical background and describes the current context of the NEC, discusses the dilemmas that are faced, and then turns toward new challenges and opportunities. The paper concludes

¹ U.S. Census Bureau, *Census 2000*; U.S. Conference of Mayors, *U.S. Metro Economies: GMP – The Engines of America's Growth* (Lexington, MA: Global Insight, Inc.), 2006, Table 1; Regional Plan Association and the Penn Institute for Urban Research, "Northeast Climate and Competitiveness Summit," March 2, 2007, http://www.america2050.org/2007/03/northeast_corridor_mobility_sum.html (accessed 5/7/07).

² University of Pennsylvania, *Reinventing Megalopolis: The Northeast Megaregion* (Philadelphia: UPenn School of Design, Spring 2005).

³ Arianne Bernard, "International Business: Research Model of French Train Beats Record, Hitting 357 Miles an Hour," *The New York Times* (4 April 2007): C-4; Allison L. C. de Cerreño and Shishir Mathur, *High-Speed Rail Projects in the United States: Identifying the Elements of Success – Part 2*, MTI Report 06-03 (San José, CA: MTI, November 2006), p. 87.

⁴ Average MAS calculated using Maximum Authorized Speed and Speed Restriction Tables, provided by Amtrak's Planning and Analysis Department.

with a discussion of what the future could and should hold for the rail corridor and for the Northeast with respect to an integrated transportation system with high-speed rail as a central component.

2. Background

Before one begins to think about the future, it is often helpful to know about and understand the past as well as the current context within which debates and decisions are taking place. To that end, the following paragraphs will provide the historical, policy, and economic framework within which the NEC must be viewed.

2.1 The Context

Legally, the Northeast [rail] Corridor (NEC) is composed of three segments: the main line right-of-way (ROW) between Washington, DC and Boston, MA; the branch line, referred to as the “spine segment” from Philadelphia, PA to Harrisburg, PA (also referred to as the Keystone Corridor); and the branch line, referred to as the “non-spine segment” between New Haven, CT and Springfield, MA. At times, the New York City-Albany, NY corridor (referred to as the Empire Corridor) is also included. However, in common usage and the way in which it will be used throughout this paper, NEC refers only to the main line.

Connecting eight states and the District of Columbia, the NEC is the busiest rail line in the United States, as well as one of the most complex operationally. On a daily basis, the line is used by over 700,000 intercity and commuter riders (200 million annually), and several Class I and Class II freight railroads, which combined account for roughly 38 daily trains along various segments.⁵ In FY 2005, intercity rail ridership alone, on Amtrak’s Acela, Metroliner, and Regional services combined, was 9.5 million, just over 37% of Amtrak’s total national ridership (25.4 million).⁶

At the geographic center of the 456-mile long rail corridor is New York City, the most populous city in the United States as well as the anchor for the most populous region in the country.⁷ Including the New York region, the NEC serves five of the twenty largest metropolitan areas in the United States (Philadelphia, Washington, DC, Boston, and Baltimore are the foundations for the other four areas).

On the south-end of the NEC (New York City-Washington, DC), Amtrak owns and has full operating control over the entire rail line, including dispatching, transportation supervision, and maintenance of way. Several other entities operate along sections of the south-end, including four commuter rail operators (Figure 1). Virginia Railway Express connects Alexandria, VA with Washington, DC, making use of Union Station in Washington, DC Maryland Rail Commuter Service (MARC) runs service between Washington, DC and Perryville, MD. MARC is administered by Maryland Department of Transportation’s Transit Administration, but is operated under contract with CSX and Amtrak, depending upon the line being used. Southeastern Pennsylvania Transportation Authority (SEPTA) operates between Wilmington, DE and Trenton, NJ, with Philadelphia as the center of its regional commuter railroad operations. Finally, NJ Transit operates between Trenton, NJ and Penn Station in New York City.

On the north-end of the NEC (New York City-Boston), there are also multiple commuter passenger operators. However, the north-end of the Corridor is also *owned, operated, and maintained* by multiple agencies (Figure 1). Amtrak owns 15.2 miles from New York Penn Station to New Rochelle, NY, and

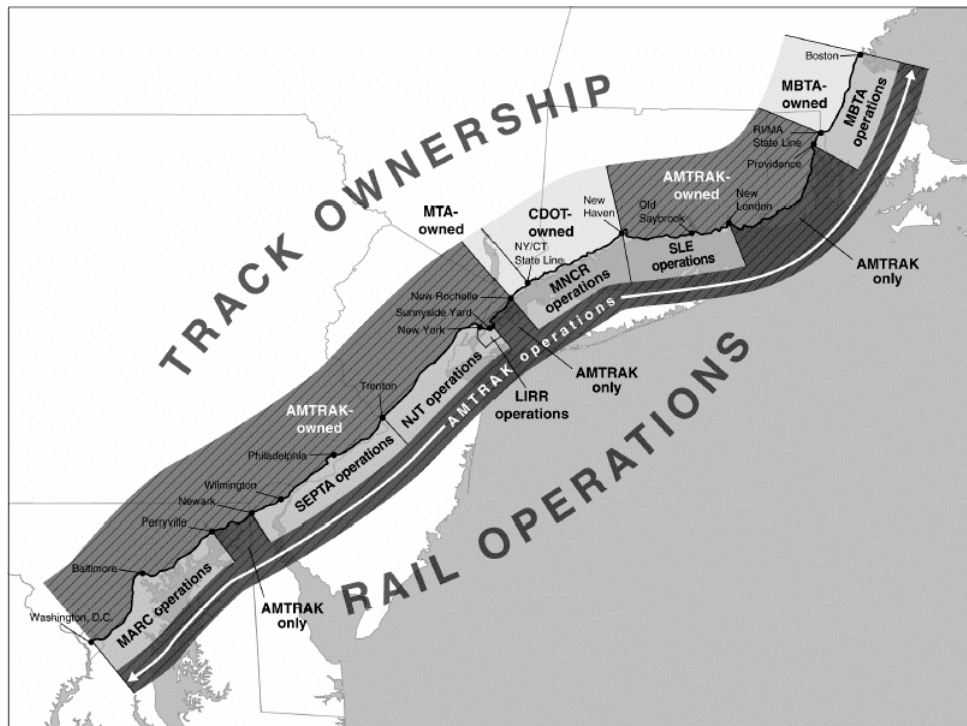
⁵ Voorhees Transportation Center, “Northeast Corridor Action Plan: A Call for a New Federal-State Partnership,” Draft Document 12/11/05, p. 1; U.S. Government Accountability Office (GAO), *Intercity Passenger Rail: Amtrak’s Management of Northeast Corridor Improvements Demonstrates Need for Applying Best Practices*, Report to the Chairman, Committee on Commerce, Science, and Transportation, U.S. Senate, GAO-04-94 [hereafter, *Need for Applying Best Practices*] (Washington, DC: GAO, February 2004), p. 1; U.S. GAO, *Intercity Passenger Rail: Congress Faces Critical Decisions in Developing a National Policy*, Testimony Before the Subcommittee on Railroads, Committee on Transportation and Infrastructure, House of Representatives – Statement of JayEtta Hecker, Director of Physical Infrastructure Issues, GAO-02-522T (Washington, DC: GAO, April 11, 2002), <http://www.gao.gov/new.items/d02522t.pdf> (accessed 6/23/05), p. 3.

⁶ Amtrak, “News Release: Annual Amtrak Ridership of 25.4 Million Marks Third Straight Year of Record Increases” (October 19, 2005), http://www.amtrak.com/servlet/ContentServer?pagename=Amtrak/am2Copy/News_Release_Page&c=am2Copy&cid=1093554022797&ssid=181 (accessed 1/19/06).

⁷ U.S. Census Bureau, *Census 2000*.

117.9 miles between New Haven and the Massachusetts state line. From New Rochelle to the Connecticut state border (9.8 miles), the line is owned by New York's Metropolitan Transportation Authority (MTA) and operated and maintained by MTA Metro-North Railroad (MNR). From the Connecticut state border to New Haven, CT (46.8 miles), the line is owned by Connecticut Department of Transportation (ConnDOT), but still operated and maintained by MNR. The remainder of the Corridor, from the Massachusetts state border to Boston's South Station (37.9 miles) is owned by the Massachusetts Bay Transportation Authority (MBTA), which contracts out to Amtrak for dispatching and maintenance.⁸ In other words, of the 231 miles of NEC on the north-end, Amtrak owns a little over half of the line (57.6%), though it operates along the full length and is responsible for maintaining roughly three-quarters of the line.

Figure 1. Ownership and Operations on the NEC



From: U.S. GAO, *Commuter Rail*, GAO-06-470 (April 2006), p. 6.

Two additional passenger commuter operators provide service on the north-end of the NEC. MTA Long Island Railroad (LIRR) operates along the four-mile segment between New York Penn Station, and through the East River tunnels. While this represents a very small geographic portion of the NEC, the LIRR carried almost 80 million passengers in 2004, and the vast majority of them traveled this segment.⁹ Under contract, Amtrak

operates the 33-mile Shore Line East service between New Haven and New London, which is funded by ConnDOT.

To provide a sense of where the most passenger activity occurs and which agencies operate along which sections of the corridor, Figure 2 provides a pictorial of the number of total weekday revenue-producing passenger train movements on the NEC. The chart does not include those train movements to and from the yard, nor do they include freight train movements. Nevertheless, Figure 2 provides a clear snapshot of the most congested areas along the corridor.

