



Coal Mine Site Selection & Indiana's Economic Growth

CCTR Basic Facts #13

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Coal Scene 2007-2008



- **Central Appalachian coal prices have doubled** in 1 year.
- **Metallurgical coal prices have more than doubled** in 1 year.
- **U.S. coal exports increased 19% in 2007** up to 59 MTons.
- **Still building 15,000 MW**, 27 units under construction.
- **China & India expects to add 1.1 BTon** to annual demand by 2010.
- Prices for **natural gas** are **climbing** with higher oil prices, clearing \$11.43 mcf in June 2007.
- **Nuclear power can't significantly increase** its supply to the grid for probably at least 15 years.
- U.S. coal demand in 2008 is **expected to further increase**, (consumption in 2006 = 1.112 BTons, 2007 = 1.128 BTons).



Indiana's Coal Vital Statistics

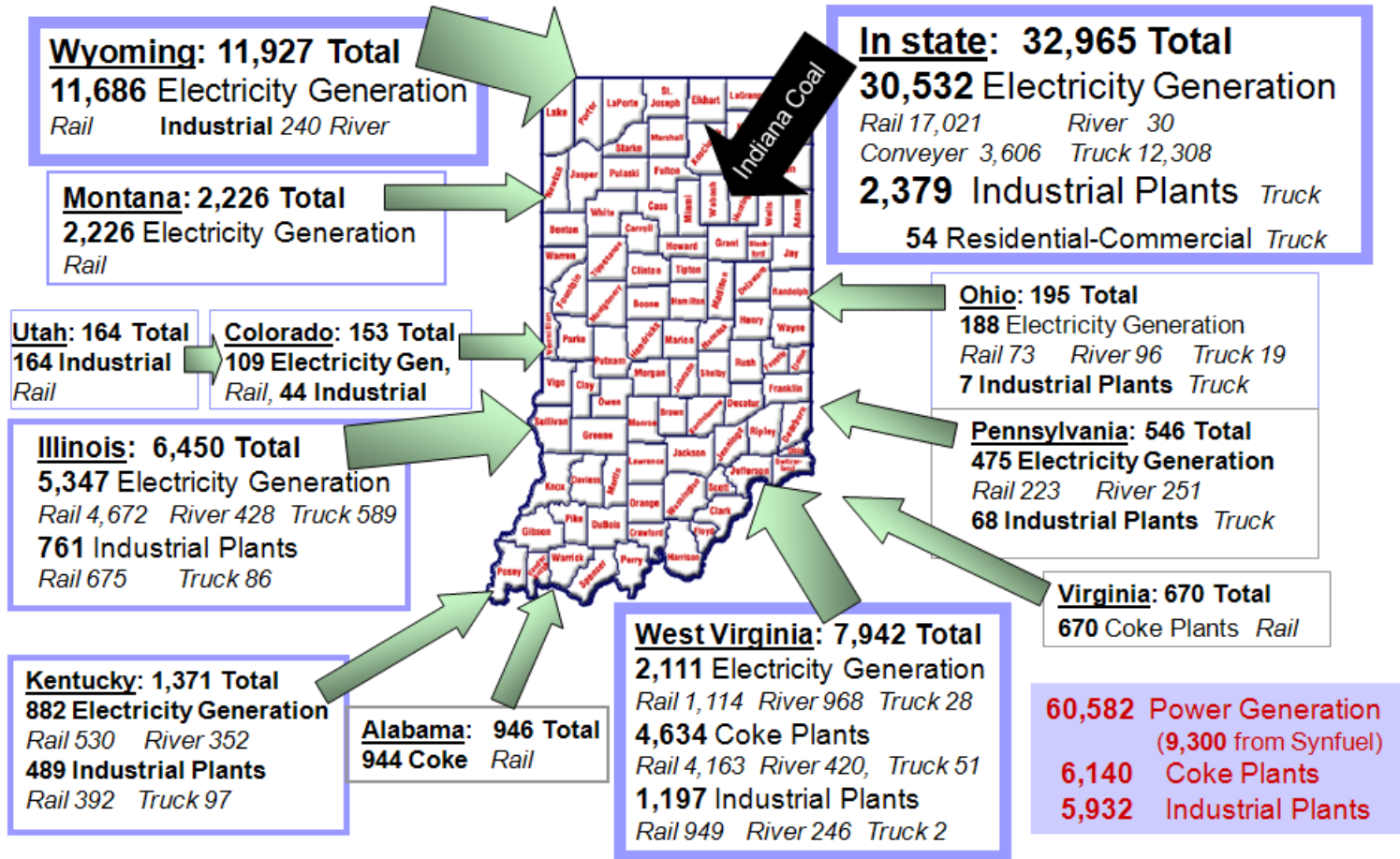


- ❑ **Indiana generates 95% of its electricity from coal & its price for electricity is the 3rd cheapest east of the Mississippi.**
- ❑ **Indiana imports twelve times the coal tonnage that it exports.** 37 MTons flow into the state & nearly 3 MTons flow out.
- ❑ **Over 80% of the Indiana coal inflows go to power plants.**
- ❑ **Indiana's coal-fired power stations use 50% Indiana coals; & other 50% comes from out of state.**
- ❑ **For many years to come Indiana's electric power generation will come from coal powered stations. Best plan is for Indiana to be mining & consuming more of its own coal.**



2006 Coal Destination: Indiana

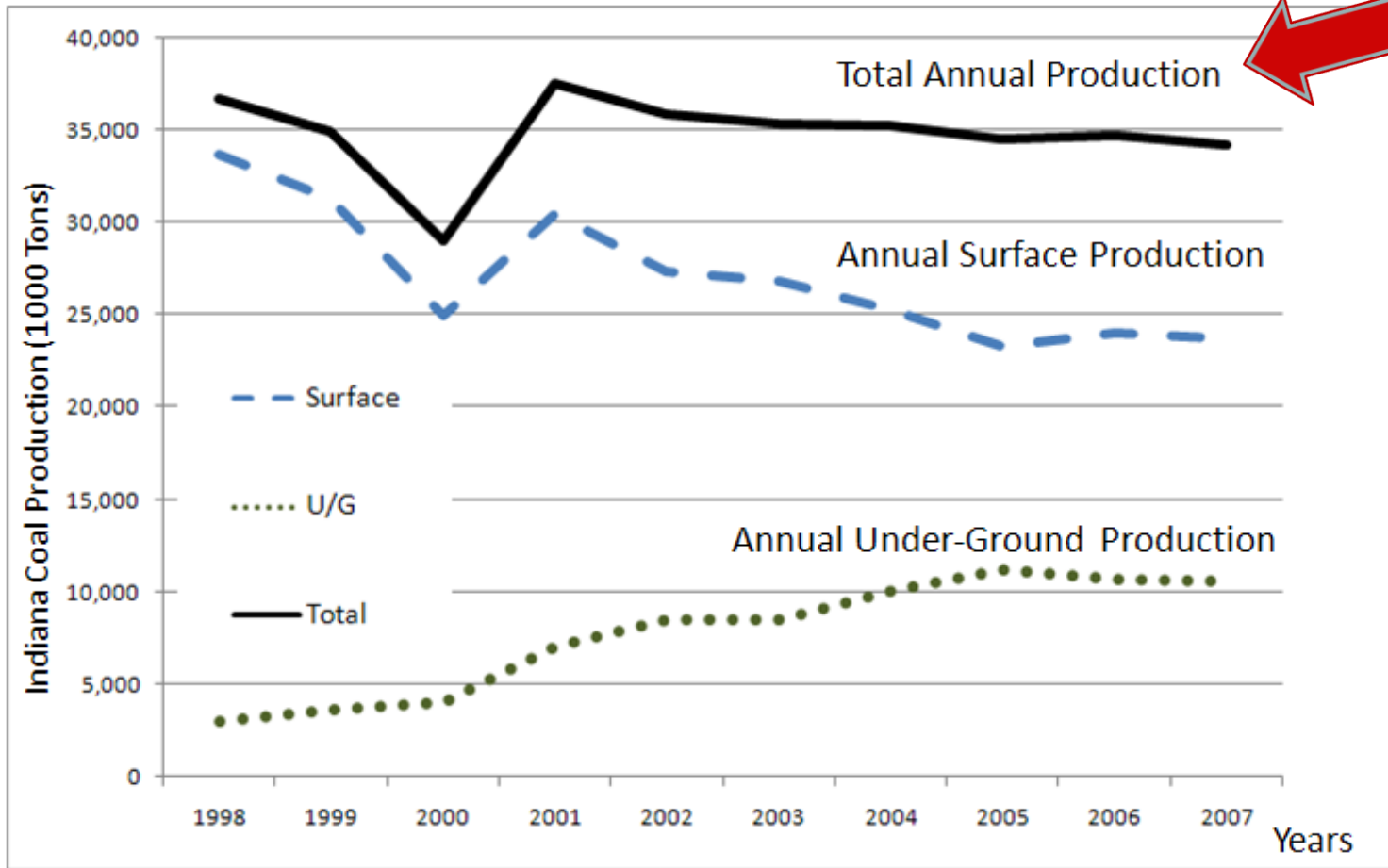
Coal Destined for Indiana: 72,346 (Thousand short tons) & Methods of Transportation



