A Prescriptive Analysis of the Indiana Coal Transportation Infrastructure

August 30, 2006

Project Team

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- INDOT/JTRP Advisory Board

Project Rationale

- 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?

Quick Status Summary

- Commencement of Funding
  - JTRP – January 2006
  - CCTR – May 2006
  - Internal Processing(Extension) – August 2006
- Acquisition of Research Materials
  - Maps(Statistics, Routes, Operations)
  - Equipment Registers(Capacity)
- Literature Searching
- Project Tasks

Project Task Status

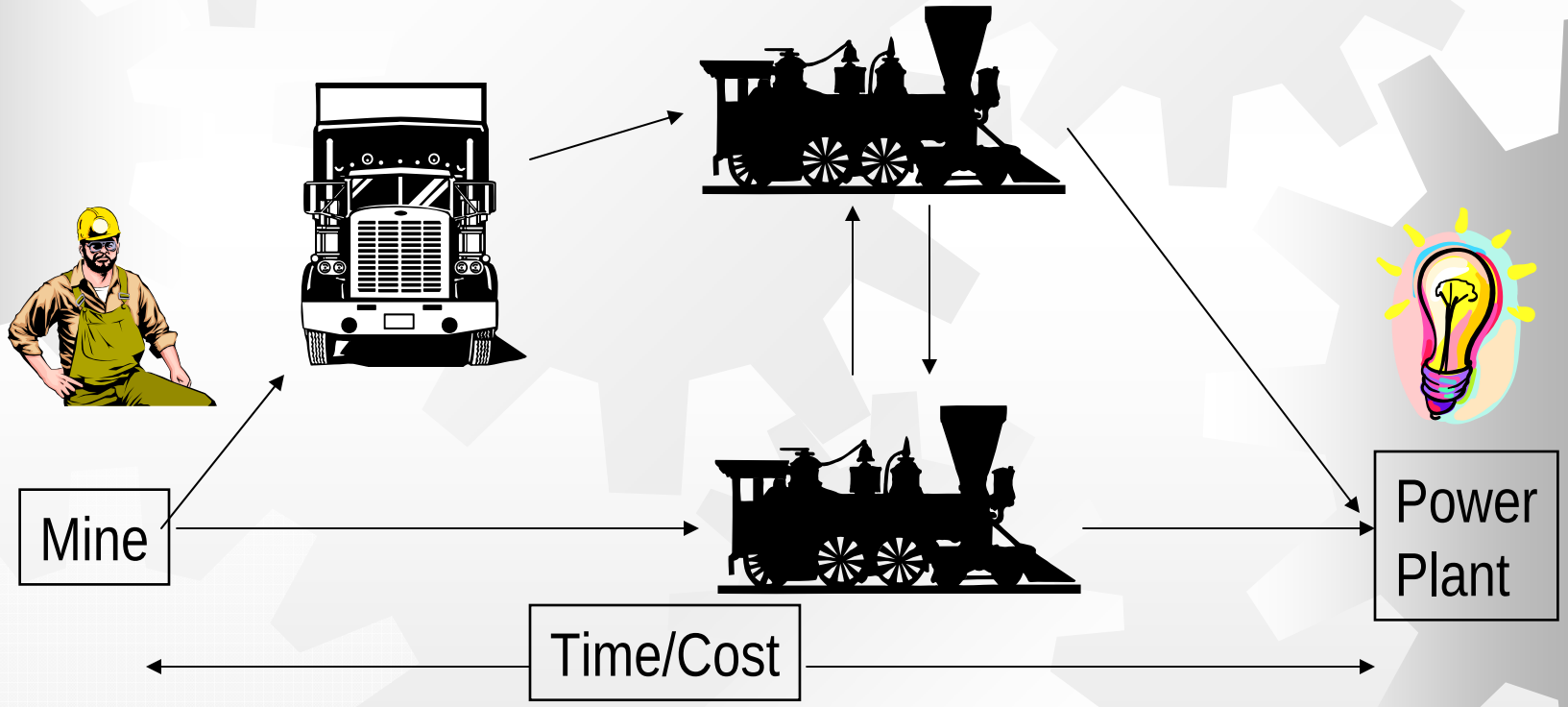
- Characterize the demand and supply states of Indiana coal usage (90%)
- Characterize the transport methods of Indiana coal supply and demand (70%)
- Develop a simulated environment of Indiana coal supply and demand (30%)
- Develop a set of transportation infrastructure improvements to address bottlenecks in current Indiana coal Transportation Network (15%)
- Develop a Return on Investment Methodology and simple Portfolio Optimization Model (5%)