Important to keep in mind is that while there are seven different commuter railroads operating along the same ROW as Amtrak, and while a number of Amtrak stations also house or are nearby urban transit systems, the intercity rail system and these urban systems often are not well linked. Further, in some cases, transit (either bus or rail) does not exist. The lack of easily accessible connections, combined with relatively slow travel times, insufficient scheduling between certain stations, and a perceived lack of reliability, often leads travelers to consider automobile or air travel instead of rail in the corridor.

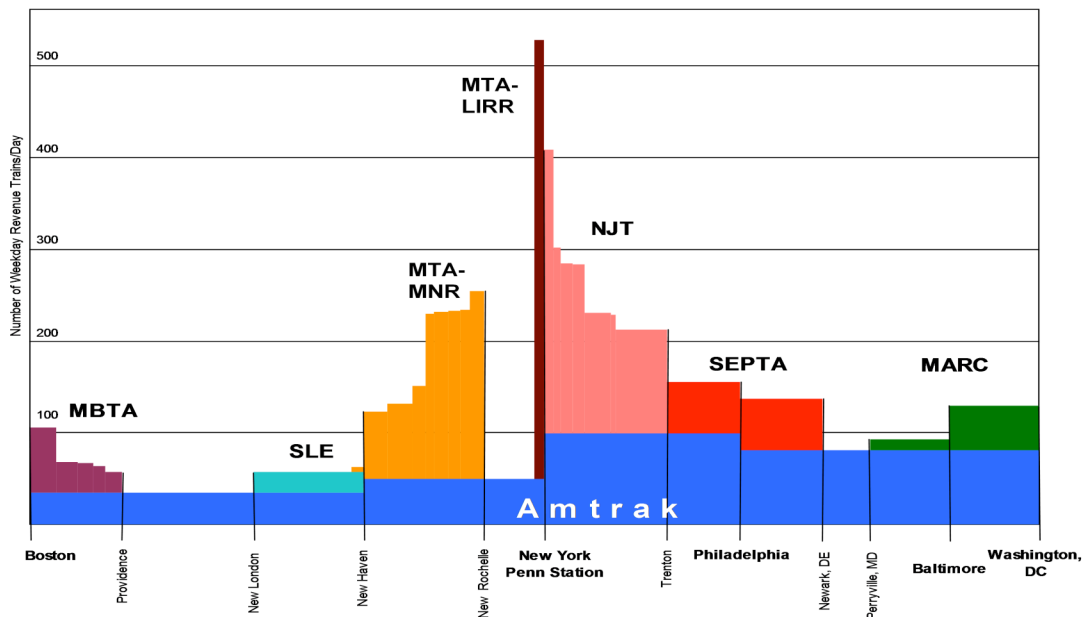
⁸ Information on ownership and operations from U.S. GAO, *Northeast Rail Corridor: Information on Users, Funding Sources and Expenditures*, Report to the Chairman, Subcommittee on Surface Transportation and Merchant Marine, Committee on Commerce, Science, and Transportation, U.S. Senate, GAO/RCED-96-144 (Washington, DC: GAO, June 1996), p. 8. Mileage for the segments is derived from speed restriction tables provided by Amtrak's Planning and Analysis Department.

⁹ Long Island Railroad Annual Ridership, <http://www.mta.nyc.ny.us/mta/ind-perform/annual/lirr-ridership.htm> (accessed 2/8/06).

In addition to passenger rail, several freight rail companies operate on both the north-end and south-end of the NEC. Providence & Worcester Railroad Company, a Class II railroad, operates four local service freight trains daily between Providence, RI and New Haven, CT. Two additional trains are added each year, from March until Thanksgiving – one runs between Rhode Island and South Norwalk, CT; the other continues south to New York City. CSX Corporation also operates on north-end, between New York City and New Haven, CT, as well as in the Boston area, but the traffic tends to be local and runs during evening hours. Unlike portions of the south-end, on the north-end, though the freight trains use the Amtrak ROW, they do not use the passenger rail tracks; there is a third track dedicated to freight rail.

On the south-end of the NEC, Delaware & Hudson/CP Rail operates between Landover and Perryville, MD. Norfolk Southern operates local freight trains along three segments of the line: between Landover and Philadelphia, between Perryville and Baltimore, and between Perryville and Wilmington, DE. On average, there are 2 to 4 daily freight train movements between Landover

Figure 2. NEC Weekday Revenue Passenger Train Movements, 2006



Source: Amtrak, MBTA, SLE, MTA, NJT, SEPTA, MARC

From: C. de Cerreño and Mathur, *High-Speed Rail Projects in the United States: Identifying the Elements of Success – Part 2, MTI Report 06-03* (San José, CA: MTI, November 2006), p. 91.

and Philadelphia, and 8 daily freight train movements on the other two segments on which NS operates. CSX and Norfolk Southern also operate, via Consolidated Rail Corporation (Conrail) which serves as their terminal and switching agent between New York City and Philadelphia, PA. Again, these are primarily local train movements and on average there are two to four daily.¹⁰

While freight rail still moves along the NEC, it has become increasingly squeezed as a result of large passenger volumes and remains constrained, even as freight volumes are expected to grow nationally and in the region through 2025.

2.2 A Brief History

While the history of rail on the NEC begins as early as the 1800s, for the purposes of this paper, the starting point is the 1965 High-speed Ground Transportation Act (HSGTA). The Act authorized \$90 million for high-speed demonstration projects and established the Office of High-speed Ground Transportation (OHSGT) within the Department of Commerce, directing them to plan, organize, fund, and evaluate

¹⁰ Bill Schafer, Director Corporate Affairs, Norfolk Southern Corporation, Personal Communication 2/10/06.

demonstration projects to determine how high-speed ground transportation systems could contribute to more efficient and cost-efficient intercity rail.¹¹

Both the north and south-ends of the Northeast Corridor were quickly identified for demonstration projects under the HSGTA and \$51.8 million was allocated to the corridor. On the south-end, between Washington, DC and New York City, the OHSGT signed a contract with the Pennsylvania Railroad, initially committing \$6.7 million (later increased to \$11 million) to support the acquisition of new-generation electric-powered self-propelled passenger cars that could travel at speeds of up to 160 mph.¹² The total cost for the trainsets would eventually reach \$60 million, with another \$45 million spent on upgrades to the ROW to run the new trains.¹³

The first Metroliner placed into service in January 1969. The new service reduced the trip time between New York City and Washington, DC by an hour and was well received by passengers. Indeed, immediately after the introduction of the Metroliner, ridership improved markedly.¹⁴ However, within less than a decade performance was suffering, in part because the infrastructure was not upgraded at the same time as the trainsets were introduced, and in part because of overall deferred maintenance on the line. Initially able to run at speeds over 100 mph, the Metroliner was limited to 80 mph by 1975, severely hampering operations with resulting decreases in ridership. By the end of 1976 three-quarters of the Metroliner trains were arriving late.¹⁵

What could have been a stronger and long-lasting success was undermined by inadequate vision and investment. Indeed, the issue of deferred maintenance is one that continues to haunt and constrain high-speed rail on the NEC.

On the north-end of the NEC, between New York City and Boston, MA, the TurboTrain was introduced into revenue service in April 1969. The TurboTrain featured a pendular banking suspension system similar to the Talgo trains in Spain, allowing it to round curves faster than conventional trains and travel and achieve speeds of up to 170 mph. The goal was to reduce travel between Boston and New York City by an hour, but the TurboTrain fell short, only reducing travel time by half that. Furthermore, though it attracted a loyal clientele, the TurboTrain experiment was plagued with mechanical difficulties.

By 1970, when the National Railroad Passenger Corporation (Amtrak) was created under the Rail Passenger Services Act, it was clear that the TurboTrain was not as successful as hoped. In September 1976, after several incidents in which the trains caught fire, the TurboTrain was taken out of service.

2.2.1 The Northeast Corridor Improvement Project (NECIP), Phase 1

High-speed rail on the NEC was given a critical boost at the federal level in 1976 when Congress passed the Railroad Revitalization and Regulatory Reform Act (4R Act), launching what would become the largest federal investment in intercity rail in the 20th Century. In addition to designating Amtrak as the primary owner of the NEC, the Act authorized the Northeast Corridor Improvement Project (NECIP) which included \$1.75 billion for improvements between Washington, DC and Boston.¹⁶

The primary objective was to have, by 1981, “the establishment of regularly scheduled and dependable” intercity rail passenger service of 3 hours 40 minutes between Boston and New York, and of 2 hours 40 minutes between New York and Washington, DC, including intermediate stops.¹⁷ From the beginning, however, these trip times were a representation of political expediency, rather than being based on an objective analysis of what would make high-speed intercity rail competitive with air and automobile along the corridor. Indeed, to truly reach speeds that would make rail in the NEC competitive with alternative

¹¹ U.S. GAO, *Problems in the Northeast Corridor Railway Improvement Project*, Report by the Comptroller General of the United States, CED-79-38 (Washington, DC: USGAO, 1979), p. 3.

¹² Anthony Perl, *New Departures: Rethinking Rail Passenger Policy in the Twenty-first Century* (Lexington: University Press of Kentucky, 2002), p. 141.

