A Prescriptive Analysis of the Indiana Coal Transportation Infrastructure

February 28, 2006
Project Team

- Dr. Tom Brady, Purdue University North Central
- Chad Pfitzer, Purdue Extension-Daviess County
- Dr. K. Sinha, Purdue University, School of Civil Engineering, JTRP
- Tom Beck, Steve Smith, INDOT
- Dr. Black, Indiana University
Project Rationale

- **Global Energy Prices**
  - $60/barrel oil

- **Indiana Coal Resources**
  - 18 billion tons (200 years)

- **Indiana Coal Demand**
  - Power Plants (66% total demand)

- **National Rail Infrastructure**
  - Converges in Chicago
Indiana is a net importer of coal
Indiana is a net importer of rail tons (58 million originate, 72 million terminate)
Coal accounts for 41% of total rail tonnage
Indiana, Illinois, Ohio, Kentucky, Pennsylvania, West Virginia account for 27% rail tonnage
High density rail corridors will likely have to handle new 315k ton rail cars
$7 billion backlog in upgrades for 286k cars
Project Rationale (cont.)

- Use Indiana coal for economic development

Issues

- Technology – Coal composition
- Infrastructure
  - Indiana has the coal
  - Indiana is at the center of the national rail infrastructure
  - Does Indiana have the rail infrastructure?
Three Important Rail Component Issues to Consider prior to Project Commencement:

- Route Structure
- Ownership
- Capacity
ROUTE STRUCTURE

- Indiana - and the nation’s - rail network is vastly different than it was in post WWII
- Fewer Class 1’s through merger, bankruptcy and abandonment
- Fewer routes
- Stagger’s Act (1980) de-regulates railroad industry and allows abandonment of money losing lines
- Best routes have been selected over time based on many factors (curvature, access to or bypass around major cities, historical traffic flows, profiles (elevation), access to water/markets, economies of scale, etc.)
- Concentration of traffic to fewer, larger capacity routes
- Greater efficiency per ton-mile
- NOTE: Majority of Indiana traffic moves through the Northern portion of the state to and from Chicago
- NOTE: Lines on map indicate routes present in 1948
OWNERSHIP

- Vast majority of U.S. railroads are privately owned
- Not all routes are owned by the same private organizations
- Not all private organizations have access to other private companies trackage
- 141,000 route-miles nationally
- Almost all routes are owned and managed by the railroads themselves
- Rolling stock generally interchangeable from one railroad to the other
- **NOTE:** Lines on the map indicate routes
- **NOTE:** Color of line indicates route ownership
- Continuing trend: consolidation through merger
## Consolidation

<table>
<thead>
<tr>
<th>Item</th>
<th>1975</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1 Route-Miles</td>
<td>191,520</td>
<td>99,250</td>
</tr>
<tr>
<td>Class 1 Railroads</td>
<td>73</td>
<td>8</td>
</tr>
</tbody>
</table>
CAPACITY

- The maximum amount of tonnage or number of trains that can be accommodated in a given period of time
- Capacity constrained primarily by route development and traffic density
- Rail traffic density defined as revenue ton-miles per mile of road owned

**NOTE:** Lines on the map indicate routes

**NOTE:** Thickness of an individual line indicates route traffic density

Continuing trend: “[r]ailroads must be able to both maintain their existing infrastructure and equipment and build the substantial new capacity that will be required to handle the additional traffic they will be called upon to haul.”


SOURCE: U.S.DOT, 2006
Class 1 Railroads deriving revenue from moving coal in/out/within Indiana

- Union Pacific
- BNSF
- Norfolk Southern
- CSX
UNION PACIFIC

- U.S. mega-railroad
- Headquarters: Omaha, NE
- Operates over 38,000 miles of track in 23 states
- Original member in construction of the first “transcontinental” railroad completed in 1896
- Portion of old “Overland Route” or “Platte River Road” from Wyoming to Chicago known as “The Super Railroad” where unit trains from Powder River Basin (PRB) deliver coal in a highly efficient manner envied by other railroads due to superior grade, curvature and double (sometimes triple) track mainline comprised entirely of welded rail and equipped with state-of-the-art traffic control (dispatching) technologies
- Moves PRB coal into Northern Indiana
- UP hauls around 30 unit coal trains each day out of the PRB destined for power plants located primarily in the Southwest and Midwest, with an equal number of empty coal trains arriving back at the mines

SOURCE: www.trainsmag.com
BNSF

- US mega-railroad
- Headquarters: Ft. Worth, TX
- Operates over 31,000 miles of track in 27 states and two Canadian provinces
- Original player in the Power River Basin (PRB) with multiple routes emanating from Wyoming
- Moves PRB coal into Northern Indiana utility market
- Each day, BNSF originates between 40 and 60 loaded coal trains from PRB mines in northeastern Wyoming and southeastern Montana, with an equal number of empty trains arriving to be reloaded

SOURCE: www.trainsmag.com
NORFOLK SOUTHERN

- US mega-railroad
- Headquarters: Norfolk, VA
- Operates over 22,000 miles of track in 22 states, the District of Columbia and the province of Ontario
- Moves very little coal to Indiana utilities
- Will be a key player in the movement of Powder River Basin coal in the future, through mergers with western or Canadian carriers

SOURCE: www.trainsmag.com
CSX

- US mega-railroad
- Headquarters: Jacksonville, FL
- Operates over 23,000 miles of track in 22 states, the District of Columbia and two Canadian provinces
- Moves coal in/out/within Indiana to state utilities
- Will be a key player in the movement of Powder River Basin coal in the future, through mergers with western or Canadian carriers

SOURCE: www.trainsmag.com
Peripheral Railroad activity affecting the future of the Indiana Coal Industry

