In The
SUPREME COURT OF OHIO

Industrial Energy Users, Ohio, *et al.*,	:	Case No. 06-1594
	:	
Appellants,	:	On appeal from the Public Utilities Commission of Ohio, Case No. 05-376-EL-UNC, *In the Matter of the Application of Columbus Southern Power Company and Ohio Power Company for Authority to Recover Costs Associated with the Ultimate Construction and Operation of an Integrated Gasification Combined Cycle Electric Generating Facility.*
v.	:	
The Public Utilities Commission of Ohio,	:	
Appellee.	:	

AMICUS CURIAE BRIEF OF MURRAY ENERGY CORPORATION SUBMITTED IN SUPPORT OF APPELLEE, PUBLIC UTILITIES COMMISSION OF OHIO AND INTERVENING APPELLEES, COLUMBUS SOUTHERN POWER COMPANY AND OHIO POWER COMPANY

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Introduction

Murray Energy Corporation ("Murray Energy"), headquartered in Pepper Pike, Ohio, is one of the nation's leading coal producers. Murray Energy companies operate ten coal mines in five states: Kentucky, Illinois, Ohio, Pennsylvania, and Utah. Through its subsidiaries, Murray Energy has amassed over three *billion* tons of in-place coal reserves. In Ohio, Murray Energy's in-place coal reserves stand at 1.15 *billion* tons. These reserves support both new mine development and Murray Energy's existing mines.

Two of Murray Energy's Ohio companies, The Ohio Valley Coal Company and American Energy Corporation, operate the largest underground mining complexes in the state—the Powhatan No. 6 Mine and Century Mine. Last year these two mines accounted for 48% of Ohio's total coal production from all surface and underground mines.[1] These mines provide 1000 jobs generating over $70 million in wages and benefits. Factoring in taxes and supplies, they directly generate over $100 million in direct benefits– much of it being spent in the already depressed Appalachian region of the State. And, indirectly, according to a well-known national study conducted by Penn State University's Mineral Economics Department, each mine job is responsible for creating up to 11 non-mining jobs.[2]

Recognizing that coal, Ohio's most abundant[3] energy resource, is a key driver of Ohio's economy, the Ohio General Assembly declared it "imperative for this state to have a strong, viable coal industry in order to create and preserve jobs and improve the economy of this state...." R.C. 1551.31 (E). At the same time, cognizant of the environmental drawbacks of burning Ohio coal, the Ohio General Assembly declared that "the future of the Ohio coal industry lies in the development of clean coal technology..." R.C. 1551.311. One very important clean coal technology is known as Integrated Gasification Combined Cycle ("IGCC"). IGCC

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[1] In 2005, the Powhatan No. 6 Mine produced over 5.3 million clean tons of coal and Century Mine produced over 6.6 million clean tons. The total coal production from all 44 surface and 10 underground mines in Ohio in 2005 was 24.7 million tons. See, Appendix p. 2: Energy Information Administration, Annual Coal Report 2005, DOE/EAI-0584 at www.eia.doe.gov (see "coal," then "production"). 11.9 of 24.7 million tons is 48%.

[2] Rose, Adam and Frias, Rose, "The Impact of Coal on The U.S. Economy" (1994) at p. 12 (finding a multiplier of 11.003 for employment) (Appendix pp. 4, 16).

[3] See R.C. 1551.31 (A). ODNR estimates Ohio has 11.5 billion tons of *economically recoverable* coal reserves. See, Appendix p. 40: from ODNR website www.ohiodnr.com (see Mineral Resources Management then "Coal Facts.") These reserves will last 465 years at Ohio's present rate of production, 24.7 million tons in 2005.

has control technology for all primary air pollutants and mercury emissions and can be designed to facilitate carbon dioxide capture and sequestration to meet likely upcoming emission limits on carbon dioxide to reduce greenhouse gases.

Support for IGCC technology is vital to Ohio's coal industry and the state's overall economy. Murray Energy, like any corporation, directs its available (limited) investment capital to the locations where the best opportunity for a reasonable return on investment exists. Murray Energy continually evaluates its Ohio coal reserves against its reserves in other states for development potential based on a variety of factors and market conditions. One of the factors Murray Energy considers before opening or expanding a coal mine in a particular state is the regulatory environment of that state.

In Ohio, Murray Energy evaluates the regulation of both mining and electricity generation because coal-fired power plants generate nearly 90% of the state's electricity.[4] These plants are the largest consumers of coal and in order for Ohio to have a competitive economic advantage in the global marketplace, it must continue to be able to provide low cost electricity. The market for Ohio coal will improve only if advances in clean coal technology continue to come on line in Ohio to minimize fuel transportation costs as an element of the cost of electricity. The present reality is that investment in IGCC electricity generation facilities will **not** happen without assurance of cost recovery by the utility companies that build them.

Other states have begun to recognize this reality. For example, in July 2006 the Indiana Utilities Regulatory Commission approved Duke Energy's application to recover the costs of a

[4] See report by Ohio Air Quality Development Authority at www.ohioairquality.org. (Appendix p. 41).

front-end engineering and design ("FEED") study for an IGCC plant in Edwardsport Indiana.[5] Distinguished academics have thoroughly studied this subject and concluded that IGCC plants are not likely to be built without government assistance due to cost and risk concerns.[6] The testimony of record in this case echoes this reality:

> The Companies will not be able to go forward with construction of an IGCC plant in Ohio unless this plan, or some comparable plan, is approved by the Commission. It is unrealistic to expect the Companies to invest over $1 billion on construction for an IGCC facility if recovery of costs is subject to uncertainty. If the Companies were required to wait for this facility to be used and useful before seeking cost recovery, the facility would not be built in Ohio.[7]

To prevent Ohio from falling behind other states, Appellee The Public Utilities Commission of Ohio ("PUCO") took a first important step by approving "the relatively small costs" of an engineering and scoping study for the AEP Companies' proposed IGCC plant.

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[5] *Verified Joint Petition Of PSI Energy, Inc. d/b/a Duke Energy Indiana, Inc. And Southern Indiana Gas And Electric Company d/b/a Vectren Energy Delivery Of Indiana, Inc. For Authority Pursuant To An Alternative Regulatory Plan Authorized Under Ind. Code § 8-1-2.5 Et Seq. To Defer And Subsequently Recover The Feasibility Study, Engineering, And Preconstruction Costs Associated With The Consideration And Exploration Of Constructing An Integrated Coal Gasification Combined Cycle Electric Generating Facility, And Approval Of Confidential Treatment Of Certain Information To Be Presented In This Cause*, Cause No. 42894, 2006 Ind. PUC LEXIS 211, Ind. Util. Regulatory Comm'n (Jul. 26, 2006) (Appendix 42). Like Ohio, the Indiana Legislature declared that the state should "...encourage the use of advanced clean coal technology...." *Id.* at *20, citing I.C. 8-1-8.8 (a)(5). The Indiana Commission characterized its Order as "consistent with this legislative framework...." *Id.* (Appendix p. 46.)

[6] Rosenberg, Williams G., Dwight C. Alpern and Michael R. Walker, "Deploying IGCC Technology in this Decade with 3 Party Covenant Financing: Volume I." ENRP Discussion Paper, Discussion Paper 2004-07 at pp. 51-52. Cambridge, MA: Belfer Center for Science and International Affairs, Kennedy School of Government, Harvard University, July 2004. Electronic copies of this report are available at www.ksg.harvard.edu/bcsia/enrp (cited pages in Appendix, pp. 50-53.)

[7] See p. 6 of Intervening Appellee Companies' Second Supplement.

(Opinion and Order, pp. 11, 19.) [8] The PUCO properly exercised its authority in recognizing that Ohio's electric restructuring law, Am. Sub. S.B. No. 3 (SB 3), allows electric distribution utilities (EDU) flexibility in how they meet their Provider of Last Resort (POLR) obligation. As the PUCO explained in its Order, nothing in SB 3 prohibits generation owned by the EDU from being an appropriate component of an EDU's portfolio of capacity and energy resources used to satisfy its POLR obligations. (Opinion and Order, pp. 12-22.) The PUCO provided the vital cost recovery support for IGCC technology consistent with its authority recognized by this Court by establishing a mechanism that assures the recovery of costs that an EDU incurs in its position as a POLR. See *Constellation NewEnergy v. PUCO* (2004), 104 Ohio St. 3d 530, 2004 Ohio 6767, 820 N.E.2d 885.

Murray Energy submits that the PUCO's legal analysis is sound. Rather than repeat the legal points thoroughly covered by the merit briefs of the PUCO and AEP Companies, Murray Energy will highlight the convergence of public policy which supports the PUCO's chosen path to Ohio's first IGCC plant.

II. Statement of the Case and Facts

Murray Energy adopts the statements of case and facts as set forth by Appellee The Public Utilities Commission of Ohio.

III. Argument

Proposition of Law

[8] The PUCO's April 10, 2006, Opinion and Order can be found in Appellant IEU's App. pp. 10-33.

The Opinion And Order of the Public Utilities Commission of Ohio Promotes The Public Interest

The Ohio General Assembly in R.C. 4928.06 (A) directed the PUCO to effectuate the public policy of the state expressed in R.C. 4928.02 when implementing SB 3. R.C. 4928.02 provides, in pertinent part, that:

> It is the policy of this state to do the following throughout this state beginning on the starting date of competitive retail electric service:
>
> (A) Ensure the availability to consumers of adequate, reliable, safe, efficient, nondiscriminatory, and reasonably priced retail electric service;
>
> ***
>
> (I) Facilitate the state's effectiveness in the global economy.

Maximizing the use of Ohio coal in an environmentally-sound manner is a critical step toward effectuating this policy of assuring the availability of reasonably price electricity. Ohio also must be strong in the energy sector to improve its own economy to be effective in the global economy.

Prior to enacting SB 3, the General Assembly found it "imperative" to increase the use of Ohio coal and have a strong, viable coal industry in order to create and preserve the jobs needed for a vibrant economy. Specifically, the General Assembly declared that increasing Ohio coal use is a public policy of the state:

> § 1551.31. Public policy of state to increase Ohio coal use
>
> The general assembly hereby finds and declares that:
>
> (A) Coal is one of the state's best, most abundant energy resources.
>
> (B) In recent years the coal industry in this state has experienced economic difficulties that have resulted in a loss of jobs in that industry.

