

# CRS Report for Congress

## Rail Transportation of Coal to Power Plants: Reliability Issues

September 26, 2007

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Prepared for Members and  
Committees of Congress

# Rail Transportation of Coal to Power Plants: Reliability Issues

## Summary

Half the nation's electricity comes from coal, and most of that coal is delivered to power plants by railroads. The reliable supply of coal by rail is therefore important to the electric power system. Concern over reliable deliveries of coal and other commodities, limited rail system capacity, and related issues such as rail rates, sparked several congressional hearings in 2006.

This report provides background information and analysis on coal transportation by rail to power plants. The report discusses:

- Problems since 1990 with the rail delivery of coal.
- Implications of rail capacity limits on service reliability.
- The role of coal inventories as a backstop to reliable coal deliveries.
- Proposed legislation intended, in part, to improve the quality of rail service to coal-fired plants and other shippers.

The report also identifies data and analysis gaps that complicate measuring the scope of rail service and capacity issues, determining the need for federal action, and evaluating the possible efficacy of proposed legislation.

Freight rail transportation and electric power generation are mutually dependent network industries. Railroads accounted for over 70% of coal shipments to power plants in 2005, and due to economic and physical limitations on other modes (truck, barge, and conveyor) the heavy dependency of the power industry on rail transportation is likely to continue into the future. From the standpoint of the rail industry, coal transportation is an important business, accounting in recent years for about 20% of freight revenues for the major railroads.

The mutual dependency between the rail and power industries creates a complex business relationship. There are connections and to some degree tradeoffs between such factors as railroad investments in capacity and service enhancement, and power company tolerance for transportation risk and willingness to carry the cost of larger coal stockpiles. A central point is that increasing the reliability of coal deliveries to power plants costs money, as does coping with disruptions. A central issue between power companies and railroads is how these costs should be shared.

This report will be updated as developments warrant.

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# Rail Transportation of Coal to Power Plants: Reliability Issues

## Introduction and Review of Findings

Half the nation's electricity comes from coal, and most of that coal is delivered to power plants by railroads. The reliable supply of coal by rail is therefore important to the electric power system. Concern over reliable deliveries of coal and other commodities, limited rail system capacity, and related issues such as rail rates, sparked several congressional hearings in 2006.<sup>1</sup>

This report provides background information and analysis on coal transportation by rail to power plants. The report discusses:

- Problems since 1990 with the rail delivery of coal.
- Implications of rail capacity limits on service reliability.
- The role of coal inventories as a backstop to reliable coal deliveries.
- Proposed legislation intended, in part, to improve the quality of rail service to coal-fired plants and other shippers.

The report also identifies data and analysis gaps that complicate measuring the scope of rail service and capacity issues, determining the need for federal action, and evaluating the possible efficacy of proposed legislation.

## Review of Findings

CRS research finds that there have been nine episodes since 1990 in which coal supply to power plants has been disrupted by rail transportation problems (Appendix 1). The causes of these problems vary, including severe weather; surges in demand; difficulties with rail system integration consequent to railroad mergers; and major, unplanned maintenance programs. The most significant events were probably in 1997 and 1999 (merger-related), and in 2005 (related to unplanned maintenance to western coal lines). Research indicates that each of these events involved major, widespread congestion and concomitant delivery delays. However, the cost consequences of these events appear to be ill defined. We are unaware of any comprehensive cost estimates by the electric power industry, government agencies, or other entities. CRS identified, from scattered electric power industry sources,

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<sup>1</sup> These included House Committee on Transportation and Infrastructure (Subcommittee on Railroads, April 26, 2006); Senate Committee on Energy and Natural Resources (full committee, May 25, 2006); Senate Committee on Commerce, Science and Transportation (Subcommittee on Surface Transportation and Merchant Marine, June 21, 2006); House Committee on Resources (Subcommittee on Water and Power, August 9, 2006).

estimates totaling \$228 million in costs from the rail service delays that began in 2005 (Appendix 2).

In addition to these major events, other more persistent indicators of service issues have appeared. The average speed of coal unit trains on the major coal-carrying railroads has generally declined since the early part of this decade. The electric power industry and other industrial shippers claim that the railroads are increasingly unwilling to offer strong service quality guarantees. This may indicate the reluctance, or inability, of the railroads to guarantee service quality when their systems are capacity constrained.

Capacity limits on the rail system appear to have contributed to coal transportation service problems. The rail industry has historically been plagued with uneconomic excess capacity. Since passage of the Staggers Rail Act in 1980, the railroads have brought capacity and the demand for rail services into alignment by increasing traffic, shedding assets and staff, and by generally not building new capacity far ahead of near-term demand expectations.

It appears that the railroads believe it would be uneconomic to build more buffer capacity to handle service contingencies, and question whether customers would be willing to pay for it. Wall Street has at times encouraged the rail industry to pursue a conservative approach to capital spending. However, without more buffer capacity, the rail network may lose resiliency. Unexpected events, such as bad weather or surges in demand, may be more likely to cause persistent congestion, and delays in deliveries of coal and other commodities.

A final aspect of tight rail system capacity is that it seems to have been an important factor in allowing the railroad industry — which has never been found revenue adequate by the Surface Transportation Board (STB) — to significantly increase coal and other rates, and boost profits since 2004. Other factors contributing to the ability of the railroads to raise rates include demand growth and muted competition from trucks (due to cost and capacity issues in that sector). Some parties have also suggested that the increase in rates is indicative of the ability of the rail industry to exercise pricing power, at least in some markets. The Government Accountability Office has performed a limited study of this issue, with inconclusive results. The STB is planning a study of this issue, due to be completed in late 2008.

The coal stockpiles stored at power plants are in some respects a backstop to rail system capacity. Power plant coal stocks cannot replace reliable rail service — even large stocks will eventually be depleted by a major transportation disruption, and not all plants have the space to store large amounts of coal — but stocks can act as a “shock absorber,” postponing the need for plant operators to find expensive alternative fuel or electricity supplies in the event of delivery delays. Power plant coal stockpiles, measured in days of burn,<sup>2</sup> have generally been declining since the 1970s (stocks dropped by 40% by the latter half of the 1990s). Coal transportation problems likely contributed somewhat to this decline, but a primary factor seems to

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<sup>2</sup> “Days of burn” means the number of days the stockpiles can support normal operations assuming no further deliveries.

have been efforts by the power industry to cut costs to improve financial results. In the case of regulated electric utilities, the impetus to cut costs was sometimes at the behest of regulators. The unregulated independent power producers (IPPs), who entered the coal generation market in the 1990s with the advent of power market restructuring, have generally maintained lower stocks than regulated utilities. This may reflect the greater exposure of IPPs to market forces and investor demands.

The electric power industry cut stocks even as more coal was shipped long distances from western mines. The decisions made to cut stocks presumably reflected, in part, the service guarantees included in rail transportation contracts, and the receding risk of coal miner strikes as more production came from non-union western mines. Nonetheless, it appears the power industry reduced stocks even as its supply lines lengthened and arguably became more vulnerable.

Since 2006, as rail service improved, the power industry has increased coal stocks. In addition to rebuilding western coal stocks depleted due to the rail service problems beginning in 2005, this trend probably reflects recognition of the risk of being caught short on coal supplies given the capacity constraints on the rail network. The stock build also may reflect the difficulty, noted above, the power industry (and other industries) claims to have had securing strong service quality guarantees from the railroads.

Several legislative proposals before the 110th Congress address rail service and other rail issues such as rate levels. These proposals fall into two categories: tax incentives to encourage the expansion of rail system capacity, and regulatory restructuring proposals aimed at changing the rail regulatory regime that has been in effect since the 1980s.<sup>3</sup>

The tax incentives are intended to encourage investments in rail system capacity, particularly for investments that expand system capacity.<sup>4</sup> Our understanding is that the incentives would be available to any party making rail-related investments, including, in addition to railroads, power plants and coal mines that make such capital expenditures.

The objective of increasing system capacity appears to be broadly consistent with the interests of coal and other shippers who want a more robust and reliable rail network, and of transportation planners who believe the market should have more options for moving some freight traffic off of highways. By effectively reducing the cost of capital expansion, the tax incentives also seem to address the reluctance of the

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<sup>3</sup> The specific bills are the Freight Rail Infrastructure Capacity Expansion Act of 2007 (S. 1125 and H.R. 2116), the Railroad Competition and Service Improvement Act of 2007 (S. 953 and H.R. 2125), and the Railroad Antitrust Enforcement Act of 2007 (S. 772 and H.R. 1650).

<sup>4</sup> A related issue, which is how or if the federal government should seek to ensure modal-neutral funding for rail and other freight modes, is beyond the scope of this report. Also note that because the proposed tax incentives would reduce revenues, the legislation may require offsets under Congressional “pay-as-you-go rules.”

rail industry to take on the additional financial risks inherent in greater capital spending.

Issues that may be of interest in evaluating the tax incentive proposals include:

- *Scope of the Problem and Information:* There is limited public information on rail system capacity or service for coal shipments and other traffic. This makes it difficult to quantify the current rail capacity and service situation, and would make it difficult to measure any benefits that flow from rail tax incentives. If there is interest in having the government collect and publish additional service and capacity data, a potential issue is data confidentiality. The rail industry may consider detailed capacity and service data to be business sensitive and proprietary. If data confidentiality is a concern, steps can be considered to prevent disclosure of confidential information, such as by aggregating or otherwise masking carrier-specific data.
- *Expected Outcomes:* Coal shippers appear to want a fluid, resilient rail network able to operate reliably even under adverse conditions. However, this may imply a level of investment in buffer capacity that the rail industry would find undesirable and unaffordable, even with tax incentives. As noted earlier, excess capacity has historically been a financial burden on the railroad industry; more recently, the close balance between rail capacity and demand appears to have contributed to the ability of the industry to raise rates and increase profits. Because of these factors, the response of the railroad industry to tax incentives may be cautious and yield limited, not system-wide, improvements in capacity and service quality.
- *Control:* Some groups have argued that the public should have more control over how the rail tax incentives would be used. The rail industry believes that the direction of rail system investments should be left to private managers who have the best information on railroad capacity constraints and traffic patterns. Another consideration is that it may be difficult to implement some proposals for limiting the tax incentives to certain categories of traffic, such as coal shipments to power plants captive to a single railroad. As pointed out by transportation system analysts, railroads are networks, so an investment in one location can have wide effects. It may therefore be difficult to determine if a specific investment will primarily benefit any one category of traffic.

The regulatory restructuring proposals include bills that would remove certain antitrust law exemptions that apply to the rail industry, and bills that would more generally revise the current regulatory scheme. The intent of the bills appears to be to use new regulatory rules to introduce more competition into the rail industry. The concept is that more competition will lead to innovation and cost reductions that will improve coal and other service, decrease rates, and help the rail industry win new business. The railroad industry characterizes these proposals as “re-regulation.” It



argues that the proposals would inhibit the pricing and operational freedom that has been important to the revival of the rail industry, and would cause the industry's finances and service quality to regress.

The emphasis in the regulatory restructuring proposals on enhanced competition appears consistent with an underlying principal of the current regulatory regime, which is "to allow, to the maximum extent possible, competition and the demand for services to establish reasonable rates for transportation by rail" (49 U.S.C. § 10101). However, the proposals would accomplish this goal through new rules and government oversight, so depending on how the goals outlined in the proposed legislation are actually implemented there is a risk that the outcome could be, at least to some extent, more regulatory control instead of more reliance on the market. In general, the outcomes from the regulatory restructuring bills may depend heavily on the details of implementation.

Other factors that may be of interest in evaluating the regulatory restructuring proposals include:

- *Scope of the Problem and Information:* Are the coal and other rail service reliability and related issues (such as rates) of sufficient severity to justify major revisions to the current regulatory framework? This is arguably an open question because of the limited available data on rail service, rates, and the degree to which coal and other shippers are subject to market power.
- *Financial Condition:* A central objective of the Staggers Rail Act of 1980 was to restore the long-term financial health of the railroad industry. An evaluation of regulatory restructuring may turn in part on whether the rail industry has achieved this goal of "revenue adequacy." However, the reliability of the STB's annual revenue adequacy determinations is uncertain. Some parties contend that various aspects of the STB's methodology are flawed. Based on a review of financial literature, one technical criticism seems to have particular significance. This criticism is that the STB, by using a specific computational approach (a "single-stage discounted cash flow" model) in combination with the recent high rates of earnings growth in the railroad industry, has overstated the railroad industry's threshold for achieving revenue adequacy. A more general concern is also suggested by a review of financial literature. This is whether the STB's reliance on one financial ratio to determine if a railroad has achieved revenue adequacy may put too much weight on a single metric. A contrast can be drawn to typical electric power rate cases, where an evaluation of multiple factors by the regulatory body is used to determine a utility's rate of return.
- *Service Focus:* as an alternative to extensive revision of the current regulatory regime, could more limited changes result in material improvements in coal rail service? If otherwise desirable, a more limited agenda might include elements of current proposals, including giving rail service problems and their resolution greater

public visibility; creation of a rail public advocate; and new requirements in the law for reliable rail service.

The remaining sections of this report include:

- Background: Coal and Rail in the U.S. Power System.
- Background: the Railroad Industry.
- Railroad Capacity.
- Railroad Service and Disruptions in Coal Transportation.
- Rail Rate Trends.
- Analysis of Legislative Proposals — Tax Incentives.
- Analysis of Legislative Proposals — Regulatory Restructuring.

## **Background: Coal and Rail in the U.S. Power System**

### **Role of Coal and Rail in Power Production**

Coal has historically fueled about half the electricity generated in the United States.<sup>5</sup> The federal Energy Information Administration (EIA) projects annual coal burn by power plants to increase 21% between 2005 and 2020 (by 223 million tons per year).<sup>6</sup> The great majority of this coal would move to power plants by rail.

Railroads accounted for over 70% of coal shipments to power plants in 2005.<sup>7</sup> The balance moved by truck, barge, and conveyor. Most coal moved by rail because coal mines are often distant from power plants, and rail is usually the most economical means for moving bulk commodities long distances. Truck shipments of coal are generally uneconomic over about 50 miles; barge is practical only for mines or power plants near navigable water; and conveyors can be used only if a power plant is adjacent to a coal mine. For most power plants the only feasible means of shipping coal is by railroad.

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<sup>5</sup> U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2005*, Table 8.2a.

<sup>6</sup> U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2007*, Table A15 (Reference Case projection). Note that EIA projections assume continuation of current law and regulation (*Ibid.*, page 2). Regulatory and policy changes, as well economic and energy market trends that differ from EIA assumptions, could result in actual future coal burn deviating significantly from EIA's Reference Case estimates. As an example of uncertainties in the outlook for coal-fired generation, see Steve Mufson, "Coal Rush Reverses, Power Firms Follow," *The Washington Post*, September 4, 2007.

<sup>7</sup> U.S. Department of Energy, Energy Information Administration, table on "Distribution of U.S. Coal by Origin State, Consumer, Destination, and Method of Transportation, 2005." [[http://www.eia.doe.gov/cneaf/coal/page/coaldistrib/2005/o\\_05state.pdf](http://www.eia.doe.gov/cneaf/coal/page/coaldistrib/2005/o_05state.pdf)], visited August 31, 2007.

The importance of rail transportation of coal has grown as more western coal is shipped long distances to Midwestern, southern and eastern markets. In 2005, 52% of coal production (585 million tons) came from mines located in western states, compared to 29% in 1983. EIA projections show the western share increasing to 58% by 2020.<sup>8</sup> The growing use of western coal means greater national dependence on long rail hauls of coal to fuel power plants.

## Critical Role of the Powder River Basin

The Powder River Basin (PRB) in Wyoming and Montana (see **Figures 1 and 2**) is the nation's most important source of coal. In 2005 the PRB accounted for 38% of all coal produced in the United States (430 million tons),<sup>9</sup> making it not only the largest source of coal, but the nation's largest single source of any fuel for electricity. PRB coal is in high demand due to its environmental and cost advantages. PRB coal emits fewer air pollutants when burned than most coal. The coal is found in seams dozens of feet thick located near the surface, so it can be strip-mined at low cost. Economical transportation, primarily by rail, has made it practical for PRB coal mined in Wyoming to fuel power plants in Georgia.

The PRB is in the lightly-populated northern plains. To reach the nation's population and power generation centers the coal must be transported by railroad. Although some PRB coal is transferred from rail to water for final delivery to power plants, almost all shipments originate on railroads.

The large volume of production in the PRB means that the nation's largest single source of fuel for electricity rests on one concentration of infrastructure located in a limited geographic area. All of this coal comes from 18 mines, most in northeastern Wyoming.<sup>10</sup> PRB shipments are originated by one of two railroads, the Union Pacific Railroad (UP) or the Burlington Northern Santa Fe Railway (BNSF), and most PRB traffic begins the journey to consumers by traveling over a single rail corridor, the 103 mile "Joint Line" in Wyoming (**Figure 2**). Handling over 60 loaded coal trains a day, each train more than a mile long, the Joint Line is the busiest stretch of railroad in the world.<sup>11</sup> Once out of the PRB, most of the coal travels over a handful of major rail corridors to consumers.

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<sup>8</sup> U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2007*, Table A15; and U.S. Department of Energy, Energy Information Administration, *Coal Production in the United States — an Historical Overview*, Table 2 [[http://www.eia.doe.gov/cneaf/coal/page/coal\\_production\\_review.pdf](http://www.eia.doe.gov/cneaf/coal/page/coal_production_review.pdf)].

<sup>9</sup> U.S. Department of Energy, Energy Information Administration, *Annual Coal Report 2006*, Table 6.

<sup>10</sup> This total of the number of mines counts the following as single operations: Black Thunder and South Black Thunder (Rochelle); Cordero and Caballo Rojo; and Clovis Point and Wyodak.

<sup>11</sup> Testimony of Janssen Thompson, General Manager, Powder River Division, BNSF Railway Co., U.S. Congress, House Committee on Resources, Subcommittee on Water and Power, hearing, *Keeping the Lights On and Maintaining Wyoming's Jobs: Overcoming the Challenges Facing Western Power Generation Facilities*, 109<sup>th</sup> Cong., 2<sup>nd</sup> sess., August 9, 2006, p. 2.

PRB rail capacity and routing options may increase if a long-planned project to build a new rail line into the PRB comes to fruition. The Dakota, Minnesota & Eastern Railroad (DM&E), a regional (“Class II”) carrier that currently serves grain markets in the northern plains, proposed in 1997 a multi-billion dollar project to open a new route into the PRB. The project would involve upgrading 600 miles of existing rail lines and building about 250 miles of new track. If completed, the DM&E project would open a new outlet for PRB coal into the Midwest, bypassing the Joint Line and the existing BNSF and UP main line rail corridors (see **Figures 3, 4, and 5**).

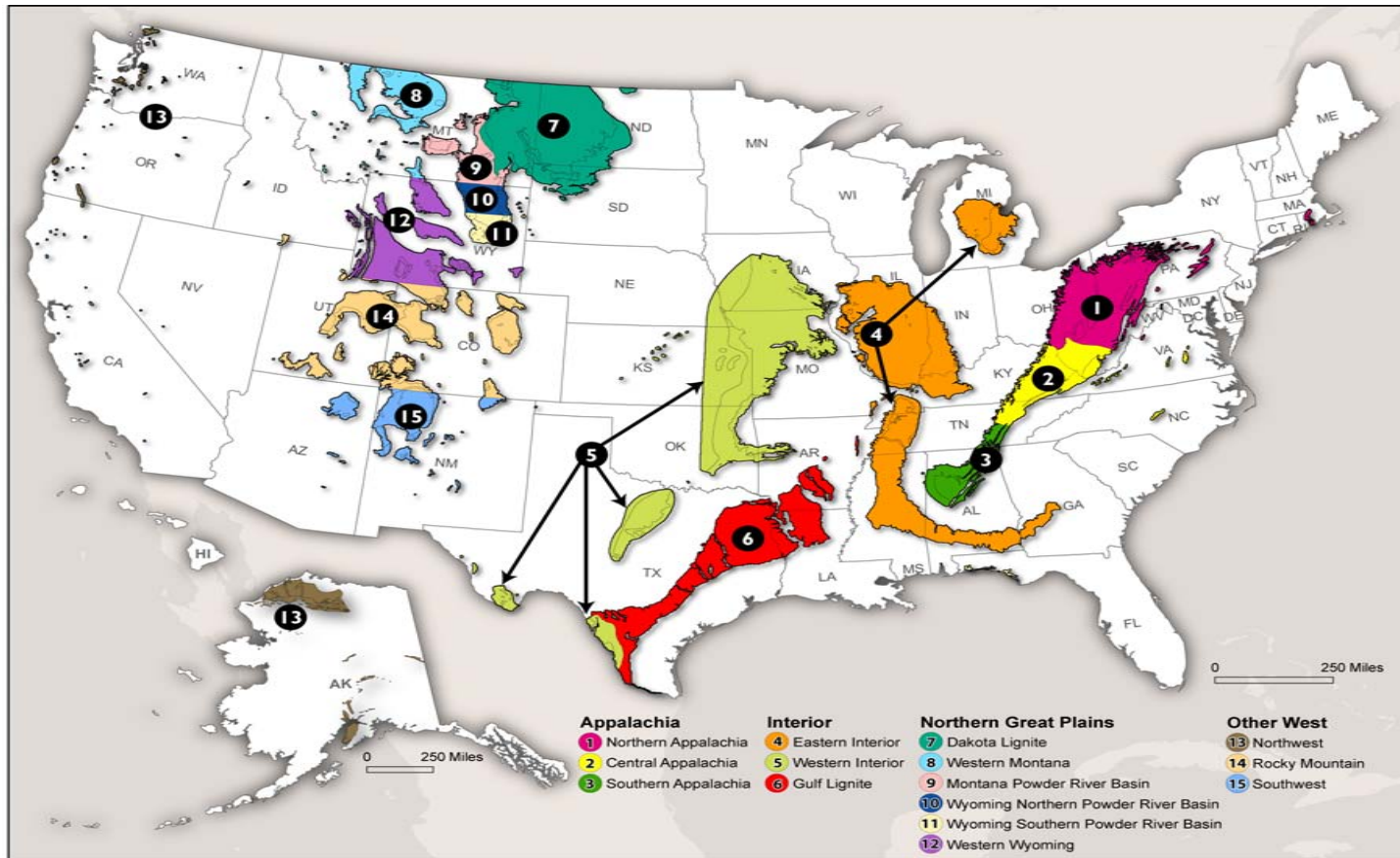
Although the DM&E project has been in development for many years and received regulatory approvals, it has never begun construction and there is no firm initial operating date. The backers have been unable to secure the financing needed to launch the project. In February 2007 the Federal Railroad Administration (FRA) rejected the project’s application for a \$2.3 billion loan guarantee, concluding that the project was too risky to commit public funds.<sup>12</sup> The project has also been opposed, at least without changes to the routing, by some landowners and communities on the project’s route, in particular by the city of Rochester, Minnesota, and the Mayo Clinic.<sup>13</sup>

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<sup>12</sup> FRA Press Release, *FRA Administrator Denies DM&E Powder River Basin Loan Application Citing Unacceptable Risk to Federal Taxpayers*, February 26, 2007.

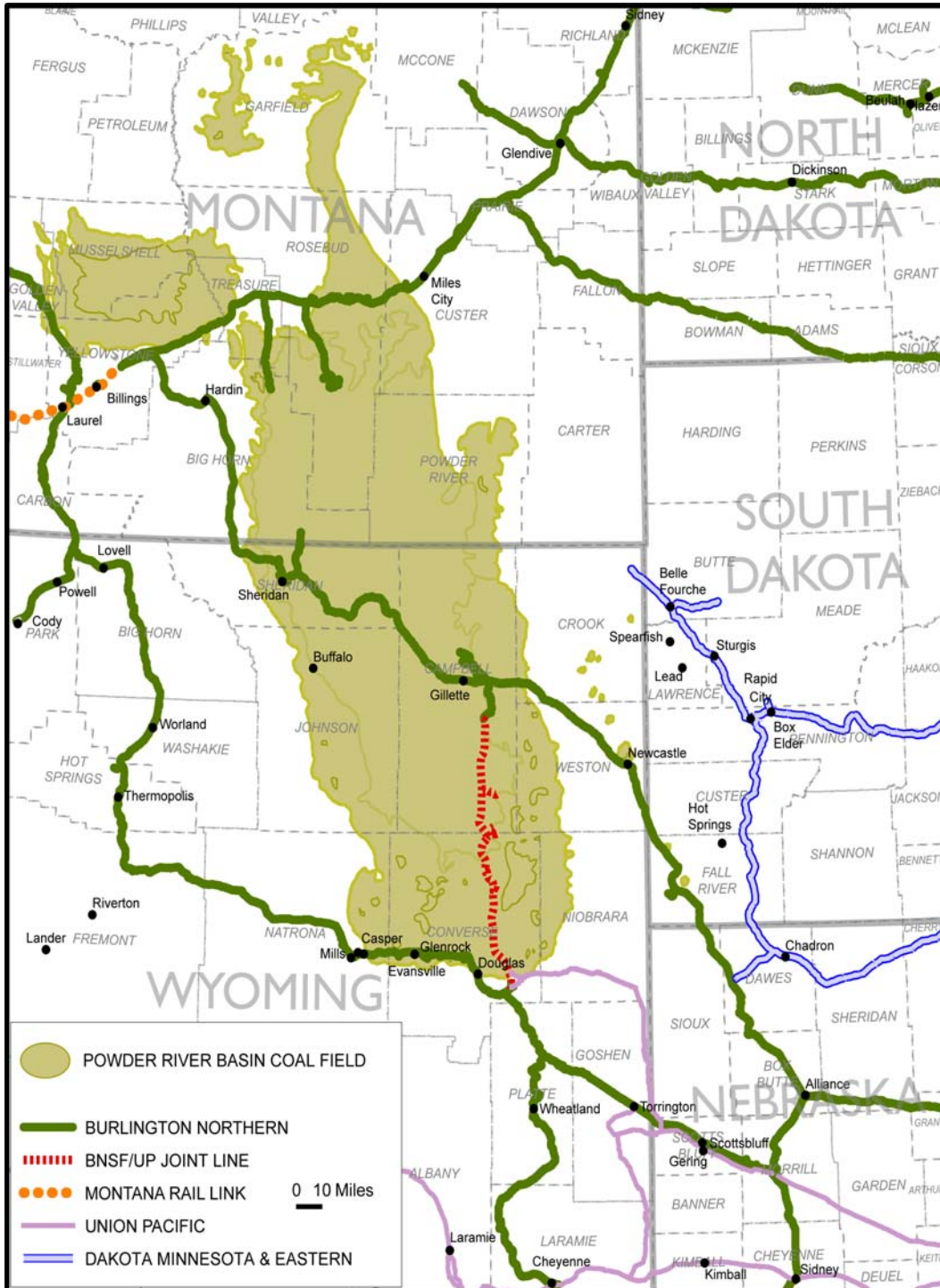
<sup>13</sup> For example, see “DM&E Opponents Turn to Court to Derail Project over Enviro [sic] Review,” *Platts Coal Outlook*, November 20, 2007.

Figure 1. Coal Fields and Regions of the United States



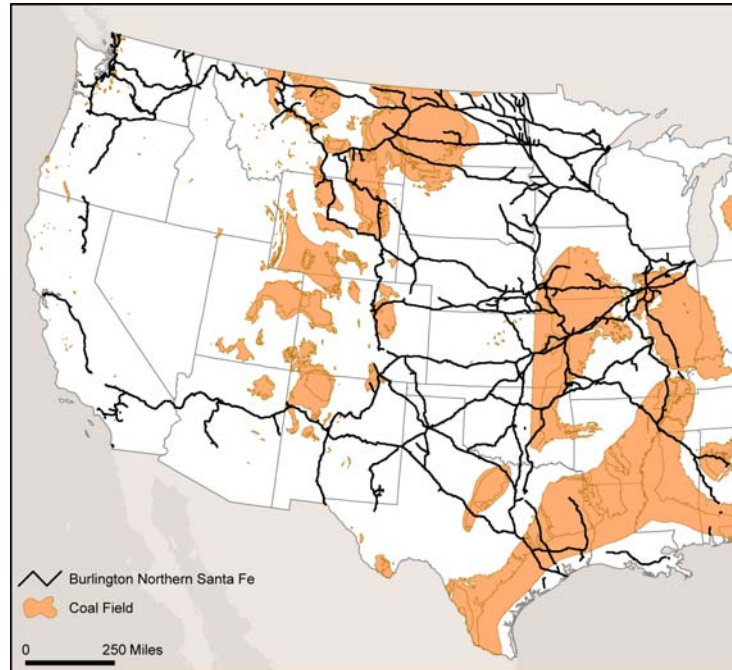
Source: Coal Fields of the Conterminous United States. Originator: USGS; Eastern Energy Team; John Tully compiler. Publication Date: May 3, 1996, <http://pubs.usgs.gov/of/1996/of96-092/>  
 Region boundaries and names are adapted from those used by the Energy Information Administration's National Energy Modeling System. Map: Congressional Cartography, Library of Congress, 2007

Figure 2. Powder River Basin Coal Field and Railroads



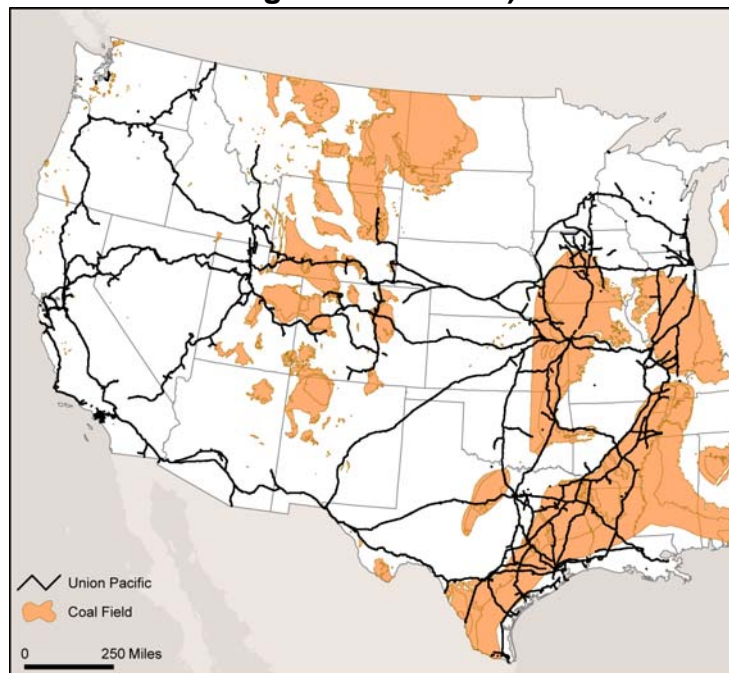
Source: Bureau of Transportation Statistics, Teletlas, Inc., Professional Railroad Atlas of North America, Deskmap Systems, Inc. Coal Fields of the Conterminous United States, Originator: USGS; Eastern Energy Team; John Tully compiler. Publication Date: May 3, 1996, <http://pubs.usgs.gov/of/1996/of96-092/> Map: Congressional Cartography Library of Congress, 2007.