¹³ *Ibid.*, p. 142; Southeast High-speed Rail Corridor (SHSRC), “A Time to Act” (1999), <http://www.sehsrc.org/reports/time2act/time2act.html> (accessed 11/27/06).

¹⁴ U.S. Department of Transportation (USDOT), *Two-Year Report on the Northeast Corridor* (Washington, DC: USDOT, 1978), p. 2.

¹⁵ *Ibid.*, p. 6.

¹⁶ USDOT, Federal Railroad Administration (FRA), *Northeast Corridor Improvement Project: Final Programmatic Environmental Impact Statement*, volume 1, FRA-RNC-EIS-77-01-F (Washington, DC: USDOT, 1978), p. ES-1.

¹⁷ *Ibid.*, p. 1-3.

modes, almost double the figure provided in the NECIP (\$3.5 billion) would have been needed at the time.¹⁸

Even as the NECIP represented a tremendous boost for rail in the corridor, the unwillingness to invest what was truly necessary to meet the desired goals was reminiscent of the discussions and debates between the Congress and Administration today. Indeed, throughout the next decade even as work progressed, constant revisions were made in scope and budget, and elements were shuffled or lost. This is not to negate the tremendous amount of progress that was made on the line. The trip time goals between Washington, DC and New York City were realized during this period and travel times between Boston and New York improved greatly. Nevertheless, the NECIP failed to meet the trip time goals on the north-end and, more importantly, the electrification of the north-end was dropped, in large part because of costs.¹⁹ Again, the result was that even with the improvements, rail was still not well positioned to offer a strong alternative to rail or automobile travel.

2.2.2 The NECIP, Phase 2 – Electrification of the North-end

Electrification of the north-end of the NEC was revisited when the Coalition of Northeastern Governors (CONEG) released a study on HSR feasibility between New York City and Boston in October 1990. The report concluded that:

- Three-hour travel by rail between New York City and Boston could be attained in the near-term through a program with public-private funding;
- Diversion of trips from air and roads to rail would help reduce fuel consumption and air pollution; and,
- A high-speed rail project would generate new regional activity throughout the Northeast and the rest of the United States, with many new jobs and increased productivity.²⁰

On the heels of the report, Senator Frank Lautenberg (D, NJ 1982-2000/2002-) played a critical role in renewing funding for the NEC by placing \$100 million in the FY 1991 appropriations bill. Efforts were refocused on increasing speeds and decreasing north-end trip times. In FY 1991, Congress appropriated \$25 million for engineering associated with electrification of the north-end between New Haven, CT and Boston.²¹ This was followed, in October 1992, by passage of the Amtrak Authorization and Development Act which amended the 4R Act of 1976 to include a new section, stipulating that the Secretary of Transportation submit a program master plan for the establishment of “regularly scheduled, safe, and dependable” service between New York and Boston of three hours or less, including intermediate stops. The Act also authorized \$470 million during FY 1993 and FY 1994 for the NECIP.²²

The Draft Environmental Impact Statement/Report (DEIS/R) for the New Haven–Boston project was released in fall 1993, with roughly two-thirds of the system design already complete.²³ Concerns were soon voiced, ranging from whether the full implications of the new service on freight rail had been taken into account, to whether the electrification system would pose a health hazard to residents along the route, to how to ensure that the moveable bridges in the New England region remained open a sufficient amount of time for marine traffic.²⁴ On this last point, Amtrak eventually agreed to a cap on the number of passenger trains along the Corridor, and committed to a change in policy that would allow the default position of the bridges to be “open for marine traffic” rather than “closed for rail” as is the case elsewhere around the country. The result has been a severe and ongoing constraint on capacity on the north-end.

¹⁸ C. de Cerreño and Mathur, *High-Speed Rail Projects in the United States*, pp. 98-101.

¹⁹ *Ibid.*, pp. 108-109

²⁰ Parsons Brinckerhoff Quade & Douglas, Inc., Cambridge Systematics, Inc., Regional Science Research Institute, *CONEG High-speed Rail Regional Benefits Study: Summary Report*, Prepared for the Coalition of Northeast Governors High-speed Rail Task Force (1990), p. ES-2.

²¹ USDOT, FRA, *Northeast Corridor Improvement Project Electrification New Haven, CT to Boston, MA: Scoping Document*, DOT-FRA-RDV-92-01 (Washington, DC: FRA, 1992), p. 3.

²² Pub. L. 102-533.

²³ USDOT, FRA, *Draft Environmental Impact Statement/Report, Volume 1: Northeast Corridor Improvement Project Electrification – New Haven, CT to Boston, MA*, DOT/FRA/RDV-93/01-A (Washington, DC: FRA, 1993).

²⁴ USDOT, FRA, *Draft Environmental Impact Statement/Report, Volume 2: Technical Studies, Northeast Corridor Improvement Project Electrification – New Haven, CT to Boston, MA*, DOT/FRA/RDV-93/01-B (Washington, DC: FRA, 1993); USDOT, FRA, *Final Environmental Impact Statement/Report, Volume 3: Response to Comments on Draft Environmental Impact Statement/Report, Northeast Corridor Improvement Project Electrification – New Haven, CT to Boston, MA*, DOT/FRA/RDV-94/01-C (Washington, DC, FRA, 1994).

In July 1994, Secretary of Transportation Federico Peña issued *The Northeast Corridor Transportation Plan: New York City to Boston* which included goals for the electrification and trip times, and identified capacity improvements and recapitalization projects to bring the line up to a state of good repair. FRA estimated that the trip time goals could be achieved by 1999 with an estimated cost of \$1.255 billion in FY 1993 dollars.²⁵ An additional \$606 million would be needed for capacity improvements to ensure efficient operation and growth of freight and commuter services on the line. Finally, funds of roughly \$1.2 billion would be needed for recapitalization related to the north-end. The total for these three components was \$3.1 billion (in 1993 \$).²⁶

Amtrak would manage the program, with responsibility for implementation shared by Amtrak, the commuter railroads, freight railroads, and state governments.²⁷ Expected completion for the entire program was forecast for 2010, with electrified operations between New Haven and Boston beginning in 1997 and 3-hour service between New York and Boston beginning in 1999.

Limited HSR service was introduced between New York City and Boston by Amtrak in January 2000. By March 2003, \$3.2 billion had been spent by Amtrak (\$2.6 billion) and the other stakeholders (\$625 million) on the north-end of the NEC.²⁸ However, as with the earlier phase of the NECIP, not all the projects identified had been completed, and the trip time goals remained elusive. Specifically, Amtrak had failed again to meet the goal of 3-hour service between New York City and Boston.

3. Current Challenges

Rail in the NEC currently faces three key sets of interrelated and critical challenges. How these challenges are addressed in the coming years will spell the difference between whether rail, particularly high-speed intercity rail, is strengthened in the corridor or whether it will continue to be plagued by inefficiencies.

3.1 Institutional Challenges

Perhaps the most obvious and long-lasting challenge to implementation of a coherent and rational rail strategy on the NEC is the multitude of stakeholders involved. First and foremost are the multiple owners and operators, each with its own priorities and perceptions about who should bear the cost of maintaining the line and ensuring adequate levels of service for high-speed intercity rail, commuter rail, and freight rail. The tension between the goals of the commuter rail lines, the freight operators, and Amtrak has been evident historically and remains today, particularly given that while some improvements benefit all interests, many are only beneficial to one or another. (See Figure 3 for an illustration of this point).

Adding to the complexity involving institutional arrangements, the NEC is caught up in the larger national debate regarding Amtrak and the future of intercity rail more broadly. While the Northeast legislators feel strongly about the need for maintaining and enhancing rail on the corridor, many from other parts of the country chafe at the funding directed to the NEC. In recent years, a more specific set of discussions have cropped up regarding whether a new business model is needed. In particular, there have been calls for the NEC to follow the examples of its European intercity counterparts with respect to separation of rail infrastructure and operations.

The Amtrak Reform Council, an independent federal commission that had been established to review Amtrak's performance, submitted a recommended plan of action for Amtrak in early 2002. Calling for a new business model and more competition, the plan recommended dividing oversight, operations, and

²⁵ USDOT, FRA, *The Northeast Corridor Transportation Plan: New York City to Boston, Report to Congress—Volume 1* (Washington, DC: USDOT, 1994), p. 1-5.

²⁶ U.S. GAO, *Intercity Passenger Rail: Amtrak's Management of Northeast Corridor Improvements Demonstrates Need for Applying Best Practices*, Report to the Chairman, Committee on Commerce, Science and Transportation, U.S. Senate. GAO-04-94 (Washington, DC: GAO, 1994), p. 13.

²⁷ *Ibid.*, p. 3.

²⁸ *Ibid.*, p. 20.