Source: http://www.eia.doe.gov/cneaf/coal/page/coaldistrib/coal_distributions.html



Indiana Coal Production Surface & Underground





Coal Economics

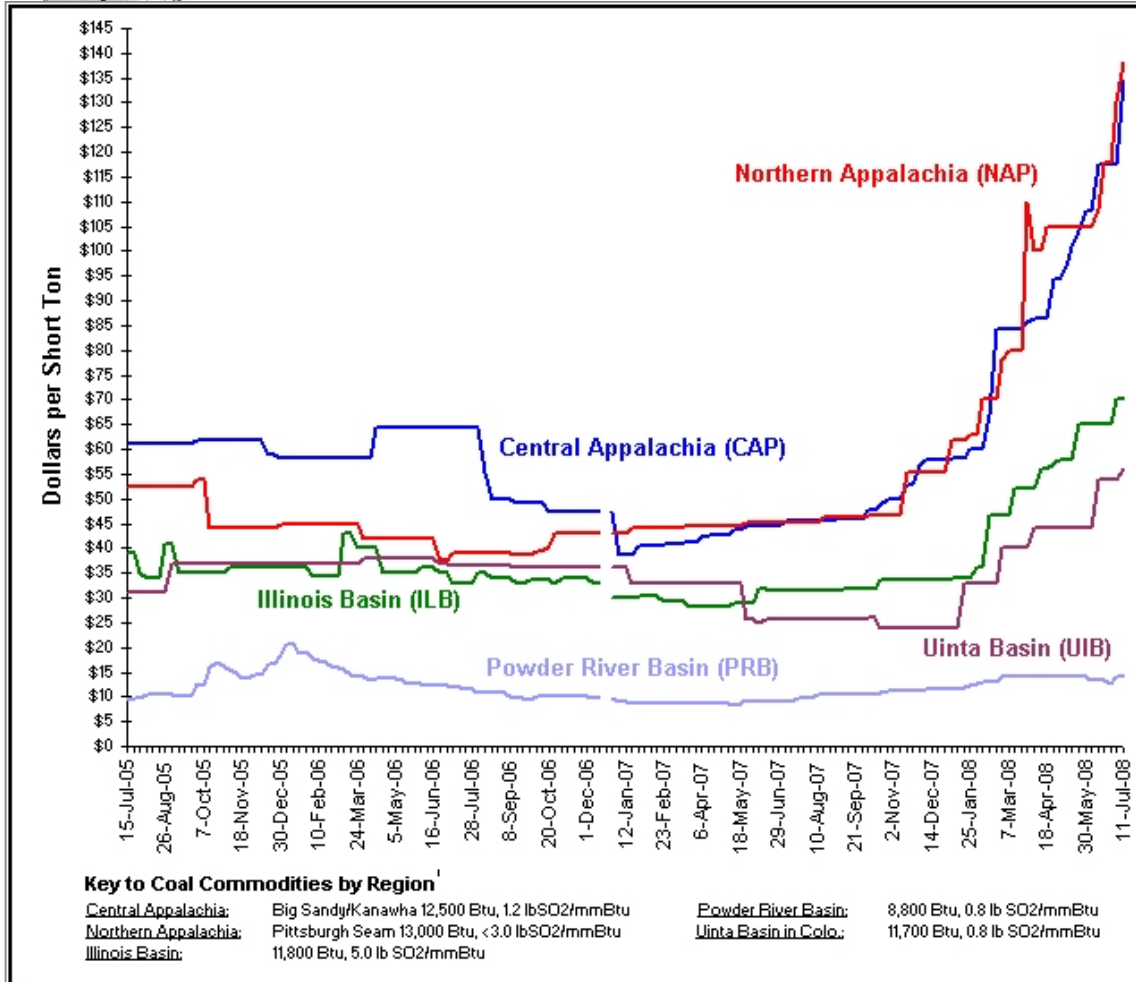


- ❑ **\$1,350 Million of Indiana's economic activity** attributable to coal mining which includes all the interaction between various components of the economy.
- ❑ Employment in Indiana's coal mining & the industries which provide goods & services to the coal mining industry results in an **estimate of 14,325 jobs** related to coal mining & the industries which provide inputs to the coal mining industry.
- ❑ Uncertainty regarding potential **carbon management legislation** & 2008 changes in the CAIR.

Source: *EXPANDING THE UTILIZATION OF INDIANA COALS*, Brian H. Bowen, Forrest D. Holland, F.T. Sparrow, Ronald L. Rardin, Douglas J. Gotham, Zuwei Yu, Anthony F. Black, Center for Coal Technology Research, Purdue University, August 18, 2004



Average Weekly Coal Commodity Spot Prices (Business Week Ended July 11, 2008)



- **Illinois Basin Coal (ILB) prices** are rising with Appalachian prices.
- Powder River Basin (PRB) prices are not having similar price rises.
- Need to consider the **impact of railroad & fuel costs** for transporting PRB coals to the Midwest.

<http://www.eia.doe.gov/cneaf/coal/page/coalnews/coalmar.html#spot>



New Mine Guideline Parameters

- ❑ **Time needed** to find mineable coal reserves & acquire mining & mineral rights - can take **5 to 10 years**.
- ❑ To start a major new mine (surface or under-ground) then investments of **\$50M to \$300M** might be required.