**Figure 3. Burlington Northern Santa Fe Rail System (Trackage Rights Not Shown)**



Source: Coal Fields of the Conterminous United States, Originator: USGS; Eastern Energy Team; John Tully compiler. Publication Date: May 3, 1996, <http://pubs.usgs.gov/of/1996/of96-092/> Rail: DeskMap Systems Inc.; Bureau of Transportation Statistics; ESRI, Inc. Map: Congressional Cartography, Library of Congress, 2007

**Figure 4. Union Pacific Rail System (Trackage Rights Not Shown)**



Source: Coal Fields of the Conterminous United States, Originator: USGS; Eastern Energy Team; John Tully compiler. Publication Date: May 3, 1996, <http://pubs.usgs.gov/of/1996/of96-092/> Rail: DeskMap Systems Inc.; Bureau of Transportation Statistics; ESRI, Inc. Map: Congressional Cartography, Library of Congress, 2007

**Figure 5. Proposed Combination of the Canadian Pacific and Dakota, Minnesota, & Eastern Rail Systems**



**Source:** Canadian Pacific Railway.

**Key:** CP: Canadian Pacific Railway; DM&E/IC&E: Dakota, Minnesota, & Eastern Railroad and its affiliate, the Iowa, Chicago, & Eastern Railroad.



In September 2007 the Canadian Pacific Railway, a large (“Class I”) carrier with operations in the United States and Canada, announced a plan to purchase the DM&E, fold it into the CP system, and possibly pursue the PRB project. Although CP expects to close the acquisition before the end of 2007, it would not actually take control of the DM&E until and if control is approved by the STB. CP expects the STB to complete its review by the end of 2008.

Based on statements by CP, there is no assurance as to if or when it will commit to building the PRB project. CP stated that it is buying the DM&E based on the DM&E’s access to U.S. agricultural and ethanol markets, and it characterized the PRB project as potential “icing on the cake,” not as the centerpiece of the deal.<sup>14</sup> Other information indicates that CP’s horizon for starting construction could extend as far as 2025, although CP has said that it may make a launch decision within three years.<sup>15</sup> Other observers reportedly claim that “CP would not have paid so much for the deal if it did not intend to pursue the PRB plan....”<sup>16</sup> If CP decides to proceed and is able to do so, the expected construction time is reportedly two to three years.<sup>17</sup>

The DM&E’s PRB line would be one of the largest rail construction project in the U.S. in more than a century. If the project is ultimately built, it would add a large amount of capacity to the biggest U.S. coal transportation market. The project could reportedly access, mainly through connecting railroads, up to 101 coal-fired plants.<sup>18</sup>

## Background: the Railroad Industry

### Composition of the Industry

The U.S. rail industry consists of two broad categories of companies: seven Class I carriers that move the vast majority of rail traffic, and about 553 regional and short lines that either feed traffic to the Class I railroads or make final delivery of freight shipped on the big carriers.<sup>19</sup> These railroads play an important role in freight

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<sup>14</sup> “Canadian Pacific Acquires DM&E, Ready to Become Third Rail Operator in PRB,” *Platts Coal Trader*, September 6, 2007.

<sup>15</sup> *Ibid.*; L.B. Foster Co. Press Release, *Foster Announces Sale of DM&E Interest*, September 5, 2007.

<sup>16</sup> “CP DM&E Buy to Shift PRB Balance of Power,” *Argus Coal Transportation*, September 11, 2007, p. 4.

<sup>17</sup> *Ibid.*

<sup>18</sup> *Ibid.*, p. 5.

<sup>19</sup> Designation of a railroad as Class I is made by the federal Surface Transportation Board based on a periodically-adjusted revenue threshold. The 2005 threshold was minimum operating revenue of \$319.3 million. In 2005 the Class I railroads accounted for 93% of freight railroad revenues, 89% of freight railroad employees, but only 68% of freight railroad track mileage. The short lines which operate the balance of the track mileage in many cases use relatively lightly-used lines that have been sold or leased by the Class I

transportation. As described by the American Association of State Highway and Transportation Officials (AASHTO), “in the ‘freight transportation service spectrum,’ rail occupies a place between and overlapping water transport and trucking. It competes with water transport for heavier, lower-value, less time-sensitive commodities. It competes with trucking for higher-value, often containerized, shipments moving over longer distances. And it is the preferred mode for a number of economically important, but heavy and bulky commodity groups, such as coal, farm products, and minerals.”<sup>20</sup>

Within the group of seven Class I railroads, most rail traffic is carried by four dominant carriers: In the western states, the UP and BNSF (**Figures 3 and 4**, above), and in the eastern states, the Norfolk Southern Railway (NS) and CSX Transportation (CSX; **Figures 6 and 7**, below). These four carriers are the industry giants, accounting in 2005 for 92% of Class I railroad operating revenues.<sup>21</sup>

The rail industry is sometimes characterized as consisting of two duopolies, one in the east and one in the west.<sup>22</sup> The actual situation may be more complex. The degree to which the railroads have market leverage appears to vary by commodity, individual customer, geography, and other factors. For example, in general the railroads face more competition from trucks for general merchandise shipments than for coal and other heavy bulk goods. A coal-fired plant with access to barge shipments of coal has more competitive leverage in the transportation market than a plant remote from navigable waterways served by a single railroad. The competitive environment also changes over time. As discussed in the report’s section on rates, coal rates declined for many years but have more recently increased sharply. The extent to which the rail industry is able to exercise market power appears to vary across markets and time.

Since 2004 the freight market has been especially favorable for railroads. For reasons discussed later in this report, the rail industry has been able to significantly increase rates, which have translated to strong financial results. In May 2007, UBS Investment Research concluded that “the North American railroads are in their best financial shape in decades as the so-called rail renaissance enters its fourth year in 2007.”<sup>23</sup> According to Standard and Poor’s, Class I railroad industry profits grew by

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<sup>19</sup> (...continued)

carriers. See Association of American Railroads, *Railroad Facts 2006 Edition*, pp. 3 and 8.

<sup>20</sup> AASHTO, *Freight-Rail Bottom Line Report*, 2003, p. 14.

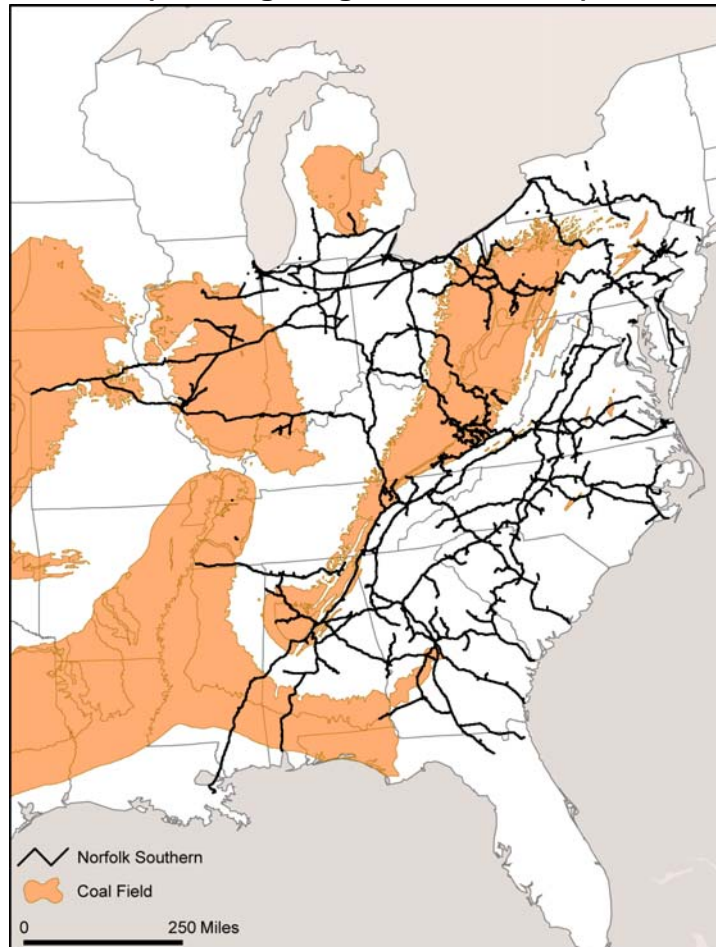
<sup>21</sup> Association of American Railroads, *Railroad Ten-Year Trends*, Vol. 23, p. 34. The other three Class I carriers are the Kansas City Southern (KCS), serving portions of the south, Midwest and (through an affiliate) parts of Mexico; the Canadian National (CN) in the Midwest and south, and the Canadian Pacific (CP) with operations in parts of the Midwest and Northeast (CN and CP operate predominantly in Canada).

<sup>22</sup> Jeffrey O. Moreno, “Changing Role of Rail Rate Regulation in a Capacity Constrained Market,” *Journal of Transportation Law, Logistics & Policy*, pre-print, third quarter 2007, p. 292.

<sup>23</sup> Fadi Chamoun, et. al., “Debt Is the Engine for Growth for Rails,” *Barron’s Online*, May (continued...)

46% in 2005 and 32% in 2006, and return on investment also improved substantially.<sup>24</sup> (Note that these results are not necessarily equivalent to the railroad industry achieving the regulatory goal of revenue adequacy, as discussed elsewhere in this report.)

**Figure 6. Norfolk Southern Rail System  
(Trackage Rights Not Shown)**



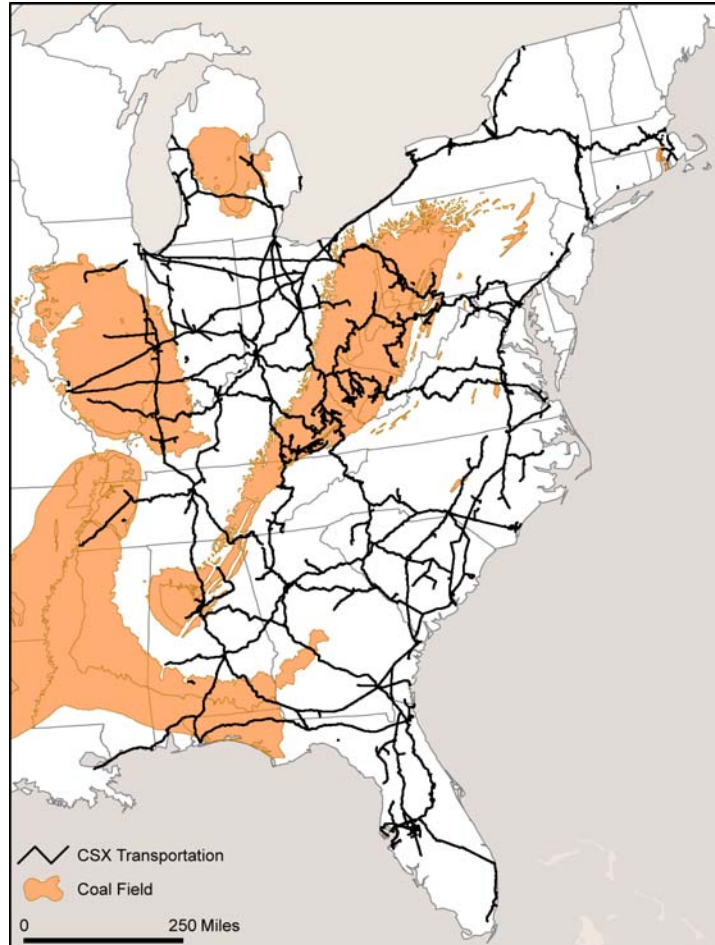
Source: Coal Fields of the Conterminous United States, Originator: USGS; Eastern Energy Team; John Tully compiler. Publication Date: May 3, 1996, <http://pubs.usgs.gov/of/1996/of96-092/> Rail: DeskMap Systems Inc.; Bureau of Transportation Statistics; ESRI, Inc. Map: Congressional Cartography, Library of Congress, 2007

<sup>23</sup> (...continued)

3, 2007 [<http://online.barrons.com/article/SB117814759058790096-search.html?KEYWORDS=railroads&COLLECTION=barrons/6month>].

<sup>24</sup> Standard & Poor's, *Industry Surveys, Transportation: Commercial*, June 21, 2007, p. 7.

**Figure 7. CSX Rail System (Trackage Rights Not Shown)**



Source: Coal Fields of the Conterminous United States, Originator: USGS; Eastern Energy Team; John Tully compiler. Publication Date: May 3, 1996, <http://pubs.usgs.gov/of/1996/of96-092/> Rail: DeskMap Systems Inc.; Bureau of Transportation Statistics; ESRI, Inc. Map: Congressional Cartography, Library of Congress, 2007

## Period Before Passage of the Staggers Rail Act

Today's highly concentrated and increasingly profitable rail industry contrasts with the situation in the 1970s. Prior to 1980 the rail industry included 39 Class I railroads, many in poor financial and physical condition. Current policy debates are colored by the history of the railroads, in particular by concerns, expressed by some parties, that changing the existing regulatory system could cause the rail industry to regress, financially and operationally.

Until the mid-1970s, the rail industry labored under tight federal regulation. The Interstate Commerce Commission (ICC) controlled rail rates, conditions of service, and construction and abandonment of rail lines, and had authority over proposed railroad mergers. This regulatory system was designed for a 19<sup>th</sup> and early 20<sup>th</sup> Century transportation market dominated by railroads and characterized by "indiscriminate construction, market manipulation, rate abuses, and discriminatory

practices against certain types of freight customers and passengers.”<sup>25</sup> But by the 1920s the railroads faced increasing competition from trucks and barge shipments. While trucks and barge companies had significant freedom to adjust rates and terms of service to meet market needs, regulation handicapped the ability of the railroads to respond to competition and changing market conditions (regulation did not insulate the industry from periodic booms and busts related to overall economic trends). Between 1950 and 1975 the railroad share of domestic surface freight shipments declined from 63% to 50%, with most of the market share lost to trucks (see **Figure 8**).<sup>26</sup>

The loss of market share was accompanied by financial and physical decay. In 1970 the Penn Central, the major northeastern railroad, collapsed in what was then the largest bankruptcy in the nation’s history. Other large carriers also failed, and for the industry as a whole returns on investment dropped to low levels (just over 1% in 1975).<sup>27</sup> The railroad industry was in “serious economic decline.”<sup>28</sup>

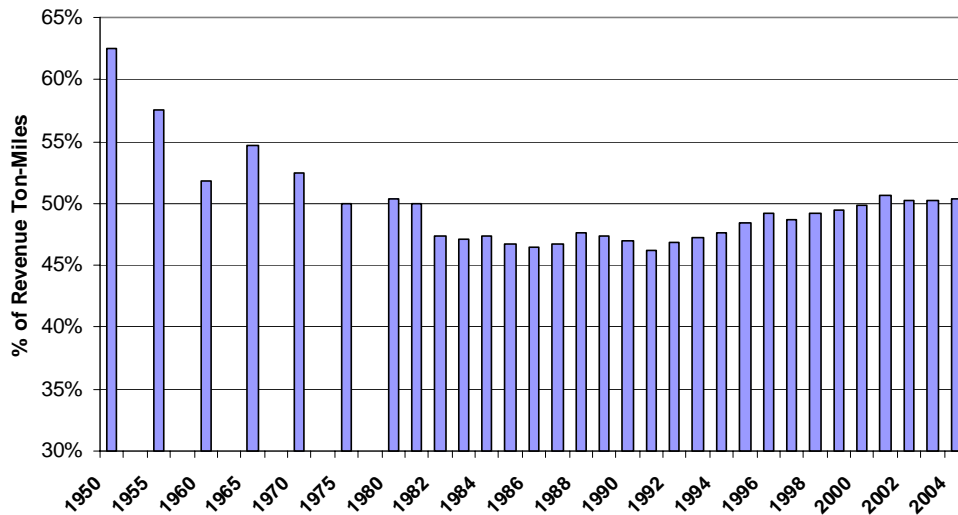
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<sup>25</sup> Raymond Atkins, Office of the General Counsel, STB, Written Statement of the Surface Transportation Board Before the Antitrust Modernization Commission, December 1, 2005, pp. 2 -3.

<sup>26</sup> There are at least four, partly inconsistent sources of data on freight transportation by mode. The Department of Transportation (DOT) reports this data in two statistical series covering overlapping time periods, one of which uses an updated methodology. According to DOT the series are not comparable; see [[http://www.bts.gov/publications/national\\_transportation\\_statistics/](http://www.bts.gov/publications/national_transportation_statistics/)], Tables 1-14a and 1-14b. The Eno Foundation publishes data for 1950 to 2001 in the 19<sup>th</sup> edition of its publication *Transportation in America*; the 20<sup>th</sup> edition has revised data but only back to 1990. Market shares by mode are estimated for this report as follows: the percentages shown are the railroad share of total truck, rail, and domestic water revenue ton-miles. Coastal shipping, pipeline, and air freight are excluded. Data for 1950 to 1960 are from Eno Foundation, *Transportation in America*, 19<sup>th</sup> Edition, p. 42; for 1965 to 1975, rail data are from *Transportation in America*, p. 42, and all other data are from [[http://www.bts.gov/publications/national\\_transportation\\_statistics/](http://www.bts.gov/publications/national_transportation_statistics/)], Table 1-14a; for 1980 to 2004, all data are from [[http://www.bts.gov/publications/national\\_transportation\\_statistics/](http://www.bts.gov/publications/national_transportation_statistics/)], Table 1-14b. The truck ton-miles for 1950 through 1975 were adjusted upward to be consistent with the trend in the revised DOT methodology. The adjustment factor (1.118) was derived by comparing DOT Tables 1-14a and 1-14b data for all years in which the tables overlap. Water (river, canal, and Great Lakes) shipments include some non-domestic freight for 1950 to 1960.

<sup>27</sup> *Final Standards, Classification, and Designation of Lines of Class I Railroads in the United States, Vol. I*, U.S. Department of Transportation, 1977, p. 1

<sup>28</sup> GAO, memorandum report to Congressional Requesters, *Freight Railroads: Updated Information on Rates and Other Industry Trends*, August 15, 2007, p. 1.

**Figure 8. Rail Share of Domestic Surface Freight Market**

**Notes and Sources:** railroad share of ton-miles for total of trucks, rail, and domestic water. Excludes coastal shipping, pipeline and air freight. Data from [http://www.bts.gov/publications/national\\_transportation\\_statistics/](http://www.bts.gov/publications/national_transportation_statistics/), Tables 1-14a and 1-14b, and Eno Foundation, *Transportation in America*, 19th Edition, p. 42. Truck data is partly estimated by CRS; see main text of report for details. Waterborne freight for 1950 - 1960 includes non-domestic shipments.

By 1976, 15% of the route miles of the entire Class I rail system were owned by bankrupt carriers. Most of the northeastern rail system had been absorbed within a government-owned corporation, Conrail. In part because of the reluctance of the ICC to allow railroads to abandon lightly-used rail lines, the railroad industry was operating thousands of miles of uneconomic railroad.<sup>29</sup> According to a 1978 U.S. Department of Transportation (DOT) report, “the railroad industry finds itself in the worst economic condition of any privately operated mode of transportation,” with very low return on investment, deteriorating physical plant, and, if trends continued, the likelihood of more railroads falling under government control.<sup>30</sup>

As difficult as the picture appeared, the extent and depth of the rail industry’s troubles in the 1970s and early 1980s should not be overstated. The financial and physical condition of the rail industry in the 1970s was mixed, not uniform. The 1978 report by DOT cited above, in addition to cataloging the rail industry’s troubles, also concluded that the weakness of the rail industry was to a degree a regional problem centered in the Northeast and Midwest,<sup>31</sup> where problems were most severe,

<sup>29</sup> *Final Standards, Classification, and Designation of Lines of Class I Railroads in the United States, Vol. I*, U.S. Department of Transportation, 1977, p. A2-1.

<sup>30</sup> *A Prospectus for Change in the Freight Railroad Industry: A Preliminary Report by the Secretary of Transportation*, U.S. Department of Transportation, 1978, pp. 2, 3, and 11.

<sup>31</sup> The regional concentration of rail financial and maintenance problems is partly attributable to the patterns of rail industry development after the Civil War. Depressed economic conditions in the South, and climatic and geographic conditions in the West, limited the construction of rail lines in those regions. Most overbuilding of rail lines  
(continued...)

and that other parts of the industry were in reasonably good financial and physical condition. The investment analysis firm Standard and Poor's, writing in 1979, found that "the financially strong and profitable carriers should be able to fund their sizable [capital] requirements from internally generated monies, and excellent credit standings will provide access to the debt and equity markets....the negative industry picture masks sectors of acute weakness and relative strength."<sup>32</sup> As DOT concluded in 1978, "parts of the [rail] system are sick, but the system as a whole is far from dead."<sup>33</sup>

## The Staggers Act

Congress decided to address the ills of the rail industry with deregulation.<sup>34</sup> In October 1980, Congress passed the Staggers Rail Act (P.L. 96-448). This legislation, and its implementation by the ICC and the successor STB, created the current railroad regulatory regime.<sup>35</sup>

The Staggers Act established a 15-point national Rail Transportation Policy, including:

- (1) to allow, to the maximum extent possible, competition and the demand for services to establish reasonable rates for transportation by rail;
- (2) to minimize the need for Federal regulatory control over the rail transportation system and to require fair and expeditious regulatory decisions when regulation is required;
- (3) to promote a safe and efficient rail transportation system by allowing rail carriers to earn adequate revenues, as determined by the Board;
- (6) to maintain reasonable rates where there is an absence of effective competition and where rail rates provide revenues which exceed the amount necessary to maintain the rail system and to attract capital;

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<sup>31</sup> (...continued)

occurred in the industrialized Northeast and Midwest, including passenger lines that fell into disuse as more traffic moved to roads and airlines. See *Freight Capacity for the 21st Century* (Washington, DC: Transportation Research Board, 2003), pp. 59-60; Elizabeth Pinkston, *Freight Rail Transportation: Long-Term Issues*, Congressional Budget Office, 2006, p. 8; James N. Heller, *Coal Transportation and Deregulation: An Impact Analysis of the Staggers Act* (Washington: The Energy Bureau and Serif Press, 1983), p. 149.

<sup>32</sup> Manuel Correia, *Standard & Poor's Industry Surveys: Railroads Basic Analysis*. Standard & Poor's, 1979, pp. R33-R34.

<sup>33</sup> *A Prospectus for Change in the Freight Railroad Industry: A Preliminary Report by the Secretary of Transportation*, U.S. Department of Transportation, 1978, p. iv.

<sup>34</sup> In addition to the substantial deregulation of the rail industry, other transportation deregulation actions taken about this time by the Congress included passage in October 1978 of the Airline Deregulation Act (P.L. 95-504), and in July 1980, the Motor Carrier Act of 1980 (P.L. 96-296).

<sup>35</sup> Congress' first effort at deregulation was the Railroad Revitalization and Reform Act of 1976 (P.L. 94-210, often referred to as the "4R Act"). However, the results of this legislation were viewed as unsatisfactory, in part because the ICC chose to narrowly interpret the provisions of the act intended to give the railroads more freedom to set rates.

(12) to prohibit predatory pricing and practices, to avoid undue concentrations of market power, and to prohibit unlawful discrimination.<sup>36</sup>

These points illustrate the balancing aims of the Staggers Act: to allow competition to determine the operation of the rail freight market, to provide for the financial recovery of the rail industry, and to protect shippers from abuses of market power. Within this balance, restoring the financial integrity of the railroad industry was a primary objective. According to the conference committee report:

The overall purpose of the Act is to provide, through financial assistance and freedom from unnecessary regulation, the opportunity for railroads to obtain adequate earnings to restore, maintain and improve their physical facilities while achieving the financial stability of the national rail system.<sup>37</sup>

The act and its implementation by the ICC and STB have given the railroads wide discretion to freely set coal and other rates in response to market conditions. As directed by the act, the ICC exempted almost entirely from regulation categories of traffic with general access to competitive transportation options, such as most agricultural commodities and intermodal shipments.<sup>38</sup> Shippers of traffic potentially subject to railroad market dominance and rates that could be unreasonable, such as coal and grain shipments, retained the option of appealing rates to the ICC.<sup>39</sup> However, rates could be appealed only if the shipper could demonstrate that it was “captive” to one railroad; that is, it had no credible competitive alternative for receiving coal other than delivery by a single railroad.<sup>40</sup>

The act also provided for:

- Faster processing of railroad applications to merge, and of requests to abandon, sell, or lease track a railroad no longer wanted to operate. The Class I railroads responded with rapid consolidation and contraction of parts of its physical plant. Between 1980 and 2002, the Class I rail industry shrank from 39 carriers to the current seven, of which four account for most traffic and revenues.

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<sup>36</sup> 49 U.S.C. § 10101.

<sup>37</sup> U.S. Congress, Conference Committees, *Staggers Rail Act of 1980*, conference report to accompany S. 1946, 96<sup>th</sup> Congress, 2<sup>nd</sup> sess., September 29, 1980, H.Rept. 96-1430 (Washington: GPO, 1980), p. 80.

<sup>38</sup> Intermodal transportation, in the context of the rail industry, means the carriage of truck-trailers or containers by rail. In a typical domestic intermodal shipment, a truck takes a trailer to an intermodal terminal where it is loaded on rail. The railroad long-hauls the cargo hundreds or thousands of miles to a terminal where the trailer is reloaded onto a truck for final delivery. Import and export containers may be transferred directly between ship and rail, or a truck may transfer the container between the port and railroad. For additional information see CRS Report RL31834, *Intermodal Rail Freight: A Role for Federal Funding?*, by John F. Frittelli.

<sup>39</sup> 49 U.S.C. § 10701(d)(1).

<sup>40</sup> For additional background information on the issue of captive shippers, see CRS Report RL34117, *Railroad Access and Competition Issues*, by John Frittelli.



- Other things being equal, the most profitable business for a railroad is typically long-haul movements where the entire route is on its own tracks (“single-line” movements). But past regulatory practice had required railroads to offer joint (multi-carrier) rates “on practically all possible combinations of railroad tracks between two points,” and to offer identical rates for each route “without regard to the actual cost of providing the service.”<sup>41</sup> Staggers gave a railroad wide discretion to rationalize its traffic flows by canceling joint movements, changing rates, and funneling traffic to its single line routes. This was economically beneficial to the railroads, but potentially reduced the competitive routing options available to coal and other shippers. However, Staggers gave the ICC new authority to direct railroads to interchange traffic when in the public interest or “necessary to provide competitive rail service.”<sup>42</sup>
- Railroads were given an unambiguous right to enter into confidential contracts for rail service, with rates and service terms customized for specific customers. The terms of contracts are outside of regulatory jurisdiction.

The Staggers Act left substantial regulatory powers with the federal government, including rate appeals for non-exempt traffic, authority to approve and condition mergers,<sup>43</sup> authority to direct railroads to routinely interchange traffic at designated gateways when in the public interest,<sup>44</sup> emergency powers to direct rail traffic in the event of disruptions to railroad service such as severe congestion,<sup>45</sup> authority to proscribe unreasonable business practices by railroads,<sup>46</sup> and authority to require financial and operations reports by the rail industry.<sup>47</sup>

The ICC Termination Act of 1995 (P.L. 104-88) replaced the ICC with the STB, an independent regulatory agency with a three-member board administratively housed within DOT. The ICC Termination Act made other relatively limited changes to rail regulation, and essentially left intact the regulatory regime created by the Staggers Act and the ICC.

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<sup>41</sup> *Baltimore Gas & Electric v. United States*, 817 F.2d 108 (D.C. Cir 1987), at 110-111.

<sup>42</sup> 49 U.S.C. § 11102(c)(1).

<sup>43</sup> 49 U.S.C. § 11321-11328.

<sup>44</sup> 49 U.S.C. § 11102. This is referred to, depending on the circumstance, as joint use of terminal facilities or reciprocal switching. The STB’s interpretation of this provision is discussed later in this report. This is an instance in which the Congress used the Staggers Act to increase the regulatory power of the federal government over the railroads by expanding authority previously available to the ICC; see *Baltimore Gas & Electric v. United States*, 817 F.2d 108 (D.C. Cir 1987), at 113.

<sup>45</sup> 49 U.S.C. § 11123.

<sup>46</sup> STB, Ex Parte No. 661, *Rail Fuel Surcharges*, Decision, January 25, 2007, pp. 7-8.

<sup>47</sup> 49 U.S.C. §§ 11144-11145

## Railroad Productivity and Efficiency Trends

Since the rail industry was largely deregulated in 1980, the Class I railroads have dramatically improved their productivity. However, cost-efficiency and revenue generation has improved more slowly, and in some respects service quality has improved little or not at all. The basis for these conclusions is discussed below.

Railroads have improved their productivity by introducing improved technology and management practices; abandoning, leasing, or selling lightly-used rail lines; cutting payrolls; and employing their assets much more intensively than in the past. As shown below in **Table 1**, employment by the Class I railroads dropped by 65% between 1980 and 2005, and miles of railroad operated declined by 42%. At the same time traffic increased substantially. Revenue ton-miles increased by 85% between 1980 and 2005. The fastest-growing major railroad business line was intermodal traffic, with units shipped up 277%. Coal traffic increased by 54% for the same period. The railroad share of all domestic surface freight, after reaching bottom at 46%, has slowly increased back to 50% (**Figure 8**, above).