Research Material Acquisition

- Global Energy Maps
  - US Coal industry
  - PRB
- SPV Rail Atlas
- The Official Railway Equipment Register

Infrastructure

- Supply Chain Concept



Literature Search Themes

- Transportation is a significant component of coal economics
  - “PRB coal is $6/ton, cost of transporting is $30/ton”
  - “Shipping costs of coal on transcontinental railroads helping Western-mined coal to make additional inroads into traditional Illinois coal markets”
  - “the availability and cost of transportation constitute important factors in the marketability of coal”
  - “morph the DM&E, a decrepit $220 million a year line into a 2800 mile, 1 billion plus per year coal carrying artery”

Literature Search Themes

- National Rail Infrastructure is capacity constrained
  - "the rail network is inadequate with bottlenecks forming around the nation and particularly in Wyoming"
  - "This wealth of coal can't flow freely through the US economy until some costly and difficult fixes are applied across the whole business of mining, transporting, and burning coal"
  - "An estimated 1/3 of US rail cargo flows through Chicago. Industry's boom underscores the need for better infrastructure"
  - "2006 Transportation Bill increased FRA loan budget from 3.5 to 35 billion and required the FRA give priority to projects that "alleviate rail capacity problems"
  - "Railroad congestion is the biggest bottleneck to expansion of coal-fired plants"
  - "It is not at all clear, moreover, how well today's infrastructure could support the rapid adoption of hybrid vehicles that draw on electricity"

Literature Search Themes

- Coal is facing challenges from other commodities for use of rail resources
  - "For decades, coal was the #1 commodity moved over the rails. Lately it has been displaced by consumer goods pouring into West Coast ports from Asia"
  - "The rail industry is watching the ethanol story unfold. Ethanol can't move by pipeline, so if it does hit the big time, railroads may stand to gain a major source of traffic."

Literature Search Themes

- Railroads control coal pricing
  - "Shipping costs of coal on transcontinental railroads helping Western-mined coal to make additional inroads into traditional Illinois coal markets"
  - "show that even a brand-new rail line would be able to serve Otter Tail's coal needs at a lower cost than BNSF"
  - "Coal delivery by rail has become increasingly unreliable and expensive", Glenn English, CEO, National Rural Electric Cooperative
  - Railroads monopoly on coal hauling is important for 3 reasons
  - They determine price and availability

Literature Search Themes

- Rail transportation is plagued by variability
  - “Strong demand for PRB coal is putting strains on coal supply chain. Some utilities report getting coal deliveries in the nick of time.”
  - “..Arkansas Electric has a problem that is a growing concern for many US utilities: It can’t get enough coal to run its power plants because the trains that serve as its supply line aren’t running on time.”
  - “Coal delivery by rail has become increasingly unreliable and expensive”,
  - “Delays re increasing as are train derailments, breakdowns, human error, and weather”

Literature Search Themes

- PRB is being developed as a national, long term, volume commodity
  - "Shipping costs of coal on transcontinental railroads helping Western-mined coal to make additional inroads into traditional Illinois coal markets"
  - "Energy information Administration estimates US will demand additional 100 million tons annually from PRB by 2010"
  - "Train counts in PRB coalfields averaged 65.4 per day in May"
  - "UP PRB study – Operating 286,000 pound cars instead of 263,000 pound cars required approximately 1500 fewer trains, 15,000 fewer crew starts, 770 fewer locomotives and 29,500 fewer cars"
  - "40% of us coal burned comes from Wyoming, 400 million tons"
  - "Between 1997 and 2004, coal production in Wyoming grew 40%"

Literature Search Themes Relative to this Project

- "Depending on the proximity of the customer to the mine and the transportation available for delivering coal to that customer, transportation cost can range from 4 to 41% of the delivered cost. As a consequence, the availability and cost of transportation constitute important factors in the marketability of coal"
- "A crucial challenge was to connect the DM&E to Chicago and Minneapolis, major hubs where its coal shipments could connect with railroads serving the power plants"
- "Otter Tail created a virtual railroad on paper-complete with hypothetical routes, equipment, and customers to show that even a brand-new rail line would be able to serve Otter Tail's coal needs at a lower cost than BNSF"
- "Once equipped with scrubbers, utilities can buy coal from just about anywhere and still meet the new regulations. Utilities that once burned Indiana coal are expected to return to their roots to take advantage of lower transportation costs, because Indiana is closer than Wyoming"

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?