- ❑ In underground mines the **geological characteristics** (coal thickness, roof & floor strength), are **primary planning parameters**. Under ground mining gets difficult when the seam is < 4 ft thick.
- ❑ **Uncertainty of compliance costs** associated with Mine Safety & Health Administration (MHS) regulations.
- ❑ Typically for **every 10 Tons of in-place coal**, for under-ground mines **it yields 4.0 to 4.5 Tons of coal product**, and for surface mines **almost 8.0 to 9.0 Tons**.



Where to Locate A New Mine

Determining the location where to mine new large coal supplies is a huge issue & depends on:

- (1) **Economics** of mineable reserves,
- (2) Acquiring the **rights to mine** coal, &
- (3) Critical need for a **good transportation infrastructure** that connects with the mine site.
- (4) **Over burden** to seam thickness ratio is a critical factor for surface mining.

The need for a specific **coal quality must match the demand** when considering future levels of production.



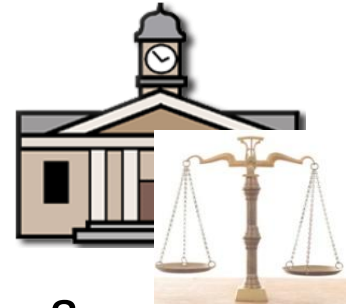
Major Issues for New Mines

- 1) **Permitting** & land acquisition.
- 2) Changes in power plant **emission standards** & regulations for SO₂, NO_x, Hg, & potential CO₂ legislation.
- 3) Coal **quality** & expected volumes/sales.
- 4) Attracting/developing **qualified workers**.
- 5) Rising **transportation costs**.
- 5) Availability/delivery of **mining equipment**.
- 7) Types of **coal contracts**.
- 8) **Transportation & infrastructure**.
- 9) **Large capital** investments are required.