> (C) Some coal users are reluctant to use coal from this state because of its high sulfur content.
>
> (D) The increased use of Ohio coal in this state could enable the state to be more energy self-sufficient.
>
> (E) It is therefore imperative for this state to have a strong, viable coal industry in order to create and preserve jobs and improve the economy of this state and that, in order to strengthen that industry, methods must be found to use Ohio coal in an environmentally acceptable, cost effective manner.
>
> Accordingly, it is declared to be the public policy of the state, through operation of sections 1551.30 to 1551.35 of the Revised Code *and other applicable laws and authority* vested in the general assembly, to assist in the development of facilities and technologies that will lead to increased, environmentally sound use of Ohio coal.(emphasis added)

R.C. 1551.31 (E) specifically provides for effecting the policy through "*other applicable laws and authority.*" SB 3 is one such law. This is not the first instance in which the public policy expressed in R.C. 1551.31 applied outside the context of R.C. 1551.30 to 1551.35. In *Redman v. Ohio Dep't of Indus. Relations* (1996), 75 Ohio St. 3d 399, 1996 Ohio 196, 662 N.E.2d 352, the Court applied this public policy when interpreting a statute relating to oil and gas drilling in coal-bearing townships. The Court construed R.C. 1509.08 against the backdrop of what it described as the public policy of Ohio to maximize "the utilization, development, and production of coal and coal technology in an environmentally and economically proficient manner." (*citing* R.C. 1551.31(A) and (E)). *Id.* at 407-09

Likewise, SB 3 should be interpreted consistent with R.C. 1551.31 *and* R.C. 4928.02 to promote the public policy goals of maximizing the utilization of Ohio coal and assuring a reliable, clean energy supply to enhance Ohio's position in the global economy. Consistent with these policies, the PUCO recognized "a need to invest in new clean coal technology...,"

observed that IGCC technology is "very attractive for high sulfur bituminous coals" and concluded that "the value of IGCC may be its importance as a hedging strategy—a way to keep using the nation's most abundant energy source while providing options to deal with long-term environmental demands." (Opinion and Order at 19). The PUCO also found that the "economic benefits and technological advances are beneficial for the environment, the state of Ohio, the region, and the nation." (Opinion and Order at 20).

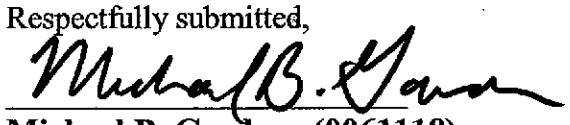
The PUCO's interpretation of the flexibility inherent in SB 3 clearly meets the public interest test. The PUCO's support for the IGCC plant assures a reliable source of electric generation for the POLR task and increases the market for Ohio coal. A major benefit of the AEP Companies' IGCC plant is that it will use Ohio coal in an environmentally acceptable manner.[9] The increased use of Ohio coal will enable the state to become more energy self-sufficient and greatly improve its economy to assure a stronger position in the global economy. The PUCO has taken the first step on a vitally important course for Ohio. Murray Energy urges the Court to embrace the direction the PUCO has taken for the good of all Ohioans.

IV. CONCLUSION

For all of the foregoing reasons, Murray Energy Corporation urges the Court to affirm the Opinion and Order of The Public Utilities Commission of Ohio.

[9] See p. 22 of Intervening Appellee Companies' Second Supplement.

Respectfully submitted,



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Murray Energy Corporation's Amicus Curiae Brief in Support of the Public Utilities Commission and Intervening Appellees Columbus Southern Power Company and Ohio Power Company was served by first class U. S. mail, postage prepaid, upon counsel identified below for all parties of record this 22nd day of December, 2006.

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AMICUS CURIAE MURRAY ENERGY CORPORATION'S APPENDIX

Energy Information Administration

Official Energy Statistics from the U.S. Government

Coal Production and Number of Mines by State and Mine Type

Data for: 2005
Next Release Date: September 2007

Table 1. xls pdf Annual Coal Report

Table 1. Coal Production and Number of Mines by State and Mine Type, 2005-2004 (Thousand Short Tons)

Coal-Producing State and Region [1]	2005		2004		Percent Change	
	Number of Mines	Production	Number of Mines	Production	Number of Mines	Production
Alabama	**53**	**21,339**	**49**	**22,271**	**8.2**	**-4.2**
Underground	9	13,295	8	16,114	12.5	-17.5
Surface	44	8,044	41	6,156	7.3	30.7
Alaska	**1**	**1,454**	**1**	**1,512**	**-**	**-3.8**
Surface	1	1,454	1	1,512	-	-3.8
Arizona	**2**	**12,072**	**2**	**12,731**	**-**	**-5.2**
Surface	2	12,072	2	12,731	-	-5.2
Arkansas	**1**	**3**	**2**	**7**	**-50.0**	**-65.0**
Underground	-	-	1	1	-100.0	-100.0
Surface	1	3	1	6	-	-59.9
Colorado	**13**	**38,510**	**13**	**39,870**	**-**	**-3.4**
Underground	8	28,439	8	29,608	-	-3.9
Surface	5	10,071	5	10,262	-	-1.9
Illinois	**20**	**32,014**	**19**	**31,853**	**5.3**	**0.5**
Underground	12	26,343	12	26,907	-	-2.1
Surface	8	5,671	7	4,946	14.3	14.7
Indiana	**29**	**34,457**	**29**	**35,110**	**-**	**-1.9**
Underground	8	11,189	7	10,092	14.3	10.9
Surface	21	23,268	22	25,018	-4.5	-7.0
Kansas	**1**	**171**	**1**	**71**	**-**	**141.6**
Surface	1	171	1	71	-	141.6
Kentucky Total	**432**	**119,734**	**419**	**114,244**	**3.1**	**4.8**
Underground	224	73,702	223	71,765	*	2.7
Surface	208	46,032	196	42,478	6.1	8.4
Eastern	404	93,322	397	90,871	1.8	2.7
Underground	211	52,054	212	52,445	*	-0.7
Surface	193	41,269	185	38,426	4.3	7.4
Western	28	26,412	22	23,373	27.3	13.0
Underground	13	21,648	11	19,321	18.2	12.0
Surface	15	4,763	11	4,052	36.4	17.5
Louisiana	**2**	**4,161**	**2**	**3,805**	**-**	**9.3**
Surface	2	4,161	2	3,805	-	9.3
Maryland	**16**	**5,183**	**19**	**5,225**	**-15.8**	**-0.8**
Underground	3	3,175	3	3,339	-	-4.9
Surface	13	2,009	16	1,886	-18.8	6.5
Mississippi	**1**	**3,555**	**1**	**3,586**	**-**	**-0.9**
Surface	1	3,555	1	3,586	-	-0.9
Missouri	**2**	**598**	**3**	**578**	**-33.3**	**3.4**
Surface	2	598	3	578	-33.3	3.4
Montana	**6**	**40,354**	**6**	**39,989**	**-**	**0.9**
Underground	1	162	1	158	-	3.0

Surface	5	40,192	5	39,831	-	0.9
New Mexico	**4**	**28,519**	**4**	**27,250**	**-**	**4.7**
Underground	1	7,905	1	7,685	-	2.9
Surface	3	20,613	3	19,565	-	5.4
North Dakota	**4**	**29,956**	**4**	**29,943**	**-**	*****
Surface	4	29,956	4	29,943	-	*
Ohio	**54**	**24,718**	**52**	**23,222**	**3.8**	**6.4**
Underground	10	15,823	8	14,270	25.0	10.9
Surface	44	8,896	44	8,952	-	-0.6
Oklahoma	**9**	**1,856**	**8**	**1,792**	**12.5**	**3.6**
Underground	1	465	1	409	-	13.8
Surface	8	1,391	7	1,383	14.3	0.6
Pennsylvania Total	**266**	**67,494**	**260**	**65,996**	**2.3**	**2.3**
Underground	53	54,563	58	53,224	-8.6	2.5
Surface	213	12,931	202	12,772	5.4	1.2
Anthracite	68	1,645	66	1,679	3.0	-2.0
Underground	14	264	20	271	-30.0	-2.3
Surface	54	1,380	46	1,408	17.4	-2.0
Bituminous	198	65,849	194	64,317	2.1	2.4
Underground	39	54,298	38	52,953	2.6	2.5
Surface	159	11,551	156	11,364	1.9	1.6
Tennessee	**28**	**3,217**	**32**	**2,887**	**-12.5**	**11.4**
Underground	13	1,224	12	826	8.3	48.2
Surface	15	1,993	20	2,061	-25.0	-3.3
Texas	**13**	**45,939**	**13**	**45,863**	**-**	**0.2**
Surface	13	45,939	13	45,863	-	0.2
Utah	**13**	**24,521**	**13**	**21,746**	**-**	**12.8**
Underground	13	24,521	13	21,746	-	12.8
Virginia	**132**	**27,743**	**123**	**31,420**	**7.3**	**-11.7**
Underground	83	16,386	77	20,437	7.8	-19.8
Surface	49	11,357	46	10,983	6.5	3.4
Washington	**1**	**5,266**	**1**	**5,653**	**-**	**-6.9**
Surface	1	5,266	1	5,653	-	-6.9
West Virginia Total	**277**	**153,650**	**261**	**147,993**	**6.1**	**3.8**
Underground	166	91,009	152	90,932	9.2	*
Surface	111	62,641	109	57,061	1.8	9.8
Northern	50	42,628	49	40,646	2.0	4.9
Underground	29	37,590	27	36,082	7.4	4.2
Surface	21	5,037	22	4,564	-4.5	10.4
Southern	227	111,022	212	107,347	7.1	3.4
Underground	137	53,419	125	54,851	9.6	-2.6
Surface	90	57,603	87	52,497	3.4	9.7
Wyoming	**18**	**404,319**	**20**	**396,493**	**-10.0**	**2.0**
Underground	1	410	1	43	-	NM
Surface	17	403,908	19	396,450	-10.5	1.9
Appalachian Total	**1,230**	**396,666**	**1,193**	**389,884**	**3.1**	**1.7**
Underground	548	247,528	530	251,588	3.4	-1.6
Surface	682	149,139	663	138,297	2.9	7.8
Northern	386	140,023	380	135,089	1.6	3.7
Underground	95	111,151	96	106,915	-1.0	4.0
Surface	291	28,873	284	28,174	2.5	2.5
Central	790	235,297	764	232,525	3.4	1.2
Underground	443	123,075	426	128,559	4.0	-4.3
Surface	347	112,222	338	103,966	2.7	7.9
Southern	54	21,347	49	22,271	10.2	-4.1
Underground	10	13,303	8	16,114	25.0	-17.4
Surface	44	8,044	41	6,156	7.3	30.7
Interior Total	**106**	**149,165**	**100**	**146,038**	**6.0**	**2.1**

