South to North Coal Movement
Indiana Rail Capacity/Potential

Center for Coal Technology Research
Energy Center

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Agenda

- Project 1 Review
- Project 2
  - Phase I: North/South Coal Movement
  - Phase II: North/South Coal Routes for Export Market
A Prescriptive Analysis of the Indiana Coal Transportation Infrastructure

- **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 to support coal movement?

- **Final Report issued May 2007**
Coal Transportation Infrastructure
Supply Chain Concept
Modeling Process

- Develop a Scenario
  - Source, Destination, Rate
- Overlay the route using timetable information from 10 by 10
- Determine performance metrics
- Experiment
  - Set parameters
  - Model generates long run expected performance estimates
  - Iterate
Model Architecture

INDIANA COAL RAILROAD TIMETABLE: ROUTE 2

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SOURCE: Comprehensive Railroad Atlas of North America; compiled by Chad Hitzer

Map Key:
- Top 10 Power Stations
- Top 10 Coal Mines
- Railroads
- Interstates
Scenarios
Project 1 Conclusions

★ This project was defined as a scoping study to:
  ★ Demonstrate ‘proof of concept’ for simulation analysis of rail infrastructure
  ★ Build awareness of the transportation aspect of the coal economy
Project 2 Plan

- A 2 year comprehensive project examining the movement of Indiana coal
  - NiSource
  - INDOT/Energy Office
  - Congressman Joe Donnelly
- Main Objectives
  - Expand Scope of Project 1
    - From IN coal to IN Power Plants to IN coal to IN export sites (Ports, rail carriers) & industries (steel)
  - Expand Modeling Details of Project 1
Project 2 Plan

- Phase I: Scenario Modeling
  - Southern mines to NIPSCO Schahfer
- Phase II: Potential North/South Routes
  - Coal Export Opportunities
- Phase III: ??
Phase I: NIPSCO Schahfer

- Indiana Coal Sourcing
  - Farmersburg, Prosperity, Gibson, Francisco mines

- Routing Scenarios
  - Alternate Routing
    - West Link
    - Northwest Link
    - Eastern Illinois/South Chicago/Northwest Indiana
  - Hypothetical infrastructure investment
    - North Link
    - South Link
Scenario 4: Prosperity to Schahfer with hypothetical North and South links
Scenario 5: Prosperity to Schahfer via West link
Scenario 7: Prosperity to Schahfer via Northwest route
Phase I Results
Modeling Methodology Validation

Validation: The process of determining whether the conceptual model correctly reflects the real system

- Train Speeds
- Congestion
- Mechanical Delay

Validation with Gateway Mine
Phase I Results
Train Velocity

- Train velocities according to model inputs were too high
  - Congestion factors
  - Use of maximum rail speeds by link
  - Mechanical breakdown repair times were too low
  - Effects of crew changes on long hauls
Phase II
Extended Scenario Modeling

Coal Export Market
- Peabody Coal shipped more coal overseas in first 6 weeks of 2008 than all of 2007
- Port of Hampton Roads, VA, busiest coal port expanded shipments by 50%

China Factor
- Exported 80 million tons in 2005
- Building a new power plant every 10 days
- Became a net importer in 2008
Phase II
Extended Scenario Modeling

🌟 Coal Export Market

🌟 DOE estimates US exports up 300% in 2008/2009
  - Record year was 1991, 109 million tons
  - 2008 estimate is 80 million
  - Estimated export capacity is 120 million

🌟 US will export 8% of 2008 coal production
  - US has 27% of world coal resources
  - Major global exporter for 1st time since 1991
Phase II
Extended Scenario Modeling

- Coal Export Market
  - Spot prices up by 64% for PRB coal
- Significant rail and port upgrades necessary
  - 1981 OTA report on “Coal Exports and Port Development”
Phase II Scenario
Southern Indiana Coal to Port of Indiana

- West Route
  - Actual
- East Route
  - Hypothetical
Phase III Modeling

🌟 Suggestions?