Indiana Coal Production

Mine	Owner	Production(000 tons)	Rail Provider
Farmersburg	Peabody	4268	CSX(INDR)
Somerville Central	Peabody	3134	ISRR(CSX,NS)
Prosperity	Lafayette Coal	2367	CSX,ISRR
Somerville	Peabody	2236	ISRR(CSX,NS)
Craney	Solar Sources	2207	ISRR(CSX)
Francisco	Peabody	2133	NS(CSX,ISRR)
Discovery	Peabody	1830	ISRR(CSX,NS)
Air Quality I	Peabody	1715	CSX(ISRR)
Viking	Peabody	1460	ISRR(CSX)
Cypress Creek	Koester Companies	1170	NS/ISRR/SCS(CSX)

Source: 2006 US Coal Industry Map: Global Energy Decisions LLC

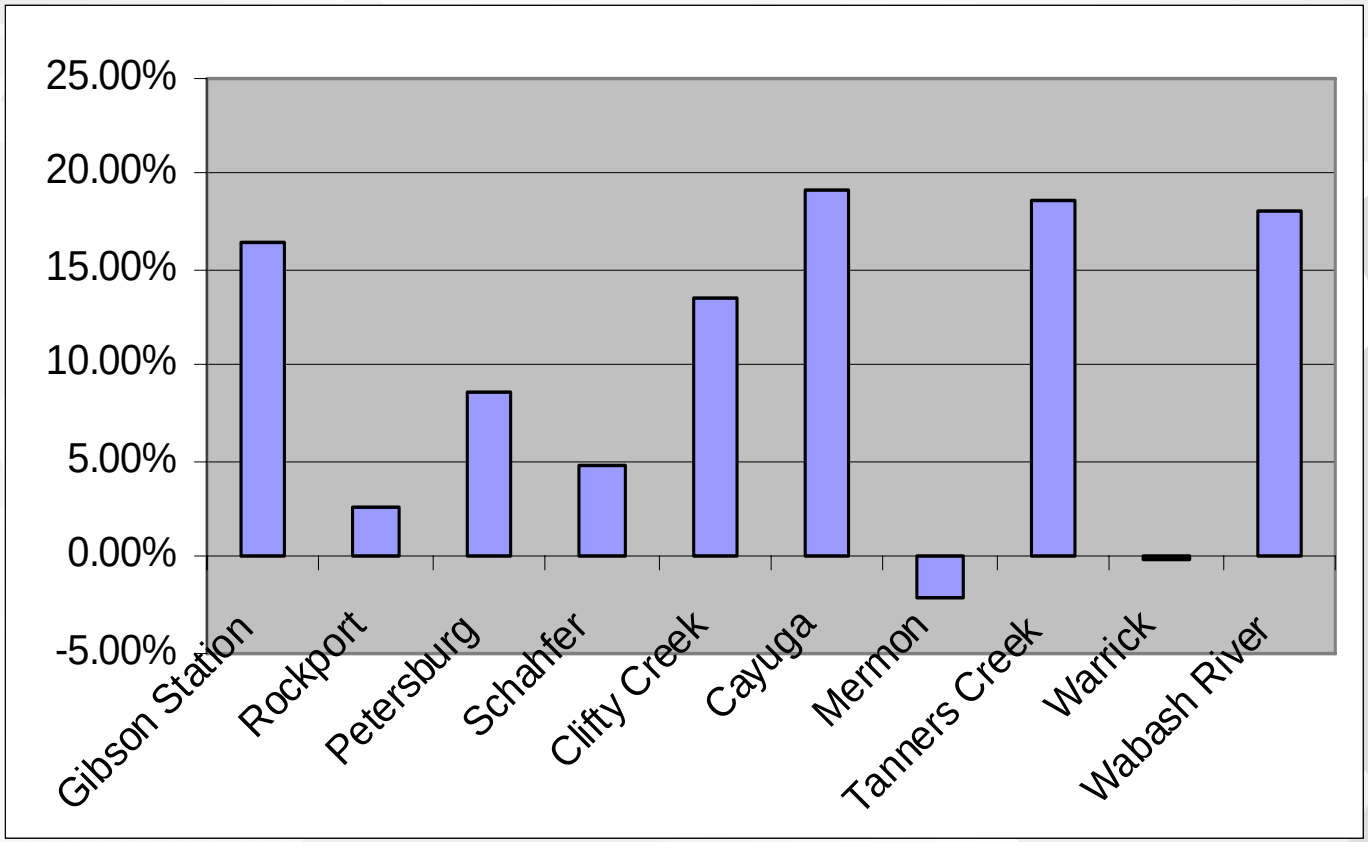
Indiana Coal Consumption

Plant	Operator	Consumption(000 tons)	Rail/Barge(NS/SCS)	Scrubbed
Gibson Station	PSI	9583	Rail(NS)	Y
Rockport	NMI	9207	Barge(NS)	N
Petersburg	IPALCO	5213	Rail(ISSR)	Y
Schahfer	NIPSCO	5026	Rail(NS)	Y
Clifty Creek	INKY	4470	Barge(NS)	N
Cayuga	PSI	3185	Rail(CSX/INDR)	N
Mermon	HREC	2899	Rail(INDR)	Y
Tanners Creek	INMI	2581	Barge(CSX)	N
Warrick	ALCOA	2365	Rail/Barge(NS/SCS)	N
Wabash River	PSI	2247	Rail(INDR)	N