The Permitting Process



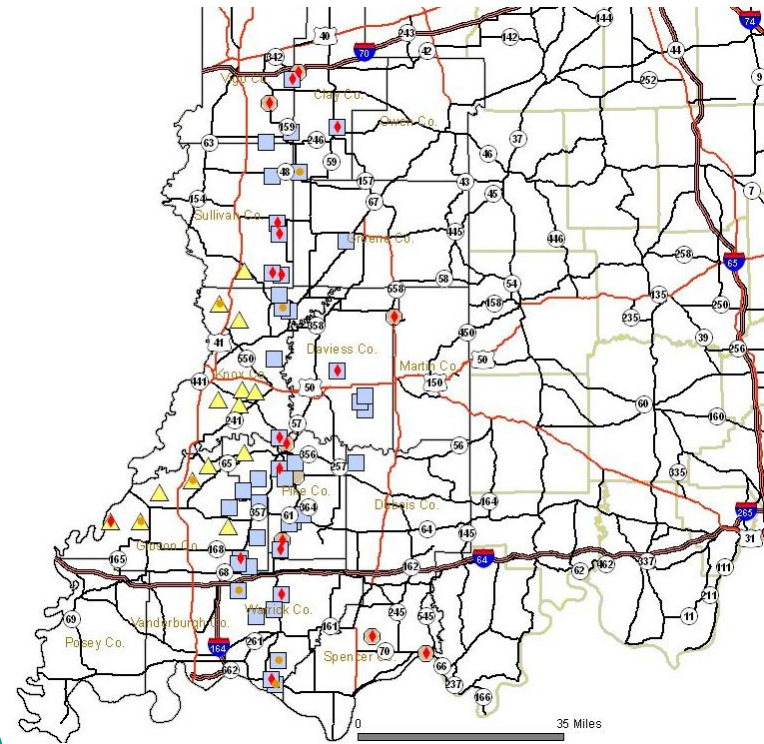
- ❑ **Permitting** can take a **long time** (for data gathering & regulatory approval) & is **possibly the biggest time issue** when considering investment for a new mine.
- ❑ The ACOE (**Army Corps of Engineers**) has regulations affecting mining as well as post mining reclamation.
- ❑ **Permitting** is a long process involving **regulatory uncertainty**.
- ❑ ACOE regulates **jurisdictional quality** for U.S. water-ways & the state (IDEM) handles mine water outflows & air permitting.
- ❑ Costs of surface coal reserves are increasing. Typical **costs for purchasing Indiana farm land can exceed \$4,000/acre**. Depending on strip ratio (*cubic yards/ Ton product*) purchasing mineral rights can involve a further \$8,000/acre - **total cost is often > \$12,000/acre for surface mining**.



DNR Mine Permits

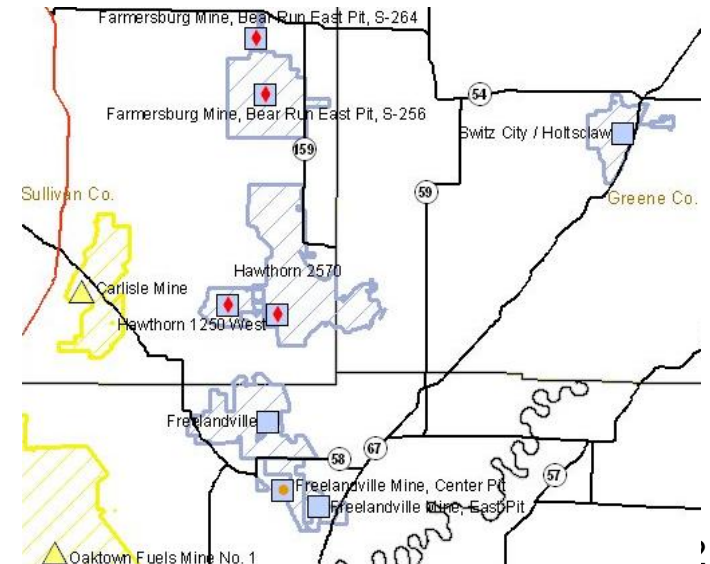
Information about Indiana's coal mine permits are on the Indiana Department of Natural Resources (DNR) website.

http://www.in.gov/gis-dnr-web/website/DNR_MineMap_II/viewer.htm



Legend

- New Permits
- ◆ Temporary Cessation of Mining
- Processing Area
- Surface Mine
- ▲ Underground Mine