Underground	34	59,645	32	56,729	6.3	5.1
Surface	72	89,520	68	89,309	5.9	0.2
Illinois Basin Total	**77**	**92,883**	**70**	**90,336**	**10.0**	**2.8**
Underground	33	59,180	30	56,319	10.0	5.1
Surface	44	33,703	40	34,016	10.0	-0.9
Western Total	**62**	**584,970**	**64**	**575,186**	**-3.1**	**1.7**
Underground	24	61,438	24	59,240	-	3.7
Surface	38	523,532	40	515,946	-5.0	1.5
Powder River Basin	**16**	**429,996**	**17**	**420,992**	**-5.9**	**2.1**
Underground	-	-	-	-	-	-
Surface	16	429,996	17	420,992	-5.9	2.1
Uinta Region	**24**	**62,145**	**24**	**60,744**	**-**	**2.3**
Underground	20	52,495	20	50,896	-	3.1
Surface	4	9,650	4	9,848	-	-2.0
East of Miss. River	**1,308**	**493,105**	**1,264**	**483,806**	**3.5**	**1.9**
West of Miss. River	**90**	**637,697**	**93**	**627,303**	**-3.2**	**1.7**
U.S. Subtotal	**1,398**	**1,130,802**	**1,357**	**1,111,109**	**3.0**	**1.8**
Refuse Recovery	**17**	**696**	**22**	**990**	**-22.7**	**-29.6**
U.S. Total	**1,415**	**1,131,498**	**1,379**	**1,112,099**	**2.6**	**1.7**

[1] For a definition of coal producing regions, see the Glossary
* Quantity is less than 0.5 thousand short tons or percent change is less than 0.1%
NM = Changes of 500 percent or more are not shown
Note: Totals may not equal sum of components because of independent rounding
Source: U.S. Department of Labor, Mine Safety and Health Administration, Form 7000-2, "Quarterly Mine Employment and Coal Production Report"

More Tables on Coal Production and Number of Mines: **Formats**

Table 2. Coal Production and Number of Mines by State, County, and Mine Type html xls pdf

Table 6. Coal Production and Number of Mines by State and Coal Rank html xls pdf

see also:
Historical Coal Data back to 1949
Projected Coal Supply & Demand to 2030
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THE IMPACT OF COAL ON THE U.S. ECONOMY

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Report to the National Coal Association

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I. INTRODUCTION

The coal industry has played a prominent role in the U.S. economy for over two centuries. Throughout much of this period, the industry was a major source of jobs and a magnet for investment. The presence of this inexpensive and abundant fuel was also a major factor in the prominence of the U.S. iron and steel industry and the availability of a major power source--electricity. Many have suggested that the role of the coal industry has been even more widespread than the areas noted but, given the lack of data, this has been difficult to quantify.

The purpose of this study is to determine the extent of the impact of the coal industry on the U.S. economy. This is accomplished with the aid of an *interindustry*, or *input-output*, model. Specifically, we analyzed how coal industry operations generate production, income, and employment in other sectors of the nation's economy. Our results indicate that these *ripple*, or *multiplier*, effects are several times the magnitude of that of production, income, and employment within the coal industry itself. *The results also indicate that government policies and private industry decisions affecting the coal sector will potentially affect every other aspect of the U.S. economy.*

II. ECONOMIC INTERDEPENDENCE

As a modern industrial nation, the United States has a highly interdependent economy. Each business enterprise relies on many others for inputs into its production process. This means the coal industry's contribution to the nation's economy extends beyond its own production to include the demand for a succession of upstream inputs from its suppliers and downstream deliveries to its customers. The sum of these many rounds of derived demands and commodity

allocations can be a large multiple of the value of coal production itself. Hence, we say that the industry generates *multiplier* effects.

The first round *demand-driven* impacts are the obvious one--the direct inputs to coal production. The more indirect demands, the successive rounds of inputs to coal production, however, thread their way through the economy in some subtle ways, and, in fact, eventually stimulate every other sector. The first round of coal industry *supply-driven* impacts is also obvious--direct sales to coal customers. But again a chain of indirect stimuli increases production in other sectors, some of which can be attributed uniquely to the coal industry.

For this study, economic interdependence was measured in terms of multipliers by utilizing a tool called an input-output model (explained more fully in the Appendix). Demand-driven impacts, or backward linkages, are computed with conventional input-output multipliers. Supply-driven impacts, or forward linkages, are computed with a variant known as allocation multipliers.

A disaggregation of the first four rounds of conventional multiplier effects stemming from $1 billion of U.S. coal industry output is presented in Table 1. The table shows upstream impacts on selected sectors[1] listed in the left-hand column. The first round, or direct effects on these sectors, indicate that for every $1 billion of coal produced, there is a demand by the coal industry, for example, for $11.2 million of refined petroleum, $5.4 million of transportation, and $12.8 million of business services. Note that these totals refer only to goods actually produced in the U.S. Imported inputs are included in the $15.4 million "Imports & Adjustments" entry in column 1.

Round 2 represents the inputs into the three previously mentioned sectors and into all of the other direct inputs into coal production. For example, refined petroleum in the form of diesel fuel is used to run railroad trains, electricity is required to power businesses serving the coal industry, and transportation is needed to move goods between sectors. Round 3 indicates that iron ore is needed to produce steel used in the manufacture of mining equipment in Round 2, which, in turn, was utilized to extract coal in Round 1.

TABLE :

Coal Final Demand 1,000 millions

COAL PRODUCTION MULTIPLIER ROUNDS
(In millions of dollars)

SECTOR	FIRST ROUND	SECOND ROUND	THIRD ROUND	FOURTH ROUND	TOTAL ROUNDS
1 LIVESTOCK PRODUCTS	0.0	1.1	6.2	4.1	26.5
2 OTHER AGRIC. PROD.	0.0	0.7	3.5	2.9	17.8
3 FORESTRY & FISHERY	0.0	0.2	0.3	0.2	1.2
4 AGR., FOREST, FISH SERV	0.0	0.6	2.1	1.4	9.8
5 IRON AND FERR ALLOYS	0.0	0.0	0.1	0.1	0.4
6 NONFERR. METAL ORE MIN.	0.0	0.0	0.1	0.1	0.7
7 Coal Mining	34.3	2.3	0.8	0.5	1,039.4
8 CRUDE PETROL. & NAT GAS	0.5	8.6	9.9	6.5	50.0
9 STONE & CLAY MINING	2.1	1.8	1.2	1.1	10.2
10 CHEM. & FERT. MINING	0.2	0.5	0.5	0.4	3.3
11 NEW CONSTRUCTION	0.0	0.0	0.0	0.0	0.0
12 REPAIR & MAINT. CONST.	7.9	6.1	12.0	4.9	50.8
13 FOOD & KINDRED PROD.	0.0	30.8	13.8	14.6	101.4
14 TOBACCO MANUFACTURERS	0.0	2.6	0.8	1.0	6.7
15 BROAD & NARR FABRICS.	0.2	1.1	1.8	1.1	8.4
16 APPAREL	0.0	7.0	1.8	2.7	16.4
17 MISC. TEXTILE GOODS	0.0	0.8	0.4	0.4	3.0
18 MISC. FABRICATED TEXTI	0.0	1.2	0.6	0.6	4.2
19 WOOD CONTAINERS	0.6	0.6	0.7	0.7	5.3
20 Wood Containers	0.0	0.0	0.0	0.0	0.2
21 OTHER TRANSPORTATION E	0.1	1.1	0.3	0.5	3.3
22 HOUSEHOLD FURNITURE	0.0	2.0	0.3	0.7	4.8
23 OTHER FURNITURE & FIXT	0.0	0.0	0.0	0.0	0.2
24 PAPER AND ALLIED PROD.	0.1	2.8	3.2	3.4	20.5
25 Paperboard Containers And	0.0	0.5	1.6	1.0	8.9
26 PRINTING AND PUBLISHIN	1.0	8.0	8.0	5.0	37.5
27 CHEM. & SELECTED CHEM.	8.7	2.5	3.0	3.3	30.6
28 PLASTICS & SYNTHETIC M	0.1	1.3	1.8	1.4	9.2
29 DRUGS, CLEANING & TOIL	0.1	8.2	3.5	3.6	25.6
30 Paints And Allied Product	0.0	0.3	0.3	0.3	1.9
31 PETR. REFINING & RELAT	11.2	10.8	4.8	5.4	48.1
32 RUBBER & MISC. PLASTIC	6.1	3.2	3.7	2.4	23.8
33 STONE & CLAY PROD.	1.8	1.0	0.7	0.6	5.9
34 Leather Tanning And Finis	0.0	0.0	0.1	0.0	0.4
35 FOOTWEAR & OTHER LEATH	0.0	0.8	0.2	0.3	2.1
36 GLASS & GLASS PROD.	0.0	0.5	0.8	0.5	3.6
37 PRIMARY IRON & STEEL M	0.7	4.8	2.7	1.8	13.4
38 PRIMARY NONFERROUS MAN	0.3	1.3	1.2	1.0	8.9
39 METAL CONTAINERS	0.0	0.0	0.9	0.5	3.2
40 OTHER FABRICATED METAL	1.2	1.6	1.2	0.9	8.0
41 HEAT., PLUMBING, FABR.	1.7	0.9	0.4	0.5	4.7
42 SCREW MACHINE PROD.& S	4.3	1.1	1.7	0.8	11.0
43 ORDNANCE & ACCESORIES	0.0	0.2	0.1	0.1	0.7
44 ENGINES & TURBINES	3.5	0.7	0.3	0.2	5.4
45 FARM & GARDEN MACHINER	0.3	0.2	0.3	0.3	2.2
46 CONSTR. & MINING MACHI	17.7	1.4	0.2	0.1	19.6
47 MATERIALS HANDLING MAC	0.8	0.1	0.0	0.0	1.1
48 METALWORKING MACH. & E	0.3	0.8	0.4	0.3	2.6
49 GENERAL INDUSTRY MACHI	10.0	1.8	0.5	0.3	13.2
50 ELECTRICAL INDUSTRIAL	2.5	1.1	0.6	0.3	5.6
51 SPECIAL INDUSTRY MACHI	0.4	0.4	0.3	0.3	2.5
52 OFFICE COMPUTING & ACC	0.0	1.1	0.5	0.6	3.9
53 SERVICE INDUSTRY MACHI	0.1	0.2	0.2	0.1	1.0
54 MISCELLANEOUS MACHINER	6.4	1.5	0.9	0.5	11.1
55 HOUSEHOLDS APPLIANCES	0.0	1.2	0.2	0.5	3.1
56 ELECTRIC LIGHTING & WI	0.2	0.3	0.2	0.2	1.3
57 RADIO, TV & COMM. EQUI	0.0	0.9	0.3	0.4	2.9
58 ELECTRONIC COMPONENTS	0.0	0.5	1.1	0.9	5.4
59 MISC. ELECTRICAL MACHI	0.2	0.4	0.4	0.2	1.8
60 MOTOR VEHICLES & EQUIP	0.6	16.7	7.7	7.6	64.0
61 AIRCRAFT & PARTS	0.3	0.5	0.4	0.3	2.5
62 SCIENTIFIC & CONTROLLI	0.2	0.9	1.9	0.9	7.6
63 OPTICAL, OPHTALMIC, PH	0.1	0.7	0.4	0.4	2.8
64 MISCELLANEOUS MANUFACT	0.1	2.2	1.0	1.0	7.4
65 TRANSPORTATION & WAREH	5.4	14.3	8.1	8.1	60.7
66 Communications, Except Ra	2.1	8.4	7.9	5.6	42.1
67 Radio And Tv Broadcasting	0.3	0.8	1.8	0.9	7.0
68 Electric Services	19.2	10.0	6.2	5.3	57.6
69 GAS & SANITARY SERV	1.4	6.0	4.1	3.2	25.2
70 WHOLESALE & RETAIL TRA	13.8	74.5	17.8	29.6	211.0
71 Eating & Drinking	0.1	14.5	2.6	5.4	35.5
72 FINANCE & INSURANCE	5.4	38.6	17.9	18.8	135.1
73 REAL ESTATE AND RENTAL	25.2	78.8	31.7	34.0	267.0
74 HOTELS, PERSONAL SERVI	0.4	13.4	4.0	8.8	38.0
75 BUSINESS & PROF. SERVI	12.8	16.9	28.5	17.0	137.4
76 AUTOMOBILE REPAIR & SE	2.7	10.8	2.8	4.5	32.5
77 AMUSEMENTS	0.1	6.6	2.8	3.6	23.5
78 HEALTH, EDUCATION & S.	3.1	91.3	14.6	33.3	221.4
79 STATE & LOCAL GVT. ENT	4.8	8.9	4.4	4.3	35.5
80 FEDERAL GOVT. ENTERPRI	0.8	2.4	3.5	2.1	16.6
81 GOVERNMENT INDUSTRY	0.0	0.0	0.0	0.0	0.0
82 Rest Of The World Industr	0.0	0.0	0.0	0.0	0.0
83 HOUSEHOLD INDUSTRY	0.0	1.2	0.2	0.4	2.7
84 Inventory Valuation Adjus	0.0	0.0	0.0	0.0	0.0
Total Intermediate	224.5	546.1	273.0	274.5	3,137.7
Imports & Adjustments	15.4	13.5	8.0	7.4	75.7
Wage & Salaries	302.0	178.3	80.3	85.5	1,162.9
Capital Income	137.3	108.0	60.0	55.9	803.3
Indirect Business Taxes	100.8	36.0	14.6	16.3	228.1
	1,000.0	882.0	435.9	439.7	5,207.7