Source: 2006 US Coal Industry Map: Global Energy Decisions LLC

Coal Consumption Growth

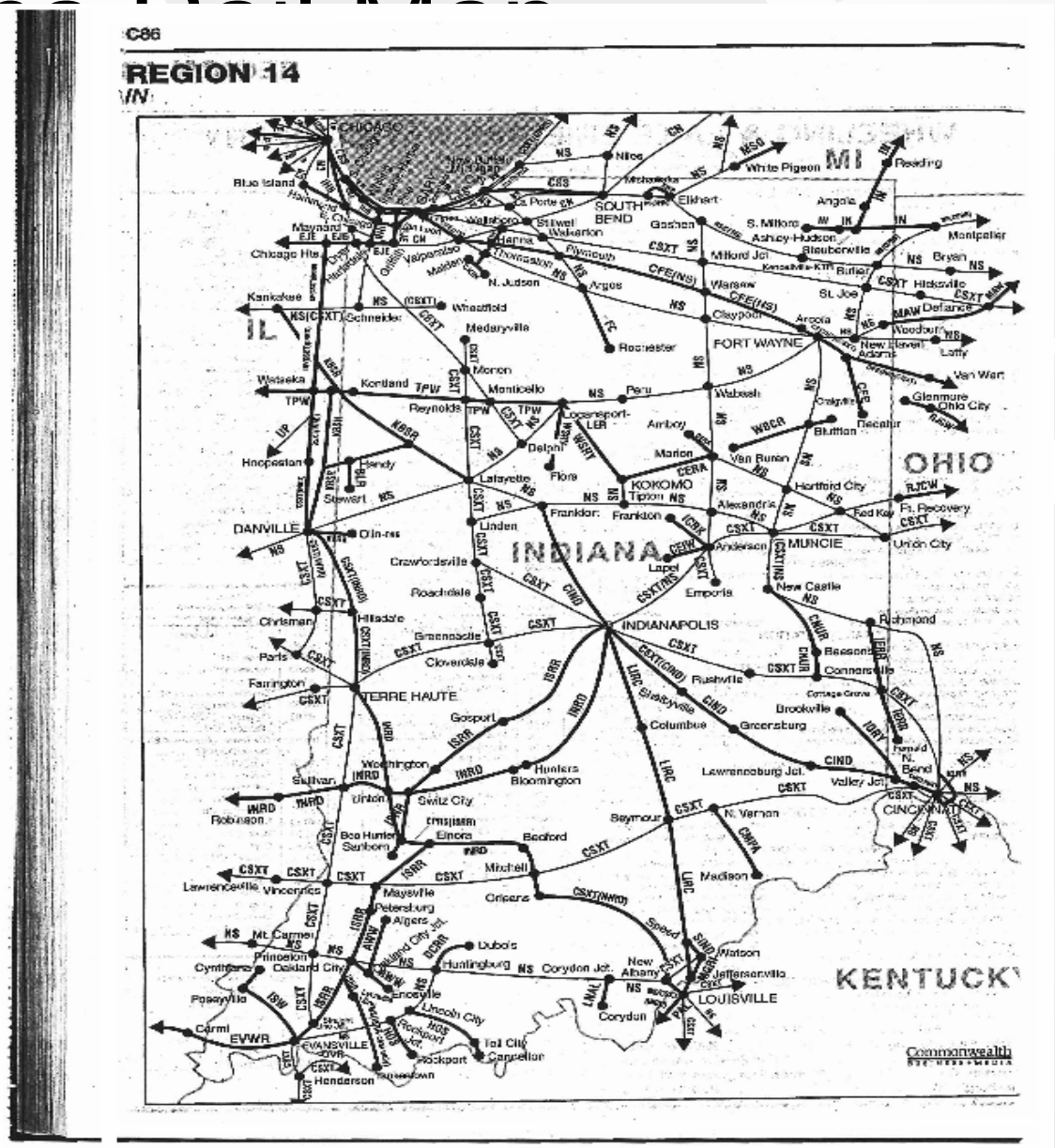
2000-2005



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

Indiana Rail Map

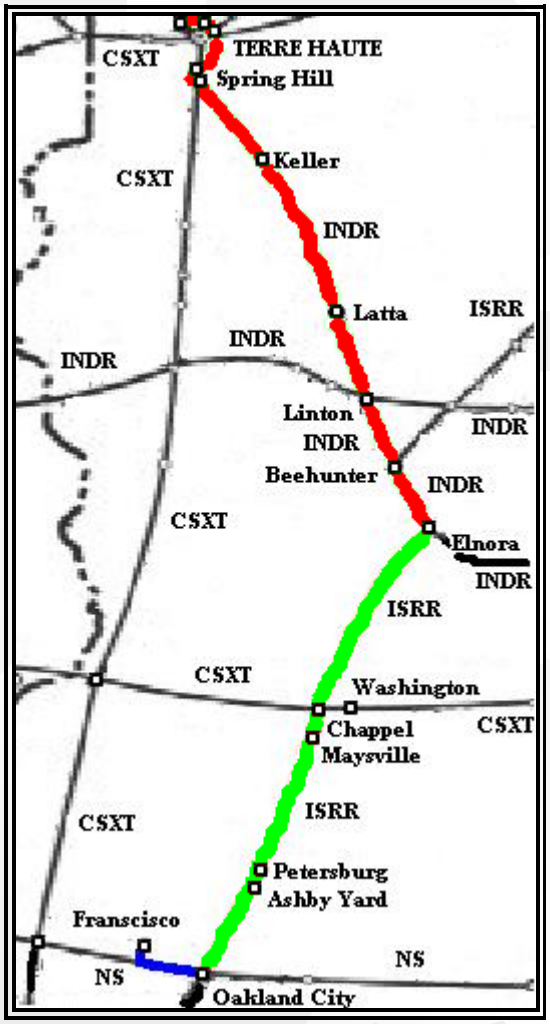


Use of the Model

- Analyze Scenarios(3 Types)
  - Type 1 – Currently in Place
    - Develop baseline economic case
  - Type 2 – New Connections, Current Rail Infrastructure
    - Francisco Mine to Schahfer
  - Type 3 – New Rail Infrastructure
    - Extend CSXT from Medaryville to Wheatfield

Example Scenario

Francisco Mine to Wabash River



Example Scenario

Francisco Mine to Wabash River

STATION	MILEAGE	TRACK				NOTATIONS	OWNERS PRESENT AT INTERLOCKS
		OWNER	NUMBER	CLASS	SPEED		
READ DOWNWARD FOR NORTHBOUND							
FRANCISCO	0.00	NS	1	-	-		
OAKLAND CITY	5.75	NS, ISRR	1	-	25	A	NS, ISRR
ASHBY YARD	16.25	ISRR	1	-	25	B,E,Y	
PETERSBURG	17.75	ISRR	1	-	25		