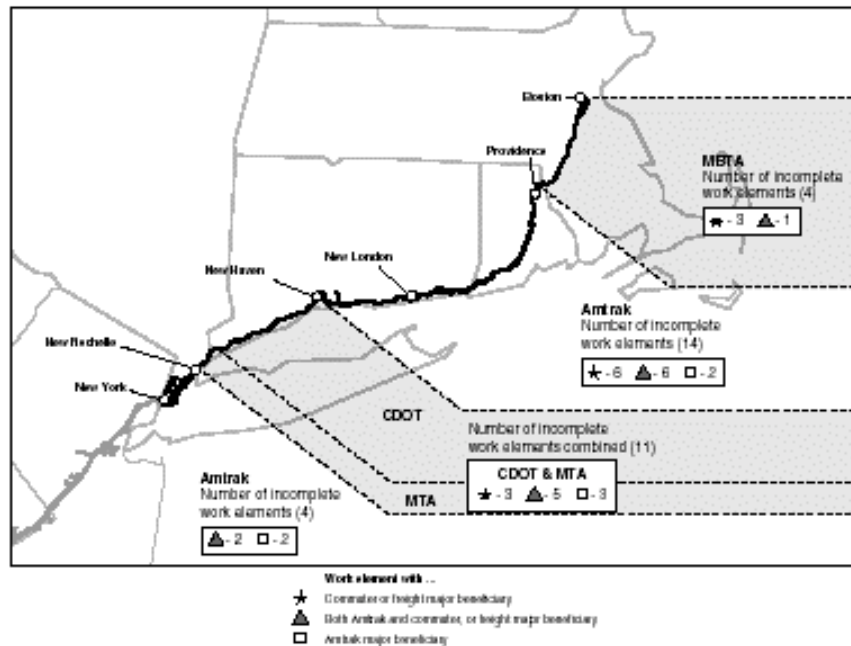
infrastructure responsibilities among three entities.²⁹ This call has been more recently rekindled by the Alan M. Voorhees Transportation Center at Rutgers University, which suggests that USDOT should assume ownership of the line and then create a public benefit corporation that would contract with Amtrak for intercity rail service.³⁰

3.2 Capacity Constraints

Capacity constraints continue to worsen along the entire corridor for both passengers and freight, affecting travel times, reliability, and as a result, ridership and customer satisfaction. With respect to high-speed intercity rail, on the north-end a significant segment of the line is owned and/or operated by MTA Metro-North which

has significant commuter traffic competing for space on the system. Furthermore, throughout this segment of the line, the track centers are too narrow to allow for use of the tilt feature on the Acela, reducing the potential for higher speeds. In addition, the issues revolving around the water-borne traffic and the caps on the number of intercity passenger trains persist.

Figure 3. Major Beneficiaries of Remaining Work Elements by Location, 2003



From: U.S. GAO, *Intercity Passenger Rail*, GAO-04-94 (February 2004), p. 19.

Specifically (and contrary to policy in other parts of the country), current policy regarding the moveable bridges along the north-end of the NEC stipulates that the default position of the bridges is “open” rather than “closed”. With the caps and the default open position, intercity HSR rail will continue to be seriously inhibited regardless of other improvements and will likely never reach a 3-hour trip time goal.

On the south-end, the constraints are more related to sheer volumes of traffic, especially between New York City and Philadelphia, and to shortcomings associated with deferred maintenance. In fact, in 2005 the estimated cost of bringing the NEC to a state of good repair was roughly \$5 billion, the majority of which was aimed at the south-end.³¹ That figure has since risen. While on the north-end, the high-speed intercity rail trip time goals have never been realized, on the south-end, the goal of 2 hour 40 minute service was achieved, only to be lost as a result of this deferred maintenance.

3.2.1 Freight. These capacity constraints also affect freight service along the corridor. Recent testimony to the Surface Transportation Board by Neil Pedersen, Executive Board Chairman of the I-95 Corridor Coalition, suggested that the situation is perilous along the entire eastern seaboard, but particularly along

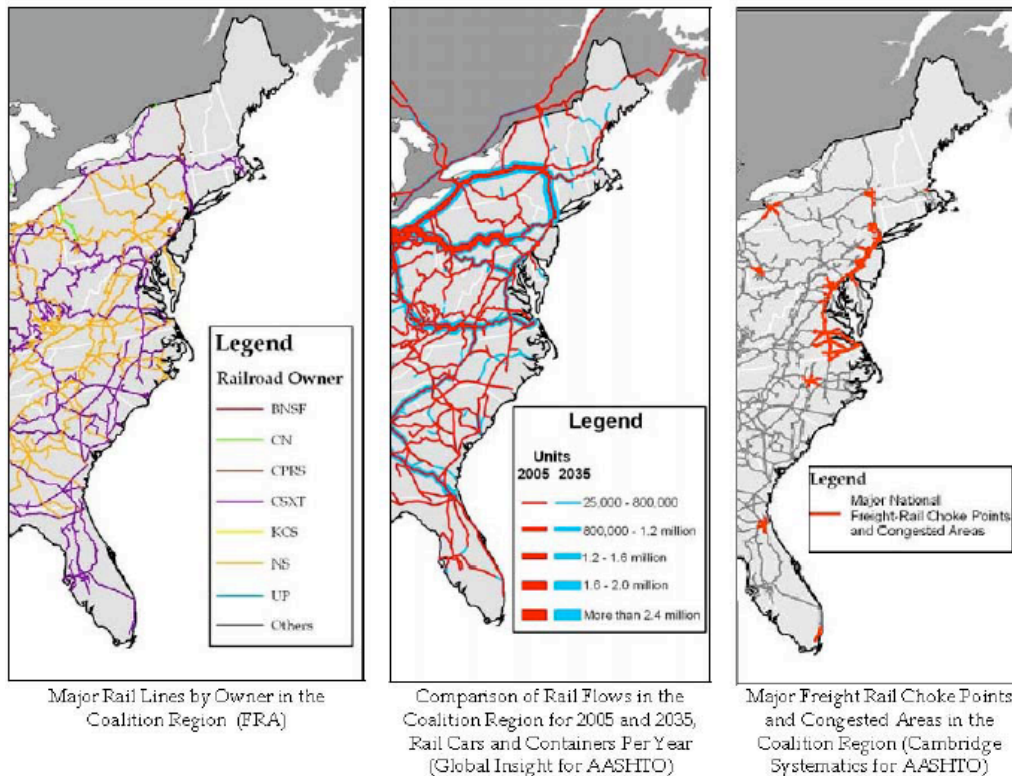
²⁹ Amtrak Reform Council, “Today, the Amtrak Reform Council Releases its Action Plan for the Restructuring and Rationalization of the National Railroad Passenger System,” Press Release (February 7, 2002), p. 1.

³⁰ Alan M. Voorhees Transportation Center and Hamilton, Rabinovitz & Alschuler, Inc., *Northeast Corridor Action Plan: A Call for a New Federal-State Partnership* (November 2006), p. 3.

³¹ U.S. DOT, Office of the Inspector General, *Reauthorization of Intercity Passenger Rail and Amtrak*, Testimony before the Committee on Commerce, Science, and Transportation, Subcommittee on Surface Transportation and Merchant Marine, U.S. Senate – Statement of the Honorable Kenneth M. Mead, Inspector General, U.S. Department of Transportation, CC-2005-030 (Washington, DC: GAO, April 21, 2005), p. 9.

the Northeast Corridor between Boston and Washington, DC. Figure 4 shows the major freight rail lines on the east coast, the rail volumes in 2005 and projected to 2035, and major choke points and congested areas. As one can see, the vast majority of the congested areas and choke points reside along the NEC. Moreover, these choke points significantly reduce the potential of the corridor to support increased freight traffic, as evidenced by the middle picture, which shows very little growth along the NEC mainline.

Figure 4. Major Rail Lines, Rail Flows, and Choke Points/Congested Areas



From: Neil J. Pedersen, "Rail Infrastructure Requirements" (April 11, 2007), p. 6.

In 2002, the Mid-Atlantic Rail Operations study (MAROps), a joint initiative of the I-95 Corridor Coalition, the states of Delaware, Maryland, New Jersey, Pennsylvania, and Virginia, and Amtrak, CSX, and Norfolk Southern, issued their report identifying seventy-one major projects to address bottlenecks in just in these five states. The projects were aimed at aging and undersized bridges and tunnels, lack of sufficient track capacity, inadequate horizontal and vertical clearances, and outmoded information and control systems.³²

The Northeast Rail Operations Study (NEROps) which has followed MAROps, notes several additional challenges confronting the seven states of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. Among them, are the increases in both passenger and freight (especially intermodal) traffic, and the inability of the rail freight yards to handle these increasing volumes, as well as the lack of sufficient trackage to meet this growth.³³

3.3 Inability to Offer a Clear Alternative

In some respects, these ongoing limitations on capacity can be viewed as a reflection of the inability at both the state and federal levels to develop a more comprehensive vision for the corridor, and an

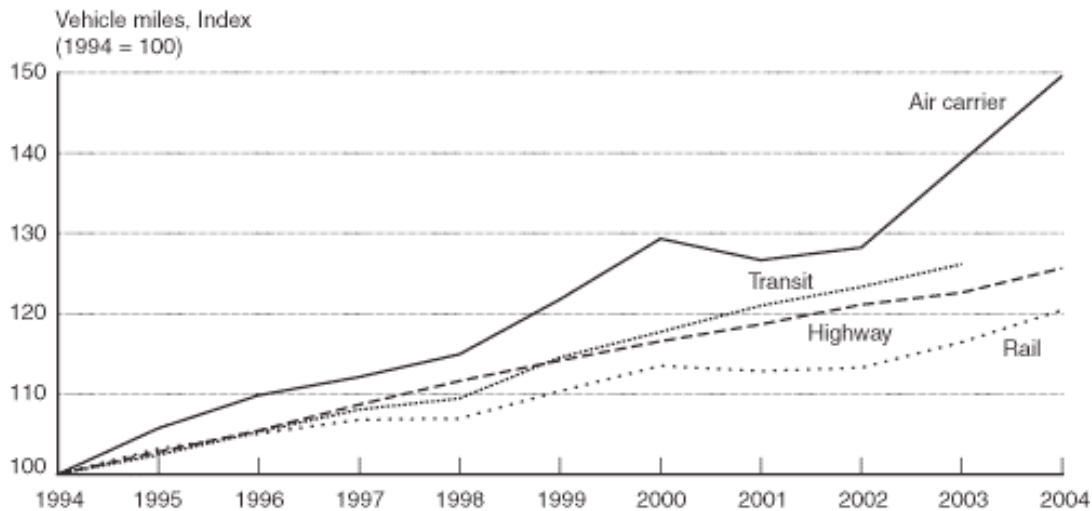
³² I-95 Corridor Coalition, *Mid-Atlantic Rail Operations Study (MAROps)* (Cambridge: Cambridge Systematics, April 2003); Allison L. C. de Cerreño, *Identifying and Reducing Institutional Barriers to Effective and Efficient Freight Movement in the Downstate New York Region* (NY: NYU Wagner Rudin Center, December 2006), pp. 19-20.