In fact, additional coal is needed for steel production (as it is also for electricity production). Thus, the operation of one coal mining company indirectly stimulates the activity of other such companies. Note also that the demand for food products is stimulated significantly beginning with the second round. This results from the spending of wage payments to workers in the coal industry in Round 2 and in other industries in subsequent rounds. An analogous set of indirect and induced demands are generated for health, education, and social services.

Note that in addition to displaying increases in the production of other goods and services, we can portray the impacts of the coal industry on primary factors (labor and capital), as well as tax payments in each of the rounds. The sum of all inputs equals one billion dollars in the first round, or the value of output in that round. Similar equalities of the value of inputs and outputs hold for each of the remaining rounds.

An infinite number of such rounds of *indirect* (interindustry) and *induced* (income spending) demands occur in principle. As is indicated in Table 1, these rounds become progressively smaller, and the totals approach a limit. We are thus able to add the elements of the column of total impacts and divide them by the sum of Round 1 impacts to obtain the value of the *coal industry output multiplier*. The results show that one billion dollars of U.S. coal production stimulates a total of $3.138 billion of production throughout the economy.

The total impacts of the U.S. coal industry on the gross output of all of the sectors of the nation's economy are presented in Table 2. The numbers in Table 2 are almost 21 times the corresponding numbers from the entries in Table 1; this corresponds to the total value of net coal production in the U.S. economy in 1992 of $20.978 billion (U.S. EIA, 1993). The sectors most affected by coal production are in rank order: real estate, health/education/social services, wholesale/retail trade, business services, finance, food products, transportation, electric utilities, motor vehicles, maintenance/repair, oil/gas extraction, and refined petroleum products, all with gross output increases in excess of a billion dollars. In addition, the total increase in employee compensation (wages and salaries) is over $24 billion.

TABLE 2

Coal Final Demand 20,978 millions

COAL PRODUCTION MULTIPLIER ROUNDS
(In millions of dollars)

SECTOR	FIRST ROUND	SECOND ROUND	THIRD ROUND	FOURTH ROUND	TOTAL ROUNDS
1 LIVESTOCK PRODUCTS	0.0	22.1	131.1	83.8	567.1
2 OTHER AGRIC. PROD.	0.4	13.3	73.2	81.4	372.9
3 FORESTRY & FISHERY	0.0	3.5	5.5	3.6	25.8
4 AGR.,FOREST, FISH SERV	0.8	16.8	48.6	28.8	204.6
5 IRON AND FERR ALLOYS	0.0	0.6	2.3	1.5	8.5
6 NONFERR. METAL ORE MIN.	0.2	1.0	2.5	2.4	14.8
7 Coal Mining	718.3	47.9	18.0	9.5	21,804.2
8 CRUDE PETROL. & NAT GAS	8.9	180.0	208.9	137.3	1,049.2
9 STONE & CLAY MINING	44.6	33.8	24.9	23.3	213.0
10 CHEM. & FERT. MINING	3.6	10.0	10.7	8.9	88.5
11 NEW CONSTRUCTION	0.0	0.0	0.0	0.0	0.0
12 REPAIR & MAINT. CONST.	185.1	108.8	250.9	102.9	1,068.7
13 FOOD & KINDRED PROD.	0.2	845.3	289.1	308.1	2,127.8
14 TOBACCO MANUFACTURERS	0.0	54.7	13.1	20.8	161.5
15 BROAD & NARR FABRICS,	4.8	22.2	36.2	24.1	175.4
16 APPAREL	0.4	145.8	37.8	58.5	385.4
17 MISC. TEXTILE GOODS	0.2	16.9	8.7	9.4	62.2
18 MISC. FABRICATED TEXTI	0.0	24.9	12.5	13.1	83.5
19 WOOD CONTAINERS	15.7	13.3	15.6	14.5	112.2
20 Wood Containers	0.0	8.0	0.2	0.7	3.5
21 OTHER TRANSPORTATION E	2.1	22.9	7.0	10.2	59.7
22 HOUSEHOLD FURNITURE	0.0	42.7	8.2	15.3	109.3
23 OTHER FURNITURE & FIXT	0.2	0.8	0.7	0.7	4.3
24 PAPER AND ALLIED PROD.	2.1	58.4	96.7	71.7	430.3
25 Paperboard Containers And	0.0	11.0	33.9	20.5	143.8
26 PRINTING AND PUBLISHIN	21.4	124.9	167.5	104.0	794.9
27 CHEM. & SELECTED CHEM.	162.3	51.6	82.5	68.6	845.1
28 PLASTICS & SYNTHETIC M	2.3	26.9	32.8	29.9	183.5
29 DRUGS, CLEANING & TOIL	2.1	172.2	72.8	74.7	534.9
30 Paints And Allied Product	0.2	8.3	7.3	8.7	40.6
31 PETR. REFINING & RELAT	234.1	226.2	96.7	113.2	1,009.1
32 RUBBER & MISC. PLASTIC	127.3	87.8	77.2	60.0	498.4
33 STONE & CLAY PROD.	37.6	20.2	13.8	13.4	122.9
34 Leather Tanning And Fina	0.0	0.7	2.4	0.9	8.0
35 FOOTWEAR & OTHER LEATH	0.0	17.0	3.8	6.4	43.3
36 GLASS & GLASS PROD.	0.2	10.1	17.2	10.2	74.7
37 PRIMARY IRON & STEEL M	13.6	101.0	68.4	37.1	322.9
38 PRIMARY NONFERROUS MAN	5.7	27.5	24.6	20.8	145.4
39 METAL CONTAINERS	0.0	1.0	18.4	9.9	67.8
40 OTHER FABRICATED METAL	25.8	32.6	28.1	19.4	167.8
41 HEAT., PLUMBING, FABR.	35.9	18.3	7.4	10.6	98.2
42 SCREW MACHINE PROD.& S	80.6	22.3	34.9	17.2	231.3
43 ORDNANCE & ACCESORIES	0.4	4.0	2.0	2.1	14.9
44 ENGINES & TURBINES	72.5	15.1	7.0	3.9	112.4
45 FARM & GARDEN MACHINER	7.1	4.6	8.4	8.0	45.1
46 CONSTR. & MINING MACHI	372.1	29.9	3.3	1.8	412.2
47 MATERIALS HANDLING MAC	17.2	2.1	0.8	0.5	23.2
48 METALWORKING MACH. & E	5.7	13.2	8.4	8.1	52.6
49 GENERAL INDUSTRY MACHI	210.0	33.9	10.0	5.6	277.9
50 ELECTRICAL INDUSTRIAL	51.8	23.4	12.2	7.2	118.0
51 SPECIAL INDUSTRY MACHI	8.4	7.7	6.8	6.6	32.6
52 OFFICE COMPUTING & ACC	0.2	23.4	10.6	12.3	82.1
53 SERVICE INDUSTRY MACHI	2.3	4.0	3.6	2.7	21.2
54 MISCELLANEOUS MACHINER	135.1	32.4	18.4	10.2	232.1
55 HOUSEHOLD APPLIANCES	0.2	28.1	5.1	10.0	65.7
56 ELECTRIC LIGHTING & WI	4.4	8.0	3.2	3.4	26.4
57 RADIO, TV & COMM. EQUI	0.4	19.8	6.3	9.3	60.1
58 ELECTRONIC COMPONENTS	0.8	9.9	22.2	18.3	114.3
59 MISC. ELECTRICAL MACHI	3.1	7.4	8.5	4.7	40.9
60 MOTOR VEHICLES & EQUIP	13.2	329.0	161.5	180.3	1,133.7
61 AIRCRAFT & PARTS	8.5	8.8	8.9	8.4	52.2
62 SCIENTIFIC & CONTROLLI	4.8	18.8	30.7	19.4	158.8
63 OPTICAL, OPHTALMIC, PH	1.3	16.3	8.9	8.3	58.9
64 MISCELLANEOUS MANUFACT	2.8	46.4	21.0	21.5	154.2
65 TRANSPORTATION & WAREH	114.1	300.5	168.0	170.0	1,274.1
66 Communications, Except Ra	43.4	197.0	146.6	118.1	862.8
67 Radio And Tv Broadcasting	8.9	11.2	37.8	18.0	145.8
68 Electric Services	401.7	209.7	130.4	110.4	1,208.5
69 GAS & SANITARY SERV	28.3	126.1	85.9	96.8	529.1
70 WHOLESALE & RETAIL TRA	288.7	1581.9	370.0	821.3	4,426.6
71 Eating & Drinking	2.9	303.8	53.6	112.5	744.8
72 FINANCE & INSURANCE	112.7	810.5	374.8	394.2	2,833.2
73 REAL ESTATE AND RENTAL	528.0	1602.0	885.7	713.0	5,600.9
74 HOTELS, PERSONAL SERVI	7.3	281.0	82.9	116.1	796.4
75 BUSINESS & PROF. SERVI	267.7	353.8	598.9	357.6	2,882.3
76 AUTOMOBILE REPAIR & SE	56.8	228.9	59.0	83.8	880.8
77 AMUSEMENTS	1.3	134.2	59.7	78.4	493.1
78 HEALTH, EDUCATION & S.	84.2	1915.3	306.7	697.5	4,643.6
79 STATE & LOCAL GVT. ENT	100.3	187.4	93.3	90.1	744.1
80 FEDERAL GOVT. ENTERPRI	17.6	50.1	72.9	44.0	344.0
81 GOVERNMENT INDUSTRY	0.0	0.0	0.0	0.0	0.0
82 Rest Of The World Industr	0.0	0.0	0.0	0.0	0.0
83 HOUSEHOLD INDUSTRY	0.0	24.8	3.4	8.7	37.1
84 Inventory Valuation Adjus	0.0	0.0	0.0	0.0	0.0
Total Intermediate	4,710.0	11,456.8	6,727.2	5,768.4	65,822.1
Imports & Adjustments	323.1	283.9	167.2	155.8	1,588.1
Wage & Salaries	10532.0	3,740.7	1,685.3	1,794.6	24,395.6
Capital Income	3299.5	2,253.7	1,258.2	1,172.1	12,635.0
Indirect Business Taxes	2113.9	755.8	306.5	343.0	4,785.4
	20,978.5	18,502.8	9,144.5	9,223.5	109,246.2