- Canadian National
- Canadian Pacific
- Kansas City Southern
- Dakota, Minnesota & Eastern
CANADIAN NATIONAL

- Canadian transcontinental railroad
- Headquarters: Montreal, Quebec
- Operates over 38,000 miles of track in 7 provinces and 11 US states

SOURCE: www.trainsmag.com
CANADIAN PACIFIC

- Canadian transcontinental railroad
- Headquarters: Calgary, Alberta
- Operates over 13,000 miles of track in 6 provinces and 5 US states
- NOTE: Line from Chicago to Louisville recently sold to Indiana Railroad

SOURCE: www.trainsmag.com
KANSAS CITY SOUTHERN

- Independent midsized class 1 U.S. railroad
- Headquarters: Kansas City, MO
- Operates over 2,700 miles of track in 11 states
- Subsidiaries serve Mexico City
- NAFTA enhanced north/south configuration and development of Laredo (TX) gateway
- Increased valuation could trigger last round of “transcontinental” rail mergers between mega companies

SOURCE: www.trainsmag.com
DAKOTA, MINNESOTA & EASTERN

- Independent midsized class 2 (regional) U.S. railroad
- Headquarters: Sioux Falls, SD
- Operates over 2,500 miles of track in 8 states
- Moving forward with plans to build 262 miles of new track to tap Powder River Basin (PRB); work includes installation of continuous-welded rail, new cross ties, state-of-the-art traffic control (dispatching)
- PRB project will convert DM&E into a virtual coal conveyor belt from Wyoming to Mississippi River
- PRB project billed to: help lower energy costs for electric rate payers, reduce power plant emissions, and upgrade track for existing and future customers
- Will drive coal shipping rates lower across the board: particularly with Great Lakes utilities
- PRB project planning began 8 years ago: process now in the 11th hour pending federal legislation
- Increased valuation could trigger last round of “transcontinental” rail mergers between mega companies

SOURCE: www.dme.com
Requested References for Rail Component

- *The Official Railway Guide*
- *The Official Railway Equipment Register*
- *SPV’s Railroad Atlas*: Mountain Plains (WY, MT, ID); Dakotas and Minnesota (ND, SD, MN); Prairies West (NE, KS, OK); Prairies East (IA, MO, AR); Great Lakes West (WI, IL, MI); and Great Lakes East (IN, OH, MI)
- *U.S. Coal Industry and South Powder River Basin Maps*
- *North America Railroad map Software for Windows XP*
- *TrainMaster 4.3*
- *RailDriver Desktop Train Cab Controller*
Infrastructure

Supply Chain Concept

Mine → Power Plant

Time/Cost
Project Task 1

- Characterize the demand and supply states of Indiana coal usage
  - Demand Side
    - Where is coal consumed in Indiana
  - Supply Side
    - Where is Indiana coal produced
Project Task 2

- Characterize the transport methods of Indiana coal supply and demand
  - Demand Side
    - How does coal get to high-demand sites in Indiana
  - Supply Side
    - How does coal produced in Indiana get moved
Project Task 3

- Develop a simulated environment of Indiana coal supply and demand
  - Use Task 1 & 2 data
  - Construct a simulated rail environment to investigate
    - Capacity Issues
    - Cost Issues
Project Task 4

- Develop a set of transportation infrastructure improvements to address bottlenecks in current Indiana coal Transportation Network
  - Road (Dr. Sinha)
  - Rail
Project Task 5

- Develop a Return on Investment Methodology and simple Portfolio Optimization Model
Example Rail Scenarios

- Entice CSX, with the help of state funds: to rebuild the abandoned Monon right-of-way between Medaryville and La Crosse, IN; and rebuild abandoned Big Four right-of-way from San Pierre to Wheatfield, IN: to reroute coal trains off of the traditional North-South CSX thoroughfare to the west on the old C&EI. Such an arrangement would bypass (and not exacerbate) Chicagoland congestion and bring increased competition to NIPSCO Power facilities (such as Wheatfield) in the way of Indiana Coal. Also, helps CSX increase density on former Monon secondary route.

- Coordinate the efforts of CSX and Norfolk Southern, with respect to their relationships with both the Indiana and Indiana Southern Railroads (establish trackage rights or coordinate track sales). Move unit trains from Southern Indiana coal mines on routes parallel to CSX’s old C&EI mainline (interchange at Elnora) on to Terre Haute and access to CSX primary and secondary routes to the north and east: avoiding both Indianapolis and Chicago.

- If transcontinental mergers occur, be prepared at the state level to ask for trackage rights and line sale concessions from Class 1’s. Priority corridor establishment and capacity building programs for Indiana regional railroads to help them establish routes to haul coal within the state, to benefit Hoosiers with an independent all Indiana-owned rail network and not compromise relations with Class 1 carriers.

- After concessions, rebuild the abandoned Monon right-of-way between Gosport and Cloverdale, IN to take all trains off CSX mainlines; establishing a coal corridor between Southern Indiana and NIPSCO utilities in Northern Indiana.

- Other regional carriers such as the KB&S, CSS&SB and CFW&E could also be looked at to establish routes under a common Indiana-owned carrier.
Conclusions

- **Rail**: Policymakers should take steps that assist-and, just as importantly, refrain from taking steps that hinder—railroads in earning enough to make the investments they need to sustain themselves and provide the current and future freight capacity Indiana coal producers and utilities require.

- **Rail**: Establish a forward-thinking policy in regard to establishing an Indiana controlled rail corridor for moving coal north and south throughout the state.

- **Road**: The “Last 50 feet Dilemma”

- **Water**: Integration of water transport into the equation
Conclusions

- This project will allow scenarios to be tested that will quantify the effect of Indiana’s coal transportation infrastructure, now and in the future.