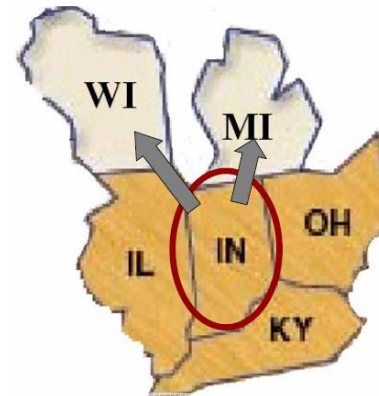




Coal Market Opportunities

- ❑ Indiana's annual production **tonnage remains constant** around 35-36 MTons/year
- ❑ There are changes are in market share **from one company to another.**
- ❑ Indiana has **market opportunity** by displacing some PRB coal, expanding exports & with new generating capacity (Edwardsport) .
- ❑ **Boiler design changes** are needed to switch from one type of coal to another.

Wisconsin 2002 coal imports (MTons)
from
WY 21.80, MN 2.92,
CO 1.50, IL 0.66,
UT 0.66, PA 0.60,
IN 0.39, KY 0.09



Michigan 2002 coal imports (MTons)
from
WY 12.87, MN 6.46,
WV 3.62, KY 3.52,
PA 1.01, CO 0.39,
OH 0.26, VA 0.12



Indiana Coal Company Rankings 1998 & 2007

1998 Indiana Coal Company Production Rankings

(tons)

1. Black Beauty Coal Company	10,654,165
2. Peabody Coal Company	6,255,746
3. Kindill Mining, Inc.	4,017,242
4. Solar Sources, Inc.	
& Solar Sources Underground, LLC	3,710,900
5. United Minerals Company, LLC	2,603,111
6. Vigo Coal Company	2,483,562
7. Triad Mining, Inc.	2,279,789
8. Midwest Coal Company	1,407,697
9. B & B Mining	929,914
10. Foertsch Construction, Inc.	716,655
11. Beech Coal Company	603,971
12. Little Sandy Coal Company, Inc.	371,660
13. Rogers Group, Inc.	240,075
14. Phoenix Natural Resources	197,541
15. McCawith Energy, Inc.	82,811
16. Collie Coal Company	70,532
17. Squaw Creek Coal Company	62,897
18. Maurice Kane	4,945

2007 Indiana Coal Company Production Rankings

(tons)

1. Black Beauty Coal Company	19,648,971
2. Gibson County Coal	3,213,852
3. Triad Mining, Inc.	3,141,517
4. Solar Sources, Inc.	2,983,983
5. Five Star Mining, Inc.	2,624,031
6. Vigo Coal Company	1,403,304
7. Sunrise Coal	972,477
8. White River Coal Company	243,014

The 2007 Black Beauty Coal Company includes, from the 1998 list,

1. Black Beauty Coal Co.
- & 5. United Minerals Company LLC



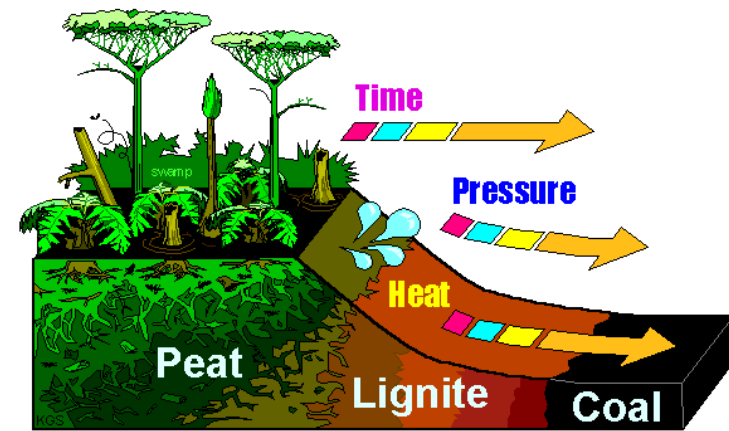
Changes & Uncertainties in Emissions Regulations

- ❑ **Cost** is definitely **the driving factor** in all instances.
- ❑ The **projected revenues must be sufficient** to justify all capital expenditures.
- ❑ **Operating expenses** must be especially considered for long-term projects.
- ❑ **New production** can be approached in two ways:
 - (a) Find a reserve & try to market it or
 - (b) There is a long term demand & a reserve is developed to meet the criteria.