Note also that the total gross output increase of the coal sector is $21.8 billion. The difference between this and the net output figure of $21.0 billion is attributable to coal preparation, and various coal mining support services, as well as small amounts of coal used by coal companies (e.g., for fuel) and other companies to produce the indirect and induced demands of that product.

III. COAL INDUSTRY DEMAND-DRIVEN MULTIPLIER EFFECTS

The multiplier effects of the coal industry are not just limited to production and sales. They also extend to income, employment, and tax revenues. Moreover, the effects discussed in the previous section pertain only to the *current account* operations of the industry. Multiplier effects also stem from capital account activities, such as investment. That is, the mining equipment entries in Tables 1 and 2 represent smaller items that are completely consumed in one year or are a component of a larger piece of more durable machinery. The rounds of production stimulated by the demand for this larger piece of machinery are an example of the multiplier effects of investment. Finally, tax receipts of federal, state, and local governments from the coal industry are used to fund public expenditures, which also generate multiplier effects. Thus, the construction of such facilities as roads, schools, and hospitals, and the resulting rounds of upstream inputs are also linked to the coal industry operations.

Three major indicators of the direct operation of the U.S. coal industry in 1992 are presented in row 1 of Table 3. Again we list the net output of $20.978 billion. In addition, the industry employed 136,085 workers[2] and generated direct personal income (before taxes) of $13.8 billion.[3] Simple multipliers associated with each of these indicators are presented in row 2 of Table 3. The output multiplier of 3.138 means that each dollar of net coal industry production translates into three dollars and fourteen cents of economy-wide output. The simple multiplier effect of the operation of the industry results in $65.8 billion of output throughout all of the sectors of the U.S. economy, as shown in row 3. Analogous interpretations hold for income and employment multipliers.[4]

TABLE 3. ECONOMIC IMPACT OF THE COAL INDUSTRY ON THE U.S. ECONOMY, 1992
(Conventional Multipliers)

	Output	Personal Income[a]	Employment[b]
Direct Output	$20,978	$13,807	136,085
Simple Multiplier	3.138	2.683	5.453
Sub-Total	65,822	37,050	742,133
Direct Output from Taxes	3,941	2,146	70,820
Simple Multiplier	3.645	3.928	3.379
Sub-Total	14,365	8,430	239,275
Direct Output from Investment	2,418	1,150	16,872
Simple Multiplier	3.360	3.513	5.448
Sub-Total	8,126	4,039	91,928
Grand Total	$88,313	$49,519	$1,073,336

Source: Based on computations utilizing the IMPLAN U.S. Input-Output Table for 1990, as well as supplementary data (see text).

[a]All effects measured in 1992 dollars.
[b]All effects measured in full-time equivalents.

The relatively large employment multiplier for the coal industry reflects its decreasing labor intensity. As labor productivity increases, the indirect and induced employment stimulated by the coal industry increases in relation to the industry's shrinking direct employment per unit of output. Still nearly three-quarters of a million workers throughout the economy owe their jobs to the operation of the American coal industry through a combination of direct employment and simple multiplier impacts.

An analogous explanation applies to the seemingly low income multiplier. The relatively high direct income coefficient, reflecting relatively high wages and relatively high returns to capital, depresses the ratio of total impacts to direct impacts. We ask the reader to note that second-order impacts are a combination of multipliers and the stimulus to which they are applied. That is, potential impacts should not be inferred from multipliers alone. Thus, the relatively low income multiplier is used in conjunction with a relatively high direct income base. The opposite is true for the employment multiplier for the coal industry.

The multiplier effects of coal industry investment and tax revenues are also presented in Table 3 and add to the simple multiplier effects significantly.[5] The estimated direct investment of $2.418 billion[6] by the coal industry in 1992 generated income and employment in machinery and construction sectors as indicated by the entries for those two indicators. In a similar vein, the output effect of estimated coal industry tax payments of $3.941 billion in 1992[7] represents government expenditures on a mix of goods and services, as well as income payments to government employees. These direct stimuli, the associated multipliers, and total impacts are presented in the second and third partitions of Table 3.

Overall, the coal industry was responsible for over $88 billion of total sales in the economy, for the jobs of nearly 1.1 million workers, and for personal income of nearly $50 billion. These figures are larger than one would infer from conventional data compilations on the coal industry.

IV. COAL INDUSTRY SUPPLY-DRIVEN MULTIPLIER EFFECTS

Tables 1, 2, and 3 present *backward linkages* in production, i.e., the economic stimulus associated with obtaining the resources required for production to occur. Another perspective on the role of an industry within the nation's economy is to examine *forward linkages*. The premise in this case is that the existence, or supply, of a basic resource calls forth its utilization, thus stimulating production downstream throughout the economy. However, such *supply-driven impacts* are less certain since relative cost considerations, the availability of substitutes, and demand for final products are the major determinants of resource use.

Admittedly, the existence of coal is not indispensable for all of the electricity production stemming from the current use of this fuel in the United States. If coal were not available, use of oil, gas, nuclear, and hydropower inputs would increase. Similarly, if coking coal were not available in the U.S., it would most likely be imported, or the move to using the electric-arc alternative method of steel-making would receive greater impetus. All of these alternatives are, however, relatively more expensive than the use of coal, and would have the dual effect of reducing that purchasing power of consumers and the output of the economy.

The production of an additional million tons of coal will not necessarily generate its own demand in the future. However, in performing an analysis of actual coal utilization in a previous year, it is reasonable to mention the forward linkages that did take place. In the analysis below, we choose a middle ground.

The results of our forward linkage, or supply-driven multiplier, analysis are presented in Table 4 for three major economic indicators--output, income, and employment. The direct effect entries in the first row are the same as those in Table 3, as are direct investment and tax effects. It is the multiplier values that differ between the two tables. Total forward linkage effects for output, for example, are $115.244 billion. The overall implicit allocation multiplier is 5.494, in contrast to the implicit conventional output multiplier of 4.210 (calculated from Table 3). Similar comparisons can be made for income and employment multipliers.

TABLE 4. SUPPLY IMPACTS OF THE COAL INDUSTRY ON THE U.S. ECONOMY 1992
(Allocation/Supply-Driven Multipliers)

	Output[a]	Personal Income[a]	Employment[b]
Direct Output Effect[c]	$20,978	$13,807	136,085
Simple Multiplier	4.946	3.263	6.582
Direct Investment Effect	$2,418	$1,150	16,872
Investment Multiplier	1.572	1.464	1.814
Direct Tax Effect	$3,941	$2,146	70,815
Tax Multiplier	1.951	2.201	2.057
Subtotal[d]	$115,244	$51,454	1,071,919
Subtract Direct Effects[e]	$27,337	$17,103	223,772
Subtotal	$87,907	$34,351	848,147
Probability Adj. (50%)[f]	$43,954	$17,176	424,074
Adjusted Total	$43,954	$17,175	424,073

Source: Based on the 1990 U.S. IMPLAN Input-Output Table and data referenced in the text.

[a]In millions of 1992 dollars.
[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.
[c]Combination of direct, indirect, and induced effects (multipliers times direct effects) for production, investment, and expenditures from tax revenues.
[d]Includes direct production, investment, and expenditure from taxation.
[e]See text.
[f]To be added to conventional (demand-driven) multiplier effects in Table 5.

As a prelude to formulating a combined multiplier assessment, two adjustments must be made, however. First, we must subtract direct effects from either the backward or forward multipliers, or they would be counted twice. Second, because of the aforementioned uncertainty associated with forward linkage inducements, we choose to include only 50 percent of their subtotal values.

