ECONOMIC BENEFITS OF A COAL-FUELED POWER PLANT COMPARED TO NATURAL GAS

PREPARED FOR

PEABODY ENERGY

Economic Benefits of a Coal-Fueled Power Plant Compared to Natural Gas

Summary

Peabody Energy has requested Hill & Associates, Inc to evaluate the potential economic benefits of constructing and operating a large coal-fueled power plant in the Midwest, compared to developing and operating a plant of similar size fueled by natural gas. This report presents the results of our analysis, which shows that coal has a much more favorable economic impact. The numbers presented are representative of the state-wide economic impacts that would be associated with development of a new power plant in any of the several mid-western states that produce coal.

The construction and operation of a coal-fueled power plant in a coal-producing state will bring major economic benefits in terms of jobs created and sales for regional businesses. Constructing a coal-fueled power plant and the associated mine will increase business volume at the state level by $4.5 billion dollars and result in over 20,000 job-years of new employment. Operating the mine and plant over the estimated 40 – 50 year life will lead to an additional $439 million dollars of business volume in the state each year and create almost 2,300 permanent jobs. Much of the economic activity and many of the new jobs will be created indirectly as a result of the expenditures made directly at the power plant and mine.

By contrast, a new gas-fueled power plant of the same size would have only about one third of coal's favorable impact on the economy and regional employment during the construction phase. Gas would also have a less favorable impact during the operating life of the plant because most of the dollars spent for operating the gas plant would probably go out-of-state for purchases of the natural gas. New jobs created by operation of the gas plant would amount to only 38% of the jobs created by the new coal plant and mine.

In addition to the advantages coal offers in terms of project-related spending and employment, the use of coal for power generation also provides broader economic benefits. Because fuel is a major element in the cost of electricity and coal is so much cheaper than gas, the use of coal-fueled generation provides a secure base of low-cost generation for all of the consumers and businesses in the region. Furthermore, low electricity costs will help attract other new business. Appendix A shows the current cost of coal to a mine-mouth power plant in the Midwest is likely to be about $0.70 per million Btu. Based upon the typical performance pattern of an underground mine, these costs are expected to remain approximately constant over the life of the mine. Also, the annual forecast of U.S. steam coal prices prepared by Hill & Associates, Inc. predicts declining coal prices in the Midwest. In contrast, gas prices have recently been higher and are expected to remain far above coal. According to the 2002 edition of the Annual Energy Outlook of the U.S. Energy Information Agency (EIA), the average price for natural gas delivered to U.S. utilities during 2000 and 2001 was almost $4.50 per million Btu. Because the EIA and others forecast the price of gas will average around $3.50 per million Btu (in constant dollars) over the next 20 years, it appears that coal will continue to be a much lower cost fuel than natural gas. These fuel price differences account for the fact that states generating power

from gas have the highest electricity prices and states using coal have the lowest electricity prices.

There will also be non-economic benefits derived from a new coal plant. While gas generally offers environmental advantages over coal, it should be noted that a modern coal plant with a high thermal efficiency and equipped with state-of-the-art pollution control equipment will, because of its low operating costs, displace the output of old, small and less well-controlled coal plants that can be significant sources of pollution. The UFEM/NPM model used by Hill & Associates to model coal use and electricity dispatch across the U.S. consistently shows that modern coal plants in the Midwest will force some of the smaller/older plants to be shut down. Thus the environment will gain along with the economy.

Background and Approach to the Study

This study was prepared by Hill & Associates, Inc., a consulting firm specializing in energy industry economics and markets, with the assistance of the University of West Virginia's Bureau of Business and Economic Research. The two options analyzed were:

1. A 1,500 megawatt coal-fueled power plant equipped with the latest technology for emissions control. The coal for this plant would be supplied by a new mine sited near the power plant.

2. A plant of the same size burning natural gas and utilizing combined cycle technology. In all likelihood, a plant of this size would have to use gas produced outside the region and piped in via the interstate pipeline system.