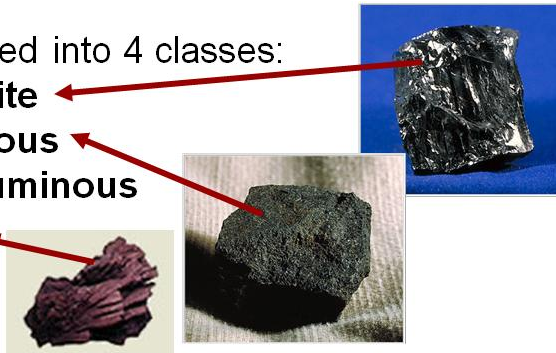
Coal Quality



- ❑ Quality is such a huge issue.
- ❑ Btu content is still the big attraction.
- ❑ We need to know the ash fusion temperature & other coal characteristics.
- ❑ Mercury content in Indiana coal is low.
- ❑ The design of power plant boilers takes consideration of what coal quality is to be used.

Coal is divided into 4 classes:

- (1) Anthracite
- (2) Bituminous
- (3) Sub-bituminous
- (4) Lignite



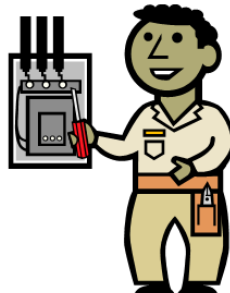
COAL COMPONENTS

Pure Coal		Mineral Matter	Total Moisture	
Fixed Carbon	Volatile Matter = Organic + Mineral	Ash	Inherent Moisture	Surface Moisture



Qualified Mining Work Force

- ❑ **Safety & skills training** in Indiana is provided at Vincennes University.
- ❑ **Skilled & professional manpower** is in demand more than ever before.
- ❑ There is great need for skilled operators, mechanics & electricians.
- ❑ **Training is high on the agenda** for all mining companies.





Rising Transportation Costs

- ❑ **Increased fuel prices** are having their impact on the railroads, highway trucks & other mine equipment.
- ❑ For **each ton of surface coal produced approximately two gallons of diesel fuel** are consumed by mining machinery. **This adds an immediate cost of \$8 per ton of coal** even before the coal has been moved from the mine site.
- ❑ **Problems in obtaining spare parts** for mining equipment especially non-availability of large off-highway tires.
- ❑ Always a **great advantage if a coal-fired power plant is located at the mine mouth** or very close to it.





Purchasing Mining Equipment

- ❑ There is a **shortage of equipment**.
- ❑ **New equipment has a long lead time** to arrive > year.
- ❑ **Increased mineral costs for steel & copper** is raising the costs of electrical & mechanical machinery.
- ❑ **Severe shortages** in very large off-highway tires (high demand & limited production); Indiana has purchased tires from Russia & China for off-highway mining equipment.
- ❑ **High prices of mining-supplies** makes planning very difficult, Examples: - roof bolts for underground mining, and diesel fuel & explosives for surface mining equipment.