V. TOTAL MULTIPLIER IMPACTS

Total multiplier effects of the coal industry on the U.S. economy are presented in Table 5. They are disaggregated into four major components: direct production effects, direct investment and tax effects, backward linkage effects, and adjusted forward linkage effects. Our multiplier analysis indicates that, in 1992, the U.S. Coal industry contributed directly and indirectly to $132.266 billion of output, $66.691 billion of personal income, and 1,497,405 jobs throughout the nation. The respective implicit multiplier values (the ratio of the total of the various effects to the direct effects) are 6.3049 for output, 4.830 for personal income, and 11.003 for employment.

Several other types of directly and indirectly beneficial effects on the economy are generated by the American coal industry. For example, some of the taxes paid by the industry have been used to build public improvements such as schools and the highway system. In addition to ordinary multiplier effects, these structural improvements have served other industries, as well as the public at large, and have contributed to the long-run growth of the nation. Unfortunately, the extent of these multiplier effects is difficult to estimate. They are positive, though not nearly as large as the backward linkages we have calculated. Therefore, given these infrastructure effects, the estimates presented in Tables 1-4 understate the total positive economic impact of the coal industry on the U.S. economy. This is not to say that there are no negative impacts. Side-effects such as subsidence, acid mine drainage, and air pollutants are present, but the associated economic effects are extremely difficult to measure.

TABLE 5. TOTAL IMPACTS OF THE COAL INDUSTRY ON THE U.S. ECONOMY, 1992
(Demand-Driven and Adjusted Supply-Driven Multipliers)

	Output[a]	Personal Income[a]	Employment[b]
Direct Output Effect[c]	$20,978	$13,807	136,085
Direct Investment & Tax Effects	6,358	3,296	87,687
Backward Linkage Effects[c]	60,976	32,416	849,559
Adj. Forward Linkage Effects[d]	43,954	17,172	424,074
Total	$132,266	$66,691	1,497,405
Implicit Multipliers	6.305	4.830	11.003

Source: Based on the 1990 U.S. IMPLAN Input-Output Table and data referenced in the text.

[a]In millions of 1992 dollars.
[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.
[c]Combination of indirect and induced input effects from production, investment, and expenditure from tax revenues (see Table 3).
[d]Combination of indirect and induced allocation effects from production, investment, and expenditures from tax revenues (see Table 4).

VI. CONCLUSION

The analysis of the coal industry presented in this report can also prove useful in evaluating public policies. For example, if new Clean Air Act legislation would displace 35,000 coal miners and other coal industry employees in the Appalachian Region, the total job losses in the U.S. economy would be approximately 11.003 times the direct effect, or 385,105 workers. Moreover, these job losses would affect every industry. Using the ratio of personal income to employment, the direct personal income loss from the 35,000 workers would be $3.551 billion, and total income loss throughout the economy would be $17.151 billion.

These decreases would be partially offset by increased production of coal from other regions and by higher output of other fuels. The substitutes necessarily would be more expensive; if they were cheaper, they would have been used already. Therefore, there is still likely to be a net loss due to the cost increase and subsequent drop in the quantity demanded of goods the fuels are used to produce.[8] Also, if imported oil were to be substituted, there would be no offset effect.

APPENDIX. INPUT-OUTPUT ANALYSIS

An input-output (I-O) table is a valuable tool that provides insights into economic interdependence. The table is composed of a set of accounts representing purchases and sales between all of the sectors of an economy. Official versions of these tables at the national level, prepared by the U.S. Department of Commerce, are based on an extensive collection of data from nearly all of the business establishments in the United States.

These accounts can serve as the foundation for more formal models, the most basic of which assumes a linear relationship between inputs and the outputs they are used to produce. This structural model enables us to trace linkages between sectors and to estimate the economy-wide effects of changes in activity in any one sector.

Input-output analysis was pioneered in the 1930s by Professor Wassily Leontief. Since that time, Leontief and hundreds of other researchers have extended I-O theory, constructed tables for countries and regions around the world, and used these tables to perform a broad range of economic impact analyses. I-O analysis is considered such an important achievement that Leontief was awarded the Nobel prize in economics in 1973. (See Leontief, 1986; Miller and Blair, 1985; and Rose and Miernyk, 1989 for further information on input-output analysis).

In addition to the national I-O table, based on a census of business establishments, tables have been constructed for many regions of the U.S., based on adjustments of national data and/or a regional sample of firms. One of the pre-eminent sets of regional input-output tables are those of the Impact Analysis for Planning System, or IMPLAN, developed and maintained by the U.S. Forest Service (1993) in conjunction with several other government agencies. IMPLAN consists of national and regional economic data bases and methodologies to construct, update, and modify I-O tables and to apply them in impact studies. In this study we used the 1990 IMPLAN I-O Table for the U.S. economy.

Due to the enormous amount of data collection and reconciliation that goes into constructing the official U.S. Table, there is typically a considerable lag between the year in which

data are gathered and the date of availability of the table. It is therefore standard practice to use an I-O table that is somewhat dated. We have satisfied ourselves that we are utilizing the best available model, and that any errors in estimating coal industry impacts at the national level are likely to be small. Although the economy has grown, the structural relationships (ratios of input to outputs), upon which the model is based, have been found to be relatively stable over short time periods (up to 10 years). Moreover, we have made adjustments for the major change in the coal industry over this time horizon – the increase in labor productivity.

We have used 1988 coal industry employment data from U.S. EIA (1989) to calculate employment multipliers. Other changes in coal sector parameters were deemed unnecessary or impossible to undertake. For example, coal combustion efficiency changes were considered. However, the average heat rate (defined as BTU input per kilowatt hour generated) improved only slightly between 1982 and 1992.

The I-O models used for impact analysis at the state level in a related study of major coal-producing states were compiled by the Regional Economics Division of BEA as part of its Regional Input-Output Modeling System, or RIMS II (see, e.g., U.S. BEA, 1993a). This system is continuously updated, and the output, income, and employment multipliers used are calibrated with 1989 data (U.S. BEA, 1993b). Data were not available at the state level to adjust the multipliers from their 1989 benchmark to a 1992 base. However, the multipliers used are considered to be close approximations for the same reasons given above for national multipliers.

Finally we note that the standard IMPLAN multipliers are known as Type III multipliers. In general, a multiplier is a ratio of total impacts divided by direct impacts. Versions of multipliers differ according to the calculation of total impacts. Type I multipliers only include indirect impacts (interindustry demands) and are rarely used because they omit a major component of economic interdependence. Type II multipliers include indirect effects and induced effects (those stemming from income payments and their expenditure). Type III multipliers also include both indirect and induced effects, but treat the latter differently than their Type II counterparts. In essence, marginal propensities to consume (spend) out of additional income are

used instead of average propensities to consume, as is indicated by economic theory and empirical studies. Since marginal propensities are slightly lower than average propensities, Type III multipliers are a bit more conservative than Type II multipliers. Because it was necessary to update some of the IMPLAN multipliers, we chose to utilize the IMPLAN table to generate Type II multipliers, since the Type III multipliers generated by the IMPLAN system are almost impossible to adjust given the complicated formulas used to calculate them. On the surface, this would imply that our multipliers are higher than standard IMPLAN Type III version. However, we also made an adjustment for *transboundary* income and consumption flows, such as foreign remittances, tourist spending, and other payments, which are not endogenous flows in the U.S. economy (see Rose and Stevens, 1991). This further reduces our Type II multiplier to a level comparable to the IMPLAN Type III multipliers (which omit this adjustment).

ENDNOTES

[1]The sectors are classified according to "2-digit" Bureau of Economic Analysis Industry Codes.

[2]This figure includes 110,198 production workers (U.S. EIA, 1993) and 25,887 overhead workers. The latter is based on a ratio of the two categories of employees in the coal industry for 1991 found in U.S. BLS (1993).

[3]This estimate is based on a personal income coefficient of .6582 used to calculate income multipliers in the IMPLAN I-O Model (see the Appendix). The coefficient for 1990 was used because more current data were not available. (Coal companies do have more recent data on payouts for such items as wages, dividend, interest, and royalties. However, much of these data are confidential, and, in any case, it is felt that the 1990 coefficient is a reasonable approximation. A decrease in the mining workforce and its downward effect on personal income is offset somewhat by wage rate increases corresponding to the associated productivity increase, as well as to higher profits, a large proportion of which become personal income.

[4]All multipliers for coal production were calculated by the standard formulas (see, e.g., Miller and Blair, 1985) applied to the IMPLAN 1990 U.S. I-O Table (U.S. Forest Service, 1993). The IMPLAN employment multiplier was modified on the basis of what we considered more accurate and current employment data from U.S. EIA (1993). In essence, we inserted a new direct employment coefficient for the coal sector into the I-O Model, using the 1992 EIA production worker estimate enhanced to include "overhead" workers (see footnote 2 above). To make the multiplier compatible with a 1990 dollar base of the IMPLAN I-O table, we adjusted the coal gross output figure to a 1990 base by using an index of coal prices. Note that this modification is required for consistency of basic multipliers. As discussed in the Appendix, we assume the 1990-based multipliers hold for 1992. Our impact of results are in 1992 dollar terms because the figures to which the multipliers are applied (the entries in Row 1 of Table 3, for example) are expressed in 1992 dollar terms. The multipliers themselves are just ratios (dollars signs and time periods in the numerator and denominator canceling out).

[5]Investment multipliers pertain to those for Sector 46--Construction and Mining Machinery--which comprises a major portion of coal company capital expenditures. Tax multipliers were computed on the basis of the government expenditure columns of the IMPLAN I-O Table and related employment data.

[6]This estimate is based on a large sample of capital expenditure reports of coal companies for 1991 compiled by Mercer Management Consulting, Inc. (1992).

[7]This figure is based on data on indirect business taxes and estimates of corporate profits taxes. The former amounted to $2.609 billion in 1992 (U.S. BEA, 1993a). The latter is based on an estimate of $2.676 billion of profits for the coal industry, utilizing again a large sample of coal companies compiled by the Mercer Management Consulting, Inc. (1992). A fifty percent tax rate was applied to this figure as an approximation of the sum of federal, state, and local corporate profit taxes.

[8]The net loss is not a certainty because the substitute fuel may have a greater capability to stimulate total employment than does coal production.