The railroads were able to move more traffic with fewer employees and a smaller system by greatly improving the utilization of their resources and increasing traffic density. Between 1980 and 2005 freight-revenue ton-miles per employee increased by 425% and ton-miles per mile of road grew by 217% (**Table 1**). As shown in **Figure 9**, the gains in productivity have generally been steady over time.<sup>48</sup>

**Table 1. Class I Railroad Traffic and Productivity Trends**

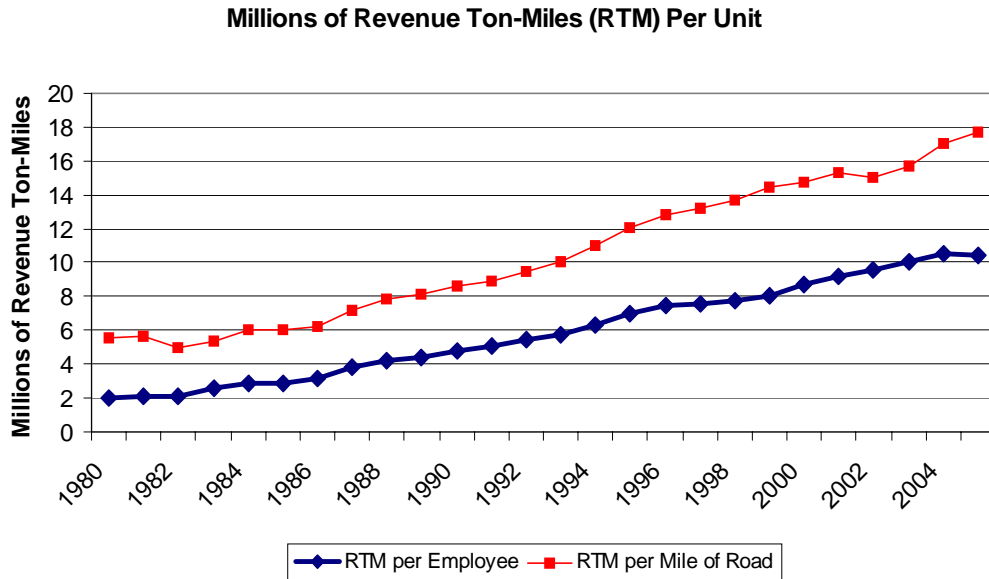
Year	Employees (thousands)	Miles of Road (thousands)	Revenue Ton-Miles (billions)	Intermodal Units (millions)	Coal (millions of tons originated)	Revenue Ton-Miles per Employee (millions)	Revenue Ton-Miles per Mile of Road (millions)
1980	458	165	919	3.1	522	2.0	5.58
1990	216	120	1034	6.2	579	4.8	8.63
2000	168	99	1466	9.2	758	8.7	14.77
2005	162	96	1696	11.7	804	10.5	17.70
<b>% Change, 1980 - 2005</b>	<b>-65%</b>	<b>-42%</b>	<b>85%</b>	<b>277%</b>	<b>54%</b>	<b>425%</b>	<b>217%</b>

**Source:** Association of American Railroads, *Railroad Facts*, 2005 Edition, except for coal data. Coal data is from Association of American Railroads, *Railroad 10-Year Trends*, Volumes 1, 7, 16, and 23.

<sup>48</sup> Locomotives provide an illustration of how the railroads achieved productivity gains. The industry negotiated new labor agreements which allowed it to reduce train crews from three to two people; purchased more powerful and reliable locomotives that can pull longer and heavier trains with fewer breakdowns; and it upgraded rail lines to handle heavier loads and more wear and tear. The result has been more intensive, higher-volume operations with fewer people.

**Notes:** A “revenue ton-mile” is one ton of freight moved one mile in revenue-earning service; an “intermodal unit” is a truck trailer or cargo container shipped by rail for part of the movement from origin to destination; coal “originated” begins shipment on a railroad although final delivery may be by another mode such as barge; a mile of “road” is a mile of right-of-way owned by a railroad, and may contain more than one line of track.

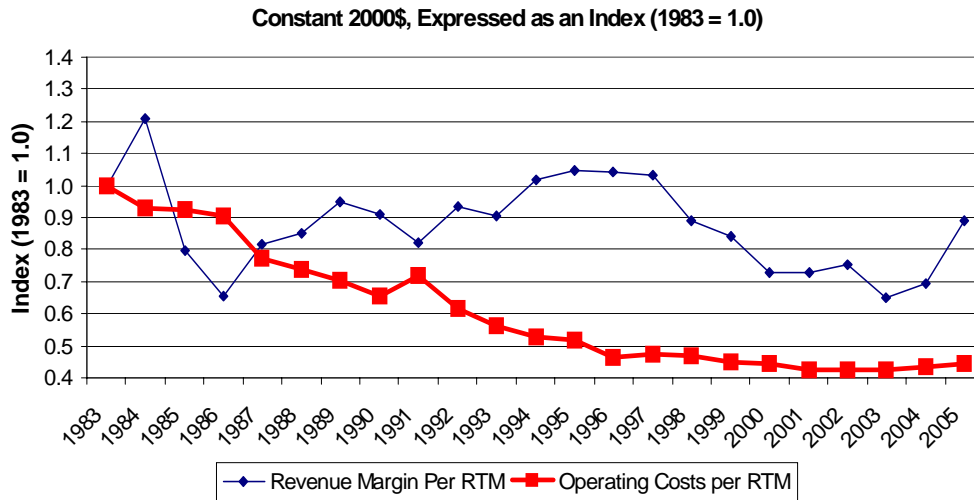
**Figure 9. Class I Railroad Productivity Trends**



Sources: AAR, Railroad Facts; AAR, Railroad 10-Year Trends; CRS calculations.

Improvements in railroad cost efficiency and revenue generation have been harder to consistently achieve than the gains in productivity. As shown in **Figure 10**, operating cost per revenue ton-mile, tracked in constant dollars, declined by over 50% between 1983 and 1996, but has shown little improvement since. The revenue margin (the difference between operating revenues and operating costs), also tracked in real dollars, has moved erratically over time, declining from the mid-1990s until it began to sharply increase in 2004 and 2005. As discussed later in this report, the improvement in real-dollar margins after 2003 is consistent with reported increases in rail rates due to tight capacity and other factors.

**Figure 10. Trends in Rail Operating Cost and Revenue Margin Efficiency**



Notes and Sources: Revenue margin is the difference between total operating expense and total operating revenue. Special charges are excluded. Costs are converted to 2000 dollars using the implicit price deflator for gross domestic product. Because of a change in accounting practices, cost data prior to 1983 is not comparable to later years. RTM = Revenue Ton-Mile. Data is from AAR, *Railroad Ten-Year Trends*; computations by CRS.

The railroads have achieved some cost reductions by encouraging or demanding the transfer of costs from the carriers to shippers.<sup>49</sup> For example, the railcars on a coal train can be either railroad-supplied or “private” cars supplied by the shipper. Railroads have offered rate discounts to encourage power companies to provide railcars, freeing the railroads of coal car investment and maintenance costs. Many power companies now provide the railcars used to move coal to their power plants. Between 1987 and 2007 the percentage of coal shipped in private railcars grew from 47% to 68%.<sup>50</sup>

Cost-shifting combined with rate reductions can save money for railroads and shippers. However, the utility industry claims that as rail capacity has tightened and the market power of the railroads has increased, railroads have sometimes insisted that power companies “pay for substantial infrastructure improvements identified by the railroad as a condition for discussing or providing rates and service terms.”<sup>51</sup>

<sup>49</sup> GAO, *Freight Railroads: Industry Health Has Improved, but Concerns about Competition and Capacity Should Be Addressed*, November 2006, pp. 15-17.

<sup>50</sup> Data developed by the GAO from STB records [<http://www.gao.gov/special.pubs/gao-07-292sp/c2t4.html>].

<sup>51</sup> Statement of William M. Mohl, Vice President, Commercial Operations, Entergy Services, Inc., on Behalf of the Edison Electric Institute, before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, p. 17.

From the power company perspective these costs may be “onerous;”<sup>52</sup> from the standpoint of the railroad this may be a rational response to a situation in which rail capacity is tight and the carrier must stretch a limited capital budget.

## Railroad Capacity

### Rail System Capacity and Service

The national rail system generally had substantial excess capacity when the railroad industry was largely deregulated in 1980. The railroads have since brought their capacity and volume of business into alignment by increasing traffic; selling off, leasing, or abandoning surplus track and equipment; and by cutting staff.<sup>53</sup> They have also added capacity in some sectors; for example, to support intermodal traffic and PRB coal shipments.

The changing traffic mix on the rail system has also contributed to tighter capacity. There is a tradeoff between the number of coal and other bulk cargo trains running on a system versus high-speed/high-priority intermodal traffic. To compete against trucks, rail intermodal traffic must be price competitive and offer speed and timeliness. Consequently, intermodal traffic usually takes priority over coal trains (and other freight traffic). When intermodal and coal trains are in conflict for the same segment of track, the intermodal train is typically allowed to run through while coal and other traffic is moved to a siding or otherwise held.<sup>54</sup> In general, when trains of varying speeds are mixed on a rail system and the faster trains are given priority, the effective carrying capacity of the slower trains — the amount of cargo they can move over a given period of time — is reduced.<sup>55</sup>

A capacity-constrained rail network may lack resiliency and have limited ability to deal with unexpected events (e.g., bad weather, mechanical failures, unexpected growth in demand). Shocks to the system can result in widespread and prolonged congestion. According to 2006 congressional testimony by the FRA, “... events that once would have had little effect now cause major disruptions throughout the rail

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<sup>52</sup> *Ibid.*

<sup>53</sup> Capacity reduction through the disposal of excess track was most important in the eastern states, less in the west where the system was not as overbuilt. Also see James McClellan, “A Railroad Perspective,” presentation to Transportation Research Board, *Conference on Freight Demand Modeling*, September 27, 2006, p. 9.

<sup>54</sup> I-95 Corridor Coalition, *Mid-Atlantic Rail Operations Study, Appendix B, Mid-Atlantic Rail Capacity Issues*, April 2002, p. 4; Arvid E. Roach, J. Michael Hemmer, and Pamela L. Miles, letter filed with the STB on behalf of the UP Railroad, *Ex Parte 573/Service Order No. 1518 — Rail Service for Construction Materials in Texas*, July 28, 1998, p. 3.

<sup>55</sup> Tellier, Paul, “Intermodal’s Elusive Ingredient: Profit,” *Railway Age*, June 1996; Edward Morlok, *Introduction to Transportation Engineering*, McGraw-Hill Book Company, New York, 1978, p. 210; and Frank J. Pergolizzi, “Western Rail Service Crisis and its Impact on Contract Coal Shippers,” presentation to the Western Coal Transportation Association, Tucson, April 6, 1999, unpaginated. [<http://www.sloverandloftus.com/fjp.htm>].

network, because there is no reserve capacity.”<sup>56</sup> As explained by the Congressional Budget Office (CBO):

Capacity can be constrained by a shortage of any critical input — infrastructure (for example, tracks or switching systems), equipment (locomotives and other railcars), or labor. And because the transportation industries are networks, the existence of capacity constraints at one key junction or along one key corridor can cause delays that cascade throughout the system. A late afternoon thunderstorm at a hub airport, for example, can cause airplanes destined for that hub to be grounded at numerous other locations. Even people traveling between cities with clear weather may be delayed, either because they have to travel through the disrupted hub or because the aircraft they are supposed to fly aboard has been held up. Such effects can occur in the freight rail industry....<sup>57</sup>

Unlike airlines, which can “reset” their networks relatively quickly because of the mobility of aircraft and their freedom from fixed infrastructure except at the origin and destination, railroad equipment has limited mobility within a system of track and yards that cannot be appreciably expanded or modified over the short term. Consequently, congestion on rail networks can persist for weeks or months.

When a rail system is congested it loses “fluidity.” As the term suggests, the system slows down. Trains are late and the railroads may be unable to carry all the traffic a shipper has contracted for or otherwise wants to move. A congested railroad may not be able to deliver all of the coal required by generators, and power plants can run short of fuel.

Tight capacity and consequent risks of delays in rail service have been identified since at least the mid-1990s. According to a 1998 White Paper by an advisory panel to the STB, “the serious railroad transportation problems experienced in 1997 throughout the United States prompted [our analysis of] whether rail infrastructure continues to be capable of efficiently moving the volume of goods demanded by citizens. Our conclusion is that ... our rail system has reached the point of being capacity constrained.”<sup>58</sup> The *Wall Street Journal* reported in 1998 that “railroads say they increasingly are caught short of the resources to handle more business.”<sup>59</sup>

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<sup>56</sup> FRA also noted “While much of the [rail] system needed paring back due to redundancy and unused and light density lines, traffic on the remaining portion is moving over heavily traveled corridors. This has resulted in a reduction in system average train speed by nearly 20 percent, accompanied by network congestion and deterioration in service reliability.” Statement of Joseph H. Boardman, Federal Railroad Administrator, U.S. Congress, House Committee on Transportation and Infrastructure, Subcommittee on Railroads, *U.S. Rail Capacity Crunch*, hearing, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., April 26, 2006, pp. 2 and 4. Also see “This Capacity Crunch May Not Be the Last,” *Railway Age*, September 2004; “Freight Rail Transportation: Long-Term Issues,” Congressional Budget Office, January 2006, p.1.

<sup>57</sup> Elizabeth Pinkston, *Freight Rail Transportation: A Review of the 2004 Experience*, Congressional Budget Office, May 2005, p. 1.

<sup>58</sup> Railroad-Shipper Transportation Advisory Council, *White Paper I* (Washington, D.C., 1998), p. 2.

<sup>59</sup> Daniel Machalaba, “Railroads’ Big Outlays on Infrastructure Are Questioned — Critics (continued...) ”

## Means of Increasing and Allocating Rail System Capacity

Railroads have several avenues for increasing capacity, including:

- *Running more trains.* However, operating more trains is not always an effective means of increasing capacity. If a system is already congested or on the edge, adding more trains can trigger or exacerbate slowdowns.
- *Running trains faster.* Greater velocity allows a railroad to move more traffic with the same amount of equipment.<sup>60</sup> Railroads can increase velocity through capital improvements that de-bottleneck the system and by streamlining train handling procedures.
- *Running trains closer together.* A minimum headway between trains is required for safe operations. If the headway can be reduced the density of trains on the system increases. The freight railroads are testing advanced braking and train control systems that could reduce headway.
- *Running bigger trains.* By increasing the number of cars in a train and using more locomotives a railroad can deliver more coal with fewer trains, releasing capacity for new coal traffic or other business. The biggest coal trains in routine power plant service currently have 135 cars and tests are underway on 150 car trains.<sup>61</sup>
- *Installing and improving track.* Examples include adding double-track and more sidings to heavily-used rail corridors, straightening curves that force trains to slow down, replacing light-duty rail with heavier track that permit faster and heavier trains, and expanding or building new rail yards and intermodal terminals.

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<sup>59</sup> (...continued)

Fear Spending Won't Bring Adequate Amount of New Business," *The Wall Street Journal*, April 30, 1998.

<sup>60</sup> An average system velocity increase of one mile per hour can free 250 locomotives, 5,000 freight cars, and 180 train crews to move more traffic. A one mile per hour velocity increase has also been equated to a savings of \$200 million annually for a major railroad. See Statement of Edward R. Hamberger, President and Chief Executive Officer, Association of American Railroads, U.S. Congress, Senate Committee on Science, Commerce and Transportation, Subcommittee on Surface Transportation and Merchant Marine, hearing, *Economics, Service and Capacity in the Freight Railroad Industry*, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., June 21, 2006, pp. 14-15; and Statement of Joseph H. Boardman, Federal Railroad Administrator, U.S. Congress, House Committee on Transportation and Infrastructure, Subcommittee on Railroads, *U.S. Rail Capacity Crunch*, hearing, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., April 26, 2006, p. 7.

<sup>61</sup> "PRB Efforts May Contribute to Velocity," *BNSF Today* (website), June 9, 2006. [[http://www.bnsf.com/employees/communications/bnsf\\_today/2006/06/2006-06-09-f.html](http://www.bnsf.com/employees/communications/bnsf_today/2006/06/2006-06-09-f.html)].

- *Technological improvements.* New technology has historically been instrumental to increasing rail system capacity and productivity. Examples include more powerful and reliable locomotives, light-weight aluminum railcars that carry more coal than steel cars, and track-side sensors that can detect and automatically alert a train crew to incipient equipment failures before a railcar breaks down.
- *Adding and Managing Staff.* Personnel planning and management is essential to fluid rail operations. At the system level, railroads want to avoid overstaffing but must have enough crews to handle traffic. In 2004 the UP was caught short-staffed, causing delivery shortages and delays for power companies and other shippers.<sup>62</sup> Because it takes months to train new crews, staff shortages cannot be quickly eliminated. At the individual train management level, railroads must precisely synchronize the positioning of coal and other long-haul trains with relief crews. A train must stop, wherever it is, when its crew reaches the end of its 12 hour shift. The train will sit idle until the railroad can transport a new crew to the train. Stalled trains can block tracks and delay other trains, causing more crews to reach the end of their shifts remote from crew change points. These delays can cascade through a rail system, causing widespread congestion.

Railroads allocate capacity, current and planned, to balance customer demands, operational constraints, and the railroad's financial goals. As discussed above, capacity is routinely allocated by assigning priorities to different classes of rail traffic. The highest priority is given to passenger traffic and to time-sensitive, truck-competitive intermodal traffic. The lowest priority is given to bulk shipments, such as coal trains. Another means of allocation is through pricing. Under federal law railroads are "common carriers" that are required to provide service, when reasonably practicable and on reasonable terms, to any requesting shipper.<sup>63</sup> In practice, the rail industry uses "price rationing of available capacity" (also known as "congestion pricing") as a means of managing traffic.<sup>64</sup> According to AASHTO, in some cases railroad companies use high prices to "de-market" business in order to release capacity that can be used more profitably and to prevent overloading of their systems.<sup>65</sup> As explained by the Union Pacific railroad:

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<sup>62</sup> Transcript of First Quarter 2004 Union Pacific Earnings Conference Call, April 29, 2004, FD (Fair Disclosure) Wire.

<sup>63</sup> 49 U.S.C. § 11101(a).

<sup>64</sup> Francis P. Mulvey, Vice-Chairman, STB, *The STB and the Nation's Railroads*, presentation to the American Forest and Paper Association, May 23, 2006, p. 20.

<sup>65</sup> AASHTO, *America's Freight Challenge*, 2007, p. 22 ("It [the rail industry] also is using pricing to turn away less profitable business."); James McClellan, "Railroad Capacity Issues," paper presented to *Research to Enhance Rail Network Performance: A Workshop*, Transportation Research Board, April 5, 2005, p. 5 ("A railway may choose to deal with a capacity issue by effectively demarketing certain low-margin traffic or traffic which creates extraordinary congestion").



We ... need to maintain a balance between the traffic we accept and the capacity we own. We maintain this balance as any other business would in the marketplace: we adjust prices to reflect demand in the market, at least where contracts give us that freedom. If we fail to act in this responsible manner, we could again be overwhelmed by more traffic than we could handle and suffer severe congestion, a situation we encountered in the fall of 2003 when traffic surged unexpectedly.

Requiring us to satisfy all demand and requiring us to provide reliable service on infrastructure that lacks capacity to meet every shipping demand would put us in an impossible position.<sup>66</sup>

Railroads, and other transportation modes, can also deal with capacity shortages by reducing the quality of service, generally or for some customers. As described by a former railroad executive, “A railway may simply accept lower standards of service during peak times or lower service quality for some customers. A strategy of poorer service or higher rates during peak times is a de facto reality with all transportation modes today.”<sup>67</sup>

## Railroad Capital Spending

Most of the options for increasing railroad capacity involve capital investment in equipment or infrastructure. In addition, railroads must invest large sums annually to renew or replace their existing capital stock. Railroads are consequently much more capital intensive than most businesses and comparable to electric power companies. Over the period 1998-2005, the Class I railroads spent on average the equivalent of 17% of their annual revenues on capital investment, compared to 3% for all manufacturing industries and 5% for the truck transportation sector.<sup>68</sup>

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<sup>66</sup> James R. Young, Chairman, President, and CEO, Comments of Union Pacific Railroad Co., before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 11, 2007, p. 18.

<sup>67</sup> James McClellan, “Railroad Capacity Issues,” paper presented to *Research to Enhance Rail Network Performance: A Workshop*, Transportation Research Board, April 5, 2005, p. 5. McClellan worked for the Norfolk Southern and other railroads.

<sup>68</sup> While railroads are clearly capital intensive, the rail sector is sometimes incorrectly referred to as the most capital intensive major industry (for example, in AASHTO, *America’s Freight Challenge*, 2007, p. 21). The capital intensity of the electric power industry is similar to that of the rail industry; both sectors spent on capital the equivalent of about 17% of revenues during the period 1998-2005. The oil and gas extraction industry is more capital intensive (an average of 29% of revenues for the period). Note that the data on capital intensity is incomplete because capital investments made overseas by U.S. companies are not captured in government statistics (Michael Mandel, “What Spending Slowdown?,” *Business Week*, April 23, 2007). Comparisons with years prior to 1998 can be difficult to make because of a change in the industrial classification system used by the federal government.

Capital intensity was computed primarily from Bureau of the Census data, including the 2002 *Economic Census*; *Annual Survey of Manufactures: 2005*; and *Annual Capital Expenditures*, volumes for 1998 to 2005. Revenue data for the electric power sector and the oil and gas extraction sector are estimates from the economic analysis firm Global Insight,

(continued...)

As shown in **Figure 11**, Class I railroad capital spending in real dollars has varied since 1983, in part tracking the overall economic performance of the rail industry:

- Investment grew strongly in the mid-1990s, peaking at \$7.6 billion (constant 2000 dollars) in 1998. The railroads invested to meet expected demand growth and to integrate merged rail systems.<sup>69</sup>
- Following the 1998 peak, capital expenditures dropped by over a third to a recent low of \$5.0 billion (constant 2000 dollars) in 2001. Factors in the decline include the 2001 recession, efforts by the railroads to pay down debts and resolve operating problems associated with the mergers of the 1990s, less demand growth than anticipated, and generally mediocre financial performance in the latter part of the 1990s.<sup>70</sup>
- Since 2001, railroad capital spending has increased continuously to an estimated \$7.2 billion (constant 2000 dollars) in 2006, 43% higher than the 2001 trough and on-par with the peak years of the 1990s.

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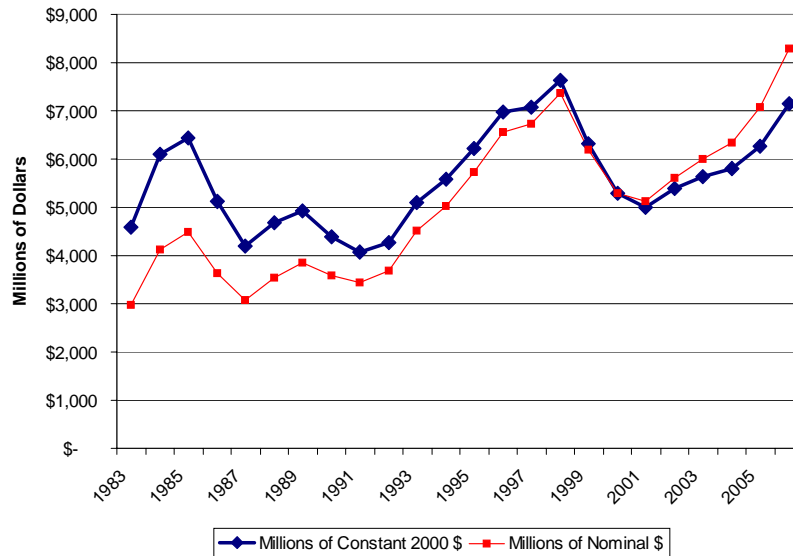
<sup>68</sup> (...continued)

except for 2002, when the source is the *Economic Census*. Railroad data is from AAR, *Railroad Ten-Year Trends*, Volume 23, page 77.

<sup>69</sup> Daniel Machalaba, "Railroads' Big Outlays on Infrastructure Are Questioned — Critics Fear Spending Won't Bring Adequate Amount of New Business," *The Wall Street Journal*, April 30, 1998.

<sup>70</sup> Transcript of Fourth Quarter 2003 Norfolk Southern Earnings Conference Call, January 28, 2004, FD (Fair Disclosure) Wire; Stan Kaplan and Trygve Gaalaas, *Strategic Analysis of Railroad Rate, Cost, and Service Prospects* (Electric Power Research Institute: 1999), pp. 3-1 to 3-5; Tony Hatch, "The Capital Question — Again," *Progressive Railroading.Com*, May 11, 2004. [<http://www.progressiverailroading.com/commentary/article.asp?id=4748>]

**Figure 11. Capital Expenditures by Class I Railroads, 1983-2005, in Nominal and Constant 2000 Dollars**



**Note:** Investment data for 1983 and after is not fully comparable to earlier years due to a change in railroad accounting practices. **Sources:** AAR, *Railroad Ten-Year Trends*; estimate for 2006 from BNSF presentation to the *Economic Development and Transportation: Moving Iowa Forward* conference, January 18, 2007, citing AAR. Constant dollar values computed by CRS using the the implicit price deflator for gross domestic product.

The recent growth in capital expenditures has been almost directly proportional to the increase in operating revenues that has resulted from volume growth and higher rates. Railroad capital spending as a percentage of revenues has been relatively steady from 2000 through 2005 at 15% to 16%, compared to 22% in 1998. Railroad capital investment proportional to traffic has also been steady since 2000, varying, in constant 2000 dollars, from a low of 3.3 mills per revenue ton mile in 2001 (a mill is a tenth of a cent) to a high of 3.7 mills per revenue ton mile in 2005. This compares to 5.5 mills in 1998.

This pattern, in which capital investment changes in-step with growth in revenue and traffic but not more rapidly or slowly, appears to be consistent with the industry's stated approach to capacity expansion. In order to improve their return on investment, the railroads tailor investments to the expected change in demand over the short term. They do not "build ahead" of short-term demand forecasts. As one former industry executive explains, "[T]oo much capacity (again, track, terminals, cars, locomotives, and crews) means that financial returns decline and the availability of capital becomes more expensive. So management is in a constant struggle to create 'just in time' capacity; having the needed resources in place when needed and not six months too soon or six months too late."<sup>71</sup> According to the President of the Association of American Railroads (AAR), a "build ahead" approach is financially unviable:

<sup>71</sup> James McClellan, "Railroad Capacity Issues," paper presented to *Research to Enhance Rail Network Performance: A Workshop*, Transportation Research Board, April 5, 2005, p. 4.

... to contend that railroads can afford to have significant amounts of spare capacity on hand ‘just in case’ — or that shippers would be willing to pay for it, or capital providers willing to finance it — is completely unrealistic. Like other companies, railroads try to build and staff for the business at hand or expected soon to be at hand. “Build it and they will come” has rarely been a winning strategy for freight railroads.<sup>72</sup>

A related point is that when a railroad expands its asset base it also incurs on-going costs for operating and maintaining those assets.<sup>73</sup> Because rail investment tends to be long-lived, railroads focus their investment dollars where they can either expect long-term traffic and revenues, or can recover investments quickly.

In trying not to build capacity too far ahead of, or behind, demand, railroads are not unique; the same capital budgeting problem can face any firm.<sup>74</sup> In respect to coal traffic, the railroad industry, and the coal production and power industries, must deal with long-term strategic questions in making investment decisions. Because of actual or prospective actions at the state and federal levels in such areas as carbon emission controls, enhanced controls on other air emissions, and encouragement of renewable energy sources, there is uncertainty concerning the volume and source of future coal flows. The degree of this uncertainty has not stopped coal-related investment, as evidenced by continuing railroad investment in coal traffic and power company construction of new coal plants. Nonetheless, these uncertainties and incomplete information complicate long-term investment planning for railroads. For example, according to a trade press report:

Eastern U.S. coal producers and railroads are moving to better plan for coal-sourcing shifts in the East, calling on the STB for assistance, as one railroad [CSX] cites a lack of solid information on which to base capital expenditures.... [According to the railroad] CSX recognizes the coming shift, but the railroad has little solid information to go on.<sup>75</sup>

A conservative approach to capital investment has been encouraged at times by Wall Street; for example, an investment analyst testified to Congress in 2001 that “investors, again becoming aggravated by poor returns, are now pressuring railroad

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<sup>72</sup> Statement of Edward R. Hamberger, President and Chief Executive Officer, Association of American Railroads, U.S. Congress, Senate Committee on Science, Commerce and Transportation, Subcommittee on Surface Transportation and Merchant Marine, hearing, *Economics, Service and Capacity in the Freight Railroad Industry*, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., June 21, 2006, pp. 5-6.

<sup>73</sup> E. Hunter Harrison, *How We Work and Why: Running a Precision Railroad* (Montreal: Canadian National Railway Co., 2005), p. 59.

<sup>74</sup> J. Fred Weston and Eugene F. Brigham, *Managerial Finance*, 7th Edition, 1981, pp. 395-396.

<sup>75</sup> “Eastern Producers, Rails Seek Better Planning,” *Argus Coal Transportation*, April 19, 2007. Also see, Steve Thomas, “Delayed Scrubbers Contribute to Market Uneasiness,” *Platts Coal Outlook*, June 11, 2007.

management to cut back on capital expenditures.”<sup>76</sup> Tight rail system capacity has also helped the railroads increase rates and profits. The chief executive officer of the BNSF noted in a 2007 STB hearing that it has taken about 25 years for the rail market to find an “equilibrium of demand and capacity,” and in such a market rail rates will tend to rise.<sup>77</sup> The GAO identified a “capacity-constrained environment in which the demand for [rail industry] services exceeds its capacity in some areas” as contributing to rate increases.<sup>78</sup>

There are no firm estimates of how railroad capital spending is divided between system maintenance and capacity expansion. A rough estimate is that the railroads dedicate about 15% to 20% of their annual capital spending to capacity expansion, or about \$1 billion to \$2 billion.<sup>79</sup> Industry-wide data are unavailable on how much of the capacity-expansion investment made by the railroad industry is attributable to coal shipments, but data for the BNSF suggests that coal-specific spending can be highly variable. As shown in **Figure 12**, BNSF’s annual coal-related capacity-expansion capital spending varied from over \$400 million (constant 2000 dollars) to zero during the period 1994 to 2005.

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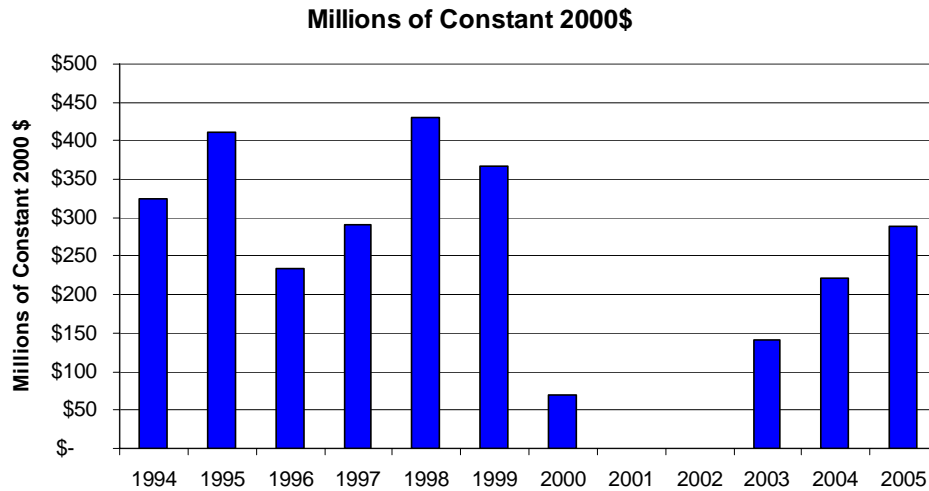
<sup>76</sup> Testimony of James J. Valentine, Morgan Stanley, U.S. Congress, Senate Committee on Commerce, Science, and Transportation, Subcommittee on Surface Transportation and Merchant Marine, hearing, *State of the Rail Industry*, 107<sup>th</sup> Cong., 1<sup>st</sup> sess., May 9, 2001, p. 3. For other examples of investors encouraging the rail industry to limit capital spending see Christopher Palmeri, “Serving Two (Station) Masters; More Spending May Assuage Burlington Northern’s Customers, but Not Wall Street,” *Business Week*, July 24, 2006, and Daniel Machalaba, “Railroads’ Big Outlays on Infrastructure Are Questioned—Critics Fear Spending Won’t Bring Adequate Amount of New Business,” *The Wall Street Journal*, April 30, 1998.