The study team developed estimates of power plant construction and operating costs and employment from sources such as the Department of Energy, the International Energy Agency, the Electric Power Research Institute and internal company files of mine costs and staffing. These cost estimates were then fed into the IMPLAN model, a widely-used model that provides estimates of the full statewide impact of changes in economic inputs. The IMPLAN model calculates direct, indirect and induced economic activity. These measures capture the "ripple" effect that occurs when one element of new economic activity creates new employment and spending in related areas as well as additional employment and spending in economic sectors not directly related to the one where the initial new expenditures are made. The cost and staffing estimates used as inputs to the IMPLAN model are summarized in Appendix A.

Estimates of Economic Impacts

The results of the IMPLAN model analysis are shown in Tables 1 - 6 below. Tables 1 and 2 show the economic impacts of a coal-fueled power plant and the mine needed to supply the coal. Tables 3 and 4 show a similar analysis for a gas-fueled plant of the same size. Tables 5 and 6 summarize the differences. In each case, the first table of a pair shows the total life-of-

project numbers for the impact of the construction work and the second table shows the annual impacts (in millions of dollars per year and in equivalent jobs) of plant operations.

Before discussing the results as presented in the tables, it will be useful to review a few definitions of the major terms used in the study. These are:

- *Direct Economic Impacts* – The first round of spending on the project.
- *Indirect Impacts* – The second and later rounds of spending by the contractors and sub-contractors.
- *Induced Impacts* – Later rounds of business volume related to the consumption spending by the construction and operating employees of the project.
- *Business Volume* – Sales (or spending).
- *Employment* – Permanent jobs in the operation phase and ”Job-years” during the construction phase (a job-year being one person employed for 12 months, two employed for 6 months, etc.)
- *Employee Compensation* – Wages and salaries plus employers’ contributions for social security, unemployment insurance, workers’ compensation, medical insurance, etc.

A review of the tables below shows the economic benefits of a coal-fueled plant are much greater than gas for the following three reasons:

1. The construction cost for a coal-fueled plant is almost three times that of a plant of the same size fueled by natural gas.
2. Employment at a coal plant and the mine that supplies it will be more than six times the employment at a gas plant.
3. Most of the money spent on fuel supply, which is a power plant’s largest operating cost, stays in-state for a coal plant but goes out of the state for a gas plant.

Table 1
Economic Impact of a 1500 Mw Coal-Fueled Plant & Mine - Construction Phase

Type of Impact	Direct Impact	Indirect and Induced Impacts	Total Impact
Business Volume (Sales in millions)	$2,113	$2,411	$4,524
Employment (Job-Years)	6,240	14,060	20,300
Employee Compensation (millions)	$624	$391	$1,015
Assorted State Taxes (Based on Kentucky – in millions)	--	--	$57.7

Table 2
Economic Impact of a 1500 Mw Coal-Fueled Plant & Mine - Operations Phase

Type of Impact	Direct Impact	Indirect and Induced Impacts	Total Impact
Business Volume (Sales in million $/year	$153.7	$285.7	$439.4
Employment (Jobs)	538 (1)	1,735	2,273
Employee Compensation (million $/yr)	$11.4	$57.3	$68.7
Assorted State Taxes (millions)	--	--	$4.0

1. The 395 employees needed at the coal mine are included here in the "direct impact" column because the power plant and mine will be built and operated together as part of a new business venture.

Table 3
Economic Impact of a 1500 Mw Gas-Fueled Plant - Construction Phase

Type of Impact	Direct Impact	Indirect and Induced Impacts	Total Impact
Business Volume (Sales in millions)	$750	$855	$1,605
Employment (Job-Years)	1,350	4,620	5,970
Employee Compensation (millions)	$135	$136	$271
Assorted State Taxes (millions)	--	--	$15.5

Table 4
Economic Impact of a 1500 Mw Gas-Fueled Plant - Operations Phase

Type of Impact	Direct Impact	Indirect and Induced Impacts	Total Impact
Business Volume (Sales in million $/year)	$52.2 (1)	$92.3	$144.5
Employment (Jobs)	78	790	868
Employee Compensation (million $/year)	$5.8	$23.3	$29.1
Assorted State Taxes (millions)	--	--	$1.7

Note 1. If the majority of expenditures on the natural gas plant were spent in-state, the direct economic impact of the gas plant would be $327.4 million per year. However, an estimated $275.2 million is likely to be spent out-of-state for natural gas, an expenditure that will have no impact within the state.