³³ Neil J. Pedersen, "Written Testimony on Rail Capacity and Infrastructure Requirements," Submitted by the I-95 Corridor Coalition to the Surface Transportation Board for the Hearing Record on Rail Capacity and Infrastructure Requirements (April 11, 2007), pp. 8-9.

unwillingness to make the appropriate investments in it. The overall result of these constraints is an inability on the part of rail to offer a clear alternative to air and automobile (or in the case of freight, truck) travel along the NEC. While some passengers prefer the intercity rail service, it is not clearly faster in many cases than the alternate means, and to woo new passengers as well as freight away from the other modes, reduced travel times, increased efficiency, and increased reliability are critical.

An indication of rail's inability to offer an effective and reliable alternative comes from national figures related to the increase in vehicle miles for all modes between 1994 and 2004 (Figure 5). While all modes

Figure 5. Index of U.S. Vehicle Miles, 1994-2004



From: *BTS, Transportation and Statistics Annual Report 2006* (Washington, DC: BTS, December 2006), Figure B-1.

experienced increases during this period, air and highway continued to outpace rail.

Further complicating the situation for passenger rail is the fact that there is a comparable lack of investment in urban transit and commuter rail throughout the corridor, along with additional deferred maintenance and large budget deficits. Ridership figures from London and Tokyo are indicative of this situation. In London, per capita urban rail ridership is more than double that of Philadelphia, Boston, or Washington, DC – all key urban centers along the NEC.³⁴ While Tokyo has double the population of New York City, ridership levels are three times higher than in New York City.³⁵ Similarly, links are often missing between ports and key rail lines along the corridor so trucks are still needed for freight connections.

Thus, the overall picture for the corridor is of an inadequate rail network at all levels, both for passengers and freight. Such inadequacies not only reduce efficiency and reliability, but also result in lack of key connectivity between different services, again making it more difficult to justify rail transportation when compared to air or highway.

4. New Opportunities

Along with the current challenges are new opportunities that can help shape and define the future of rail in the corridor.

4.1 Technologies

Technology is often pointed to as one means for enhancing operations in transportation, mitigating congestion, and addressing a myriad of other issues. Indeed, there are a number of technologies, broadly

³⁴ University of Pennsylvania, *Reinventing Megalopolis*, p. 13.

³⁵ *Ibid.*

grouped as intelligent railroad systems, that could help transform rail on the Northeast Corridor. Among them are, for example, digital data communications, track sensors, emergency notification systems, crew alertness monitoring systems, Positive Train Control (PTC), differential global positioning systems (DGPS), electronically-controlled pneumatic (ECP) braking systems, automatic equipment identification, and intelligent grade crossings.³⁶ Together, such technologies can increase safety and security, enhance capacity and asset utilization, reduce energy consumption and resulting emissions, and increase profitability and customer satisfaction.³⁷ For example, while current train air braking systems are applied sequentially along the length of a train, ECP braking systems allow simultaneous braking of all cars. The result is a substantial reduction in braking distance and time, which allows for faster trains with less space in between them. By increasing effective capacity while ensuring safety and security, ECP braking systems and other intelligent railroad systems could help to increase both passenger and freight rail service along the NEC.

Nevertheless, while new technological systems might aid to some degree with respect to rail operations on the NEC, in an important sense, technologies are not the limiting factor for rail on the NEC. Nowhere is this clearer than in intercity rail operations where high-speed technologies have been available for decades, and have been deployed successfully in many parts of the world, but only to a very limited extent on the Northeast Corridor, and nowhere else in the United States.

Japan's *Shinkansen* was first deployed in 1964, at the same time as the United States was pursuing the Metroliner and TurboTrain on the NEC. Over three decades later, the NEC is still dysfunctional, while Japan is already moving toward a third-generation model that will be even faster than the current 186 mph. Throughout Europe and Asia there are multiple examples of high-speed intercity rail, using several different technologies. France's TGV (Train à Grand Vitesse – now sometimes called the Automotrice à Grand Vitesse), Germany's ICE (Intercity Express), and Taiwan's THSR (Taiwan High Speed Rail) all run at comparable speeds. Italy's Treno Alto Velocità (TAV) also cruises at 186 mph but can also run on regular rail lines at 155 mph – still higher than on the NEC. More recently, Spain (Alta Velocidad Española – AVE) and Korea (KTX) have deployed and continue to expand their intercity high-speed rail lines. And, of course there is Shanghai's Maglev.

Thus, high-speed technologies are readily available as are information systems and a variety of other technologies that could help improve rail operations on the NEC. Steven Ditmeyer echoes this, suggesting that many of the technologies integral to intelligent railroad systems are already being used or tested on highways, in air traffic control, for maritime vessel tracking, parcel delivery services, emergency response systems, and for military command and control applications.³⁸ Yet, their applications and deployment to the rail industry, both passenger and freight, still lag behind. Indeed, as with the high-speed technologies, PTC has been piloted for over a decade, but has still not been widely deployed in the United States.

Thus, while technological advances may help to some degree, on its own technology is unlikely to generate a new future for rail in the corridor by 2025. The more difficult and yet more central issue is the willingness to invest in these technologies and implement them. With that said, however, there are several other areas of opportunity that might aid in providing the political will, and resulting financial support, to do just that.

4.2 Congestion

Rail offers one means for alleviating congestion on the increasingly crowded highways and airways throughout the northeast. Along the entire Northeast Corridor, roadways are clogged with both passenger and freight traffic. According to the Texas Transportation Institute, in 2005, travelers on the roadways along the NEC experienced over 867 million hours of travel delay, for a total cost of over \$14.6 billion.³⁹

³⁶ Steven R. Ditmeyer, "Network-Centric Railroading Utilizing Intelligent Railroad Systems," Presented at the World Bank Transport Forum 2006 (May 31, 2006), <http://www.worldbank.org/transport/learning/tf2006/railways%20day/presentations/ditmeyer2.ppt#1> (accessed 6/4/07); Ditmeyer, "Network-Centric Railroading Utilizing Intelligent Railroad Systems," Presented at the 10th International Command and Control Research and Technology Symposium (June 13-16, 2006).

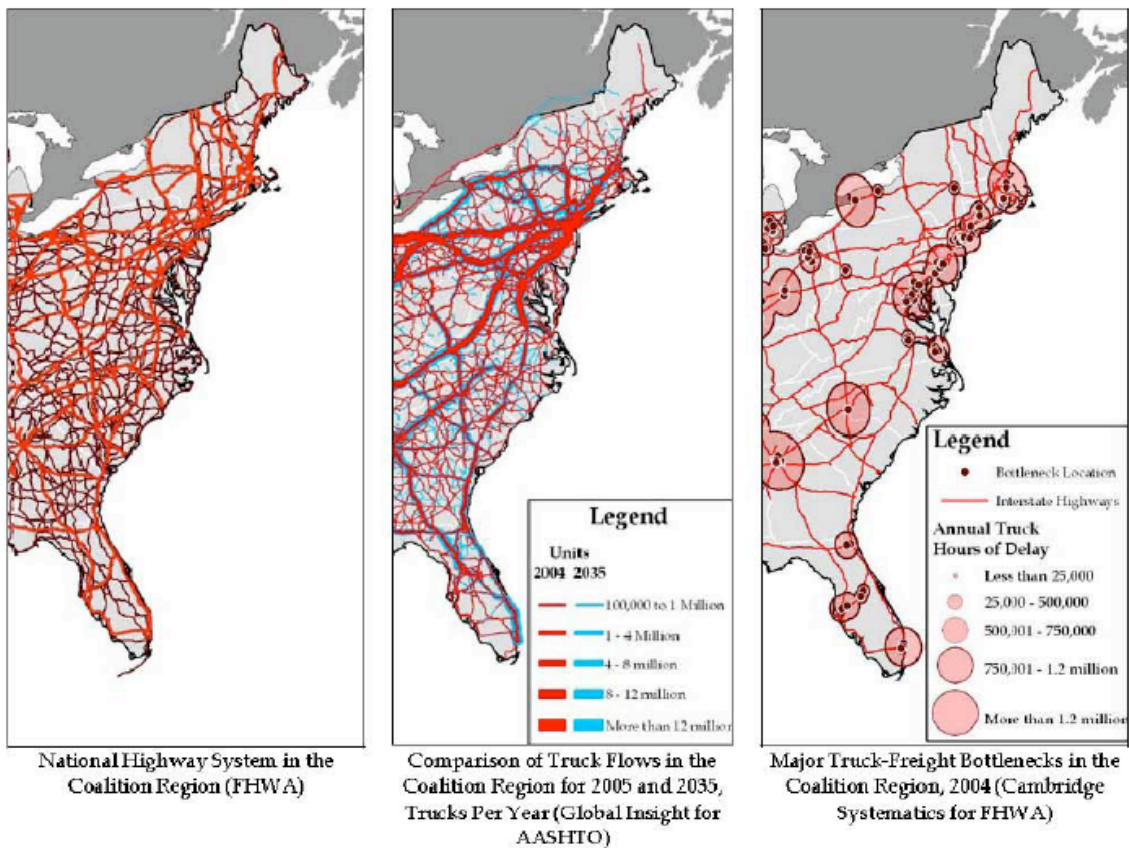
³⁷ Ibid.