<sup>77</sup> Comments of Matt Rose, Chief Executive Officer, BNSF Railway, before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007 (from video file Hearing041107\_1.wmv [<http://www.stb.dot.gov/stb/audiomee.nsf>], at approximately 20 minutes 52 seconds).

<sup>78</sup> GAO, *Freight Railroads: Industry Health Has Improved, but Concerns about Competition and Capacity Should Be Addressed*, November 2006, pp. 11-12.

<sup>79</sup> The Federal Railroad Administration suggests as a rule of thumb that about 15% to 20% of annual Class I railroad investment is dedicated to capacity expansion (Statement of Joseph H. Boardman, Federal Railroad Administrator, U.S. Congress, House Committee on Transportation and Infrastructure, Subcommittee on Railroads, *U.S. Rail Capacity Crunch*, hearing, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., April 26, 2006, p. 5). For the period 2001 to 2006 this would translate to about \$0.75 billion to \$1.6 billion. A 2003 study by AASHTO suggests that the railroads spend about \$2 billion annually on capacity growth (AASHTO, *Freight-Rail Bottom Line Report*, 2003, p. 61). When GAO requested a breakdown showing how much of estimated 2006 capital investment would be used for capacity expansion, it was told by the AAR that the information would not be available until completion of a special study (GAO, *Freight Railroads: Industry Health Has Improved, but Concerns about Competition and Capacity Should Be Addressed*, November 2006, p. 57).

**Figure 12. BNSF Investments to Increase Coal Capacity, 1994-2005**



Sources: data in nominal dollars from BNSF Railway, Presentation to the South Dakota Public Utilities Commission, April 21, 2006. Nominal values converted to constant dollars using the implicit price deflator for gross domestic product.

In addition to investments by railroads, coal producers and power companies install coal train loading and unloading facilities. Modern facilities load and unload the largest trains in four hours or less, compared to older equipment which can take 24 hours to process a train. Large mines, as in the PRB, also build “landing spots” — holding tracks which position trains off the main lines and close to the mine, ready for loading on short notice. These investments increase system capacity by improving train utilization.<sup>80</sup> However, there appears to be no compiled historical data or tracking of these investments by the electric power industry or otherwise, so a clear picture of the past, current, or projected future spending by mining and power companies on rail-related infrastructure is unavailable.

## Rail Capacity Metrics

Policy development would probably benefit from quantitative measures of railroad capacity utilization and service quality. However, most of the public information on railroad capacity are anecdotal. This is in contrast, for example, to the industrial capacity utilization indices published by the Federal Reserve Board.<sup>81</sup> The unavailability of public data on rail capacity is in part because rail system capacity is difficult to measure and define. Another consideration is that the rail network is privately owned, and capacity data may be considered proprietary by the railroads. However, as discussed below, these complications are not in themselves insuperable barriers to making more data on rail system capacity publicly available.

<sup>80</sup> Thomas C. Canter, Written Statement of National Coal Transportation Association before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, pp. 2 -3.

<sup>81</sup> Available at [<http://www.federalreserve.gov/releases/G17/>].

One study broadly defines rail capacity “as the greatest possible output while maintaining a specified minimum acceptable level of service (e.g., a minimum speed).”<sup>82</sup> However, this kind of formulation does not address a host of complications. There are in fact no standard definitions or measures of rail system capacity.<sup>83</sup> As noted by the CBO, the concept of transportation network capacity is “elusive.”<sup>84</sup>

A measure of rail system capacity is ultimately a function of the assumptions made by the analyst. The U.S. rail network has 70,000 origin-destination pairs, many routing options, and carries a wide variety of products.<sup>85</sup> The carrying capacity of a section of railroad depends on the quality of the track, whether the corridor is single-tracked or double-tracked, the number and length of sidings, and the type of signaling system installed. Railroads move trains over the network at varying speeds, depending on the quality of service needed to compete with trucks or barges, the weather, maintenance programs, and the condition of the track.<sup>86</sup> Capacity is also a function of the cost of service the railroad is willing to incur and which shippers are willing to pay. Without a consideration of cost, “the concept of capacity is meaningless.”<sup>87</sup>

Railroad network capacity is consequently not a single metric, but is different for each type of traffic, and depends on the assumptions made for traffic mix, acceptable costs, and many other variables. Since the amount of capacity on a rail network is hard to pin down, the degree to which total capacity is being utilized is also “elusive.”

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<sup>82</sup> Committee for the Study of Freight Capacity for the Next Century, *Freight Capacity for the 21st Century* (Washington, D.C: Transportation Research Board, 2003), pp. 26-27.

<sup>83</sup> *Ibid.*, pp. 26-27; Edward K. Morlok and Stephanie P. Riddle, *Estimating the Capacity of Transportation Systems: A Model with Applications to Freight Transportation* (Mid-Atlantic Universities Transportation Center, 1998), p. 1.

<sup>84</sup> Elizabeth Pinkston, *Freight Rail Transportation: A Review of the 2004 Experience*, Congressional Budget Office, May 2005, p. 1.

<sup>85</sup> The count of origin-destination pairs is from Letter from Edward Hamberger, President and CEO, AAR, to John B. Ficker, President and CEO, National Industrial Transportation League, September 29, 2006, pp. 1 and 2.

<sup>86</sup> System velocity, and therefore capacity, is reduced when a train must be held at a siding either to give the right of way to a train heading in the opposite direction or to allow a fast train to pass a slower train. Delays are minimized when a stretch of railroad has many sidings that can handle the longest trains. Traffic management options are even greater, and delays minimized, when a stretch of railroad has double track. In the Powder River Basin some parts of the railroad have triple and quadruple track. Track with modern communications systems (centralized traffic control, or CTC) can safely handle more traffic than “dark” rail.

<sup>87</sup> Comment of Alan Greenspan in Lawrence R. Klein, et al., “Capacity Utilization: Concept, Measurement, and Recent Estimates,” *Brookings Papers on Economic Activity* 1973, no. 3. A related point — that the definition and measurement of capacity cannot be separated from assumptions concerning the cost and efficiency of operations, and the chosen operating mode — is made in Frank De Leeuw, “The Concept of Capacity,” *Journal of the American Statistical Association* 57, no. 300 (December 1962): 826-840.

In spite of these complications, estimates of rail system capacity and capacity utilization are developed and used by the rail industry itself. The drivers of rail system capacity have been defined by railroad executives and other analysts; for example, the BNSF lists volume, train density, physical plant elements, and productivity as determinants of system capacity.<sup>88</sup> And while the practicality (and utility) of encapsulating the capacity utilization of an entire rail system in a single index number may be questionable, it is possible to define capacity for key corridors and categories of traffic for a given set of assumptions.<sup>89</sup> For instance, in the past CSX has reported the degree of capacity utilization on its network for general merchandise traffic and for intermodal traffic.<sup>90</sup> Union Pacific has described its capacity situation in terms of specific corridors:

[Capacity] ... is by certain corridors. Like the Sunset Corridor [from Los Angeles to El Paso]. We're at capacity on the Sunset Corridor. We are pressing capacity on the South Central [corridor] between Los Angeles and Salt Lake City. There's other areas we are not at capacity. So ... it's a little more complicated answer than probably you would like to hear but [in] some areas [with] the railroad we're bumping capacity [and in] other areas we are still in pretty good shape.<sup>91</sup>

Railroads estimate the current and projected capacity of parts of their systems in order to make investment decisions. An example is the critical Joint Line in the PRB, the nation's most important coal-carrying rail line. According to BNSF and UP:

For many years, CANAC, a Montreal-based rail engineering firm, has been evaluating [for the railroads] PRB coal production forecasts and both railroad and mine infrastructure capacity needed to support forecasted production. Recommendations for railroad capacity proposed by CANAC in 1999 ... will be fully implemented by September 2006.... CANAC began a new study of the Joint Line in early Fall 2005.... In response, Union Pacific and BNSF have advanced construction plans to add the more than 40 miles of third and fourth main line capacity to meet the annual projected growth in demand for S[outhern]PRB coal in 2007 through 2009.<sup>92</sup>

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<sup>88</sup> Summary of Testimony of Matthew K. Rose, Chairman, President and CEO, Burlington Northern Santa Fe Corp., before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 11, 2007, pp. 3-4.

<sup>89</sup> Railroads often refer to freight corridors, with distinct traffic flows and investment plans. For example, Union Pacific has the Sunset Corridor (or Route) from Los Angeles to New Orleans and the Overland Route from Oakland to Chicago [<http://www.uprr.com/aboutup/maps/attachments/upcomnam.pdf>].

<sup>90</sup> In early 2001 CSX reported having 30% excess capacity on its network for general merchandise traffic (Transcript of CSX First Quarter 2001 Earnings Conference Call, from Financial Disclosure Wire). In early 2002 it reported 60% utilization of its intermodal capacity (Transcript of CSX First Quarter 2002 Earnings Conference Call, from Financial Disclosure Wire).

<sup>91</sup> Transcript of UP Fourth Quarter 2004 Earnings Conference Call, from Fair Disclosure Wire.

<sup>92</sup> BNSF and UP joint press release, *UP, BNSF Announce Southern Powder River Basin* (continued...)



In summary, while a system-wide capacity index may be difficult or impractical to develop, corridor-specific capacity measures appear to be meaningful and feasible.<sup>93</sup> However, the federal government does not collect the data needed to estimate rail system capacity or require the railroad industry to provide estimates.

The Association of American Railroads doubts the value and feasibility of publishing capacity estimates. In September 2006, the National Industrial Transportation League (NITL, an industrial shipper trade association which has at times raised concerns over rail industry service) suggested to the AAR a joint project to “create an objective measure of capacity for the rail industry.” NITL stated that even if not entirely precise, “given the significant public dialogue about the need for increased rail capacity, such a metric would allow rail carriers, their customers and the public sector to gain a better view of the [capacity] problem.”<sup>94</sup> AAR’s response was that creation of a capacity metric was probably impractical. Because the rail system is so complex, “... it is difficult to believe that meaningful aggregations or comparisons across railroads can be obtained.” The AAR was concerned that compared to the basic performance measures, such as train speed, already publicly available, a capacity index would be “far more complicated, considerably less applicable to any particular circumstance, and potentially subject to greater misuse.”<sup>95</sup>

Nonetheless, as noted above, capacity estimates are made and used by railroads. While the possibility of misuse or misinterpretation of capacity estimates exists, this same risk presumably can exist for any metric of economic activity. As discussed later in this report the absence of published railroad capacity estimates may impede informed analysis of rail and coal transportation policy. It also can impede efficient private-sector decision-making. In a 2007 STB hearing, the Canadian National Railway suggested that the STB “consider organizing efforts by the railroads and shippers to project future traffic growth over capacity-constrained lanes. This could help lead to efforts to direct investment dollars more efficiently.”<sup>96</sup>

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<sup>92</sup> (...continued)

*Joint Line \$100 Million Capacity Expansion Plan*, May 8, 2006. [[http://www.uprr.com/newsinfo/releases/capital\\_investment/2006/0508\\_sprb.shtml](http://www.uprr.com/newsinfo/releases/capital_investment/2006/0508_sprb.shtml)]. Another example is UP’s investment plans for its Sunset Corridor. [[http://www.uprr.com/newsinfo/releases/capital\\_investment/2005/0630\\_sunset.shtml](http://www.uprr.com/newsinfo/releases/capital_investment/2005/0630_sunset.shtml)].

<sup>93</sup> On the value of corridor-level measures of capacity, see Edward K. Morlok and Stephanie P. Riddle, *Estimating the Capacity of Transportation Systems: A Model with Applications to Freight Transportation* (Mid-Atlantic Universities Transportation Center, 1998), p. 3.

<sup>94</sup> Letter from John B. Ficker, President and CEO, NITL, to Edward Hamberger, President and CEO, AAR, September 18, 2006, p. 1.

<sup>95</sup> Letter from Edward Hamberger, President and CEO, AAR, to John B. Ficker, President and CEO, NITL, September 29, 2006, pp. 1 and 2. As of mid-2007 there had been no further progress between NITL and the AAR on the development of a rail capacity index (CRS telephone interview with John Ficker, June 20, 2007).

<sup>96</sup> Sean Finn, Senior Vice-President, Public Affairs, *et.al.*, Statement of Canadian National Railway Company, before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, p. 8.

Some or much of the relevant data may be considered confidential by the railroads, coal producers, and power companies. GAO found in 2006 and 2007 studies that the railroads considered information on capacity planning, and on the condition of railway tunnels and bridges (which has system capacity as well as safety implications), to be business-sensitive and proprietary.<sup>97</sup> Nonetheless, if Congress concludes that better public data on rail capacity is needed for rail policy development or otherwise, the confidentiality issue can perhaps be dealt with by aggregating or otherwise masking the published version of the data for specific rail corridors.

## Future Rail Capacity and Investment Needs

Just as there are no public metrics that directly measure current rail system capacity, there are also no firm estimates of future capacity needs or costs. According to American Association of State Highway and Transportation Officials:

Unlike with highways, there is no national planning process which allows the magnitude of rail congestion to be measured. Because “what gets measured, gets managed” there is no systematic national management of the nation’s rail congestion needs. The individual railroads run their companies efficiently and make investments that meet the criteria of their business plans but, from the perspective of the performance of the national freight transportation system, there is no baseline for service, no standards for operations, no true measure of what type of system and service the country needs.<sup>98</sup>

A principal reason the national planning process, management, and data do not exist is that the rail network is privately owned and operated, unlike the publicly owned and operated highway system. As noted above, GAO reports indicate that much of the data AASHTO specifies would likely be considered business-sensitive and proprietary by the railroads.

Trends in railroad capacity and system congestion are important to transportation policymakers because freight traffic is projected to grow enormously. DOT and AASHTO both estimate growth in the freight traffic carried by all modes of about 60% from the 2000-2002 time period to 2020.<sup>99</sup> Because rail capacity can be less expensive to build, more cost-efficient to operate, and more friendly to the environment than truck transportation and road-building, some transportation planners are advocating a large increase in rail system capacity with the primary goal of displacing growth in truck traffic.

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<sup>97</sup> GAO, *Freight Railroads: Industry Health Has Improved, but Concerns about Competition and Capacity Should Be Addressed*, November 2006, p. 55; GAO, *Railroad Bridges and Tunnels: Federal Role in Providing Safety Oversight and Freight Infrastructure Investment Could be Better Targeted*, August 2007, p. 3

<sup>98</sup> AASHTO, *America’s Freight Challenge*, 2007, p. 24.

<sup>99</sup> The American Trucking Association’s estimated growth of 32% percent between 2004 and 2016. These estimates are cited in GAO, *Freight Railroads: Industry Health Has Improved, but Concerns About Competition and Capacity Should Be Addressed*, November 2006, p. 54.

For example, in a widely-cited 2003 study, *Freight Rail Bottom Line Report*, AASHTO estimates that “there is an estimated unfunded annual need for \$2.65 billion to \$4.15 billion of additional freight-rail infrastructure improvements,” or \$53 billion to \$83 billion over 20 years. However, this estimate is focused on the new capacity needed to put part of the growth in general merchandise traffic on rail instead of trucks, not on the capacity needed to reliably ship coal or other bulk commodities.<sup>100</sup> Moreover, AASHTO cautions that its cost estimates are no more than “‘first approximations’ for purposes of illustration and discussion” based on extrapolation from other studies and professional judgement.<sup>101</sup> It notes that “long-term, system-wide cost estimates that are comparable to those developed for the highway and transit systems do not exist. The railroads and the states generate cost estimates for specific projects to calculate return on investment and estimate public benefits, but there is no program to systematically compile these costs estimates and forecast future investment levels.”<sup>102</sup> In summary, rigorous national-level assessments of rail system capacity needs and expansion costs do not appear to exist.

## Coal Stocks as a Complement to Rail Capacity Expansion

Coal-fired power plants maintain coal stocks for two purposes: as a buffer against short term variability in coal deliveries and to provide an emergency supply in case deliveries are badly disrupted. The size of a plant’s stockpile largely determines how much delay in coal shipments a plant can tolerate before the operator must take costly emergency measures, such as running more expensive natural gas plants in lieu of its coal generation. However, there is also a cost in tying up working capital in a large coal stockpile.

There is a rough analogy between the excess capacity a railroad can build to handle peak demands and contingencies, and the coal stocks a power plant holds to provide a reserve of fuel. Railroads have suggested that it may be more economical for power companies to store more coal at their power plants than to pay the railroads to build enough surplus capacity to minimize the chance of a service problem. For example, at an April 2007 hearing before the STB on railroad capacity, CSX Chief Executive Officer Michael Ward said:

...it would make “better economic sense” for utilities to keep higher inventory levels to give them “flexibility” to make up for some unreliability of the coal supply chain. “When you think about the supply chain, my guess is that the better economic tradeoff [for utilities] is to have larger stockpiles,” he said. If utilities want “100% guaranteed delivery” they would need to be willing to pay

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<sup>100</sup> AASHTO, *Freight Rail Bottom Line Report*, 2003, pp. 60-61. AASHTO presents three scenarios of increasingly aggressive investment in expanding railroad capacity, and the level of unit train shipments (which would include coal and grain) is identical in each case (pp. 63-64, Tables 9, 10, and 11). Unit train traffic only varies (drops) in a case that assumes zero future investment in expanding railroad capacity (Table 6 on page 63).

<sup>101</sup> *Ibid.*, pp. 60 and 62. The AASHTO cost estimates appear to be in nominal dollars, do not take inflation into account, and do not express the total costs as a present value.

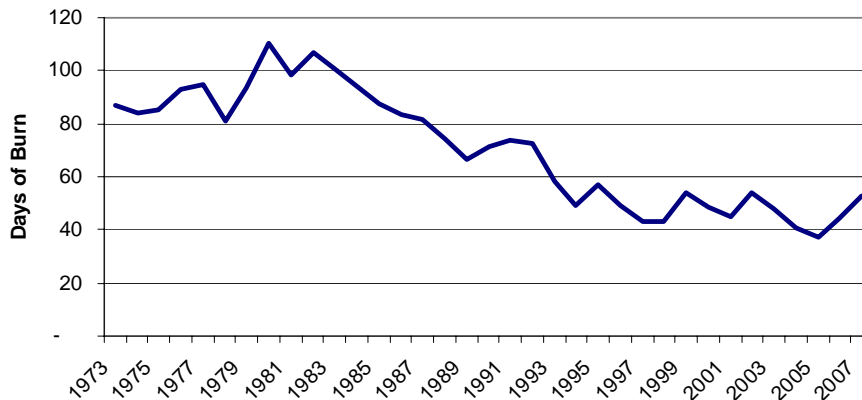
<sup>102</sup> *Ibid.*, p. 60.

for necessary rail infrastructure, which would not be as good of an economic choice for them....<sup>103</sup>

This suggestion assumes that a plant has the room to keep a large coal stockpile, which is not always the case.

Coal inventories are often measured as “days of burn”; that is, the number of days the coal stockpile can keep a plant running assuming no coal deliveries. As shown in **Figure 13**, days of burn for the electric power sector<sup>104</sup> have generally declined since the 1970s and early 1980s, from a range of about 80 to 100 days of burn to 40 to 50 days of burn by the turn of the century.

**Figure 13. Annual Average Coal Stocks, Electric Power Sector, Expressed as Days of Burn**



**Notes and Sources:** Data for 2007 is through May. Days of burn are computed by dividing the average of each year's end-of-month stocks in tons by the average daily consumption of coal for the year. Data is for the electric power sector, which consists of the utilities and independent power producers. Data are from Energy Information Administration, Monthly Energy Review and Electric Power Monthly.

The electric power industry cut its coal stocks for several reasons:

- To reduce inventory holding costs and coal handling expenses in order to improve financial results.

<sup>103</sup> Marcin Skomial, “From Railroad View, Large Coal Stocks Make Sense,” *Platts Coal Outlook*, April 16, 2007.

<sup>104</sup> The electric power sector consists of regulated electric utility companies and independent power producers whose primary business is selling electric power. The electric power sector excludes industrial and commercial cogenerators.

- The reduced threat of major coal miner strikes, as more coal production moved to non-union western mines.<sup>105</sup>
- Opposition to larger stocks by staff or other parties at state public utility commission rate hearings.<sup>106</sup>
- The change in coal inventory levels presumably reflected to some degree the performance guarantees included in rail transportation contracts.

Another factor was the sale of coal-fired power plants to non-utility independent power producers (IPPs), following the advent of power market restructuring. IPPs began buying large coal plants from utilities in the latter half of the 1990s and by 2006 accounted for 24% of total electric power sector coal consumption.<sup>107</sup> IPPs face more financial risk and potential rewards than utilities. Utilities often have monopoly service territories and regulated rates, and can earn a regulated return on the working capital tied up in coal inventories. IPPs have none of these regulatory benefits, but have more latitude to earn profits than utilities (whose rates are designed to earn a target rate of return). In this environment IPPs reduce costs by maintaining smaller stockpiles than utilities (see **Figure 14**, below).

The ability of power companies to build up stockpiles has been limited at times by coal transportation problems. Nonetheless, the long-term trend by the electric power industry to reduce its coal inventories is clear. By reducing inventories as more coal was shipped long distances from western coal mines, the power industry was cutting its “shock absorber” against coal supply interruptions at the same time the coal supply chain was getting longer and potentially more vulnerable to interruption. The reduction in coal stocks also occurred in the context of the history of coal transportation disruptions (see **Appendix 1**).

By cutting its coal inventories the electric power industry incurred more coal supply risk. According to one 2005 analysis power company “inventory optimization programs typically indicated that the holding costs of maintaining a large coal stockpile exceeded the expected [i.e., probability-weighted] cost of running out of coal.”<sup>108</sup> Utility inventory studies prior to 2005 may have excluded the

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<sup>105</sup> Mark Bossard and Trygve Gaalaas, “Coal Stockpiles: How Much is Enough?,” *Coal Age*, September 2005, pp. 33-34; Patti Best, Ellen Ewart, and Jerry Vaninetti, “Coal Stockpiles: Size Matters,” *Coal Age*, September 1999, pp. 57-58.

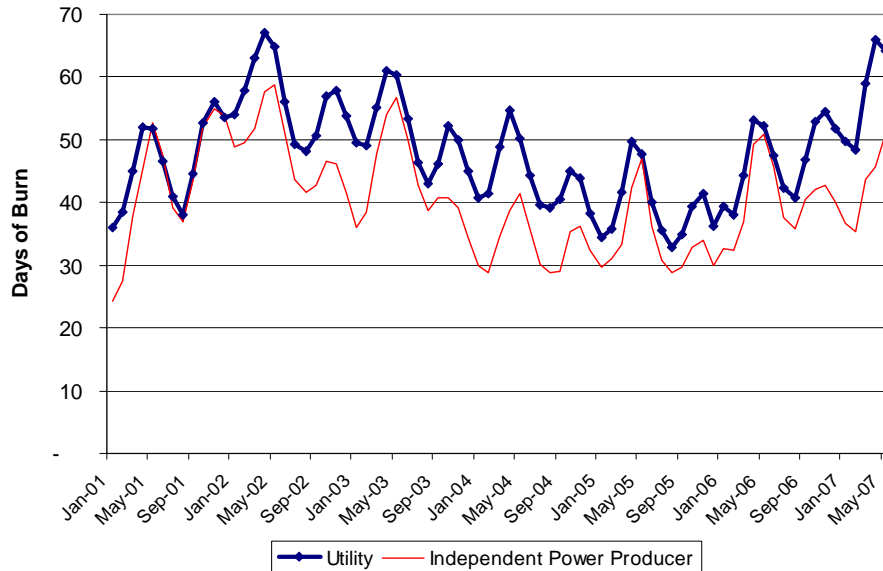
<sup>106</sup> For an example of contention over increased coal inventories, see Rebuttal Testimony of Thomas D. Crowley on Behalf of Southwestern Public Service Company, before the Texas State Office of Administrative Hearings, SOAH Docket 473-06-2536, Public Utility Commission of Texas Docket/Control No. 32766, *Application of Southwestern Public Service Company for (1) Authority to Change Rates, et. al.*, January 29, 2007, pp. 50-52.

<sup>107</sup> U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly*, March 2007, Table ES1.B.

<sup>108</sup> Mark Bossard and Trygve Gaalaas, “Coal Stockpiles: How Much is Enough?,” *Coal Age*, September 2005, p. 33.

possibility of extended, major delays in coal shipments, based on the assumption that past major disruptions were “historical anomalies.”<sup>109</sup>

**Figure 14. Trends in Electric Utility and Independent Power Producer Coal Stocks, Measured in Days of Burn**



**Notes and Sources:** Days of burn are computed by dividing each month's ending stocks by the average daily consumption of coal for the month. Underlying data is from a file provided by the Energy Information Administration and EIA's Electric Power Monthly, Table 3.1.

Inventories declined sharply due to the 2005 coal transportation problems. Electric power sector coal stocks dipped to an average of 37 days in 2005 and hit bottom at 32 days in August 2005; these are the lowest levels on record going back to January 1973. Stocks actually began to decline in 2004, which is consistent with the drop in coal train speeds during this decade (discussed below) and claims by some power companies that the deterioration in western rail service pre-dated the May 2005 derailments in the PRB.<sup>110</sup>

Rail service has generally improved since 2005 and power companies have been rebuilding stockpiles. Electric power sector coal inventories averaged 51 days of burn in 2006, the highest level since 2002, and continued to increase into early 2007.

<sup>109</sup> Thomas D. Crowley, Rebuttal Testimony of Thomas D. Crowley before the Arkansas Public Service Commission, *In the Matter of an Investigation into Entergy Arkansas, Inc.'s Interim Revision to its Energy Cost Recovery Factor*, Docket No. 05-116-U, March 15, 2006, pp. 26-27.

<sup>110</sup> Statement of William M. Mohl, Vice President, Commercial Operations, Entergy Services, Inc., on Behalf of the Edison Electric Institute, before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, p. 17; Testimony of Steven Jackson, Director, Power Supply, Municipal Electric Authority of Georgia, U.S. Congress, Senate Committee on Energy and Natural Resources, *Coal-Based Generation Reliability*, hearing, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., May 25, 2006, S. Hrg. 109-601, (Washington: GPO, 2006), pp. 26.

The increase in stocks has been especially large for utility companies (see **Figure 14**, above).

In summary, in an effort to reduce costs, the rail industry and the power industry have both been pursuing types of “just in time,” cost-minimizing strategies. For the rail industry, this has meant not building capacity ahead of demand; for the power companies, it had meant reduced inventory policies. The simultaneous pursuit of these policies by the power and rail industries, and the development of a resilient coal supply chain, may be mutually exclusive. An issue between power companies and railroads is how should the cost of improving reliability be shared between paying for larger stocks at power plants and building more rail capacity.

The trend toward increased stocks — though still not to the levels of the 1973-1990 period — suggests that power producers have decided to bear higher inventory costs to improve the reliability of their coal supplies. Given, as discussed below, the reported unwillingness of railroads to offer strong service guarantees, power companies may have had little choice except to increase coal stockpiles. Depending on the observer’s perspective, this may be indicative of an exercise of market power, or a rational and efficient economic outcome.

## **Railroad Service and Disruptions in Coal Transportation**

### **Service Quality Since Staggers**

As rail system capacity has tightened, the quality of service for some freight traffic has degraded. As explained in 2006 by one analyst:

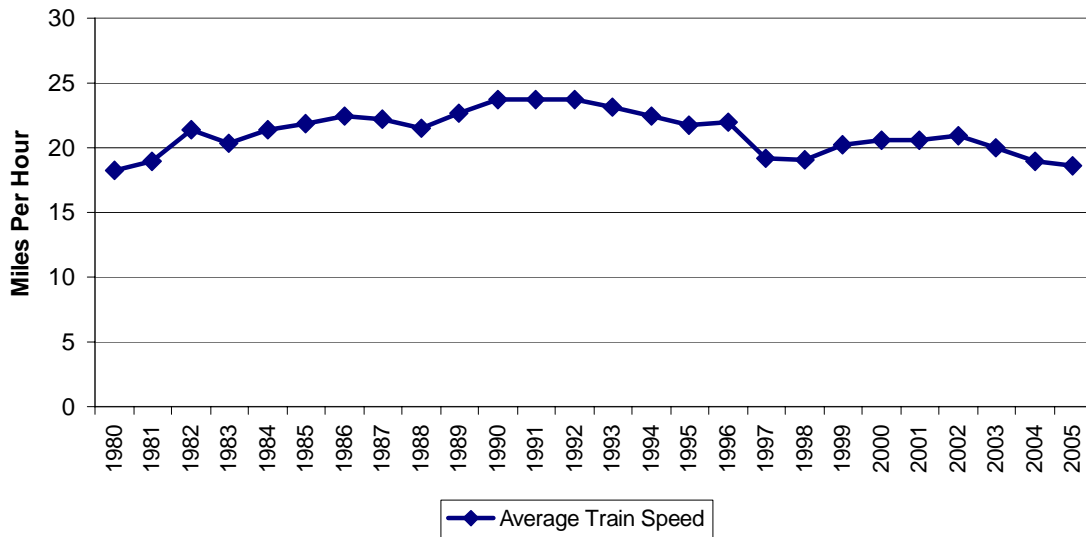
The capacity crunch is real, it could go on for a long time, and it has serious consequences. Over the past 10 years, there have been many occasions where mergers, bad weather, or spikes in demand have triggered prolonged periods of congestion. All of the major US railroads have suffered from such episodes, and customers have frequently complained about long and unreliable transit times and equipment shortages.<sup>111</sup>

As shown in **Figure 15**, average train speed has declined in recent years and in 2005 was about the same as in 1980. For coal trains specifically, average speed dropped between 2002 and mid-2007 on all four of the major rail systems, and with the exception of the Norfolk Southern was about the same or worse in 2007 than in 1999 (**Figure 16**; earlier data are unavailable).