MAYSVILLE	33.25	ISRR	1	-	25		
CHAPPEL	34.75	ISRR, INRD	1	-	25	M	ISRR, CSXT
ELNORA	53.75	INRD	1	-	-	A	ISRR, INRD
BEEHUNTER	59.75	INRD	1	-	-	A	INRD, ISRR
LINTON	65.75	INRD	1	-	-	A	INRD
LATTA	73.75	INRD	1	-	-	B,T,Y	
KELLER	78.75	INRD	1	-	-	P	
SPRING HILL	96.75	INRD	1	-	-	M	CSXT
BELT JCT	98.00	INRD	1	-	-	M,T	CSXT
VAN YARD	103.00	INRD	1	-	-	B,Y	
PRESTON	104.25	INRD	1	-	-	M	CSXT
DEWEY	104.75	INRD	1	-	-	M	CSXT (INRD)
WABASH RIVER POWER PLANT	109.25	INRD	1	-	-		
READ UPWARD FOR SOUTHBOUND							

Example Scenario

Schahfer Operations

- Consumed 5,026,000 tons in 2006
  - 13,770 tons/day
- Assumptions
  - 40 day supply kept on hand
  - $35/ton delivered($19.2 inventory investment)
  - Unit train is 12,500 tons
  - 1000 miles to PRB
  - Average 40 mph
- Need 2 dedicated unit trains

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

Next Steps

- Scenario Development
- Meeting with Indiana Railroad