Table 5
Additional Impacts of Coal (Compared to Gas) - Construction Phase

Type of Impact	Direct Impact	Indirect and Induced Impacts	Total Impact
Business Volume (Sales in millions)	$1,363	$1,556	$2,919
Employment (Job-Years)	4,890	9,440	14,330
Employee Compensation (millions)	$489	$255	$744
Assorted State Taxes - millions	--	--	$42.2

Table 6
Additional Impacts of Coal (Compared to Gas) - Operations Phase - Excluding Out-of-State Purchases of Natural Gas

Type of Impact	Direct Impact	Indirect and Induced Impacts	Total Impact
Business Volume (Sales in million $/year)	$101.5	$193.4	$294.9
Employment (Jobs)	460	945	1,405
Employee Compensation (million $/year)	$5.6	$34.0	$39.6
Assorted State Taxes – million $/year	--	--	$2.3

In summary, these tables show that:

- The economic and employment benefits of a coal-fueled power plant far exceed the benefits of a plant fueled by gas.

- During the construction phase, coal will cause business activity to increase by $2.9 billion more than gas would do.

- In that same phase, coal will create about 14,300 more job-years of work for construction personnel and a payroll that is higher by $744 million.

- After the plant begins operation, coal will create 1,400 more permanent jobs with an extra payroll of $39 million per year and more than $290 million annually in increased business activity.

APPENDIX A

POWER PLANT and LOCAL COAL MINE COST SUMMARY

	COAL-FUELED PLANT (PC with wet scrubber)			GAS-FUELED PLANT (Combined Cycle)	
SIZE (MW)		1,500			1,500
CAPACITY FACTOR		90.00%			90.00%
ANNUAL GENERATION - MWHrs		11,826,000			11,826,000
TOTAL CAPITAL COST (Millions)		$2,000.0			$750.0
OF WHICH:					
Equipment Purchase	45.00%	$900.0		60.00%	$450.0
Labor & Material	34.00%	$680.0		23.00%	$172.5
Buildings, Eng.,Land	14.00%	$280.0		8.00%	$60.0
Sales Taxes, Interest, Other	7.00%	$140.0		9.00%	$67.5
Total Coal Plant Capital	100.00%	$2,000.0	**Total Gas Plant Capital**	100.00%	$750.0

POWER PLANT OPERATING COSTS:

	$/MWHr	$/Year (Millions)		$/MWHr	$/Year (Millions)
Fuel @$0.70/mmBtu *	$7.00	$82.8	@$3.50/mmBtu	$24.64	$291.4
O&M, Labor,Services, Other	$6.00	$71.0		$4.67	$55.2
Total Coal Plant Oper. Cost	$13.00	$153.7	**Total Gas Plant Oper. Cost**	$29.31	$346.6

*$12.52 cost + $4.00 Depreciation and return on capital = $16.52/ton profitable price = $0.70/mmBtu

APPENDIX A – (Continued)

COAL REQUIREMENT

Tons/yr Required	5,011,017

COAL MINE CAPITAL AND PRODUCTION COSTS

TOTAL CAPITAL COST (Millions) $125.3
At $25/annual ton

OF WHICH:

Equipment Purchase	50.00%	$62.6	50% in-state
Labor	39.00%	$48.9	
Engineering & Land	2.00%	$2.5	
Sales Taxes, Interest, Other	9.00%	$11.3	
Total	100.00%	$125.3	

COAL MINE PRODUCTION COSTS (all coal supplied by local mine):

	$/Ton	**$/Year (Millions)**
Labor & Benefits	$4.15	$20.8
Supplies & Parts	$4.20	$21.0
State & Local Taxes, Royalties	$1.92	$9.6
Admin. Costs	$0.95	$4.8
Fed Taxes	$1.30	$6.5
Total	$12.52	$62.7

EMPLOYMENT:	**COAL:**			**GAS:**
	PLANT	**MINE**	**TOTAL**	**PLANT**
Construction (Job-Years) (at $100,000/const. Worker yr)	5800	439	6239	1350
Operations (No. Employees)	143	395	538	78