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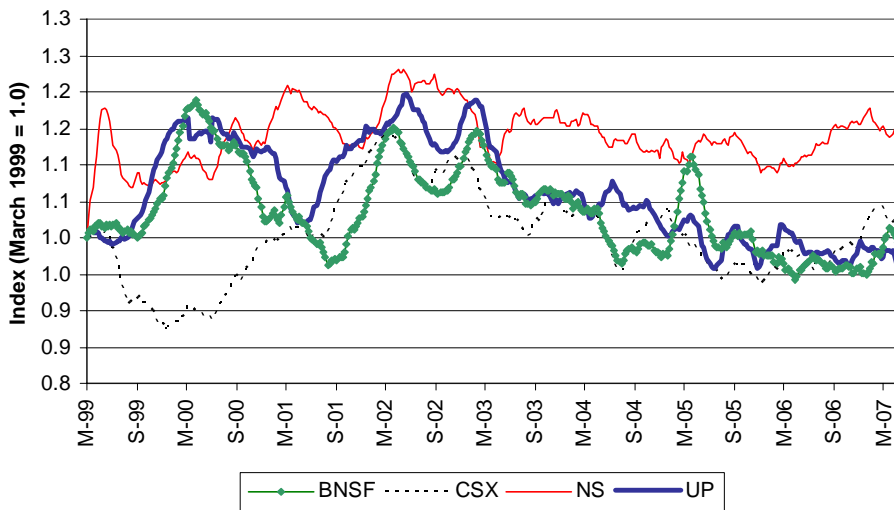
<sup>111</sup> Statement of Carl D. Martland, Senior Research Associate & Lecturer, Department of Civil & Environmental Engineering, Massachusetts Institute of Technology, U.S. Congress, House Committee on Transportation and Infrastructure, Subcommittee on Railroads, *U.S. Rail Capacity Crunch*, hearing, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., April 26, 2006, p. 3.

**Figure 15. Annual Average Speed of Class I Railroad Freight Trains**



Source: Association of American Railroads, Railroad Ten-Year Trends, Volumes 23, 16 and 7.

**Figure 16. Trends in Average Speed of Coal Unit Trains, March 1999 to June 2007, 12 Week Trailing Average**



Source: Rail performance statistics originally posted at <http://www.railroadpm.org/>.

Coal shippers have complained about the quality of service. According to a electric utility trade group, the Edison Electric Institute (EEI), even after the western railroads claimed in 2006 to have recovered from the severe coal service disruption of 2005 (discussed later in this report) some power plants were still not receiving their contracted coal tonnage. EEI noted that the increase in deliveries since 2005 to the Louisiana and Arkansas coal plants operated by Entergy (a large utility company), had been achieved by adding trains to the routes, not by restoring velocities to pre-



2005 standards.<sup>112</sup> A power company is presumably indifferent between running more trains versus fewer but faster trains, as long as the railroad is willing to supply the additional trainsets and coal delivery obligation are met; but other things being equal, system capacity is enhanced by faster trains, and consumed when more, slower trains are needed to serve customers.

The problems with rail service extend beyond coal traffic. According to United Parcel Service, average speeds have also dropped since 2002 for intermodal trains :

During the past 15 years, rail velocity has not been up to par with other improvements in transportation. All other transportation modes have seen significant time-in-transit enhancements during this period, with the exception of rail. Our intermodal freight movements move at slower speeds today than they did in the mid-90s, while service has declined. The [Surface Transportation] Board should consider an intriguing question: What mode of transportation moves slower today than it did 15 years ago? UPS continues to experience significant rail service issues in the Western U.S., with an improved service picture in the East.<sup>113</sup>

Railroad perspectives on the quality of service appear to vary. During the 2006-2007 time period, BNSF described its service as improved but still not acceptable, and CSX also pointed to the need for improvement.<sup>114</sup> NS on the other hand viewed its service since 2003 as “superior.”<sup>115</sup> The industry trade association described coal service as especially strong in 2007.<sup>116</sup> The improvement is indicated by the substantial growth in coal stocks, which probably would have been impossible to achieve without significant service gains. Electric power sector coal stocks reached 60.2 days of burn in April 2007, the highest level since the first half of 2002 and one of the highest monthly levels since the early 1990s.

As rail capacity has tightened, rail carriers have reportedly become increasingly unwilling to provide strong service quality guarantees for coal shipments and other freight. According to NITL, “meaningful service provisions in contracts are virtually impossible to obtain.”<sup>117</sup> Foundation Energy Sales, a coal producer, testified at a

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<sup>112</sup> Statement of William M. Mohl, Vice President, Commercial Operations, Entergy Services, Inc., on Behalf of the Edison Electric Institute, before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, pp. 7-9.

<sup>113</sup> Testimony of Thomas F. Jensen, Vice President, United Parcel Service, before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, p. 2.

<sup>114</sup> Transcript of First Quarter 2007 BNSF Earnings Conference Call, April 24, 2007, Voxant FD (Fair Disclosure) Wire; Transcript of First Quarter 2006 CSX Earnings Conference Call, April 19, 2006, Voxant FD (Fair Disclosure) Wire.

<sup>115</sup> Transcript of Norfolk Southern comments at the BB&T Capital Markets Transportation Services Conference, February 15, 2007, Voxant (FD) Fair Disclosure Wire.

<sup>116</sup> AAR Press Release, *Summer’s Heat Bested by Rail-Delivered Coal*, July 26, 2007.

<sup>117</sup> Testimony of John B. Ficker, President, National Industrial Transportation League, U.S. Congress, Senate Committee on Science, Commerce and Transportation, Subcommittee on (continued...)

2006 STB hearing that rail contracts “often have few if any service requirements.”<sup>118</sup> At the same hearing EEI stated that:

... the railroads are now unwilling to accept responsibility for guaranteed performance at any meaningful level. In general, the service performance standards in rail contracts have deteriorated substantially over time as the railroads have gained more market power and as competition has deteriorated.<sup>119</sup>

The mid-2007 version of the BNSF’s standard Common Carrier Pricing Authority for PRB coal shipments states that “until further notice, service commitments previously offered ... will not be accepted.”<sup>120</sup> EEI also asserts that railroads have become much more likely than in the past to use the *force majeure* clauses in transportation agreements to excuse inability to timely deliver coal,<sup>121</sup> but there is no data series that can be used to verify this claim.

## Rail Service Metrics and Disruptions

As in the case of railroad capacity, the data available on railroad service are limited and largely anecdotal. An average speed for all freight traffic can be computed from data published by the AAR (**Figure 15**, above), but this measure is so broad that it is not useful for determining, for example, if cycle times for coal shipments are improving or deteriorating, or which corridors on a rail system may be a service bottleneck. A more valuable set of service indicators has been published by the rail industry since 1999.<sup>122</sup> These indicators show for each of the seven Class I railroads several system-wide performance measures, including, for example: average speed of unit coal trains (**Figure 16**, above), intermodal trains, and other types of traffic; the number of railcars on the system (an indication of congestion);

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<sup>117</sup> (...continued)

Surface Transportation and Merchant Marine, hearing, *Economics, Service and Capacity in the Freight Railroad Industry*, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., June 21, 2006, p. 3.

<sup>118</sup> Betsy B. Monsue, Vice President, Transportation, Comments of Foundation Energy Sales, Inc. before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, p. 4.

<sup>119</sup> Statement of William M. Mohl, Vice President, Commercial Operations, Entergy Services, Inc. on Behalf of the Edison Electric Institute, before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, p. 12.

<sup>120</sup> BNSF Railway Co., *Common Carrier Pricing Authority BNSF 90068 Revision 48*, Issued June 8, 2007, p. 2.

<sup>121</sup> Statement of William M. Mohl, Vice President, Commercial Operations, Entergy Services, Inc. on Behalf of the Edison Electric Institute, before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, p. 15. A *force majeure* clause excuses non-performance due to extraordinary circumstances (sometimes referred to as “acts of God”) beyond the control of the non-performing party.

<sup>122</sup> The data for six of the seven Class I carriers is posted at [<http://www.railroadpm.org/>]. Data for the Canadian National railroad is located at [[http://www.cn.ca/about/investors/perfmeasures/en\\_InvPerfMeasures.shtml](http://www.cn.ca/about/investors/perfmeasures/en_InvPerfMeasures.shtml)].

and the dwell time trains spend on hold in key rail yards. While this information is useful, it is limited:

- The train speed and cars on-line data are system-wide, so problem corridors cannot be identified.
- According to the AAR the data are not comparable between railroads.<sup>123</sup> The lack of comparability is significant because it makes it difficult to determine if service issues on one railroad are unique to that carrier or part of a wider problem.
- The limited set of metrics excludes other measures (presumably important) used by the railroads themselves to measure performance.<sup>124</sup> The railroads may consider this data to be proprietary.
- The data are posted on-line for the most recent 53 weeks. As each week rolls off the website it is not retained. There does not appear to be any readily accessible public archive of the data. To the degree it is available, data prior to 2005 may not be consistent with later years due to a change in methodology. In addition, the Canadian National railroad, which operates in the United States, does not use the same methodology to compute performance measures as the other Class I railroads.<sup>125</sup>

In the case of coal shipments, there is no statistical or other type of standard source that can be used to determine the frequency, duration, or seriousness of service disruptions. Perhaps the most severe recent examples of rail system congestion were:

- *Major delays in PRB coal shipments beginning in 2005.* Delays began in May when two coal trains derailed on the Joint Line. The UP and BNSF determined the derailments were due to a widespread

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<sup>123</sup> “Despite the use of a common methodology, one railroad’s performance metrics cannot meaningfully be compared to another railroad’s, due to differences including, but not limited to, those associated with network terrain and design characteristics, traffic mix, traffic volume, length of haul, extent of passenger operations, and operational practices — as well as external factors such as weather and port operations which can impact carriers differently.” [<http://www.railroadpm.org/>]

<sup>124</sup> These measures include, for example, mine to power plant and back cycle times; locomotive supply; locomotive and freight car miles per day; connection performance (the percent of time cars meet their departure times); and time required for interchange between carriers. Some of these values may appear irregularly in railroad presentations or financial statements, but they are not routinely reported. “How Valuable are AAR Performance Measures?,” *Argus Rail Business*, July 16, 2007, p. 1, and Transcript of UP First Quarter 2006 Earnings Conference Call, from Voxant FD (Fair Disclosure) Wire.

<sup>125</sup> On CN using its own methodology, see “How Valuable are AAR Performance Measures?,” *Argus Rail Business*, July 16, 2007, p. 4.

track instability problem caused by the infiltration of coal dust into the railroad ballast (ballast is the material, usually crushed rock, on which track is laid).<sup>126</sup> The railroads had to launch a months-long maintenance program to fix the problem, causing major delays, and a delivery shortfall in 2005, as estimated by a shipper trade association, of about 30 million tons.<sup>127</sup> UP and BNSF both triggered the *force majeure* clauses in their coal transportation contracts to excuse non-performance. The UP recommended that power companies take steps to conserve coal.<sup>128</sup> BNSF believed that enough coal would ship so “that everybody is okay,” but also stated that almost every BNSF-served plant using PRB coal was below target on inventory, customers would not be able to increase coal stockpiles until late 2005 or Spring of 2006, and that it would be prudent for customers to have contingency plans for alternate coal and transportation.<sup>129</sup> Due to the service delays and lack of capacity the UP stopped accepting new customers for PRB coal service for almost two years, from July 2005 to March 2007.

- *UP and Southern Pacific merger (1997); and*
- *Division of the Conrail system between CSX and NS (1999).* In both cases the integration of the rail systems resulted in severe system congestion and delays lasting months. The congestion on the UP system (often referred to as a “meltdown”) was so bad the STB issued an emergency order allowing the diversion of UP traffic to other railroads.<sup>130</sup>

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<sup>126</sup> Coal dust can blow off of railcars as they move along the tracks. As part of a lawsuit between UP and the power company Entergy Arkansas, Inc., UP has claimed that the power company was responsible for the coal dust coming off the cars and is liable for damages to UP. Although not explicitly mentioned in the complaint, this claim presumably relates to whether Entergy Arkansas should have paid to have the coal company treat the coal as it was loaded into the railcars to reduce dust blow-off. UP, First Amended Complaint and Application for Declaratory Judgment and Damages, *Union Pacific Railroad Co. vs. Entergy Arkansas, Inc., et. al.*, Case No. CV2006-2711, Circuit Court of Pulaski County, Arkansas, Sixth Division, served May 30, 2007, pp. 10-11.

<sup>127</sup> Thomas C. Canter, Written Statement of National Coal Transportation Association before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, p. 5.

<sup>128</sup> “While we continue to do everything we can on the delivery side, we strongly encourage each of you to take steps to conserve coal until normal operations resume on the Joint Line. At this stage, we do not expect to be in a position to operate the Joint Line unencumbered until late November 2005 when track repair is completed for the year or suspended due to weather.” UP, Southern Powder River Basin Update for July 1, 2005 [[http://www.uprr.com/customers/energy/sprb/updates\\_2005.shtml](http://www.uprr.com/customers/energy/sprb/updates_2005.shtml)].

<sup>129</sup> “Market Commentary” and “BNSF, UP Decided to Absorb Big Hit Now to Fix Joint Line Once and For All,” *Coal and Energy Price Report*, June 30, 2005.

<sup>130</sup> Richard Saunders, Jr., *Main Lines: Rebirth of the North American Railroads, 1970-2002* (continued...)

In addition to the consequences for shippers, these kinds of events can also be very costly for the railroads. For example, the after-tax cost of the meltdown to UP in 1997 alone was about \$450 million, including business it lost and claims it paid to customers.<sup>131</sup>

While these events were unique in scope and severity, significant disruptions in rail transportation of coal date back to the 1970s when large-scale service out of the PRB was initiated by the Burlington Northern railroad.<sup>132</sup> Disruptions in coal service occurred repeatedly in the 1990s and this decade. Appendix 1 lists nine episodes since 1990 when coal service was significantly disrupted, identified primarily through a review of the trade press. The triggers of these congestion and delay events varied; factors included severe weather, demand outstripping capacity, problems integrating merged rail systems, and unanticipated major maintenance projects

Tight railroad capacity increases the chance of future disruptions in coal and other freight services. As explained by the AAR, “at full or near-full capacity, transport systems become more fragile. With inadequate redundancy, there are fewer alternative routes and facilities, breakdowns and back-ups proliferate faster and further, and recovery from disruptions takes longer.”<sup>133</sup> Evaluating the seriousness of this situation depends in part on understanding the consequences of past disruptions in coal transportation service. However, as discussed below, this information is difficult to find.

## Consequences for Power Generation of Coal Transportation Disruptions

Coal transportation disruptions can impose two types of costs on power companies and their customers:

- *Direct costs* an individual shipper incurs when it takes steps to compensate for undelivered coal. Power companies can replace coal-fired generation with purchased power or electricity generated from plants using other fuels (typically natural gas); attempt to find alternative coal supplies with secure transportation (in 2005-06, some generators resorted to imported coal);<sup>134</sup> or try to increase coal

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<sup>130</sup> (...continued)

(DeKalb: Northern Illinois University Press, 2003), pp. 329-336, 340-345; “STB Expands, Extends Western Service Order,” *Rail Business*, December 8, 1997.

<sup>131</sup> UP 1997 10-K filing.

<sup>132</sup> Chuck Conway, “Powder River Coal, Part 2,” *CTC Board*, April 1991, pp. 34-35.

<sup>133</sup> Statement of Edward R. Hamberger, President and Chief Executive Officer, Association of American Railroads, U.S. Congress, Senate Committee on Science, Commerce and Transportation, Subcommittee on Surface Transportation and Merchant Marine, hearing, *Economics, Service and Capacity in the Freight Railroad Industry*, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., June 21, 2006, pp. 6-7.

<sup>134</sup> For example, Arkansas Electric Power Cooperative and the Municipal Electric Authority (continued...)

deliveries by buying or leasing more railcars. A power company can also keep large coal inventories on-site as a backup fuel source in the event of transportation or supply problems. These steps can keep a power plant from running out of coal, but the tradeoff is higher costs.<sup>135</sup>

- *Market costs* are the market-wide increases in coal prices and rail rates that can occur when power companies have to scramble to secure coal supplies and reliable transportation services. These higher costs are incurred by all buyers, whether or not they are affected by transportation problems.

If the generator is a regulated electric utility, the higher costs may be passed through to ratepayers or absorbed in whole or part out of profits, depending on state regulations.

These costs can be difficult to estimate. To estimate the direct costs an analyst must develop a “what-if” picture of how a power system would have operated if the rail delivery disruption had never occurred. The relationship between a rail disruption and the market price for coal is much harder to parse. But even after granting these complications, it is notably difficult to locate quantitative information on the costs and other consequences of shortfalls in coal deliveries. There appears to be no comprehensive estimates of the costs of the 2005-06 PRB coal shipment delays by the electric power industry, the federal government, or other parties. Published estimates from electric-power related groups range from “hundreds of

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<sup>134</sup> (...continued)

of Georgia imported coal from Indonesia to compensate for shortfalls in deliveries of PRB coal. Note that while this may be a cost issue for the utilities and their ratepayers, according to the U.S. Department of Energy, “The United States does not face a security problem due to coal imports nor is it likely to incur one in the foreseeable future.” E-mail from Steve Sharp (AECC) to Stan Kaplan (CRS), July 17, 2007; U.S. Congress, Senate Committee on Energy and Natural Resources, *Coal-Based Generation Reliability*, hearing, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., May 25, 2006, S. Hrg. 109-601 (Washington: GPO, 2006), page 26 (Testimony of Steven Jackson, Director, Power Supply, Municipal Electric Authority of Georgia) and page 75 (supplemental response of Dr. Howard Gruenspecht, Deputy Administrator, Energy Information Administration, Department of Energy).

<sup>135</sup> A power plant usually buys the least expensive coal (combination of price at the mine, cost of transportation, pollution control costs, and combustion efficiency) it can find. Almost by definition, alternative supplies are likely to be more expensive. Power plants are also designed to burn specific types of coal, so a plant’s ability to use alternatives to its primary supplies may be limited. Putting more railcars into service may yield only a small increase in deliveries if a rail system is congested, and the additional cars could further degrade system performance by increasing the load on the system. For this reason a congested railroad may refuse to accept more trainsets.

millions of dollars”<sup>136</sup> to “roughly \$4-6 billion to the economy.”<sup>137</sup> However, these estimates are undocumented.<sup>138</sup>

Appendix 2 lists 27 electric power generators that reported taking steps during 2005-06 to compensate for shortfalls in western coal deliveries. The list was created from a CRS search of financial reports, regulatory filings, claims filed in lawsuits between power companies and the UP railroad, and press reports. There is no assurance that the list is comprehensive since additional research avenues, such as a state-by-state review of utility rate case filings, were beyond the scope of this study.

Of the 27 entities listed in Appendix 2, a dozen reported incurring higher costs. Whether the other 15 entities did not report higher costs because they did not incur significant costs, could not reliably calculate the costs, chose not to reveal the costs, or the costs are reported in a document or forum this research did not uncover, is unknown. The costs that are reported total \$228 million, of which four entities account for almost 80% (\$180 million).<sup>139</sup> This total does not include Arkansas Electric Power Cooperative, which reported costs of “millions of dollars” but no more precise figure.<sup>140</sup> The reported costs appear to be incremental to the expenses the power company would have incurred with normal operations. This compilation does not account for any market-wide increases in coal and transportation prices due to the 2005-06 rail problems.

In summary, the research for this report located electric power industry reported costs due to the 2005-06 rail transportation disruption of about a quarter billion dollars. This is only a rough estimate. There appears to be no comprehensive analysis of the costs and consequences of the 2005 disruption, or of earlier delays in coal deliveries. This is an example of the information gaps that permeate the rail

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<sup>136</sup> William L. Slover, et. al., Statement of the Western Coal Traffic League before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, pp. 2 and 5.

<sup>137</sup> Thomas C. Canter, Written Statement of National Coal Transportation Association before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, p. 5.

<sup>138</sup> As of September 2007 the Senate version of the appropriations bill for the Department of Transportation (S. 1789) required in section 193 that “Not later than 90 days after the date of the enactment of this Act, the Inspector General of the Department of Transportation shall (1) conduct an investigation of rail service disruptions since 2004 and incidents since 2004 in which rail carriers failed to timely deliver various commodities, such as coal, wheat, ethanol, and lumber; and (2) submit a report containing legislative and regulatory recommendations designed to reduce such disruptions and incidents and to improve railroad service to” committees of the House and Senate.

<sup>139</sup> These are the Tennessee Valley Authority (\$80 million), Wisconsin Electric Power (\$52 million), Municipal Electric Authority of Georgia (\$28 million), and Wisconsin Power & Light (\$20 million).

<sup>140</sup> Arkansas Electric Power Cooperative (AECC) believes its costs are in the area of \$100 million and still growing, as it continues to import coal from Indonesia to maintain acceptable coal stockpile levels. (E-mail from Steve Sharp (AECC) to Stan Kaplan (CRS), July 17, 2007.) This value does not appear in the annual reports reviewed by CRS.

policy debate. These gaps in data and analysis make it difficult to evaluate past and current rail service and capacity, the severity of transportation disruptions, and perhaps the need for government action.

## Rail Rate Trends

This section of the report will review trends in rail rates. Although rates are not the primary subject of this report, the relationship between rail system capacity and rates is important for evaluating legislation intended to expand capacity and improve service.

The rail rate environment since 2004 has been described as a railroad “pricing renaissance”<sup>141</sup> Due in part to limited rail capacity

... rates are rising for the first time since the early 1980s. Rates were up on the order of 10% in 2005, which is a major change from the prior 20 years.... The reversal of a 20-year trend suggests a very significant change.... the driving factors supporting higher rail rates are the shortage of capacity in the rail system coupled with rising rates for trucking during a time when demand is growing, most notably for coal and for containerized imports. Since service quality has declined, the higher rates certainly do not reflect faster or more reliable trip times! For the first time in a generation, the railroads are able to raise rates, so they do.<sup>142</sup>

The recent increases in rail rates follows a long period in which average rates declined. Rail rate indices computed by GAO show that measured in nominal dollars, average rates declined by about 20% between 1985 and 2004; converting the indices to real terms shows a 49% drop, followed by a 5.5% real dollar increase in 2005. Rates for coal dropped more than the all-traffic average. GAO’s average coal rate index declined by 40% between 1985 and 2004; in real terms the decline was 62%. In 2005 real coal rates increased by 13.3%, more than twice as much as the industry-wide average. (See **Figures 17 and 18.**)<sup>143</sup>

Coal and other rail rates declined until the middle of this decade due to:

- Railroad productivity gains;

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<sup>141</sup> “Kansas City Southern Looks at 9%-13% Coal Revenue Growth,” *Platts Commodity News*, March 19, 2007.

<sup>142</sup> Statement of Carl D. Martland, Senior Research Associate & Lecturer, Department of Civil & Environmental Engineering, Massachusetts Institute of Technology, before the U.S. House of Representatives Committee on Transportation and Infrastructure, Subcommittee on Railroads, April 26, 2006, p. 4.

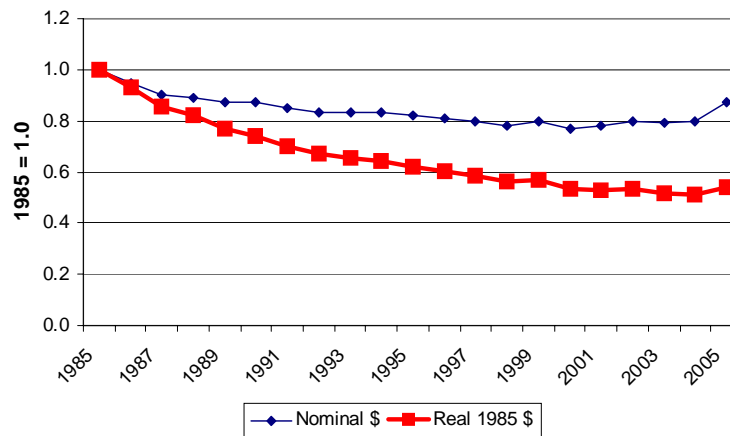
<sup>143</sup> The data used to develop the graphs was downloaded from the GAO website [<http://www.gao.gov/special.pubs/gao-07-292sp/>]. A related report is GAO, memorandum report to Congressional Requesters, *Freight Railroads: Updated Information on Rates and Other Industry Trends*, August 15, 2007. The GAO index was designed to account for year to year changes in traffic mix and traffic flows, and is intended to be a measure of true price change.



- Competition between railroads, particularly between UP and BNSF for the growing PRB coal market.
- Efforts by railroads to compete with other modes, such as barges and trucks, and to expand new markets with growth potential, such as transportation of PRB coal;
- At the outset of the post-Staggers period, surplus capacity on the rail system;
- The Staggers Act allowing the railroads to enter into customized, multi-year contracts with shippers, permitting more efficient planning and operations than public tariff rates.
- Transfer of some costs from railroads to shippers, as discussed above.

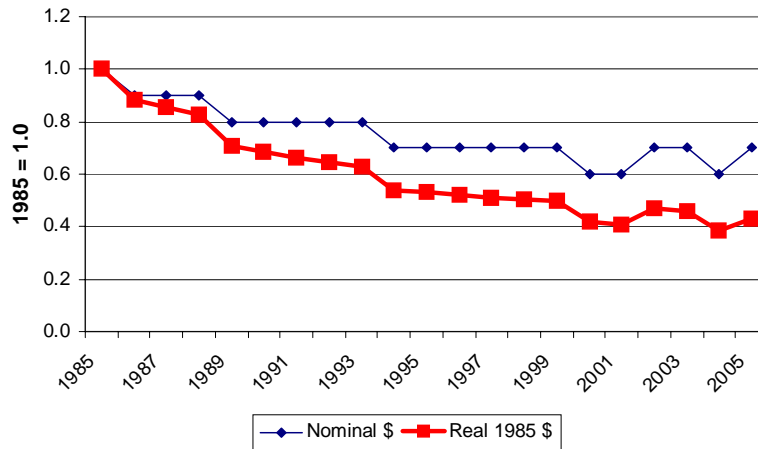
The swing from declining or relatively stable rates to increasing rates happened abruptly, around 2004, due to the confluence of several factors. As noted above, rail capacity began to tighten in the mid-1990s. After peaking in 1998, railroad capital spending declined for several years and did not return to 1995 real dollar levels until 2005. Coincident with the slow recovery in capital spending, intermodal traffic, which is especially capacity-intensive, was rapidly increasing. Intermodal shipments grew by 27% between 2000 and 2005 (see **Table 1** in the section of the report on *Railroad Productivity and Efficiency Trends*, above).

**Figure 17. Trends in GAO Rail Rate Indices, All Freight Traffic**



**Source:** nominal dollar values from <http://www.gao.gov/special.pubs/gao-07-292sp/>; converted by CRS to constant dollars using the implicit price deflator for gross domestic product.

**Figure 18. Trends in GAO Rail Rate Indices, Coal Traffic**



**Source:** nominal dollar values from <http://www.gao.gov/special.pubs/gao-07-292sp/>; converted by CRS to constant dollars using the implicit price deflator for gross domestic product.

Intermodal traffic grew in part because trucking capacity was also limited. New hours-of-service rules effective in January 2004 cut the number of hours drivers could work between breaks, effectively reducing trucking capacity. Trucking companies also found it very difficult to recruit and retain drivers.<sup>144</sup> Rising fuel costs have increased truck rates, and growing highway congestion has degraded service. These circumstances threw long-haul traffic from truck to intermodal rail and reduced the importance of the truck option as a check on rail rates. This shift may represent the leading edge of a long-term trend favorable to the rail industry. According to Standard & Poor's:

Due to a combination of driver shortages, rising fuel prices, and cost differentials, the trucking industry appears to be gradually moving away from long-haul, cross-country routes, and towards shorter hauls. Many T[ruck] L[oad] carriers are allocating an increasing number of their trucks to intermodal pickup and deliveries — allowing railroads to carry containers the longest distances, with the T[ruck] L[oad] carrier then performing the “last-mile” delivery to the customer. Consequently, some carriers are increasing their purchases and ownership of rail intermodal containers, chassis, and trailers.<sup>145</sup>

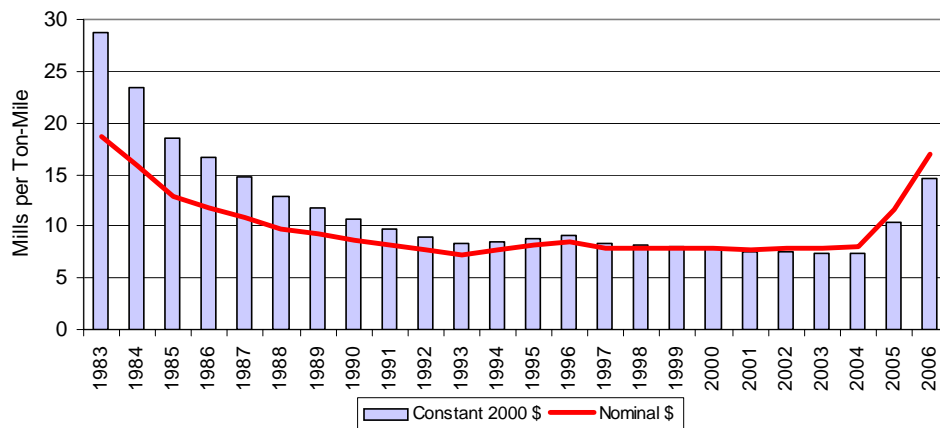
<sup>144</sup> The turnover rates for truckload carriers in the third quarter of 2006 was 121% (annualized basis), which was actually an improvement from the peak of 136% in late 2004. Kevin Kirkeby, Standard & Poor's, *Industry Surveys, Transportation: Commercial*, June 21, 2007, pp. 2 and 3.

<sup>145</sup> *Ibid.*, p. 18. A “truckload” carrier moves large shipments from origin to destination with no stops in between (p. 21).

Rates have also increased in response to higher fuel costs, an issue that has been contentious between railroads and shippers.<sup>146</sup> A final consideration in rail rate increases is the consolidation of the rail industry into seven large carriers of which four are dominant. One press review of the rail industry noted that growth in demand combined with industry consolidation “has done wonders for pricing.”<sup>147</sup>

This nexus of factors has allowed railroads to broadly increase rail rates for coal shipments. According to the Electric Power Research Institute, comparing 1999 and 2005, rates for new coal transportation agreements increased by 20% to 40% for shippers with competitive alternatives and by 40% to 70% for captive shippers.<sup>148</sup> **Figure 19** shows an estimate of the long-term trend in rates for new PRB rail transportation agreements for service to customers with competitive rail access. Rates in real terms generally declined after 1984, when the UP began to compete with BN for PRB business. But from 2004 to 2006, estimated rates increase by 100% (constant 2000 dollars). Whether this trend will continue is unknown.

**Figure 19. Trends in Rail Rates for New Powder River Basin Coal Transportation Agreements**



**Notes:** initial (new agreement) rates for competitively-served plants, including fuel surcharges, and assuming railcars are provided by the shipper. **Source:** Hellerworx, using estimates by Fieldston Co., PA Consulting Group, Pace Global Energy Services, and Hellerworx.

The increase in rates extends beyond coal traffic. As of late 2006, new rail transportation rates generally were reportedly running 10% to 30% above pre-2004 levels, with contract renewals for coal showing some of the largest rate increases.<sup>149</sup>

<sup>146</sup> For background information on increases in fuel costs to railroads and related disputes, see STB, Ex Parte No. 661, *Rail Fuel Surcharges*, Decision, January 25, 2007.