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IMPACTS OF THE COAL INDUSTRY ON THE ALABAMA ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$1,050[a]	$282[a]	6,651[b]
Simple Multiplier	x1.963	x2.030	x3.118
Sub-Total	$2,061	$573	20,741
Direct Investment	$32	$9	388
Simple Multiplier	x2.199	x2.217	x2.472
Sub-Total	$70	$21	960
Direct Output of Government	$107	$36	2,361
Simple Multiplier	x2.109	x1.988	x1.717
Sub-Total	$225	$71	4,053
Grand Total	$2,356	$665	25,754

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Alabama and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE COLORADO ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$410[a]	$110[a]	1,988[b]
Simple Multiplier	x1.981	x2.046	x3.211
Sub-Total	$812	$225	6,383
Direct Investment	$27	$7	208
Simple Multiplier	x2.227	x2.354	x3.160
Sub-Total	$60	$17	657
Direct Output of Government	$64	$17	997
Simple Multiplier	x2.296	x2.387	x2.041
Sub-Total	$146	$41	2,035
Grand Total	$1,018	$284	9,076

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Colorado and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE ILLINOIS ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$1,656[a]	$445[a]	10,278[b]
Simple Multiplier	x2.251	x2.301	x3.136
Sub-Total	$3,727	$1,025	32,231
Direct Investment	$105	$31	909
Simple Multiplier	x2.637	x2.626	x3.176
Sub-Total	$277	$81	2,886
Direct Output of Government	$252	$101	5,322
Simple Multiplier	x2.579	x2.135	x1.823
Sub-Total	$650	$215	9,701
Grand Total	$4,653	$1,321	44,818

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Illinois and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

TOTAL P.03

IMPACTS OF THE COAL INDUSTRY ON THE INDIANA ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$713[a]	$192[a]	4,510[b]
Simple Multiplier	x2.083	x2.115	x3.317
Sub-Total	$1,485	$406	14,958
Direct Investment	$53	$16	543
Simple Multiplier	x2.522	x2.448	x3.019
Sub-Total	$135	$40	1,640
Direct Output of Government	$75	$27	1,781
Simple Multiplier	x2.322	x2.059	x1.760
Sub-Total	$174	$56	3,134
Grand Total	$1,794	$501	19,732

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Indiana and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE KENTUCKY ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$3,932[a]	$1,057[a]	30,408[b]
Simple Multiplier	x2.098	x2.089	x2.993
Sub-Total	$8,250	$2,208	91,000
Direct Investment	$204	$60	2,109
Simple Multiplier	x2.428	x2.330	x2.907
Sub-Total	$496	$141	6,132
Direct Output of Government	$541	$162	11,333
Simple Multiplier	x2.378	x2.247	x1.856
Sub-Total	$1,287	$364	21,030
Grand Total	$10,033	$2,714	118,162

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Kentucky and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE MARYLAND ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$84[a]	$23[a]	541[b]
Simple Multiplier	x1.638	x1.728	x2.100
Sub-Total	$137	$39	1,136
Direct Investment	$4	$1	38
Simple Multiplier	x1.886	x2.000	x2.345
Sub-Total	$8	$2	89
Direct Output of Government	$12	$4	229
Simple Multiplier	x2.072	x1.889	x1.696
Sub-Total	$24	$8	389
Grand Total	$169	$50	1,614

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Maryland and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE MONTANA ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$397[a]	$107[a]	883[b]
Simple Multiplier	x1.757	x1.753	x2.715
Sub-Total	$697	$187	2,397
Direct Investment	$8	$3	192
Simple Multiplier	x1.637	x1.619	x1.502
Sub-Total	$14	$4	288
Direct Output of Government	$149	$53	3,975
Simple Multiplier	x1.783	x1.655	x1.499
Sub-Total	$266	$88	5,956
Grand Total	$976	$279	8,642

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Montana and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE NEW MEXICO ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$568[a]	$153[a]	2,078[b]
Simple Multiplier	x1.852	x1.831	x3.007
Sub-Total	$1,052	$280	6,250
Direct Investment	$34	$10	386
Simple Multiplier	x1.730	x1.744	x2.031
Sub-Total	$59	$17	784
Direct Output of Government	$96	$34	2,171
Simple Multiplier	x1.963	x1.788	x1.634
Sub-Total	$189	$60	3,547
Grand Total	$1,300	$357	10,581

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for New Mexico and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE NORTH DAKOTA ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$237[a]	$62[a]	919[b]
Simple Multiplier	x1.833	x1.822	x2.976
Sub-Total	$435	$113	2,734
Direct Investment	$7	$2	67
Simple Multiplier	x1.699	x1.808	x2.231
Sub-Total	$12	$3	149
Direct Output of Government	$41	$13	1,045
Simple Multiplier	x2.032	x1.908	x1.622
Sub-Total	$84	$24	1,695
Grand Total	$531	$140	4,578

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for North Dakota and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE OHIO ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$815[a]	$217[a]	5,576[b]
Simple Multiplier	x2.157	x2.198	x3.234
Sub-Total	$1,757	$478	18,030
Direct Investment	$53	$17	548
Simple Multiplier	x2.523	x2.410	x2.931
Sub-Total	$135	$40	1,607
Direct Output of Government	$90	$32	2,103
Simple Multiplier	x2.411	x2.106	x1.754
Sub-Total	$216	$68	3,688
Grand Total	$2,107	$586	23,325

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Ohio and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE PENNSYLVANIA ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$1,951[a]	$525[a]	15,633[b]
Simple Multiplier	x2.171	x2.223	x3.017
Sub-Total	$4,235	$1,167	47,157
Direct Investment	$106	$33	1,027
Simple Multiplier	x2.502	x2.434	x2.925
Sub-Total	$265	$79	3,003
Direct Output of Government	$231	$90	4,920
Simple Multiplier	x2.413	x2.062	x1.801
Sub-Total	$559	$186	8,858
Grand Total	$5,059	$1,432	59,018

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Pennsylvania and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE TENNESSEE ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$92[a]	$24[a]	993[b]
Simple Multiplier	x1.871	x1.953	x2.377
Sub-Total	$173	$48	2,360
Direct Investment	$4	$1	47
Simple Multiplier	x2.264	x2.398	x2.672
Sub-Total	$10	$3	125
Direct Output of Government	$13	$3	189
Simple Multiplier	x2.130	x2.350	x2.020
Sub-Total	$27	$7	383
Grand Total	$210	$58	2,868

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Tennessee and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE TEXAS ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$684[a]	$183[a]	2,471[b]
Simple Multiplier	x2.017	x1.982	x2.884
Sub-Total	$1,380	$364	7,126
Direct Investment	$46	$12	398
Simple Multiplier	x2.246	x2.300	x2.788
Sub-Total	$104	$28	1,110
Direct Output of Government	$74	$25	1,441
Simple Multiplier	x2.364	x2.074	x1.810
Sub-Total	$174	$52	2,608
Grand Total	$1,658	$444	10,844

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Texas and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE UTAH ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$450[a]	$121[a]	2,466[b]
Simple Multiplier	x1.954	x1.967	x3.071
Sub-Total	$880	$238	7,573
Direct Investment	$30	$9	337
Simple Multiplier	x2.157	x2.174	x2.570
Sub-Total	$64	$19	867
Direct Output of Government	$76	$28	1,461
Simple Multiplier	x2.080	x1.874	x1.877
Sub-Total	$159	$52	2,744
Grand Total	$1,103	$309	11,184

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Utah and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE VIRGINIA ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$1,181[a]	$318[a]	11,285[b]
Simple Multiplier	x1.893	x1.966	x2.509
Sub-Total	$2,236	$624	28,307
Direct Investment	$55	$17	623
Simple Multiplier	x1.986	x2.001	x2.240
Sub-Total	$108	$33	1,395
Direct Output of Government	$121	$43	2,446
Simple Multiplier	x2.114	x1.952	x1.748
Sub-Total	$256	$84	4,277
Grand Total	$2,600	$742	33,979

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Virginia and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE WEST VIRGINIA ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$4,556[a]	$1,205[a]	32,128[b]
Simple Multiplier	x1.723	x1.745	x2.594
Sub-Total	$7,850	$2,102	83,338
Direct Investment	$206	$67	2,785
Simple Multiplier	x1.782	x1.700	x1.913
Sub-Total	$366	$114	5,326
Direct Output of Government	$752	$290	22,976
Simple Multiplier	x1.752	x1.580	x1.396
Sub-Total	$1,318	$458	32,070
Grand Total	$9,534	$2,674	120,734

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for West Virginia and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

IMPACTS OF THE COAL INDUSTRY ON THE WYOMING ECONOMY, 1992

	Output	Personal Income	Employment
Direct Output of Coal	$1,548[a]	$411[a]	4,107[b]
Simple Multiplier	x1.700	x1.659	x2.586
Sub-Total	$2,632	$682	10,623
Direct Investment	$41	$12	514
Simple Multiplier	x1.542	x1.530	x1.765
Sub-Total	$63	$18	907
Direct Output of Government	$493	$175	12,513
Simple Multiplier	x1.685	x1.555	x1.457
Sub-Total	$831	$272	18,231
Grand Total	$3,527	$973	29,762

Source: Based on a 1990 RIMS II Input-Output Tables (U.S. Department of Commerce/Bureau of Economic Analysis) for Wyoming and data from Coal Production, 1992 (U.S. Department of Energy/Energy Information Administration).

[a]In millions of 1992 dollars.

[b]Employment measured in full-time equivalents. Considers all employees associated with mining operations, including office workers.

Coal Mining: Coal Facts in Ohio

The United States contains the largest recoverable coal reserves of any single country. It has been estim: U.S. coal reserves will last over 500 years at current rates of consumption.

Ohio is located in the northern portion of the Appalachian Coal Basin, which is one of the largest coal fi United States. It is estimated that Ohio has 11.5 billion tons of economically recoverable coal reserves.

Coal was produced by 31 companies at 94 mines in 16 Ohio counties in 2004, the last available reportin Production totaled 23.4 million tons, an increase of 5.2 percent from 2003. (Note: All tonnages are in sh 2004, 14.2 million tons were produced from 8 underground mines, and 9.1 million tons were produced f surface mines.

For updated information on Ohio coal production:

- Ohio Division of Geological Survey, 2004 Report on Ohio Mineral Industries
- U.S. Department of Energy, Energy Information Administration

Belmont County is the all-time coal production leader in Ohio. Once again it led the state in 2004, as in producing more than 11.9 million tons of coal. Following Belmont County, the next four largest produci are, in order of decreasing production: Harrison, Tuscarawas, Athens, and Vinton. Together these five c produced 82.2 percent of the total 2004 coal production.