³⁸ Ibid.

³⁹ David Schrank and Tim Lomax, *The 2005 Urban Mobility Report* (College Station, TX: TTI, May 2005), Table 2.

As overall travel increases, so does freight transport on the corridor's major highways. Figure 6 provides a pictorial of the overall system of major highways, the truck flow volumes along them (current and projected), and the key bottlenecks. As can be seen, the bottlenecks run along the entire corridor and serious delays occur in every major metropolitan area along the route.

Figure 6. Major Highways, Truck Flows, and Bottlenecks on the East Coast



From: Neil J. Pedersen, "Rail Infrastructure Requirements" (April 11, 2007), p. 4.

Airspace along the corridor is also becoming increasingly congested. According to the most recent *Terminal Area Forecast Summary* released from the Federal Aviation Administration (FAA), the projected growth in enplanements by 2025 for the largest five airports along the corridor ranges from 62.8% (General Edward Lawrence Logan International, Boston, MA) to over 128% (Washington Dulles International, Washington, DC). By 2025, enplanements at John F. Kennedy International (New York City, NY), Newark Liberty International (Newark, NJ), and Philadelphia International (Philadelphia, PA), are expected to increase by 91.6%, 88.5%, and 96.3%, respectively.⁴⁰ With these forecasts in mind, the FAA has suggested that even if all current planned improvements are made at John F. Kennedy International, Newark Liberty International, and Philadelphia International airports, each of them will still need more capacity by 2025. Logan and Dulles airports will be able to meet passenger travel needs by 2025, but only if current planned improvements are all made.⁴¹

Enplanements are only a part of the picture as they measure only passenger travel. While freight data is more difficult to assess, air cargo is also growing, albeit at a more modest rate compared to passenger travel. According to the Airports Council International, for example, cargo volumes over the twelve-month period ending in February 2007 grew by 1.3% at John F. Kennedy Airport, and by 2.1% at Newark Liberty

⁴⁰ U.S. DOT, Federal Aviation Administration (FAA), *Terminal Area Forecast Summary: Fiscal Years 2006-2025*, FAA-APO-07-1 (Washington, DC: FAA, March 2007), p. 9.

⁴¹ U.S. DOT, FAA, *Capacity Needs in the National Airspace System, 2007-2025: An Analysis of Airports and Metropolitan Area Demand and Operational Capacity in the Future (FACT 2)* (Washington, DC: FAA, May 2007), pp. 17-19.

International Airport.⁴² As congestion reaches a point where there is no more capacity to be found, and as costs increase and productivity is lost, rail may again prove an important means for moving additional passengers and freight.

4.3 Environmental and Health Concerns

A second area of opportunity for rail relates to environmental and health concerns, both in terms of greenhouse gas emissions and emissions that are increasingly being linked to health-related problems. Among the greenhouse gases, transportation is the second largest producer, after electric power generation, of carbon dioxide (CO₂). In 2006, the transportation sector contributed roughly one-third of all U.S. CO₂ emissions.⁴³ This share is expected to grow slowly through 2025 (Figure 7.)

In 2002, the transportation industry was also responsible for 77.3% of carbon monoxide (CO) emissions. CO indirectly increases global warming by indirectly affecting levels of other direct greenhouse gases like methane and ozone.⁴⁴

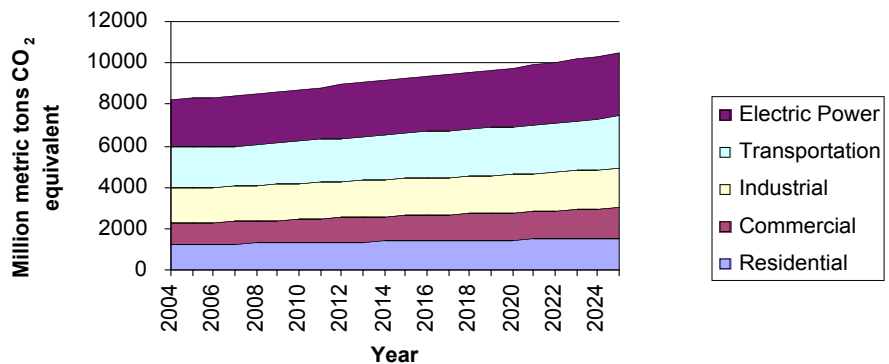
While there is increased international attention being paid to greenhouse gas emissions and global

warming, there is also increased local attention focused upon emissions that can cause more immediate health impacts. Ozone, created by the mixing of volatile organic compounds (VOC) and nitrogen oxides (NO_x), in the presence of heated sunlight, has been implicated in lung problems and increased asthma attacks.⁴⁵ Figure 8 demonstrates the severity of the air quality problem along the NEC for ozone. A similar picture results for particulate matter, which is increasingly being blamed for negative effects on health.

In both these cases, transportation plays a significant role with respect to emissions. In 2002, 54.3% of the total NO_x emissions in the United States, and 43.7% of the emissions of volatile organic compounds VOC (the key contributors to ground-level ozone formation), resulted from the transportation sector.⁴⁶ Transportation is also responsible for emissions of ammonia, sulfur dioxide (SO₂), and particulate matter.

With respect to mode distribution, highway vehicles (passenger vehicles, small commercial trucks, large trucks, and buses) continue to be responsible for the largest share of all of these emissions, but their share is declining relative to other modes, and in particular off-highway vehicles. For example, while highway vehicles were responsible for just over three-quarters of all transportation-related CO emissions in 2002, this represented a significant drop from 1970 when highway vehicles accounted for over 93% percent of such emissions. Off-highway vehicles, however, have risen in their share of emissions, with only a 6.2% share in 1970, rising to over 27% in 2002.⁴⁷ This is likely the result of implementation of

Figure 7. CO₂ Emissions by Sector and Source



Source: U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2007*, Table 18.

⁴² Airports Council International, "Cargo Traffic for Past 12 Months: 12 Months Ending February 2007," http://www.airports.org/cda/aci/display/main/aci_content.jsp?zn=aci&cp=1-5-54-4819_9_2 (accessed 6/4/07).

⁴³ U.S. Department of Energy (DOE), Energy Information Administration (EIA), *Annual Energy Outlook, 2007*, DOE/EIA-0383 (Washington, DC: EIA, February 2007), Table 18.

⁴⁴ National Oceanic and Atmospheric Administration, "Greenhouse Gases," <http://lwf.ncdc.noaa.gov/oa/climate/gases.html> (accessed 6/5/07).

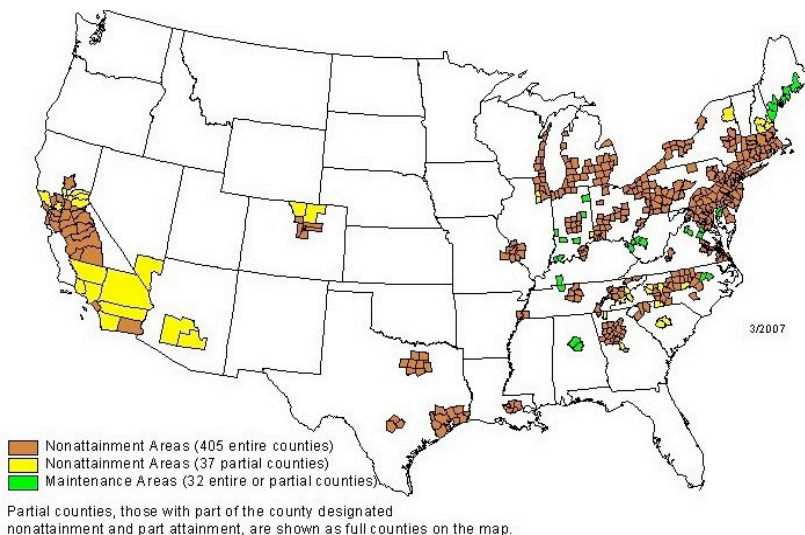
⁴⁵ See, for example, Diane Bailey, et al., *Harboring Pollution: The Dirty Truth About U.S. Ports* (NY: National Resources Defense Council, March 2004).

⁴⁶ Davis and Diegel, *Transportation Energy Data Book: Edition 26-2007*, p. 12-1.

⁴⁷ Stacy Davis and Susan Diegel, *Transportation Energy Data Book: Edition 26-2007*, ORNL-6978, Prepared for the US Department of Energy (Oak Ridge: USDOE, 2007), p. 12-3.

stronger emissions regulations for passenger cars and trucks while construction vehicles, tractors, bulldozers, etc., remain largely unregulated.