<sup>147</sup> “Railways and Buffett,” *Financial Times*, April 11, 2007.

<sup>148</sup> Summary of M. Bossard, T. Gaalaas, G. Vicinus, Electric Power Research Institute, *New Price Structures for Coal Transportation: Evidence and Implications*, prepared by Pace Global Energy Services, Inc., November 2005 [<http://my.epri.com/portal/server.pt?>].

<sup>149</sup> “Railroad Freight Pricing is Going Up as Shippers Complain to Congress,” *US Rail News*, (continued...)

In the view of the rail industry, higher rates are needed to secure the financial viability of the industry and to justify capacity expansion. Railroads have reportedly told power companies that “constrained capacity and the need to raise more money for capital investments” require higher rail rates.<sup>150</sup> As explained by the UP railroad, “We cannot invest for the future unless we provide service that justifies what we call reinvestible rates — rates that are sufficient to allow us to replace the infrastructure that we use to provide the service.... If government acts in a manner that allows us to obtain market-based, reinvestible rates, our ability to invest in capacity will grow, and the amount of traffic we can carry will expand. It’s that simple.”<sup>151</sup>

Coal shippers have characterized the rate increases as unreasonable. They have also criticized the STB’s rate appeals process as an ineffective deterrent to or remedy for unreasonable rate increases, a concern shared by GAO.<sup>152</sup>

The rate increases in themselves do not necessarily signify an unreasonable exercise of market power. As discussed below, the railroads have arguably never achieved the financial adequacy goal established by the Staggers Act, in which case higher rates may be a financial necessity. A 2006 GAO study of rail rates concluded, in respect to captive shippers, that its findings “may reflect reasonable economic practices by the railroads in an environment of excess demand, or they may indicate a possible abuse of market power.”<sup>153</sup> As discussed later in this report, at GAO’s urging the STB plans to conduct a study of rail competition and rates.

## Analysis of Legislative Proposals — Tax Incentives

As noted earlier, two types of legislative proposals have been put before the 110<sup>th</sup> Congress to address rail service and rate issues: tax incentive bills and

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<sup>149</sup> (...continued)

November 22, 2006, p. 180. By comparison, between 2004 and 2006, the overall rate of inflation as measured by the change in the implicit price deflator for gross domestic product was about 6% (implicit price deflator data from the St. Louis Federal Reserve Bank FRED database [<http://research.stlouisfed.org/fred2/>], visited February 28, 2007).

<sup>150</sup> “Rollovers to Short-Term Rail Contracts Expected to Raise Revenues, Give Flexibility,” *Platts Coal Trader*, November 28, 2006, p. 1.

<sup>151</sup> James R. Young, Chairman, President, and CEO, Comments of Union Pacific Railroad Co., before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 11, 2007, p. 19.

<sup>152</sup> Testimony of the Honorable Glenn English, Chief Executive Officer, National Rural Electric Cooperative Association, U.S. Congress, Senate Committee on Science, Commerce and Transportation, Subcommittee on Surface Transportation and Merchant Marine, hearing, *Economics, Service and Capacity in the Freight Railroad Industry*, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., June 21, 2006, pp. 12-13; GAO, *Freight Railroads: Industry Health Has Improved, but Concerns about Competition and Capacity Should Be Addressed*, November 2006, p. 66.

<sup>153</sup> GAO, *Freight Railroads: Industry Health has Improved, but Concerns about Competition and Capacity Should Be Addressed*, November 2006, “Highlights” page.

regulatory restructuring legislation. This section of the report describes and analyzes the tax incentive proposals from the perspective of improving the reliability of coal transportation to power plants.

## Description of Legislative Proposals

S. 1125, the Freight Rail Infrastructure Capacity Expansion Act of 2007 (FRICEA), was introduced on April 17, 2007, and its House counterpart (H.R. 2116) on May 2, 2007. Similar legislation was introduced in the second session of the 109<sup>th</sup> Congress without receiving further consideration (S. 3742, the Freight Rail Infrastructure Capacity Expansion Act of 2006).

According to the rail industry, the object of FRICEA is to help resolve a growing national problem with freight congestion, especially on highways, by providing the capacity to put more freight traffic on railroads. The underlying assumptions are that railroads are less costly to expand than highways, and that rail freight is more fuel efficient and less polluting than truck transportation. However, according to the AAR, “funding constraints will prevent railroads from meeting socially-optimal future infrastructure investment needs entirely on their own.”<sup>154</sup>

FRICEA includes two distinct but related inducements for capital spending. The first is a 25% tax credit for capacity-expanding rail investments. The tax credit would be available to any taxpayer making qualified investments, not only railroads.

The second incentive would increase rail investment generally, not just for capacity expansion, by enhancing “modal tax equity.”<sup>155</sup> This would be accomplished by allowing railroads and other tax payers to immediately deduct (“expense”) qualifying rail capital investments from gross income. The immediate deduction of capital costs is in contrast to the normal practice of depreciating the value of capital investments over several years.<sup>156</sup>

The option to expense investments is intended to end a discrepancy in the tax treatment of the capital investment costs borne by railroads and other freight modes, particularly trucks and barges. Railroads own and pay for their own rights of way and structures. Tax recovery of these investments is made over time through tax depreciation. In contrast, waterways and highways are usually publicly funded and owned. Truck and barge operators pay for these facilities through taxes and user fees

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<sup>154</sup> AAR, “Tax Incentives for Freight Railroad Capacity Expansion,” May 2007, p. 2 [[http://www.aar.org/GetFile.asp?File\\_ID=819](http://www.aar.org/GetFile.asp?File_ID=819)]. Also see AASHTO, *Freight-Rail Bottom Line Report*, 2003, p. 2, on the interest by transportation planners in putting more freight traffic on rail.

<sup>155</sup> Preambles to S. 1125 and H.R. 2116..

<sup>156</sup> When a capital investment is depreciated, the taxpayer annually deducts a fraction of the total investment from gross income. The amount that can be deducted each year and the length of the recovery period is determined by tax law and regulations. The underlying concept is that tax recovery of long-lived investments should be spread over a period of years. In contrast, operating cost items such as fuel are an expense that can be deducted in their entirety from gross income the same year the cost is incurred.

that can be immediately taken as an income tax deduction. The notion is that allowing the railroads to expense infrastructure investment will level the financial playing field between freight transportation modes.<sup>157</sup>

Advocates of modal equity in the tax treatment of freight investment costs argue it will lead to a more optimal allocation of society's resources, likely including greater investment in rail capacity.<sup>158</sup> A closely related issue is whether trucks and barges pay the full cost of the infrastructure provided by the public. According to the CBO:

The Federal Highway Administration estimates that large trucks pay in taxes only about 50 percent to 80 percent of the [federal] costs attributed to them. Barge operators on the inland waterways pay taxes that cover only about 20 percent of the amount the Corps of Engineers spends on navigation projects. In contrast, the railroads pay for their rights-of-way and infrastructure and often must pay local taxes on those investments as well. Those factors translate into lower private costs for truckers and water carriers and enable them to attract some freight shipments that could be carried at a lower total cost by the railroads. That encourages greater spending on highway and waterway construction than would be justified on economic grounds and leads to an inefficient use of the economy's resources.<sup>159</sup>

As proposed, FRICEA defines two main categories of railroad property. *Qualified Freight Rail Infrastructure Property* includes investments in hardware (such as track, rail yards, and freight loading and unloading terminals, and communication and control equipment) and related software. Investments in land and rail cars are specifically excluded.<sup>160</sup> *Qualified Locomotive Property* includes purchases of locomotives that meet the following criteria: 1) the taxpayer's total locomotive capacity, measured in horsepower, is greater at the end of the tax year than at the end of the preceding tax year, and 2) the new locomotives meet the U.S. Environmental Protection Agency's emission standards for locomotives in effect on December 31, 2006.

The 25% tax credit would be available for *New Qualified Freight Rail Infrastructure Property* and *New Qualified Locomotive Property*. To qualify as "new" — that is, capacity enhancing — the original use of the property or locomotive

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<sup>157</sup> AAR, "Tax Incentives for Freight Railroad Capacity Expansion," May 2007 [http://www.aar.org/GetFile.asp?File\_ID=819].

<sup>158</sup> *Ibid.* Also see the discussion of modal equity issues in GAO, *Freight Railroads: Industry Health Has Improved, but Concerns about Competition and Capacity Should Be Addressed*, November 2006, pp. 62-63

<sup>159</sup> Elizabeth Pinkston, *Freight Rail Transportation: Long-Term Issues*, Congressional Budget Office, January 2006, p. 17.

<sup>160</sup> According to the AAR, rolling stock was excluded because "it was felt that investment in freight rail infrastructure and qualified locomotives — two types of property that would allow rolling stock (and the freight carried by such rolling stock) to be moved in greater quantities and at faster speeds — would provide the greatest benefit." Another consideration was controlling the cost of the tax benefits. E-mail from H.K. Obie O'Bannon (AAR) to Stan Kaplan (CRS), May 31, 2007.

must commence with the taxpayer. In addition, infrastructure property that merely replaces existing property does not qualify as “new” with the exception of expanded or replacement bridges and tunnels which increase rail capacity.

The option to expense rail investments would apply to all Qualified Freight Rail Infrastructure Property, but not Qualified Locomotive Property. “Qualified Locomotive Property” that is not “New” would not qualify for any tax incentive under FRICEA.

The tax credit would reduce the investment basis for calculating tax depreciation. The taxpayer could not take both the tax credit and the expense option on the same dollar of investment. FRICEA would apply to investments made between January 1, 2008, and December 31, 2012, when it would expire.

## Discussion

The FRICEA objective of increasing system capacity appears generally consistent with the interests of coal and other shippers who want a more robust and reliable rail network, and of transportation planners who want the option of moving some freight traffic off of highways. The tax incentives also directly address the reluctance of the rail industry to take the additional financial risks inherent in greater capital spending by effectively reducing the cost of capital expansion.

This discussion of FRICEA policy issues focuses on three questions:

- Who should control how the FRICEA tax incentives are used?
- Will FRICEA investments meet expectations of increasing rail system capacity and improving the reliability and quality of rail service?
- Does the data exist to determine the need for and track the results of FRICEA?

The issue of how or if the federal government should seek to ensure modal-neutral funding for rail and other freight modes is beyond the scope of this report. Also note that because FRICEA tax incentives would reduce revenues, it may require offsets under Congressional “pay-as-you-go rules.”<sup>161</sup>

**Control.** From the standpoint of the rail industry, an advantage of FRICEA is that it leaves investment decisions to the railroads: “the railroads themselves are the ones who know where the chokepoints are in the rail network and where infrastructure expansion would do the most good.”<sup>162</sup>

From the standpoint of some electric power and other shippers, the disadvantage of FRICEA is that shippers and the government would not have more control over

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<sup>161</sup> For information on the “pay-as-you-go” rules, see CRS Report RL32835, *PAYGO Rules for Budget Enforcement in the House and Senate*, by Robert Keith and Bill Heniff Jr.

<sup>162</sup> Association of American Railroads, “Freight Rail Infrastructure Capacity Frequently Asked Questions,” Item 11 [[http://www.aar.org/itc/FAQ\\_flyer\\_v3\\_FINAL.pdf](http://www.aar.org/itc/FAQ_flyer_v3_FINAL.pdf)].

how the incentives are used. As argued by the American Public Power Association, “we strongly believe Congress should not issue a blank check in the form of an investment tax credit for railroad infrastructure. Any such tax credit must be coupled with a package of much needed reliability, accountability and policy reforms.”<sup>163</sup> The GAO has expressed a different, more general concern about the efficacy of rail tax incentives. In a 2006 report GAO noted that:

We have also raised concerns about federal tax policies. For railroads, some industry groups have proposed freight rail tax credits to encourage investment. However, our work has shown that it is difficult to target tax credits to the desired activities and outcomes and ensure that tax credits generate the desired new investments, as opposed to substituting for investment that would have occurred anyway.<sup>164</sup>

The impact of FRICEA investments on coal or other shippers is unpredictable. However, the railroads could choose to focus the incremental investments triggered by FRICEA toward specific geographic areas or categories of traffic, such as intermodal traffic.<sup>165</sup> Intermodal investments have reportedly far out-stripped coal-related spending since the middle of this decade.<sup>166</sup> If FRICEA puts more intermodal traffic on the rails, it would achieve the aims of public officials concerned with highway congestion, but could put at risk or even degrade the reliability of coal shipments. As one analyst notes, this is because “mixing the much faster intermodal trains with the slower bulk freight train movements tends to devour network capacity at an alarming rate.”<sup>167</sup> There have been instances in which railroad efforts to increase intermodal service have caused major delays for other traffic.<sup>168</sup>

Specific qualifications shippers have recommended that Congress impose on FRICEA include:<sup>169</sup>

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<sup>163</sup> Statement of Alan H. Richardson, President and CEO, American Public Power Association, before the Federal Energy Regulatory Commission, *Discussions with Utility and Railroad Representatives on Market and Reliability Matters*, Docket No. AD06-8-000, June 15, 2006, pp. 5-6.

<sup>164</sup> GAO, *Freight Railroads: Industry Health has Improved, but Concerns About Competition and Capacity Should Be Addressed*, November 2006, p. 64 (footnote omitted).

<sup>165</sup> On the increase in the profitability and volume of intermodal traffic, see Larry Kaufman, “Success at Last: Intermodal Has Become Worthwhile,” *Trains*, March 1, 2004.

<sup>166</sup> Trygve Gaalaas. “The Outlook for Coal Transportation,” presentation to the American Coal Council, *Coal Market Strategies Conference*, October 9, 2006, p. 8.

<sup>167</sup> Statement of Robert H. Plymale, Director, Nick J. Rahall, II Appalachian Transportation Institute, before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, p. 4.

<sup>168</sup> *Ibid.*; Don Phillips. “Freight-Car Congestion Is Worrying Union Pacific,” *The New York Times*, March 31, 2004; “Union Pacific to Shift Some U.P.S. Cargo to Trucks,” *The New York Times*, April 1, 2004.

<sup>169</sup> Statement of William M. Mohl, Vice President, Commercial Operations, Entergy Services, Inc., on behalf of the Edison Electric Institute, before the Surface Transportation Board (continued...)



- The credit should be tied to the imposition of mandatory railroad reliability standards and a firm obligation to serve.
- Capacity expansion should focus on assistance to domestic coal and other domestic shipments, including domestic shipments moving to export ports, in contrast to import traffic.
- First priority for investment should be captive coal shippers and other shippers captive to a single railroad, and there should be a ban on applying the tax credit to help fund investments that would enhance railroad monopoly power.
- A general recommendation for regulatory oversight to ensure that the tax credit is used in the public interest and not simply to increase capacity in the most profitable rail markets.

All of these proposed qualifications lack specificity and perhaps, in some cases, would be difficult to implement. Railroads are networks, so an investment in one location can have wide effects. It can be very difficult to determine if a specific investment will primarily benefit specific domestic shippers or groups of shippers. The implication of the proposed qualifications is that each FRICEA investment would have to be individually reviewed by the government before it could qualify for the tax credit. This degree of review (and likely associated delay) might choke off the additional investment FRICEA is intended to encourage.

It is also important to consider that the community of railroad shippers is not homogenous. For example, intermodal shippers are unlikely to support restrictions designed to funnel investment toward captive coal traffic. Other shippers support FRICEA as it stands, including the National Mining Association (which represents coal and other mining industries) and TXU, a large Texas-based electric power company.<sup>170</sup>

If Congress does want to consider the possible restrictions on FRICEA investments mentioned above, other formulations might require less intrusive federal oversight. An example is limiting the FRICEA incentives to specific types of investments with system-wide effects on capacity and quality of service. Examples of these “freight-neutral” investments include advanced electronically controlled

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<sup>169</sup> (...continued)

Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, pp. 3-6; Submission of Written Testimony, Richard L. Charter, Senior Vice President, Total Petrochemicals USA, Inc., before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, pp. 2-3; Testimony of the Honorable Glenn English, Chief Executive Officer, National Rural Electric Cooperative Association, U.S. Congress, Senate Committee on Science, Commerce and Transportation, Subcommittee on Surface Transportation and Merchant Marine, hearing, *Economics, Service and Capacity in the Freight Railroad Industry*, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., June 21, 2006, pp. 12-13.

<sup>170</sup> The AAR posts a list of supporters of FRICEA on its website [[http://www.aar.org/ITC/ITC\\_supporters.asp](http://www.aar.org/ITC/ITC_supporters.asp)].

pneumatic (ECP) brakes and positive train control (PTC) systems, and de-bottlenecking specified major choke points.<sup>171</sup> This targeted-investment approach could supplement current “public-private partnerships” which jointly fund specific freight rail projects.<sup>172</sup>

This alternative approach to directing FRICEA investments may require less detailed federal supervision than some other approaches, but still has potential disadvantages, including the following: it pre-judges today which investments would best enhance system capacity, something which could change with market and technical developments; tax incentives would not flow to worthwhile investments outside of the specified categories; and this approach, like other proposed limitations on FRICEA investments, could constrain the ability of the private sector managers responsible for the coal supply chain (and other traffic) from directing the incentives to what in their judgment would be the most productive uses.

**Expected Outcomes.** As discussed earlier, information on rail capacity and service quality is limited. Without a common baseline, different interests may have radically different views of the extent of current capacity and service issues, the benefits FRICEA is likely to yield, and what would constitute success for FRICEA.<sup>173</sup>

The greatest difference in expectations is likely to be between shippers, such as electric power producers, and the railroads. Power companies want fast, reliable service over a rail network with sufficient capacity to smoothly absorb traffic growth at what they view as economical rates. They also want the system to have enough redundancy to be able to quickly bounce back from disruptions, such as bad weather

<sup>171</sup> General use of ECP brakes and PTC would, in principle, increase capacity by allowing a greater density of trains to safely use the rail network. H.R. 2095, *The Federal Railroad Safety Improvement Act of 2007*, would require implementation of PTC systems by Class I railroads by the end of 2014. For additional information on these technologies see Zeta-Tech Associates, *Quantification of Business Benefits from Positive Train Control*, prepared for the Federal Railroad Administration, March 15, 2004; Federal Railroad Administration press release, *FRA Approves Waiver for New Braking Technology to Improve Train Safety and Control*, March 29, 2007.

<sup>172</sup> Public-private partnerships (PPP) are projects by private railroads and public agencies to enhance railroad capacity and service. The funding contributed by each party is intended to reflect the relative benefits the public and the railroad will gain from the project. Examples include the CREATE project to relieve rail congestion at Chicago, a projected \$1.5 billion project that had received as of mid-2007 \$100 million in federal funding, and the \$2.4 billion Alameda Rail Corridor project in Long Beach and Los Angeles. The Alameda Corridor was completed in 2002 and received a \$400 million federal loan. Unlike the FRICEA tax incentives, public support of PPP projects is targeted to achieve specific benefits. See [<http://www.createprogram.org/faq.html#funded>]; and James R. Blaze, “Redeveloping Aged Urban Rail Freight Infrastructure,” presentation to the National Urban Freight Conference, February 1-3, 2006, p. 6.

<sup>173</sup> For example, Arkansas Electric Cooperative believes that rail system capacity is adequate and that the reduction in average train speeds is the result of efforts by the carriers to reduce fuel consumption. Martin W. Bercovici and Michael A. Nelson, Supplemental Comments of Arkansas Electric Cooperative Corp. before the STB, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, May 4, 2007, p. 2.

or unexpected surges in demand. However, from the railroad perspective this scenario may imply ill-considered investment in excess rail capacity in lieu of the power industry purchasing larger coal stocks for power plants.

The railroad industry entered the post-Staggers era with financially burdensome excess capacity. As noted above, it has eliminated this surplus by, for example, increasing traffic, shedding assets and labor, increasing efficiency, and not building too far ahead of excess demand. The resulting tight capacity had directly contributed to the ability of the rail industry to raise rates and revenues. According to JP Morgan Securities, “it appears that the long term trend of growth in demand for rail transportation finally caught up with available capacity, and the past two years have been a period of much tighter rail capacity compared to the historical norm. As a result rail transportation rates have risen significantly in 2004 and 2005.... While the situation of tight capacity has had a negative impact on rail service for several railroads and many shippers have received less reliable rail transport service, it has also been a significant positive from an investor perspective.”<sup>174</sup> In early 2007 the railroads were reported to be “buoyed by new financial reports that validate their strategy of keeping capacity snug and pricing firm.”<sup>175</sup>

The rail industry has expressly noted the pricing advantages of running railroad systems with limited surplus capacity. According to the BNSF, “We don’t bring capacity on sooner than we need it, so we always have a natural tightness.... Supply chains from all industries are feeling a ‘tightness’ in their ability to immediately leverage up for additional volume. This will result in increasing the value for our service, improving our returns.”<sup>176</sup> CSX’s strategy for increasing the profitability of its intermodal business included reducing excess capacity.<sup>177</sup> UP told Wall Street analysts in 2005 that “in some ways we are where we always wanted to be with the demand for our service outstripping the supply.”<sup>178</sup> Part of the business strategy outlined by UP was to “leverage strong demand to drive [revenue] yield improvement by swapping out less profitable business for higher yielding moves ... our price plan

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<sup>174</sup> Thomas R. Wadewitz, JP Morgan Securities, presentation before the Surface Transportation Board, Ex Parte 658, *The 25<sup>th</sup> Anniversary of the Staggers Rail Act of 1980*, October 19, 2005, unpaginated.

<sup>175</sup> John D. Boyd, “Building Up Rails,” *Traffic World*, February 5, 2007.

<sup>176</sup> William C. Vantuono, “Fluidity, Velocity, Capacity, Consistency,” *Railway Age*, December, 2004. In 2005, the BNSF operations team was “trying to tighten capacity to ensure there isn’t too much slack in the asset base.” Scott Flower, “BNSF Seeks to Balance Pricing, Service Performance and Capital Spending to Boost Profits,” *Progressive Railroading.Com*, May 16, 2005 [<http://www.progressiverailroading.com/commentary/article.asp?id=6839>].

<sup>177</sup> Transcript of First Quarter 2001 CSX Earnings Conference Call, FD (Fair Disclosure) Wire, April 23, 2001.

<sup>178</sup> Transcript of Fourth Quarter 2004 UP Earnings Conference Call, FD (Fair Disclosure) Wire, January 24, 2005.

is actually designed to meter the flow of business onto the railroad and to drive up the profitability of the business that we do handle.”<sup>179</sup>

The strategy of minimizing excess capacity to support prices is not unique to the railroad industry. According to the investor Warren Buffett, speaking of the electric power industry:

In a deregulated market, generators have a clear incentive to reduce power reserves.... “If you own in a deregulated environment, if you own generation assets, what do you want? Things to be tight.”

...[T]he nation’s responsibility is to have “some — not too much, [but] some — excess capacity at all times. It’s crazy to operate without a margin of safety,” he said. Wise utility regulation allows for extra capacity and an adequate return on investment.... “The last thing in the world an unregulated operator wants is excess capacity around....”

However, it may be possible for industry actors to deliberately maintain a tight capacity environment, conducive to pricing power, only if the industry is highly concentrated or if competition is otherwise muted.

To the degree that tight capacity has contributed to the recent ability of the railroads to raise rates, it is not clear why the railroads would build significant surplus capacity with or without FRICEA incentives. In this case, FRICEA may not result in system-wide improvements to rail system service and resiliency in the face of adverse circumstances.

**Information.** Because the public data on rail capacity and service is limited, the problems FRICEA is intended to resolve cannot be clearly defined. Looking ahead, no existing metrics in the public domain could be used to rigorously measure the changes in coal capacity and service caused by FRICEA or other factors. FRICEA does not require industry or government to define a service and capacity baseline, provide a detailed characterization of investments that use FRICEA incentives, or determine the improvements to capacity and service, if any, that result from FRICEA incentives.

The relevant data may be considered proprietary by the railroads, coal producers, and power companies. Nonetheless, as discussed earlier in this report, if Congress concludes that better public data on rail capacity and service is needed, the confidentiality issue can perhaps be dealt with by aggregating or otherwise masking published capacity and service data for specific rail corridors.

**Tax Incentives: Considerations and Options.** Issues that may be of interest in evaluating the tax incentive proposals include:

- *Should the public influence how the FRICEA incentives are used (beyond the guidelines built into the proposed legislation)? If so,*

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<sup>179</sup> *Ibid.*

how can this intervention be structured as to be practical and not unduly burdensome?

- *Are the expected outcomes from FRICEA clear?* Coal and other shippers want a fluid, resilient rail network offering high quality service even under adverse conditions. This implies a level of investment in buffer capacity that may not be affordable, even with FRICEA incentives, and may not be attractive to the rail industry in any event because tight capacity has contributed to the industry's ability to raise rates. The question is whether FRICEA is expected to lead to system-wide improvements in rail capacity and service or more limited benefits.
- *Does the government need additional information on rail capacity and service?* This could include a baseline and on-going data that would make it possible to evaluate the need for and effectiveness of FRICEA. Collecting and publishing more capacity and service data may require taking steps to protect the confidentiality of business-sensitive information.

## **Analysis of Legislative Proposals — Regulatory Restructuring**

The rail regulatory restructuring bills before the 110<sup>th</sup> Congress are intended to deal with a host of concerns, raised by coal and other shipper interests, over rail service and rates. This discussion will focus on how the proposals could affect the reliability of coal transportation to power plants.

The restructuring bills fall into two categories: comprehensive restructuring and repeal of railroad antitrust exemptions. The two categories of bills are summarized below, followed by an analysis of their potential impacts. Note that a legal analysis of the bills, and in particular on disagreements concerning the current application of the antitrust laws to the railroad industry, is beyond the scope of this report.

### **Description of Legislative Proposals — Comprehensive Restructuring**

S. 953, the Railroad Competition and Service Improvement Act of 2007 (RCSIA), was introduced on March 21, 2007, and its House counterpart (H.R. 2125) on May 3, 2007. Similar legislation was introduced in the 109<sup>th</sup> Congress without receiving further consideration, including the Railroad Competition Acts of 2005 (S. 919) and 2006 (S. 2921), and the Railroad Competition Improvement and Reauthorization of Act of 2005 (H.R. 2047). According to the preambles, the bills are intended to “ensure competition in the rail industry, enable rail customers to obtain reliable rail service, and provide those customers with a reasonable process for challenging rate and service disputes.”

RCSIA would make major changes to federal rail regulation, as summarized below:

**National Rail Transportation Policy.** The existing policy (49 U.S.C. § 10101) would be amended to put additional emphasis on ensuring head-to-head competition between railroads, establishment of reasonable rates, and “consistent, efficient, and reliable rail transportation service” (RCSIA section 101).

**Bottlenecks and Competitive Rail Access.** From a regulatory perspective, a rail bottleneck is a situation in which more than one railroad can originate the traffic required by a customer, such as PRB coal, but only one railroad has physical access to the customer, such as a power plant.<sup>180</sup> The bottleneck carrier is then in a position to direct all shipments over its lines and to charge relatively high rates for service over what may be a very short distance. The STB has the authority to use “reciprocal switching” and joint terminal access to open bottlenecks (49 U.S.C. § 11102), but it has construed this authority relatively narrowly; specifically, to situations where a shipper can demonstrate that a bottleneck carrier has engaged in anti-competitive behavior, or when the shipper has, in certain defined circumstances, entered into a contract with another railroad for the non-bottleneck part of the haul.<sup>181</sup> According to GAO no shipper has successfully pursued the anti-competitive option before the Board.<sup>182</sup> One shipper was successful using the contract option.<sup>183</sup>

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<sup>180</sup> A bottleneck at the destination would be most common for coal traffic, but configurations with the bottleneck at the origin also exist. *Union Pacific Railroad Co. v. Surface Transportation Board*, 220 F.3d 337 (D.C. Cir. 2000). For additional information on bottleneck situations, see CRS Report RL34117, *Railroad Access and Competition Issues*, by John Frittelli, pp. 4-7.

<sup>181</sup> 49 C.F.R. 1144; Surface Transportation Board, Finance Dockets 41242, 41295, and 41626, *Decision*, December 27, 1996 (“Bottleneck I”); Surface Transportation Board, Finance Dockets 41242, 41295, and 41626, *Decision*, April 28, 1997 (“Bottleneck II”); *Baltimore Gas & Electric v. United States*, 817 F.2d 108 (D.C. Cir 1987); *MidAmerican Energy Co. v. Surface Transportation Board*, 169 F.3d 1099 (8th. Cir. 1999). The conference report for the Staggers Act described reciprocal switching as a remedy the ICC “may require ... where practical and in the public interest or where such agreements are necessary to provide competitive rail service.” U.S. Congress, Conference Committees, *Staggers Rail Act of 1980*, conference report to accompany S. 1946, 96<sup>th</sup> Congress, 2<sup>nd</sup> sess., September 29, 1980, H.Rept. 96-1430 (Washington: GPO, 1980), p. 84. The ICC’s implementation of the Staggers Act has in practice made the reciprocal switching authority of little consequence. On expectations that reciprocal switching would play a larger role in rail regulation, see James N. Heller, *Coal Transportation and Deregulation: An Impact Analysis of the Staggers Act* (Washington: The Energy Bureau and Serif Press, 1983), pp. 151-153.

<sup>182</sup> GAO, *Freight Railroads: Industry Health has Improved, but Concerns About Competition and Capacity Should Be Addressed*, November 2006, p. 42.

<sup>183</sup> Surface Transportation Board, Finance Docket 33467, *FMC Wyoming Corp. V. Union Pacific R.R. Co.*, *Decision*, December 12, 1997; *Union Pacific Railroad v. Surface Transportation Board*, 202 F.3d 337 (D.C. Cir 2000).

RCSIA sections 102 (requiring rail carriers to quote rates and provide service between any two points on their systems) and 104 (directing the STB to order reciprocal switching between railroads if in the public interest or if necessary to provide competitive service) would give shippers wide latitude to open bottlenecks and create competitive rail access. By doing so, RCSIA would appear to reverse a long-standing policy of permitting railroads, under most circumstances, to keep a shipment on its own tracks rather than forcing it to interchange.<sup>184</sup> Long-hauls and single-line hauls are the most economical modes of rail operations, in contrast to short-hauling.

Section 105 of RCSIA, “Areas of Inadequate Rail Competition,” addresses rail competition across a much wider scope. As described in a summary of the bill, this section of RCSIA:

Allows a Governor to petition the STB to have all or part of his or her state designated as an “area of inadequate rail competition.” To qualify, the area must be served by essentially one carrier, most of the rates must exceed 180 percent of the direct cost to the railroad of the transportation and the state or area of the state must have suffered significant economic adversity because of this lack of competition. Within 60 days after the STB so designates a state or area of the state, the STB shall fashion a remedy for this lack of rail competition.<sup>185</sup>

The remedies specified in Section 105 include reciprocal switching, expedited arbitration of rate disputes, expedited review of whether rates are discriminatory, requiring a rail carrier to provide rail service on its system on behalf of another railroad, and “other remedies authorized by law.”