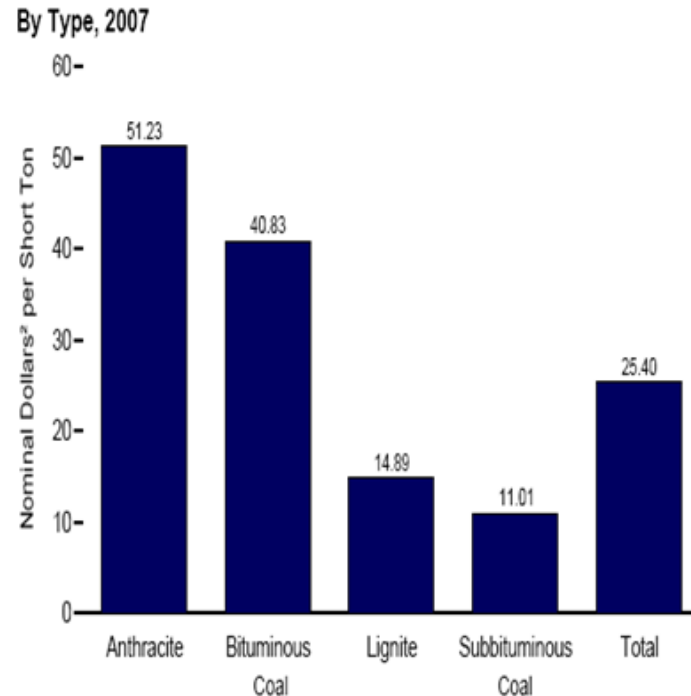
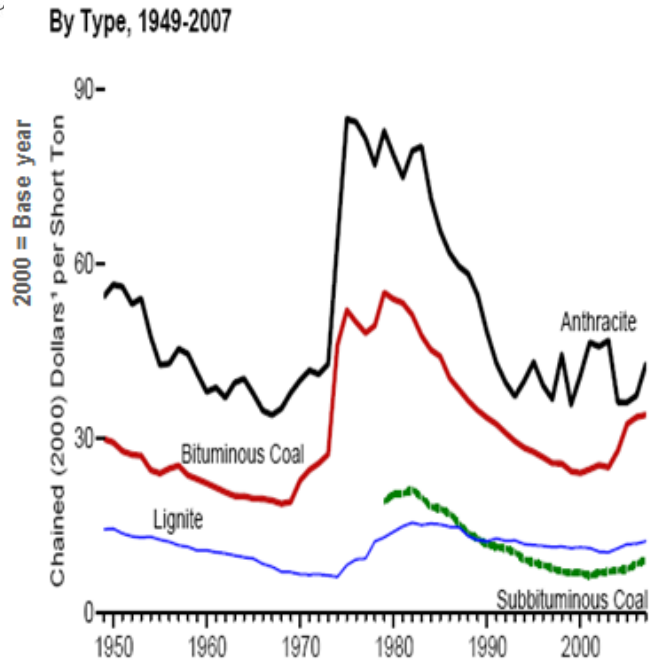
Types of Coal Contracts



- ❑ **About 85% of U.S. coal sales are via contracts & the rest via futures/spot markets.**
- ❑ Coal supply **contracts will vary** with changes in the market, levels of demand, & regulatory climate.
- ❑ The cost of coal is increasing but unlike gasoline the **bulk of coal is not sold through spot markets** but through arranged contracts that might have indexing allocations **to protect against increases** in costs in supply & services.
- ❑ Metallurgical coal is being sold at \$200 to \$300 per Ton & Indiana spot market coal at \$50 to \$70 per Ton.
- ❑ With increased fuel costs the indexing also increases coal prices.



U.S. Coal Prices By Type, 1949-2007



Prices are free-on-board (F.O.B.) rail/barge prices, which are the F.O.B. prices of coal at the point of first sale, excluding freight or shipping & insurance costs.

Source: <http://www.eia.doe.gov/emeu/aer/coal.html>



Transportation & Infrastructure

- ❑ There are **challenging infrastructure deficiencies** that delay increasing coal production; complicated major investments.
- ❑ Trucking & rail companies **won't spend the capital** until contracts are signed. County road agencies may not allow increased traffic until road improvements are in place.
- ❑ Importing Western coals becomes more expensive from limited west-east railroad capacity; bottlenecks.
- ❑ Anticipated that **transportation fuel prices will remain very high** & these will affect coal transportation plans & coal prices.



Infrastructure (continued)

- ❑ Attractive options are to have new power plants located close to the new coal mine; ie a mine-mouth station.
- ❑ Rail, roads & transmission infrastructures all need strengthening. The need for new transmission lines could impact the site location of a new coal-fired power plant.





Large Capital Investments are Required



- ❖ **Capital costs & loans** for new mines are getting more costly.
- ❖ The **extension of existing coal mining sites** is less expensive, generally a better strategy than starting a new mine.
- ❖ Extensions at existing mines can increase production up to 10% at a time but **this does not provide dramatic increases** in coal production when thinking in terms of extra Millions of Tons per year.



Summary



- ❖ Indiana has opportunity to increase it's coal production with new demand from:
 - i) increased exports,
 - ii) new power stations,
 - iii) limited substitution of PRB coal.
- ❖ Planning for new coal production capacity is a complicated & lengthy process involving technical investigations & regulatory requirements.