Figure 8. Nonattainment & Maintenance Areas in the United States – 8-hour Ozone Standard



From: EPA, <http://www.epa.gov/oar/oaqps/greenbk/map8hrmm.html>.

As early as October 1990, when CONEG released its study on the NEC, there was discussion about the importance of rail in helping to reduce air pollution.⁴⁸ Other U.S. efforts aimed at developing high-speed intercity rail (e.g., Florida, California) often cite pollution reduction as a key benefit of rail. For example, the Midwest High Speed Rail Association (MHSRA) notes on their website that high speed rail (110 mph) produces significantly lower emissions of VOC, CO, and NO_x (Figure 9).

Figure 9. Tons/Millions of Passenger Miles (Selected Pollutants)

Pollutant	Rail	Air	Car
VOC	0.084	1.582	0.703
CO	0.703	2.619	5.981
NO _x	1.214	1.164	1.955

From: MHSRA, http://www.midwesthsr.org/whyRail_cleaner.htm

One must be careful at comparing emissions across mode, since there are many intervening factors (e.g., climate, type of locomotive engine, power generation mix). However, broadly speaking, rail does tend to produce fewer greenhouse gases. Indeed, a 1999 report for the United Nations Environment Programme and the World Meteorological Organization joint Intergovernmental Panel on Climate Change provided a comparison across modes (both passenger and freight), accounting for different variables in each mode, and rail still measured well compared with the alternatives (Figure 10).⁴⁹ Moreover, according to a report by the United Kingdom Department for Transport, while carbon emissions from electric trains are dependent upon the mix used for power generation, electric trains produce zero emissions at the point of use, something particularly helpful in urban areas trying to reduce their global greenhouse gas footprint and other harmful emissions.⁵⁰

⁴⁸ Parsons Brinckerhoff Quade & Douglas, Inc., et al., *CONEG High-speed Rail Regional Benefits Study*, p. ES-2

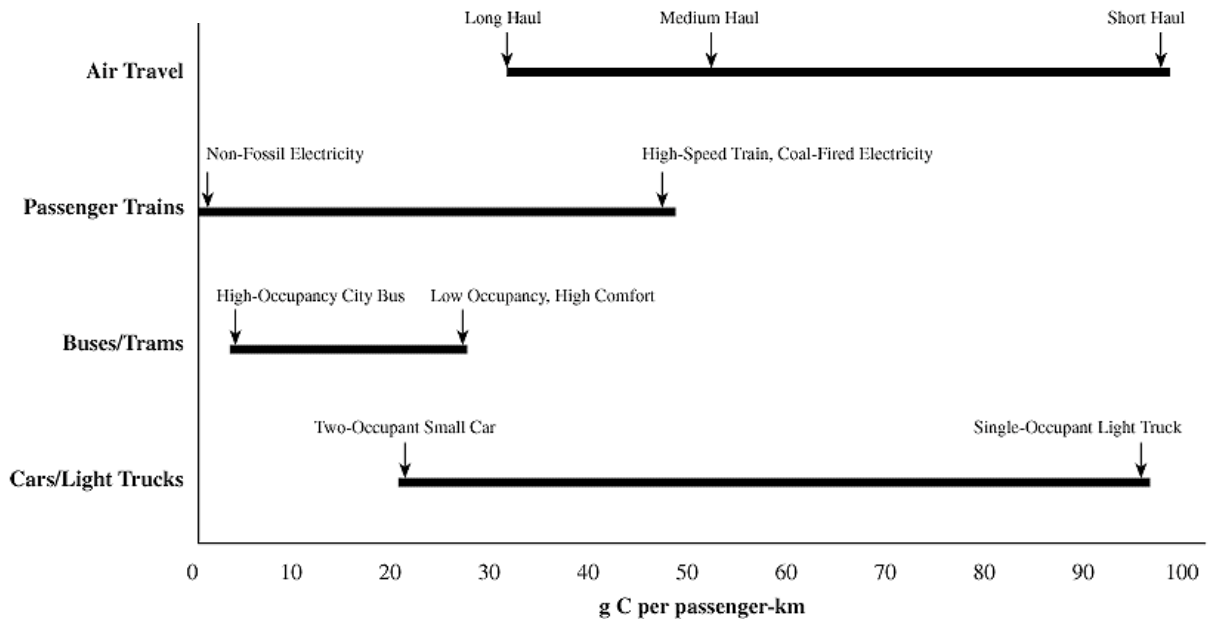
⁴⁹ Joyce E. Penner, ed., *Aviation and the Global Atmosphere*, Intergovernmental Panel of Climate Change, Summaries for Policymakers (Geneva: UNEP and WMO, 1999), <http://www.grida.no/climate/ipcc/aviation> (accessed 6/7/07).

⁵⁰ United Kingdom Department for Transport, *Low Carbon Transport Innovation Strategy* (London: Crown, May 2007), p. 59, <http://www.dft.gov.uk/pgr/scienceresearch/technology/lctis/> (accessed 6/7/07).

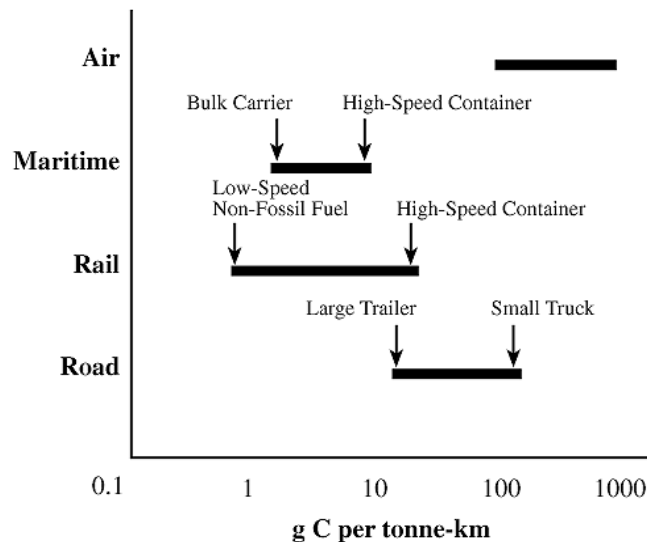
While the environmental argument has not yet proven persuasive in the United States, in other countries, emissions reduction is being taken more seriously. Spain's decision to invest in its AVE was, in part, a result of the Kyoto Protocol and a desire to reduce greenhouse gases. With more attention focused on the environment and air quality, especially in light of New York City Mayor Michael Bloomberg's PlaNYC – a vision for a sustainable New York City by 2030 – and with the likelihood that this will be just the first in a series of announcements by and interest on the part of urban areas around the country, there again is an opportunity for rail to be injected into the discussions.

Figure 10. CO₂ Intensity of Passenger and Freight Transportation Modes

Passenger Transport



Freight Transport



From: Penner, *Aviation and the Global Atmosphere*, Figures 8-4 and 8-6, respectively.

4.4 Security

Since September 11, 2001, U.S. political leaders have been focused on how to increase homeland security and again, there is an opportunity for rail to play an increasingly central role in these discussions. With respect to transportation, the current debate tends to revolve around how best to ensure the security of passengers and freight. However, there are other ways in which security concerns become an opportunity for rail in the corridor.

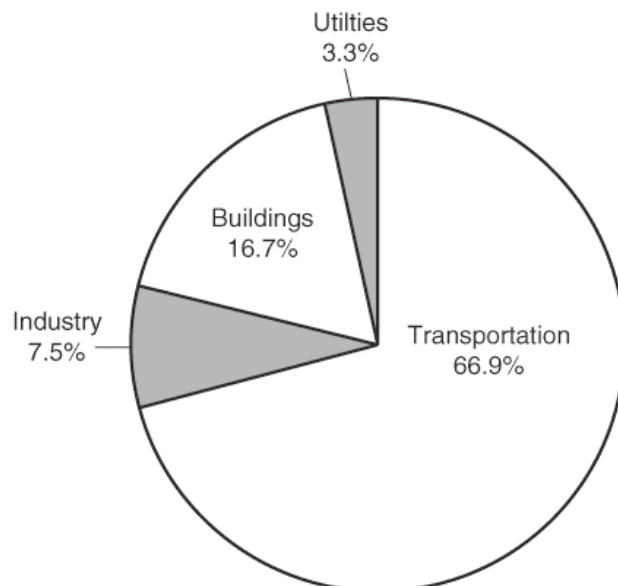
First, central to enhancing security is increasing redundancy (the availability of alternate options), resiliency (the ability to recover from an event), and robustness (the inherent strength to withstand an event without degrading). In the case of transportation, this means providing alternate and well connected modes, especially along key corridors like the NEC so that if something were to occur – either a human-made or natural catastrophe – other means would be available for continuing to move passengers and freight. In fact, on September 11, when planes around the country were grounded, most rail lines continued to run, providing vital connections, especially on the east coast.