**Interchange Commitments/Paper Barriers.** When a railroad sells or leases track to a short line railroad, the transfer agreement may restrict the short line from interchanging certain traffic with other carriers. The object is to allow the Class I railroad to remain (in conjunction with the short line) the only railroad serving a market. These restrictions are referred to as “paper barriers” or “interchange commitments.” RCSIA would ban paper barriers in the future and, upon review by the STB, make current interchange commitments unlawful (Section 103). This is another means of introducing more competition into the rail system.

Effectuating this ban on interchange commitments would likely be complex and contentious. The existing sale and lease agreements that contain paper barriers presumably have sale prices, lease rates, and perhaps other terms predicated in part on the traffic and revenues the Class I railroad expects to receive consequent to the interchange restrictions.<sup>186</sup> Eliminating the papers barriers could therefore change the

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<sup>184</sup> Federal policy to end the practice of “open routing,” which required the railroads to provide a multiplicity of interline routings between origin and destination pairs, began with the 4R Act of 1976 and was reinforced in 1980 by the Staggers Act.

<sup>185</sup> Summary of the Railroad Competition and Service Improvement Act of 2007 [[http://craig.senate.gov/rail\\_comp\\_section\\_110th.pdf](http://craig.senate.gov/rail_comp_section_110th.pdf)].

<sup>186</sup> CRS Report RL34117, *Railroad Access and Competition Issues*, by John Frittelli.

economic basis of the agreements, with impacts on rates, operations, and possibly even the viability of the transactions that are difficult to predict.

**Rail Service.** RCSIA has several provisions that directly address rail service quality. The bill would require the STB to post information about rail service complaints and their resolution on its website and submit an associated annual report to Congress (Section 201); require rail transportation subject to the jurisdiction of the STB to be “reliable and efficient” (section 202); qualify the precedence that contract service has over common carrier service under current law (section 102);<sup>187</sup> state that a rail carrier may be liable for payment of damages “due to failure of timely delivery” (Section 203); and create an Office of Rail Customer Advocacy within DOT, to be appointed in consultation with the Secretary of Agriculture. The advocate would “accept rail customer” complaints, participate in STB proceedings, have the ability to initiate STB proceedings, and would have the power to collect information and have access to the data collected by the STB (Section 204).<sup>188</sup> (Under Section 304 of RCSIA shippers agricultural products can demand binding arbitration to resolve service and rate issues. This option is not available to shippers of coal or other goods.)

**Rate Appeals.** The current STB rate appeal process has been widely criticized by coal and other shipper interests. GAO concluded in 2005 that the STB’s rate appeal process is “ineffective.”<sup>189</sup> The rate appeal process is of particular interest to power companies because almost all rate cases since the passage of Staggers have involved coal shipments to power plants. This is because coal shipments are one of the few categories of regulated traffic that have enough volume and revenue at stake, and the prerequisite lack of competitive service, to justify the cost (several million dollars) and time (typically more than three years) necessary to pursue a rate appeal.

Section 302 of RCSIA directs the STB to develop a new rate appeal process based on a railroad’s cost of service, akin to the process used in electric utility rate cases. The process is to take no longer than nine months, “shall not require excessive

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<sup>187</sup> This part of section 102 is not included in H.R. 2125.

<sup>188</sup> Although RCSIA establishes the Office of Rail Customer Advocacy within DOT, it also states that the Office shall “carry out other duties and powers prescribed by the [Surface Transportation] Board.” The independence of the Advocate relative to the STB seems ambiguous.

<sup>189</sup> GAO, *Freight Railroads: Industry Health Has Improved, but Concerns about Competition and Capacity Should Be Addressed*, November 2006, p. 66. According to GAO “...there is widespread agreement that STB’s standard rate relief process is inaccessible to most shippers and does not provide for expeditious handling and resolution of complaints...[S]hippers we interviewed agreed that the process can cost approximately \$3 million per litigant....Thus, shippers noted that only large-volume shippers, such as coal shippers...[can] afford the STB rate relief process. In addition, shippers said that they do not use the process because it takes so long for STB to reach a decision. Lastly, shippers continue to state that the process is both time consuming and difficult because it calls for them to develop a hypothetical competing railroad to show what the rate should be and to demonstrate that the existing rate is unreasonable. Since 2001, only 10 cases have been filed, and these cases took between 2.6 and 3.6 years — an average of 3.3 years per case — to complete. Of those 10 cases, 9 were filed by coal shippers.” *Ibid.*, p. 41.



litigation costs,” and puts the burden of proof on the railroad to demonstrate that the rate is reasonable (currently the burden of proof is on the complainant to show that a rate is unreasonable). It also explicitly bans any rate appeal process that relies, like the current procedure, on the cost of a hypothetical competitor. (As noted above, Section 304 of RCSIA gives agricultural shippers an option, unavailable to other shippers, of opting-out of the rate appeal process altogether and relying on binding arbitration to resolve rate disputes.)

The rate appeal process, and the proposal to change it, is a point where major threads of rail policy intersect. The existing process is deliberately designed to allow railroads to charge rates to captive customers that will include a large share of the system-wide “non-attributable” costs that cannot be specifically tied to any individual rail movement. This allows the railroads to charge lower rates (but never lower than direct cost) to customers who have competitive alternatives and are price sensitive. A cost-based rate appeal process — that is, rates based primarily on the costs that can be directly tied to a specific movement — could sharply reduce the amount of non-attributable costs chargeable to captive customers.<sup>190</sup>

If the railroad industry is still not revenue adequate, or if the high rates charged to captive customers are a cornerstone of the rail industry’s financial stability, then cost-based rate appeals could be detrimental to the financial stability of the rail industry. However, under other circumstances — such as, the industry is revenue adequate, there are relatively few captive customers, and/or the higher rates captive shippers are charged are not central to the financial integrity of the rail industry — a cost based rate appeal process may be feasible. As discussed elsewhere in this report, the information available on rail competition, rail rates, and the revenue adequacy of the railroad industry is deficient. This makes it difficult to judge whether a cost-based rate appeal process would pose financial risks to the rail industry.

**Authority to Investigate and Suspend.** The Board currently has authority to initiate investigations “only on complaint” (49 U.S.C. § 11701). Section 401 would allow the STB to begin investigations on its own initiative. It also allows the Board to suspend railroad practices that it believes may be in violation of the law. Section 201 of the bill requires the STB to respond within 90 days to complaints requesting injunctive relief against railroad practices alleged to be unlawful (excluding allegations of unreasonable rail rates).

## Description of Legislative Proposals — Antitrust

S. 772, the Railroad Antitrust Enforcement Act of 2007, was introduced on March 6, 2007, and its House counterpart (H.R. 1650) on March 22, 2007. Similar legislation was introduced in the second session of the 109<sup>th</sup> Congress but did not receive further consideration (S. 3612, the Railroad Antitrust Enforcement Act of 2006). According to the preambles, the bills are intended to “amend the Federal

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<sup>190</sup> The proposed process would set a floor on appealed rates of 180% of direct costs. Rates at this level would still recover non-attributable costs, but less than under current rates. How much less is unknown.

antitrust laws to provide expanded coverage and to eliminate exemptions from such laws that are contrary to the public interest with respect to railroads.”

The railroad industry historically has had limited exemptions from the antitrust laws. The exemptions were predicated on the assumption that normal market forces could not operate in the rail industry, and accordingly allowed the rail industry to operate in ways, such as the coordination of rates, that would have been unacceptable in a free market. The exemptions also reflected the notion that the comprehensive regulation of rates, service, market entry and exit, and mergers by the ICC effectively replaced the usual antitrust oversight of the Department of Justice and Federal Trade Commission.<sup>191</sup>

In its most recent revision to rail regulation, the ICC Termination Act of 1995, the Congress chose to continue these exemptions. The key exemptions include:

- The STB has sole jurisdiction over railroad mergers. Railroads are the only regulated industry whose mergers cannot be challenged by Department of Justice (DOJ).<sup>192</sup>
- Railroads generally cannot be sued for injunctive relief for antitrust violations by private parties.
- “Railroads are generally exempt from Sherman Act antitrust actions for treble damages if common carrier rates ‘approved by the [government]’ are involved.”<sup>193</sup>
- Joint rates established by two or more railroads which have been approved by the STB are exempt from antitrust review.

While these exemptions do not block all possible avenues for antitrust inquiry, they are significant. In 2004, DOJ noted that bottleneck rates and interchange commitments might be areas of interest for antitrust review, but because these transactions were approved by the STB they may not be subject to the antitrust laws. On the other hand, DOJ at the same time expressed interest in reviewing for possible

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<sup>191</sup> Letter from William E. Moschella, Assistant Attorney General, Department of Justice, to the Honorable F. James Sensenbrenner, Jr., Chairman, House Committee on the Judiciary, September 27, 2004, p. 1. Note that the creation of the Interstate Commerce Commission in 1887 predates subsequent anti-trust legislation.

<sup>192</sup> “By statute, the STB must give ‘substantial weight’ to the DOJ’s views on whether the transaction will adversely affect competition, but the STB makes the final decision on whether to allow the merger. In 1996 the STB approved the merger between Union Pacific and Southern Pacific, despite the DOJ’s objections that the merger was anticompetitive.” Antitrust Modernization Committee, *Report and Recommendations*, April 2007, p. 364 (footnotes omitted).

<sup>193</sup> Letter from the Honorable F. James Sensenbrenner, Jr., Chairman, House Committee on the Judiciary, to R. Hewitt Pate, Assistant Attorney General, Department of Justice, July 15, 2004, p. 1.

antitrust violations the practice of the western rail carriers of publicly disclosing certain rates. The status of this review, if underway, is not known.<sup>194</sup>

The proposed legislation would eliminate these exemptions. Advocates apparently anticipate that shippers will use these new openings to attack bottleneck rates and paper barriers, and perhaps seek to add what they view as pro-competitive conditions to existing rail merger terms. Proponents also believe that if new mergers are proposed between the Class I railroads, perhaps to create trans-continental carriers, DOJ would take a broader view of market power and competitive effects than the STB has done.<sup>195</sup> The proposal to eliminate the STB's jurisdiction over mergers is consistent with the recommendations of the federal Antitrust Modernization Commission.<sup>196</sup>

The railroads oppose the antitrust proposals, noting that:

- The implication of proponents that the “railroads can engage in conduct over which there is no government oversight ... is false.” The railroads are subject to other aspects of the antitrust laws and extensive regulation by the STB.
- The limited exemptions that apply to the railroads are “narrowly applied,” are intended to avoid dual jurisdiction between the STB and other parts of the government, and in some cases reflect special circumstances. For example, according to the AAR the exemption from private demands for injunctive relief is intended to prevent interruptions in rail system operations.
- The proposed changes to the law are unnecessary. For example, “the STB has the authority to enforce certain provisions of the antitrust laws in lieu of the Federal Trade Commission. Moreover, the federal government is not precluded from seeking injunctive relief, and the federal antitrust provisions permitting private parties to sue for damages contains no exclusion for railroads.”
- In the view of the AAR, proponents of this legislation basically do not like certain decisions made by the STB and are seeking to move decisions to a different forum. The AAR argues that “limited

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<sup>194</sup> Letter from William E. Moschella, Assistant Attorney General, Department of Justice, to the Honorable F. James Sensenbrenner, Jr., Chairman, House Committee on the Judiciary, September 27, 2004, pp. 2-3.

<sup>195</sup> Interview with Robert Szabo, director of Consumers United for Rail Equity, April 23, 2007.

<sup>196</sup> Antitrust Modernization Committee, *Report and Recommendations*, April 2007, pp. 363-365. (According to the report, “Congress established the Antitrust Modernization Commission ‘to examine whether the need exists to modernize the antitrust laws and to identify and study related issues.’ [The] Report sets forth the Commission’s recommendations and findings on how antitrust law and enforcement can best serve consumer welfare in the global, high-tech economy that exists today.” *Ibid.*, p. 1.

antitrust exemptions for the railroads exist because railroads are subject to economic regulation .... If one is to assess whether the antitrust exemption should be eliminated, one should also assess whether the remaining regulatory regime should be treated likewise.”<sup>197</sup>

## Discussion

The regulatory restructuring bills before the 110<sup>th</sup> Congress are the latest in a series of legislative proposals dating from 1983 to substantially change federal rail regulation.<sup>198</sup> The antitrust and rail competition bills described above are intended by proponents to

- Improve coal and other service.
- Drive down rail rates, by giving shipper interests new avenues to force head-to-head competition between railroads.
- Simplify the rate appeal process and tie prescribed rates to costs.
- Encourage improved service by creating new legal obligations for railroads to provide good service, and by highlighting service issues through the web posting process, annual report to Congress on service, and creation of the Rail Customer Advocate.

The railroad industry characterizes these proposals as “re-regulation.” It argues that the proposals would inhibit the pricing and operational freedom that has been important to the revival of the rail industry, and would cause the industry’s finances and service quality to regress. According to the AAR:

Reregulation would deprive U.S. freight railroads of several billion dollars in revenue each year, making it impossible for them to fund the rail capacity improvements our country needs. The result would be a shrunken rail network, higher shipping costs, more gridlock and environmental degradation as freight that otherwise would move by rail moved on the highways instead, and eventually a government bailout. It would be foolhardy to destroy the best freight rail system the world has ever seen in order to move toward a discredited system that failed in the past and would fail again in the future.<sup>199</sup>

**Rail Industry Competition and Service.** Critics of rail industry service have suggested that in a more competitive environment the railroads will be more innovative and attuned to customer demands. The rail industry contends that it has been on the leading edge of technological innovation;<sup>200</sup> critics claim it has been slow

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<sup>197</sup> AAR, *Antitrust and the Railroads*, June 2007.

<sup>198</sup> “Staggers Act End Run,” *Coal Week*, December 19, 1983.

<sup>199</sup> AAR, *Destructive Railroad Reregulation*, June 2007.

<sup>200</sup> Statement of Edward R. Hamberger, President and Chief Executive Officer, Association of American Railroads, U.S. Congress, Senate Committee on Science, Commerce and Transportation, Subcommittee on Surface Transportation and Merchant Marine, hearing, *Economics, Service and Capacity in the Freight Railroad Industry*, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., (continued...)

to implement new processes and technologies that could improve service and reduce costs.<sup>201</sup> In 2004 the National Industrial Transportation League commented, in relation to its assertion at the time that more competition was needed in the rail market:

Competition drives efficiencies and innovation. It leads to a fundamental shift in thinking, away from a static and ultimately counterproductive effort to protect a “franchise,” toward a positive effort to grow business opportunities and eliminate costs. Competition promotes cooperation between transportation providers and their customers as both become partners in an effort to eliminate inefficiencies and improve their market opportunities. The result of these efforts is increased demand for the service — that is, growth.<sup>202</sup>

The current restructuring proposals aim at improving service by heightening competition. The emphasis on competition is consistent with an underlying principal of the current regulatory regime, which is “to allow, to the maximum extent possible, competition and the demand for services to establish reasonable rates for transportation by rail;”<sup>203</sup> though, as discussed below, it is not certain that more reliance on market forces would be the actual outcome from the proposals.

The bills would not require the government to develop and enforce specific rail service standards, as has been proposed in the past.<sup>204</sup> The bills also do not directly address the limited information on rail service and capacity discussed earlier in this report. Without more information, aspects of the proposed legislation are difficult to evaluate. For example, the emphasis on rate relief and greater competition in the bills presumes that high rail rates, especially for captive shippers, is a significant national issue. This may or may not be the case.<sup>205</sup> No thorough analysis exists on

<sup>200</sup> (...continued)

June 21, 2006, pp. 12-15.

<sup>201</sup> Testimony of Thomas F. Jensen, Vice President, United Parcel Service, before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 4, 2007, pp. 3-4; Frank Wilner, “Could a Monkey Run a Railroad? These Capitalists Want to Know,” *Journal of Transportation Law, Logistics & Policy* (May 2007).

<sup>202</sup> Testimony of John B. Ficker, President, National Industrial Transportation League, U.S. Congress, House Transportation and Infrastructure Committee, Subcommittee on Railroads, hearing, *The Status of the Surface Transportation Board and Railroad Economic Regulation*, 108<sup>th</sup> Congress, 2<sup>nd</sup> sess., March 31, 2004, pp. 6-7. NITL has not taken a stance on the regulatory restructuring and tax incentive proposals discussed in this report. (E-mail from John Ficker (NITL) to Stan Kaplan (CRS), September 14, 2007.)

<sup>203</sup> 49 U.S.C. § 10101.

<sup>204</sup> A bill introduced in July 2006, *The Program for Real Energy Security Act* (H.R. 5965), would have directed the STB to develop and enforce mandatory rail service standards. The bill did not received further consideration.

<sup>205</sup> One study concluded that “there is little justification on economic efficiency grounds for proposals to address the captive shipper issue.” Curtis Grimm and Clifford Winston, “Competition in the Deregulated Railroad Industry: Sources, Effects, and Policy Issues,” in (continued...)

the degree to which rail traffic is captive or of the rates paid by these shippers. According to a 2006 study by GAO, there is:

... a reasonable possibility that shippers in selected markets may be paying excessive rates related to a lack of competition in these markets. While our analysis of available measures shows that the extent of captivity appears to be dropping in the freight railroad industry, shippers that may be captive are paying substantially over the statutory threshold for initiating a rate relief case. This situation may simply reflect reasonable economic practices ... or it may represent an abuse of market power. Our analysis provides an important first step in assessing competitive markets nationally, but it is imperfect given the inherent limitations of the Carload Waybill Sample [an STB data set] and the proxy measures available for weighing captivity. A more rigorous analysis of competitive markets nationally is needed — one that identifies the state of competition nationwide and inquires into pricing practices in specific markets.<sup>206</sup>

The GAO recommended that the STB conduct a comprehensive study of rail competition and rates, a suggestion the STB initially rejected based on GAO's inconclusive findings and its own lack of resources.<sup>207</sup> In June 2007 the STB reversed itself and said it would hire a contractor to conduct such a study to be completed by late 2008. GAO commended the STB “for taking this action, [but] it remains to be seen whether these analysts would have STB’s statutory authority and sufficient access to information to determine whether rail rates in selected markets reflect justified and reasonable pricing practices or an abuse of market power by the railroads.”<sup>208</sup>

The effect of the bills, particularly RCSIA, is also difficult to evaluate because the outcomes will largely depend on how the legislation is implemented. Implementation may produce results that differ from the apparent objectives of its supporters. For example:

- Under reciprocal switching or other avenues for opening rail bottlenecks, the new competing railroad would be required to pay the incumbent railroad a fee for the use of the incumbent’s tracks. For example, a new competing railroad delivering coal to a previously captive power plant might pay a trackage rights fee to the incumbent for each ton of coal it delivers. A study performed for the FRA suggests that the fee should be designed to, in effect,

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<sup>205</sup> (...continued)

Sam Peltzman, and Clifford Winston, eds., *Deregulation in the Network Industries: What’s Next?*, Washington, D.C: AEI-Brookings Joint Center for Regulatory Studies, 2000. On the other hand, other analysts believe that railroad market power is a major issue; for example, Jeffrey O. Moreno, “Changing Role of Rail Rate Regulation in a Capacity Constrained Market,” *Journal of Transportation Law, Logistics & Policy*, pre-print, third quarter 2007.

<sup>206</sup> GAO, *Freight Railroads: Industry Health has Improved, but Concerns about Competition and Capacity Should Be Addressed*, November 2006, p. 43.

<sup>207</sup> *Ibid.*, pp. 77-82.

<sup>208</sup> GAO, memorandum report to Congressional Requesters, *Freight Railroads: Updated Information on Rates and Other Industry Trends*, August 15, 2007, p. 10.

include all of the profit the incumbent carrier had earned before the bottleneck was opened. The report suggests that this and other aspects of its recommended approach would yield the most efficient outcome and keep incumbent railroad financially whole, but such a large fee could, in many cases, eviscerate the competitive value of reciprocal switching.<sup>209</sup>

- RCSIA requires the STB to replace its current rate appeal process with a cost of service approach “similar to the rate regulatory systems of [state] public service commissions and the Federal Energy Regulatory Commission.”<sup>210</sup> However, traditional utility rate cases can be complex, time consuming to prepare and litigate, and very expensive. While RCSIA puts a nine month time limit on rate cases, it may nonetheless have less impact on the accessibility and affordability of the process than its proponents intend.
- As noted above, Section 105 of RCSIA authorizes the STB to designate areas of inadequate rail competition and implement within those zones numerous remedies, not all of which are specified in the legislation (“other remedies authorized by law”). This provision is so broad that its potential geographic and regulatory scope, and its impact on rail rates, revenues, service, and profits, are very difficult to judge. Section 105 is probably the part of RCSIA with the greatest potential for reintroducing pervasive regulation into the rail industry.

In general it is unclear how complex and intrusive a regulatory framework the STB would have to create to implement RCSIA. A related issue is the practical ability of the STB to timely handle the additional workload RCSIA would assign to the agency. The Board is a small agency, with 137 full time equivalent staff and a budget of \$26.1 million in FY2006.<sup>211</sup> It may be difficult for the Board to effectively execute the proposed additional duties without more resources.

**Revenue Adequacy.** An important question concerning the rail restructuring proposals is the impact they would have on a central goal of the Staggers Act, returning the rail industry to financial health. By reducing the number of captive shippers and otherwise driving down rail rates, the restructuring proposals would likely cut railroad revenues and profits for some period of time. The railroad industry’s position is that the financial impact would be crippling, particularly since the railroads have still not achieved the objective of revenue adequacy established by Staggers. If this is the case service would likely deteriorate for coal and other shippers.

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<sup>209</sup> Eric Beshers, *Efficient Access Pricing for Rail Bottlenecks*, prepared by Hagler Bailly Services, Inc., for the John A. Volpe National Transportation Systems Center in support of the Federal Railroad Administration, June 1, 2000.

<sup>210</sup> Summary of the Railroad Competition and Service Improvement Act of 2007 [[http://craig.senate.gov/rail\\_comp\\_section\\_110th.pdf](http://craig.senate.gov/rail_comp_section_110th.pdf)].

<sup>211</sup> Surface Transportation Board, *Budget Request*, FY2008.

The issue of the financial impact of the restructuring proposals is particularly apt because the proposals could have the effect of changing the existing approach to railroad rate setting. This approach, called “constrained market pricing,” was developed by the ICC in 1985 with coal traffic at the forefront.<sup>212</sup> Constrained market pricing is predicated on two principles: The railroad industry is not revenue adequate, and to achieve revenue adequacy the railroad industry must be able to differentially price its services based on the price sensitivity of various groups of customers. For instance, when trying to win business that has a truck alternative, the railroad might price the movement to recover little more than the costs directly attributable to that movement, and few or none of the system-wide “non-attributable” costs (such as yard expenses) incurred by the railroad. On the other hand, it may set rates to move coal to a captive power plant at a price that recovers all the attributable costs of the movement plus a substantial share of the non-attributable system-wide expenses.

Demand-sensitive differential or “strategic” pricing is widely used in American industry.<sup>213</sup> In the case of the rail industry, where potential competition is limited by high barriers to entry, rates to the captive customers are, in principle, ultimately “constrained” by the shippers’ option to appeal to the STB. Rates can be appealed if the shipper can demonstrate that it is captive and that rates exceed 180% of the direct costs of the movement. If a protested rate meets these initial criteria, the STB then determines whether the rate exceeds the costs of a hypothetical most-efficient competitor (a “stand-alone” railroad). The costs of the stand-alone railroad represent, according to the underlying theory, the highest reasonable rate ceiling;<sup>214</sup> if the rate is ultimately determined by the STB to exceed stand-alone costs, a new rate is prescribed based on this ceiling.

In short, constrained market pricing is designed to help the rail industry achieve financial recovery by allowing it to charge relatively high rates to captive customers and relatively low rates to customers who have competitive options. The rail restructuring proposals, by providing avenues for reducing the number of captive shippers and the rates they pay, would chip away at a pillar of the constrained market

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<sup>212</sup> STB, Ex Parte No. 347 (Sub-No. 1), *Coal Rate Guidelines, Nationwide*, Decision, August 8, 1985.

<sup>213</sup> Timothy Aeppel, “Changing the Formula: Seeking Perfect Prices, CEO Tears Up the Rules,” *The Wall Street Journal*, March 27, 2007. For further background on differential pricing see CRS Report RL30373, *The Cost of Prescription Drugs for the Uninsured Elderly and Legislative Approaches*, and Robert Willig and William Baumol. “Using Competition as a Guide,” *Regulation*, vol. 11, no. 1 (1987).

<sup>214</sup> “The theory behind the stand-alone cost test, as the ICC acknowledges, is that of ‘contestable markets’ .... In such markets, the price of a product lies somewhere between its incremental and its stand-alone cost; just where it falls in the range depends on the state of demand. Thus, for regulatory purposes, stand-alone cost constitutes the proper cost-based ceiling for prices.” Robert Willig and William Baumol. “Using Competition as a Guide,” *Regulation*, vol. 11, no. 1 (1987).



pricing system. However, this may be more or less of a concern depending on whether or not the rail industry has reached the Staggers goal of revenue adequacy.<sup>215</sup>

In summary, it can be hypothesized that if the railroad industry is revenue adequate, it may be better able to withstand the stronger dose of competition and regulation the proponents of regulatory restructuring propose, and may be better positioned to respond to more intense competition with lower costs, greater efficiency, and better service. If the industry is not revenue adequate, then the regulatory status quo may be the better course of action. In particular, should the regulatory restructuring proposals, if implemented, undermine the industry's finances, then the results of regulatory change could be deterioration in rail service for coal and other traffic. There is arguably a contradiction between demands for both lower rates and better service. This point is made by Norfolk Southern:

[The Norfolk Southern CEO testified at an STB hearing] that he hears three things from rail customers. "They want more capacity; they want better service; and they want lower rates. And I don't know how you do all three".... [H]is summary of the three themes he hears from rail customers was reinforced by subsequent witnesses with no one even trying to reconcile the irreconcilable.... Unfortunately, many parties fail to see that infrastructure investment, better service, and rates are three legs to one stool. No one wants to pay; everyone wants someone else to pay.<sup>216</sup>

The counter-argument, noted above, is that more competition will force innovation, efficiency gains, and traffic growth that will leave the railroads whole or better off.

Because of these considerations it would be useful to know if the rail industry is achieving the Staggers Act objective of revenue adequacy. As required by statute, the STB makes an annual determination of revenue adequacy for each Class I railroad. However, for the reasons discussed below, the reliability of these determinations is problematic.

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<sup>215</sup> The ICC appeared to envision that once the rail industry achieved revenue adequacy, significant changes would be made to the constrained market pricing framework. In its constrained market pricing decision the ICC explicitly stated "captive shippers should not be required to continue to pay differentially higher rates than other shippers when some or all of that differential is no longer necessary to ensure a financially sound carrier capable of meeting its current and future service needs." Exactly what this means is uncertain, since it is difficult to envision a financially viable rail system in which the railroads do not have significant discretion to vary rates with the price sensitivity of different customers. Nonetheless, it seems clear that when the ICC created the current pricing framework, the expectation was that there would be significant adjustments when revenue adequacy was reached. STB, Ex Parte No. 347 (Sub-No. 1), *Coal Rate Guidelines, Nationwide*, Decision, August 8, 1985, p. 18.

<sup>216</sup> James A. Hixon, George A. Aspatore, and John M. Scheib, Supplemental Statement of Norfolk Southern Railway Company, before the STB, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, May 11, 2007, pp. 2 and 6.

The ICC's methodology for determining revenue adequacy was defined in a 1981 decision.<sup>217</sup> The test selected by the ICC is whether a railroad's return on investment was at least equal to its cost of investment capital. As explained by the ICC:

... "adequate" revenues are those which provide a rate of return on net investment equal to the current cost of capital (i.e., the level of return available on alternative investments). This is the revenue level necessary for a railroad to compete equally with other firms for available financing in order to maintain, replace, modernize, and, where appropriate, expand its facilities and services. If railroads cannot earn the fair market rate of return, their ability both to retain existing investments and obtain new capital will be impaired, because both the existing and prospective funds could be invested elsewhere at a more attractive rate of return.<sup>218</sup>

The ICC "emphasize[d] that revenue adequacy is a long-term concept that calls for a company, *over time*, to average a return on investment equal to its cost of capital."<sup>219</sup> Therefore, while a railroad might be revenue adequate in one year, it would not be deemed to have met the Staggers Act objectives for financial performance until it had achieved this threshold for a period of time. However, the ICC declined to specify "what period of time may be sufficiently representative in every case. This will vary depending upon the carrier's traffic base and the relative stability of the economy at the time."<sup>220</sup>

The ICC also noted that "we want to make clear that we will not and cannot guarantee any railroad a return equal to the cost of capital. A railroad, like any other firm, should earn such a return only if it provides a desired service in an efficient manner. We want to take great care, however, not to deny railroads the opportunity to earn the cost of capital."<sup>221</sup>

The ICC applied this approach retroactively to 1979 and subsequently. Using this standard, the financial performance of the railroad industry has been poor. As shown in **Figure 20**, over 27 years the Class I railroad industry as a whole has never once been revenue adequate. The difference between the industry's return on investment and cost of capital narrowed from 1979 to 1990, but the gap has not subsequently been closed or consistently narrowed (**Figure 20**). During this period the ICC and STB made 445 individual determinations of revenue adequacy for railroad companies. It found railroads to be revenue adequate in just 32 instances, of which just over half were for two companies, the Illinois Central (now part of Canadian National) and Norfolk Southern. Including subsidiaries and merger

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<sup>217</sup> ICC, Ex Parte No. 393, *Standards for Railroad Revenue Adequacy*, Decision, March 26, 1981.

<sup>218</sup> STB, Ex Parte No. 347 (Sub-No. 1), *Coal Rate Guidelines, Nationwide*, Decision, August 8, 1985, p. 18.

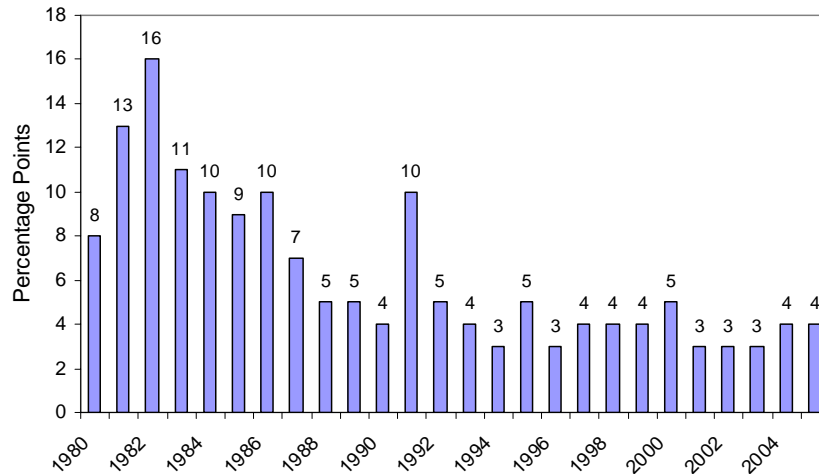
<sup>219</sup> *Ibid.* (Emphasis in the original.)