Another area of security which may provide opportunities for rail in the longer term relates to energy security and the U.S. policy goal of having a lowered reliance on petroleum. Energy consumption in the transportation sector is almost entirely based on petroleum (98%).⁵¹ Moreover, by sector, transportation accounts for the largest share of petroleum usage in the United States, with over two-thirds of all petroleum used in transportation in 2005 (Figure 11).⁵² By mode, highway vehicle travel accounts for 85% of petroleum used in transportation, air travel accounts for 9%, and the remainder (6%) represents a combination of rail and waterborne travel.⁵³

Rail is considered much more energy efficient than motor vehicles. With respect to freight, for example, the U.S. Department of Energy cites rail as being roughly 11.5 times more efficient (in terms of Btu/ton mile) than trucks.⁵⁴ With respect to passenger rail, there are efficiencies compared to passenger vehicles as well.

In the short term, the debate surrounding U.S. policy goals for petroleum usage often appears to be plagued more by rhetoric than a real desire to shift to other fuel sources. Indeed, average fuel efficiency peaked in 1987 at 22.1 miles per gallon and is currently down to 21 miles per gallon.⁵⁵ Nevertheless, as petroleum prices rise and pass \$4 and eventually \$5 or more, there may be increased interest in rail as an alternative.

Figure 11. U.S. Petroleum Use by Sector, 2005



From: U.S. DOT, BTS, *Transportation Statistics Annual Report 2006*, http://www.bts.gov/publications/transportation_statistics_annual_report/2006/html/chapter_02/table_k_03.html

⁵¹ U.S. Department of Energy, EIA, *Annual Energy Outlook, 2007*, p. 44.

⁵² U.S. Department of Transportation, Bureau of Transportation Statistics (BTS), *Transportation Statistics Annual Report 2006* (Washington, DC: BTS, December 2006), http://www.bts.gov/publications/transportation_statistics_annual_report/2006/html/chapter_02/table_k_03.html (accessed 6/4/07).

⁵³ Ibid.

⁵⁴ Ibid.

⁵⁵ Robert M. Heavenrich, *Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2006*, Executive Summary, EPA420-S-06-003 (Washington, DC: EPA, July 2006), p. 1.

5. What Could and Should the Future Hold?

Given the history of the NEC and the current situation with respect to support (or lack thereof) for rail, when looking out to 2025, the picture is not terribly optimistic. Yet, we are increasingly challenged as our desire to grow economically is increasingly constrained by congestion, environmental and health concerns, the need to conserve energy, and the need to improve security. While not by any means the only solution, rail must certainly play a more important role in addressing these challenges. However, in considering what role rail must play and how it must be connected, we need to think beyond rail.

5.1 From Megalopolis...

In 1961, Jean Gottmann published his book and coined the phrase, *Megalopolis* (which he had first used in an article several years earlier), to describe the northeast corridor from Boston to Washington, DC.⁵⁶ Several years later, Claiborne Pell published, *Megalopolis Unbound*, which informed the early discussions on the NEC and the vision of what it could be if thought of as a larger region.⁵⁷ Megalopolis, as used by Gottmann and Pell, referred to a "...chain of metropolitan areas, each of which grew around a substantial urban nucleus."⁵⁸ At the time, Gottmann suggested that, among other things, a new way of governing might be needed to deal with the challenges that would be faced by this megalopolis including (ironically) "traffic difficulties."⁵⁹

Focusing on large cities as key economic generators and the need to think more broadly about how they connect has been revisited in recent years. In 2006, Richard Morrill updated the original maps in *Megalopolis*, suggesting that while in 1950, the corridor was more a "string of pearls" with vast rural areas in between the large connecting cities, with the turn of the century the corridor has become an almost continuous urban settlement.⁶⁰ Looking more closely at transportation between Boston and Washington, DC, in *Reinventing Megalopolis: The Northeast Megaregion*, the authors describe the NEC as now consisting of a "chain of overlapping commuting patterns."⁶¹

There are some interesting parallels with the overall concept of the megalopolis and rail transportation in the United States. Just as the United States was one of the first countries to deploy high speed rail and yet quickly fell behind its European and Asian counterparts, the Northeast Corridor was the first megalopolis and yet the United States is now behind here too. During the past few decades, while Europe and Asia have been moving toward broader regional and national planning and new forms of governance to allow this to occur, the United States has moved further away from such regional views and mechanisms, leaving planning and investment increasingly in the hands of state and municipal governments and agencies.⁶²

The result, at least in terms of transportation, is that while large-scale projects crossing various regions (and in some cases, country borders) are being developed and implemented in Europe and Asia, the United States is unable to keep pace. Nowhere is this clearer perhaps than along the NEC. While high-speed trains take just under 3 hours (soon to be reduced to 2 hours and 15 minutes), to travel the 480 miles between Paris and Marseille, traveling between Boston and Washington, DC by rail (only 456 miles) still takes 6 hours and 30 minutes.⁶³

Rail transportation in the United States is very much in need of a national policy and a corresponding regional implementation plan. This is particularly important on the NEC, where multiple states are involved as well as multiple agencies and authorities, and where very large sums of funding will be

⁵⁶ Jean Gottmann, *Megalopolis: The Urbanized Northeastern Seaboard of the United States* (NY: The Twentieth Century Fund, 1961).

⁵⁷ Claiborne Pell, *Megalopolis Unbound: The Supercity and the Transportation of Tomorrow* (NY: Praeger, 1966).

⁵⁸ Jean Gottmann, "Megalopolis or the Urbanization of the Northern Seaboard," *Economic Geography* 33, 3 (July 1957): 189.

⁵⁹ *Ibid.*, p. 194.

⁶⁰ Richard Morrill, "Class Map Revisited: The Growth of Megalopolis," *The Professional Geographer* 58, 2 (May 2006): 155-160.

⁶¹ University of Pennsylvania, *Reinventing Megalopolis*, p. 7.

⁶² *Ibid.*, p. 3.

⁶³ "High-Speed Rail Give Short-Haul Air a Run for the Money in Europe, with More Flexible Travel, Greater Comfort, Lower Environmental Impact," *PRNewswire* (April 20, 2007), http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=ind_focus.story&STORY=/www/story/04-20-2007/0004570197&EDATE=FRI+Apr+20+2007.+10:48+AM (accessed 5/10/07).

necessary. Megalopolis provides the conceptual basis for pursuing such policy and the coalition that could be built upon this concept would have a greater sphere of influence than any one group could on its own. Further, such a coalition could provide an agglomeration of economies and allow for pooling of funding for the large projects that are needed.⁶⁴

5.2 ...to Megamodal

Megalopolis thus provides an important conceptual basis for developing new ways of planning and new forms of governance along the Northeast Corridor, as well as new opportunities for financing. However, with respect to transportation, more is needed, especially given the limitations imposed by the built urban environment that characterizes the majority of the corridor.

As we begin to think in larger terms with respect to how our cities and regions are connected, we also need to be thinking about how our passenger and freight transportation relate to each other, and how all the transportation modes relate to each other. Given scarce resources, it is no longer sufficient to look at the feasibility of beginning or increasing service on a particular mode of transportation. We need to begin thinking beyond intermodalism (which can mean linking as few as two types of transportation modes) and multimodalism (which just refers to the presence of more than one mode of transportation), to thinking of our transportation network as an entire organic system – in essence, a *megamodal* approach – in which decisions taken in one area are likely to have an impact (either positive or negative) in others.

With a *megamodal* approach, one no longer thinks about how rail best connects to transit services or even how intercity rail can aid in opening up airspace for more long-haul planes (though that is, indeed, part of the discussion). A *megamodal* approach for the Northeast Corridor challenges us to look at all transportation modes along the entire corridor, and develop a vision for how passengers and freight can most effectively share the system (in an environmentally-sustainable way) while creating the highest levels of mobility and accessibility possible for both people *and* goods.

5.3 The NEC in 2025

To think of the entire transportation network, as an organic system is a daunting task and, at this point, the types of metrics and data that would be needed to make decisions using a *megamodal* approach have not all been developed or gathered. Moreover, few decision makers are thinking along these lines. Thus, if we ask “what will rail in the NEC look like in 2025?” the answer is likely “not very different from what it looks like today.” Perhaps if the political will can be found to provide some additional monies for state of good repair (and to deal with the moveable bridge issue on the north-end), intercity passenger rail may be able to sustain current trip times and might even be able to add some additional trains. Commuter and freight rail operations along the corridor might also be able to sustain current operations and, in some locations (primarily on the north-end) add some modest service.

However, if we ask a different question, namely “what should and could the NEC look like in 2025” the answer is quite different, especially if one applies a *megamodal* approach while envisioning it. With a *megamodal* approach applied to the NEC, one can begin to imagine a Northeast Corridor in 2025 along which the investment has been made to develop a true high-speed intercity rail line that forms the central spine of a fully interconnected transportation system. At various nodes (cities) along the way, investments have been made in transit (bus, rail, ferry as appropriate), in transit oriented development, and in commuter services, so that the vast majority of people living within the Boston-Washington, DC megalopolis are now easily able to get from their homes to places they want to work or visit, with sufficient service and comfort that they need not use air travel, nor personal vehicles in most instances within the region. At the same time, investments will perhaps have been made in cleaner truck technologies and truck lanes since trucks can now benefit from decreased passenger use of highways, and in the links between marine ports, short-sea shipping, highways, and rail (where still appropriate in the northeast) to create more efficiency in freight movements as well. And, finally, with the additional space freed up in the air, airlines will be able to focus more on long-haul travel and opening new markets abroad that link the world to the northeast megalopolis.

⁶⁴ Paula Dowell, “Multi-state/Jurisdictional Freight Transportation Planning,” Presented for the FHWA Talking Freight Seminar, 12/15/04.

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