<sup>220</sup> *Ibid.*, p. 19.

<sup>221</sup> ICC, Ex Parte No. 393, *Standards for Railroad Revenue Adequacy*, Decision, March 26, 1981, p. 19.

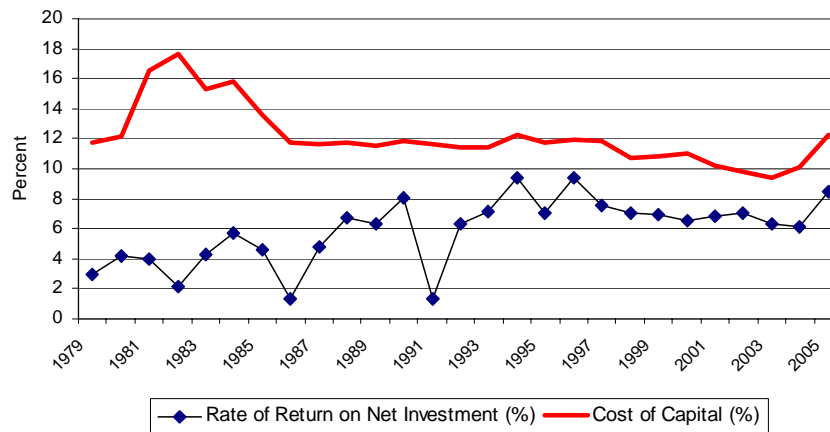
partners, the Union Pacific had one finding of revenue adequacy in 27 years by the STB's reckoning, CSX three findings, and BNSF four findings.<sup>222</sup>

**Figure 20. Difference in Percentage Points Between the Rail Industry Regulatory Cost of Capital and Return on Investment**



Note: values are rounded to nearest percentage point. Source: calculated by CRS from data in Association of American Railroads, Railroad Ten-Year Trends.

**Figure 21. Class I Railroad Industry Regulatory Cost of Capital and Return on Investment**



Source: Association of American Railroads, Railroad Ten-Year Trends.

<sup>222</sup> Most revenue adequacy findings were made in the 1980s when there more Class I railroads (as many as 37 in some years). Since 1990, when the number of Class I railroads has varied from 13 to 7, the ICC and STB have made 150 determinations of revenue adequacy for individual railroads. In these 150 evaluations, individual railroads were found to be revenue adequate in 20 instances, three quarters of which are accounted for by the Illinois Central (9 times) and Norfolk Southern (6 times).

Under the economic theory underpinning the Board's revenue adequacy test, the consistent inability of the railroad industry as whole, or even individual carriers, to achieve revenue adequacy for over a quarter century should result in significant capital shortages and even disinvestment in the rail industry. According to testimony relied upon by the ICC<sup>223</sup> in developing its revenue adequacy test:

In the final analysis, the only valid test of adequacy of a railroad's revenues is that they yield a rate of return equal to the opportunity cost of capital. Failing that, regulation will result in service deterioration as a result of disinvestment.

... any firm that earns less than this amount [its cost of capital] will be unable to compete in the market for funds. Its owners will neither wish nor be able to keep the enterprise's capital intact. They will withdraw their capital as quickly and as expeditiously as they can.<sup>224</sup>

The ICC concluded that "railroad management has little incentive to reinvest funds generated by ratepayers in continued rail uses if greater returns are available elsewhere. Railroads are private companies whose stockholders would not permit such reinvestment. Thus, even retained earnings will not be invested in the company if they cannot earn a rate of return equal to the cost of capital."<sup>225</sup>

Nonetheless, the railroads continued to invest billions of dollars in their systems over the years, even as they consistently fell short of the regulatory standard for revenue adequacy. This discrepancy between the failure to achieve revenue adequacy and the continued availability of investment capital has been explained as a consequence of optimistic investors putting money into the rail industry in anticipation of financial results that were not realized.<sup>226</sup> Other observers have suggested that the ICC's methodology for measuring railroad revenue adequacy does

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<sup>223</sup> ICC, Ex Parte No. 393, *Standards for Railroad Revenue Adequacy*, Decision, March 26, 1981, pp. 17 and 19.

<sup>224</sup> Verified Statement of William J. Baumol on behalf of the AAR, before the Interstate Commerce Commission, Ex Parte No. 393, *Standards for Railroad Revenue Adequacy*, pp. 5 and 9.

<sup>225</sup> ICC, Ex Parte No. 393, *Standards for Railroad Revenue Adequacy*, Decision, March 26, 1981, pp. 18-19.

<sup>226</sup> This explanation is made in Testimony of James J. Valentine, Morgan Stanley, U.S. Congress, Senate Committee on Commerce, Science, and Transportation, Subcommittee on Surface Transportation and Merchant Marine, hearing, *State of the Rail Industry*, 107<sup>th</sup> Cong., 1<sup>st</sup> sess., May 9, 2001, pp. 2-3. ("Investors bought railroad stocks throughout the 1980s on the idea that once the benefits of Staggers could be realized, these companies would earn their cost of capital. By the early 1990s, investors were becoming frustrated by the lack of progress although they became pacified when PEB [Presidential Emergency Board, for resolving labor disputes] 219 reduced crew sizes from 5-man to 2-man, resulting in better margins and thus better returns for the industry, but still not enough to earn the cost of capital. A few years later, after it was clear that even with 2-man crews the industry would not earn its cost of capital, investors began to lose faith at which point the industry leaders initiated a major round of mergers, with the prospects of reducing costs and capital needs through consolidation. But now, six years after this round of mergers began, we still have an industry with inadequate returns.")

not comport with the true state of the industry. The ICC itself made adjustments to the details of its methodology in 1986 after observing that its approach “does not appear to produce a realistic picture of the state of the rail industry.”<sup>227</sup> According to Standard and Poor’s, writing, respectively, in 1995 and 1999:

... until it earns at least its cost of capital, the rail industry is considered unhealthy — at least in the technical sense. We think the industry is actually fit as a fiddle, so how can this be? We believe that the [ICC’s] definition of cost of capital is at fault.<sup>228</sup>

... the industry technically remains “revenue inadequate”.... The fact that the industry may not achieve revenue adequacy is not particularly meaningful, however, given the many flaws in the design of this financial test.<sup>229</sup>

The revenue adequacy conclusions drawn by the STB are contradicted at times by statements made by railroads to financial analysts. The STB determined that NS was revenue adequate in 2004, but the railroad told investment analysts that it had not achieved its cost of capital.<sup>230</sup> UP, which according to the STB analysis has been revenue adequate only once since 1979, told Wall Street that it “did achieve our cost of capital in many years and even exceeded.”<sup>231</sup> These contradictions can perhaps be explained by differences which may exist between the financial measurement methods specified by the STB for regulatory filings versus those used by individual companies for their own purposes. Nonetheless, a situation in which the Board’s metric of revenue adequacy — which in essence is a measure of how willing investors should be to put money into the railroad industry — differs from the rail industry’s own reports to the investment analysts who advise those same investors, creates some uncertainty about the utility of the STB determinations.

Critics who claim that the STB’s methodology understates the rail industry’s actual financial performance have raised numerous technical objections to the Board’s approach. One criticism that appears to have particular significance relates to the methodology used by the Board to determine the rail industry’s cost of equity capital, a component of the overall cost of capital.

The STB uses a “single-stage discounted cash flow” (DCF) model to estimate the cost of equity. A key input into this method is an earnings growth rate that is

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<sup>227</sup> STB, Ex Parte No. 463, *Railroad Revenue Adequacy — 1984 Determination*, May 1, 1986, p. 1. That is, the industry was moving away from revenue adequacy in spite of the Staggers reforms.

<sup>228</sup> Stephen R. Klein, *Standard & Poor’s Industry Surveys: Railroads & Trucking Current Analysis*, 1995, p. R5.

<sup>229</sup> Stephen R. Klein, *Standard & Poor’s Industry Surveys: Transportation: Commercial*, 1999, p. 4.

<sup>230</sup> Transcripts of Third Quarter 2005 Norfolk Southern Earnings Conference Call, October 26, 2005 and Fourth Quarter 2004 Norfolk Southern Earnings Conference Call, January 26, 2005, Financial Disclosure Wire.

<sup>231</sup> Transcript of First Quarter 2002 Union Pacific Earnings Conference Call, April 25, 2002, Financial Disclosure Wire.

assumed to continue, unchanged, indefinitely. The assumption of an unchanging growth rate is workable for steady-state industries with growth rates that roughly mirror the growth of the overall economy. However, if an industry has been growing rapidly — as has recently been the case for the railroads — and this current high growth rate is used in the DCF formula — as the STB has done — the DCF model will produce an overstated cost of equity. This methodological pitfall is documented in the financial literature; for example, one standard text notes that “The simple constant-growth DCF formula is an extremely useful rule of thumb, but no more than that. Naive trust in the formula has led many financial analysts to silly conclusions ... resist the temptation to apply the formula to firms having high current rates of growth. Such growth can rarely be sustained indefinitely, but the constant-growth DCF formula assumes it can.”<sup>232</sup>

This problem was pointed out to the STB at least as early as 1997.<sup>233</sup> In August 2007 the STB proposed changing the approach used to estimate the cost of equity from the DCF model to an alternative “capital asset pricing model” (CAPM) methodology. The Board’s sample CAPM calculations show that application of the new method could cut its estimate of the railroad industry’s overall cost of capital in 2005 by more than a third, from 12.2% to 7.5%. Using these new estimates, the railroad industry as a whole was revenue adequate in 2005.<sup>234</sup>

The significant change in revenue adequacy that results from what is, in essence, a technical adjustment, points at a broader possible problem with the STB’s revenue adequacy methodology. This is the STB’s effort to peg the financial state of the railroad industry to a single, relatively simple to calculate measure that can be determined with a minimum of judgment. This objective may be difficult to achieve.

Financial analysis is often not as cut-and-dried as running numbers through a model and receiving clear results. For example, the Board noted that the literature on estimating just the equity component of the cost of capital is “vast ... covering the fields of finance, economics, and regulation.”<sup>235</sup> Another source notes that “there is no generally accepted definition of the cost of equity capital, but only a number of competing theories that are more or less capable of being applied numerically.”<sup>236</sup>

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<sup>232</sup> Richard A. Brealey, Stewart C. Myers, and Franklin Allen. *Principles Of Corporate Finance*, 8th Edition, 2005, p. 68-69; the same point is made in the 1981 edition of this book at pp. 48- 51. For further detail see the record in STB, Ex Parte No. 664, *Methodology to be Employed in Determining The Railroad Industry’s Cost of Capital*, posted on-line in the STB’s “E-Library” [<http://www.stb.dot.gov/>].

<sup>233</sup> Jerome E. Hass, *An Evaluation of the Measurement and the Use of the STB’s Annual Railroad Revenue Adequacy Determination*, prepared by National Economic Research Associates for the Alliance for Rail Competition, 1997, p. 4.

<sup>234</sup> STB, Ex Parte No. 664, *Methodology to be Employed in Determining the Railroad Industry’s Cost of Capital*, Corrected Decision, August 20, 2007, p. 8, Table 2.

<sup>235</sup> STB, Ex Parte No. 664, *Methodology to be Employed in Determining the Railroad Industry’s Cost of Capital*, Corrected Decision, August 20, 2007, p. 2.

<sup>236</sup> Edward Kahn, Steven Stoft, and Timothy Belden, *Impact of Power Purchases from* (continued...)

In a situation with this degree of methodological uncertainty, it is not clear that an essentially mechanical determination of revenue adequacy based on one financial ratio will necessarily yield reliable results. Note that in traditional utility rate hearings the appropriate rate of return is typically set through a contested hearing process, not through the mechanical application of a formula and procedure. According to one source, for a public utility commission:

It is appropriate to use the results of mathematical financial models to provide a ‘zone of reasonableness’ for the [return on equity or ROE].... However, the determination of the ROE is not an exact science. Judgment is inherent and certainly used by financial analysts when applying financial models. Certainly, a commission needs to exercise similar judgment to evaluate the overall results of those models and select an appropriate ROE....<sup>237</sup>

In contrast to the current use of a single financial ratio to determine revenue adequacy, prior to passage of the Staggers Act the ICC relied on a qualitative evaluation of multiple financial indicators.<sup>238</sup> When it adopted its current methodology in 1981, the Commission rejected a “multi-faceted standard” because it would require “a considerable amount of subjectivity in terms of selecting the mix of indicators to use and the performance standards applicable to each indicator.... Based on the record, we must reject a multi-indicator standard ... because no practical way has been shown to implement it objectively.” The STB later noted that an advantage of the ICC’s method for computing the key cost of equity component is that “the simple DCF method required few inputs and few judgment calls....” However, it may be difficult to avoid introducing considerable judgment into the revenue adequacy determination. For example, the CAPM approach the STB has proposed using in its future revenue adequacy determinations requires its own set of assumptions; the STB notes that “there are disputes over how to apply the model and whether newer methods are superior.”<sup>239</sup> According to a survey of finance practitioners, there are “substantial disagreements” on how to estimate all three of the key inputs to the CAPM model.<sup>240</sup>

As one text observes, “finance is in large part a matter of judgment, and we simply must face this fact.”<sup>241</sup> Financial analysis of a firm or industry for revenue

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<sup>236</sup> (...continued)

*Nonutilities on the Utility Cost of Capital*, Lawrence Berkeley Laboratory, 1994, p. 3.

<sup>237</sup> J. Robert Malko, Phillip R. Swensen, and Joseph Monteleone, “Some Thoughts on Estimating the Cost of Common Equity for a Regulated Business,” *The Electricity Journal*, June 2007, pp. 56-57.

<sup>238</sup> ICC, Ex Parte 353, *Adequacy of Railroad Revenue (1978 Determination)*, Decision, December 6, 1979.

<sup>239</sup> STB, Ex Parte No. 664, *Methodology to be Employed in Determining the Railroad Industry’s Cost of Capital*, Corrected Decision, August 20, 2007, p. 6.

<sup>240</sup> Robert F. Bruner, *et.al.*, “Best Practices in Estimating the Cost of Capital: Survey and Synthesis,” *Financial Practice and Education*, Spring/Summer 1998, p. 16.

<sup>241</sup> “Ratios, then, are extremely useful tools. But as with other analytical methods, they (continued...) ”

adequacy purposes may require the use of multiple measures, and the application of judgment in weighing the indicators and arriving at a final assessment.<sup>242</sup>

There is no consensus on whether or not the railroad industry has achieved revenue adequacy. There is a large body of opinion that the railroad industry has not achieved returns equal to its cost of capital or perhaps has done so only recently, or question how long current favorable financial trends will continue. For example, the *Financial Times* reported in 2007 that industry consolidation “along with solid demand ... has done wonders for pricing, allowing the sector to earn its cost of capital and more for a change. It is far from clear, however, how long that trend can continue.”<sup>243</sup> A study for the Electric Power Research Institute concluded in 2005 that the rail industry returns were approaching but had not yet reached the industry cost of capital.<sup>244</sup> A transportation investment analyst testified to Congress in 2001

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<sup>241</sup> (...continued)

must be used with judgment and caution, not in an unthinking, mechanical manner. Financial ratio analysis is a useful part of an investigation process.... Based on our own experience in estimating equity capital costs, we recognize that both careful analysis and very fine judgments are required in this process. It would be nice to pretend that these judgments are unnecessary and to specify an easy, precise way of determining the exact cost of equity capital. Unfortunately, this is not possible.” (J. Fred Weston and Eugene F. Brigham, *Managerial Finance*, 7th Edition, 1981, pp.160 and 601); “Although shareholders like to see their companies earn a high return on assets, consumers’ groups or regulators often regard a high return as evidence that the firm is charging excessive prices. Naturally, such conclusions are seldom cut and dried. There is plenty of room for argument as to whether the return on assets is properly measured or whether it exceeds the cost of capital.” (Richard A. Brealey, Stewart C. Myers, and Franklin Allen. *Principles Of Corporate Finance*, 8<sup>th</sup> Edition, 2005, p. 794-95 [footnote omitted]; “A single ratio does not generally provide sufficient information from which to judge the *overall* performance of the firm. Only when a group of ratios is used can reasonable judgments be made.” (Lawrence J. Gitman, *Principles of Managerial Finance*, 10<sup>th</sup> edition, 2002, p. 52 [emphasis in the original]). The originators of the methodology used by the STB to determine the equity portion of the cost of capital observed that opinions on the growth rate used in the formula will “vary among individuals with the information they have on a host of variables and with their personalities.” Myron Gordon, and Eli Shapiro, “Capital Equipment Analysis: the Required Rate of Profit,” *Management Science* vol. 3, no. 1 (October 1956), p.105.

<sup>242</sup> Interpretation of bond ratings is an example of the judgment that must be applied in interpreting financial indicators. The point has been made that railroad bond ratings of BBB are just above “junk bond” status and indicative of the financial fragility of the rail industry (James R. Young, Chairman, President, and CEO, Comments of Union Pacific Railroad Co., before the Surface Transportation Board, Ex Parte 671, *Rail Infrastructure and Capacity Requirements*, April 11, 2007, p. 2; Comments of BNSF CEO Matt Rose in “How to Solve Capacity Constraints?” *Railway Age*, May 2007). However, UP has also described a BBB rating as a “sweet spot” consistent with its financial goals (Transcript of Bear, Stearns Global Transportation Conference-Final, May 8, 2007, Voxant FD (Fair Disclosure) Wire). NS has also expressed satisfaction with a BBB rating (Transcript of Fourth Quarter 2003 Norfolk Southern Corp. Earnings Conference Call, January 28, 2004, FD (Fair Disclosure) Wire).

<sup>243</sup> “Railroads and Buffett,” *Financial Times*, April 11, 2007.

<sup>244</sup> Summary of M. Bossard, T. Gaalaas, G. Vicinus, Electric Power Research Institute, *New* (continued...)



that “the bottom line is the railroads don’t earn their cost of capital ... they destroy capital every year.”<sup>245</sup>

In summary, opinion on the regulatory restructuring proposals may hinge in part on views of the railroad industry’s financial condition. For the reasons discussed above, the STB’s revenue adequacy determinations may be of uncertain value in developing such a view.

**Regulatory Restructuring: Considerations and Options.** The following issues may be of interest in evaluating the regulatory restructuring proposals:

- *Are the coal and other rail service (and related rate and competitive access) issues the restructuring bills address of sufficient import to justify extensively revising the current regulatory framework?* Existing data on service, capacity, rates, and the degree to which captive coal and other shippers are subject to market power are incomplete at best. Should the executive agencies be directed to gather and analyze additional data in these areas on an ongoing basis? As of mid-2007 the STB plans to conduct a study of rail competition and rates, but this will apparently be a one-time analysis.
- *What is the actual financial state of the railroad industry?* Congress’s view of the restructuring proposals may depend in part on an evaluation of the financial condition of the railroads; in particular, whether they have achieved the regulatory goal of revenue adequacy. A financially robust industry may be able to respond to enhanced competition with the innovation and service improvements suggested by proponents. A weaker industry may contract in response to more intense competition, and service could deteriorate. There are other perspectives: if the railroads have achieved revenue adequacy then it might be unwise to make major changes; if it has not, then more competition may be needed to jump-start the industry. A predicate for reaching any of these conclusions is a rigorous analysis of the financial state of the railroads, and this does not currently appear to be available.
- *Would the restructuring proposals actually achieve substantial service improvements?* RCSIA leaves implementation details undefined, making the outcomes from the law uncertain. These implementation issues include, for example, the fees for bottleneck service, how a cost of service rate appeal process could be

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<sup>244</sup> (...continued)

*Price Structures for Coal Transportation: Evidence and Implications*, prepared by Pace Global Energy Services, Inc., November 2005 [<http://my.epri.com/portal/server.pt?>].

<sup>245</sup> John Gallagher, “Inadequate,” *Traffic World*, August 20, 2001.

economically managed, and operation of the remedies proposed for areas of inadequate competition.

- *Service Focus*: as an alternative to extensive revision of the current regulatory regime, could more limited changes result in material improvements in coal rail service? If otherwise desirable, a more limited agenda might include elements of current proposals, including giving rail service problems and their resolution greater public visibility; creation of a rail public advocate; and new requirements in the law for reliable rail service.

## Appendix 1. Significant Disruptions in Deliveries of Coal to Power Generators Since 1990

Year	Description
2005 - 2007	Train derailments in May 2005 trigger a large-scale maintenance project on the PRB Joint Line, causing delays and coal delivery shortfalls through most of the year on the UP and BNSF systems. Delivery shortfalls for some shippers linger into 2006. UP imposes an embargo on accepting new customers for PRB coal shipments that continues until March 27, 2007.
2004	Rail system capacity is generally stressed by sharp increases in intermodal and grain traffic. UP continues to experience shortfalls in Colorado and Utah coal shipments and some problems in the PRB, in part due to being short-staffed and needing more locomotives. NS and CSX have shortfalls in shipments of eastern coal to domestic generators due to a surge in coal export demand and capacity limitations exacerbated by hurricane damage.
2003	Delays in UP shipments of coal mined in Colorado and Utah, due to shortage of staff and locomotives.
1999 - 2000	Severe congestion and delivery shortfalls in the east due to problems with the integration of the Conrail system into NS and CSX.
1997 - 1998	Severe delivery shortfalls throughout the UP system due to problems with the integration of the SP railroad. Mid-year 1998 shortfalls in eastern coal shipments on the NS system, reportedly due to insufficient locomotives.
Early 1996	Eastern coal shipments are disrupted by harsh winter weather and difficulty meeting a surge in power plant demand for coal.
1994 - 1995	Surge in demand for PRB coal leads to congestion and delivery shortfalls on the UP and BNSF systems. In the first part of 1994, delivery shortfalls of eastern coal are experienced on the Conrail systems due to harsh winter weather and difficulties implementing a maintenance program.
1993	Coal shipment shortfalls, primarily in the Midwest, due to widespread summer flooding.
1991	PRB coal delivery shortfalls due to congestion on the UP system.

**Source:** 2007: "After Nearly Two Years, UP Removes Embargo on New PRB Business," *Coal Outlook*, April 2, 2007. 2005-06: Statement of Howard Gruenspecht, Deputy Administrator, Energy Information Administration, U.S. Department of Energy, before the Committee on Energy and Natural Resources, U. S. Senate, May 25, 2006, pp. 3, 8-10. 2004: "Desire to Downsize Hinders Railroads' Operations," *U.S. Coal Review*, April 5, 2004; "Western Bituminous Supplies Likely to be Down from UP Situation," *U.S. Coal Review*, April 26, 2004, "Rail Capacity Hits Mine Wall," *Traffic World*, November 8, 2004, "Union Pacific Congestion Problems Worsen, Analysts Say," *Coal Outlook*, April 19, 2004, "Can We Handle It?," *Railway Age*, July 1, 2004; Congressional Budget Office, *Freight Rail Transportation: A Review of the 2004 Experience*, May 2005, pp. 1-6; 2003: "M[organ] S[tanley] Downgrades UP," *Coal Outlook*, October 6, 2003; "Colorado Coal Shippers Complain of UP Service," *Coal Outlook*, November 24, 2003; 1999-00: Saunders, Richard, Jr., *Main Lines: Rebirth of the North American Railroads, 1970 - 2002*, Northern Illinois University Press, DeKalb, Illinois, 2003, pp. 340-345; 1997-98: Saunders, Richard, Jr., *Main Lines: Rebirth of the North American Railroads, 1970 - 2002*, Northern Illinois University Press, DeKalb, Illinois, 2003, pp. 329-336; "Suppliers Tell Southern Coal that Norfolk Southern Continues to Perform Sluggishly," *U.S. Coal Review*, June 15, 1998; "Reports Mixed on Recent NS Coal Service," *Coal Outlook*, June 29, 1998; Winter of 1995-96: "Marketwatch," *Coal Week International*, February 20, 1996; "Marketwatch," *Coal Week*, February 19, 1996; 1994-95: "PRB Gains are Solid, Price Says; Demand is Short of Hopeful Projections," *Coal Week*, September 11, 1995; "Marketwatch," *Coal Week*, February 6, 1995; "C&NW, BN, UP Play Catch-Up; Capacity Problems in the Powder River Basin," *Railway Age*, October 1, 1994; "Out of Crisis, a New Strategy," *Railway Age*, May 1, 1996; "River Deliveries Also Hit," *U.S. Coal Review*, February 14, 1994; "It Appears that the Problems of the Eastern Railroad and River Systems Are Not Yet Over With," *U.S. Coal Review*, April 4, 1994; 1993: "Marketwatch," *Coal Week*, August 2, 1993; "Rail and Barge Deliveries Make Progress Toward Normality," *U.S. Coal Review*, August 24, 1993; 1991: "How UP Is Closing the Capacity Gap," *Railway Age*, March 1, 1994; "Marketwatch," *Coal Week*, March 25, 1991; "Marketwatch," *Coal Week*, March 11, 1991.

**Notes:** UP = Union Pacific Railroad; BNSF = Burlington Northern Santa Fe Railway (until 1996, Burlington Northern Railway or "BN"); CSX = CSX Transportation; NS = Norfolk Southern Railroad; PRB = Powder River Basin coal producing region; SP = Southern Pacific Railroad. A "significant disruption" lasts weeks or longer, covering more than one state.

## Appendix 2. Costs and Other Consequences of the 2005-2006 Disruption in Rail Transportation of Coal

Name of Entity	Conserved Coal	Acquired More Railcars	Purchased SO <sub>2</sub> Allowances	Cost (Millions)	Notes and Sources
Ameren	✓			NR	Source: 1
American Electric Power	✓			NR	Source: 6
Aquila	✓		✓	NR	Source: 1
Arkansas Electric Cooperative Corporation	✓			“millions of dollars”	Source: 9
Associated Electric Cooperative	✓			\$6.5	Source: 3
CLECO	✓			NR	Source: 1
CPS Energy (San Antonio)	✓			NR	Source: 11
Dairyland Power Cooperative	✓			NR	Source: 3
Dynegy	✓			NR	Source: 1
Empire District Electric	✓	✓	✓	\$1.4	Source: 3 Cost does not include railcar lease cost or cost of coal conservation at Empire’s Asbury and Riverton plants.
Entergy	✓			NR	Source: 1 Arkansas Public Service Commission concluded that Entergy failed to maintain adequate coal inventories; case was still open in mid-2007.
Grand River Dam Authority	✓	✓		NR	Source: 3, 4
Kansas City Power & Light	✓			NR	Source: 1
Kansas Gas & Electric	✓			NR	Source: 1
Lansing, Michigan, Board of Water and Light	✓			NR	Source: 7
Laramie River Station (Missouri Basin Power Project; six utility owners)		✓		\$8.0	Source: 11 Cost shown is acquisition of one trainset. The owners reportedly leased an additional trainset and purchased supplemental coal supplies.

Name of Entity	Conserved Coal	Acquired More Railcars	Purchased SO <sub>2</sub> Allowances	Cost (Millions)	Notes and Sources
Municipal Electric Authority of Georgia	✓	✓		\$28.0	Source: 8 (page 26)
Nisource	✓			NR	Source: 1
Oklahoma Gas & Electric	✓			NR	Source: 6
Omaha Public Power District (OPPD)	✓			\$7.2	Source: 5 OPPD claimed damages were continuing to grow as of May 2007.
Otter Tail Power, NorthWestern Energy, and Montana-Dakota Utilities	✓			About \$7.9	Sources: 12 Total cost estimated by CRS using the reported cost per month and the duration of the coal delivery problem.
Tennessee Valley Authority	✓			\$80.0	Source: 10
Tri-State Generation and Transmission Association		✓		\$10.0	Source: 8 (page 23)
Wisconsin Power & Light	✓			\$20.0	Source: 4
Wisconsin Electric Power	✓			\$52.0	Source: 1
Wisconsin Public Service	✓			\$6.6	Source: 2
Xcel Energy	✓	✓		NR	Source: 1 Cost does not include planned upgrades to some coal handling facilities to facilitate coal deliveries by rail.

**Source:** (1) 2005 10-K report; (2) 2006 10-K report; (3) 2005 annual report; (4) 2006 annual report; (5) Complaint filed by OPPD May 15, 2007, *Omaha Public Power District v. Union Pacific Railroad Co.*, District Court of Douglas County, Nebraska; (6) 10-Q report for third quarter 2005; (7) Board of Commissioners meeting minutes for November 8, 2005, and Connections newsletter for December 2005; (8) U.S. Congress, Senate Committee on Energy and Natural Resources, *Coal-Based Generation Reliability*, hearing, 109<sup>th</sup> Congress, 2<sup>nd</sup> sess., May 25, 2006, S. Hrg. 109-601, (Washington: GPO, 2006); (9) [<http://www.aecc.com/governmental-affairs/legislative-issues/>] and *Rail Shipment Issues Lead to the Formation of Arkansas CURE*, press release, Arkansas Electric Cooperative Corp., March 8, 2007; (10) "Rail Shipment Woes Inflate TVA Coal Costs," Associated Press Newswires, April 3, 2006; (11) Statement of Alan H. Richardson, President and CEO, American Public Power Association before the Federal Energy Regulatory Commission, Docket AD06-8-000, June 15, 2006; (12) *Update on Rail Issues at Otter Tail Power Company*, presentation to the South Dakota Public Utilities Commission, April 21, 2006, and Prefiled Rebuttal Testimony of Ward Uggerud, Otter Tail Power Company, South Dakota Public Utilities Commission Case No. EL05-022, June 9, 2006.

**Notes:** NR = Not Reported. • "Conserved Coal" includes such steps as replacing coal-fired generation with generation from gas-fired or other non-coal power plants and purchases of electricity off of the grid. It also includes replacing primary coal supplies with alternative coal. • "Acquired More Railcars" refers to the purchases or lease of additional sets of coal cars (typically 120 to 135 cars per trainset) that could be put into service to deliver more coal to the entity. • "Purchased SO<sub>2</sub> Allowances" means that in order to use alternative supplies of coal with a sulfur content higher than its normal supplies, the entity had to purchase allowances that permit the release of increased amounts of sulfur dioxide (SO<sub>2</sub>). • Four of the companies on this list share power plants, so that problems at one plant affect more than one company. Kansas Gas & Electric, Kansas Power & Light, and Aquila all own shares of the Jeffrey plant. Empire District Electric, Kansas Power & Light, and Aquila are joint owners of the Iatan plant. In addition, during this period Empire had a firm power purchase contract with Westar Energy. • Costs shown appear from the context to be incremental to those that the entity would have normally incurred.