Ohio ranks fourth nationally in the consumption of coal, following Texas, Indiana and Illinois. More tha of the electricity generated in Ohio is coal-derived. Ohio used 57,334 million tons in 2003. Most of Ohi used for the generation of electricity, while some is used for making steel.

Sources

National rankings: U.S. Department of Energy, Energy Information Administration.
Ohio Division of Geological Survey, 2004 Report on Ohio Mineral Industries.

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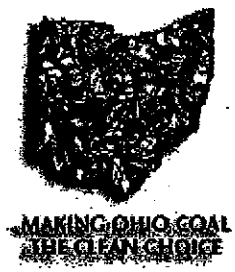

The Ohio Coal Development Office (OCDO), within the Ohio Air Quality Development Authority (OAQDA), co-funds the development and implementation of technologies that can use Ohio's vast reserves of high sulfur coal in an economical, environmentally sound manner. This is important as numerous energy forecasts project coal to fuel at least half of the nation's electric power production through 2015 and probably beyond. It is critical for Ohio, which generates nearly 90 percent of its electricity from coal. Further, given the dynamism of Ohio's diverse economy, Ohio is the third largest coal consumer of coal and the fourth largest consumer of electricity in the U.S.* While alternative energy technologies are under development and transition, coal will remain the backbone of this state's and this nation's energy supply for some time to come. It should be used cleanly, and this can only be accomplished through the development and use of clean coal technologies (CCTs).

Projects supported by the OCDO are sought through public solicitations and requests-for-proposals (click on **RFPs**, left). Cost-share is required. While OCDO can support projects ranging from applied research through commercial demonstration, it is this latter category that is of particular interest. Types of projects and funding levels are defined within the RFPs. Proposals are reviewed by independent technical reviewers, then submitted to the Office's statutorily created Technical Advisory Committee (TAC), a 15-member group comprised of public and private members having an interest in coal, power production, and the environment. Projects favorably recommended by the TAC are submitted to the OAQDA for final approval, then grant negotiations commence. To preview public abstracts describing the type and range of nearly 300 projects funded to date by OCDO, click on **Projects**, on the left.

To review selected recent accomplishments of the Office, **click here**.

For further information, contact the office at:

Ohio Coal Development Office
Ohio Air Quality Development Authority
50 W. Broad Street, Suite 1718
Columbus, OH 43215-5910
P: 614/466-3465 F: 614/752-9188

*Source: U.S. Dept. of Energy/Energy Information Administration

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50 W. Broad Street, Suite 1718, Columbus, Ohio 43215
Phone: 614-224-3383
Fax: 614-752-9188

LEXSEE 2006 IND PUC LEXIS 211

VERIFIED JOINT PETITION OF PSI ENERGY, INC. AND SOUTHERN INDIANA GAS AND ELECTRIC COMPANY d/b/a VECTREN ENERGY DELIVERY OF NDIANA, INC. FOR AUTHORITY PURSUANT TO AN ALTERNATIVE REGULATORY PLAN AUTHORIZED UNDER IND. CODE § 8-1-2.5 ET SEQ. TO DEFER AND SUBSEQUENTLY RECOVER THE FEASIBILITY STUDY, ENGINEERING, AND PRECONSTRUCTION COSTS ASSOCIATED WITH THE CONSIDERATION AND EXPLORATION OF CONSTRUCTING AN INTEGRATED COAL GASIFICATION COMBINED CYCLE ELECTRIC GENERATING FACILITY, AND APPROVAL OF CONFIDENTIAL TREATMENT OF CERTAIN INFORMATION TO BE PRESENTED IN THIS CAUSE

CAUSE NO. 42894

Indiana Utility Regulatory Commission

2006 Ind. PUC LEXIS 211

July 26, 2006, Approved

PANEL: [*1] BY THE COMMISSION: David W. Hadley, Commissioner; Scott R. Storms, Chief Administrative Law Judge; HARDY; HADLEY; LANDIS; SERVER, AND ZIEGNER, CONCUR

OPINIONBY: STORMS

OPINION: On August 9, 2005, Joint Petitioners, PSI Energy, Inc., now d/b/a Duke Energy Indiana, Inc. ("PSI" or "Duke Energy Indiana") and Southern Indiana Gas and Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc. ("Vectren") (collectively "Joint Petitioners") filed a Verified Joint Petition in this Cause with the Indiana Utility Regulatory Commission ("Commission") initiating a proceeding for authority to defer and subsequently recover the feasibility study, engineering, and preconstruction costs associated with the consideration and exploration of constructing an integrated coal gasification combined cycle electric generating facility ("IGCC"). On September 22, 2005, the Citizens Action Coalition of Indiana, Inc, ("CAC") filed a Petition to Intervene which was granted by the Presiding Officers at the September 26, 2005 Prehearing Conference. On December 5, 2005, the Indiana Industrial Group ("Industrial Group") filed a Petition to Intervene in this Cause which was subsequently approved by the Presiding Officers.

Pursuant to [*2] notice of hearing duly given and published as required by law, proof of which was incorporated into the record by reference and placed in the official files of the Commission, a Prehearing Conference in this Cause was held at 1:30 p.m. EST on September 26, 2005, in Room E306 of the Indiana Government Center South, 302 West Washington Street, Indianapolis, Indiana. The Joint Petitioners, the Office of the Utility Consumer Counselor ("OUCC"), and the Citizens Action Coalition of Indiana, Inc. ("Coalition" or "CAC") appeared and participated at the Prehearing Conference. On March 22, 2006, the OUCC submitted a Settlement Agreement entered into with PSI and Vectren, along with settlement support testimony.

Pursuant to notice published as required by law, proof of which was incorporated into the record, an Evidentiary Hearing in this matter was held on May 16, 2006, at 9:30 a.m. n1 EDT, in Conference Center # 32 of the Indiana Government Center South, Indianapolis, Indiana. The Joint Petitioners, the OUCC, the CAC and the Industrial Group appeared at the hearing. During the hearing, Joint Petitioners presented their case-in-chief, consisting of the testimony and exhibits of Ms. Kay Pashos, [*3] Ms. Diane L. Jenner, Mr. Robert D. Moreland, and Mr. Ronald G. Jochum. The Joint Petitioners and the OUCC presented the settlement support testimony of Ms. Kay Pashos and Ms. Stacie Gruca. The CAC presented its case-in-chief, consisting of the testimony and exhibits of Mr. Grant S. Smith. The Joint Petitioners also presented the rebuttal testimony of Ms. Kay Pashos, Ms. Diane L. Jenner, and Mr. Robert D. Moreland.

n1 Joint Petitioners also published notice of the filing of the Joint Petition in this Cause. *See* Joint Petitioners' Exhibit A-2.

The Commission has considered the evidence presented in this Cause in arriving at the findings and conclusions set forth in this Order. Accordingly, based upon the applicable law and the evidence herein and being duly advised, the Commission now finds as follows:

1. Notice and Jurisdiction. Due, legal and timely notice of the Evidentiary Hearing in this Cause was given and published by the Commission as required by law. The Joint Petitioners are each a public utility [*4] within the meaning of the Public Service Commission Act, as amended, Ind. Code § 8-1-2, and are subject to the jurisdiction of the Commission, in the manner and to the extent provided by the laws of the State of Indiana. The Commission has jurisdiction over the Joint Petitioners and the subject matter of this proceeding.

2. Joint Petitioner Duke Energy Indiana's Characteristics. Duke Energy Indiana is a public utility organized and existing under the laws of the State of Indiana, and has its principal office at 1000 East Main Street, Plainfield, Indiana. It is engaged in rendering electric utility service in the State of Indiana and owns, operates, manages and controls, among other things, plant and equipment within the State of Indiana used for the production, transmission, delivery and furnishing of such electric service to the public. As of April 3, 2006, Duke Energy Indiana became a wholly owned subsidiary of Duke Energy Corp. *See*, the Commission's March 15, 2006 Order in Cause No. 42873.

3. Joint Petitioner Vectren's Characteristics. Vectren is a corporation organized and existing under the laws of the State of Indiana, with its principal office located at [*5] One Vectren Square, Evansville, Indiana. It is engaged in rendering electric utility service in the State of Indiana and owns, operates, manages and controls, among other things, plant and equipment within the State of Indiana used for the production, transmission, delivery and furnishing of such electric service to the public.

4. Relief Originally Sought in this Proceeding. The Verified Joint Petition sought findings that (a) PSI has a general need for additional base-load generating capacity in the 2010-2015 timeframe; (b) Vectren has a general need for additional base-load generating capacity in the 2010-2011 timeframe; (c) there are potential benefits associated with IGCC technology; (d) Joint Petitioners' consideration and exploration of IGCC technology is reasonable; and (e) authority pursuant to I.C. 8-1-2.5 for each Joint Petitioner to defer and recover its portion of the feasibility, engineering and preconstruction costs (including carrying costs) incurred in connection with the study and development of an IGCC plant for recovery either: (i) as a capitalized project cost if the Joint Petitioner participates in the construction of an IGCC plant that is completed; or [*6] (ii) over a five-year period through an appropriate recovery mechanism beginning at the time the Joint Petitioner decides not to participate in the construction of an IGCC plant.

5. The Settlement Agreement. A copy of the Settlement Agreement between the OUCC, PSI and Vectren is attached and incorporated into this Order. The Settlement Agreement reflects resolution by those parties of several issues associated with the study of a potential IGCC Project as proposed in the Joint Petition. In the Settlement Agreement, the Joint Petitioners reinforce their commitment that, if the IGCC Project goes forward, the Project will require additional approvals from the Commission, specifically Certificates of Public Convenience and Necessity ("CPCN") under IC 8-1-8.5 and IC 8-1-8.7 as well as related relief pursuant to IC 8-1-8.8. While specifically providing that the evidence in this proceeding supports a finding of the reasonableness of conducting the studies at this time, such a finding is for purposes of this proceeding only and will not be binding as to the need for additional resources in future CPCN proceedings. The Settlement Agreement also addresses the recovery of costs associated [*7] with the study, including deferral for later recovery in a base rate case of only a portion of the costs of the study if the Project does not go forward, and no recovery of such costs if the Project does not go forward and another entity uses the results of the study to build an IGCC plant.

6. Summary of Joint Petitioners' Case-In-Chief Testimony. Ms. Kay Pashos, President of Duke Energy Indiana, testified that the company's recent integrated resource plans ("IRP") have indicated a need for base-load capacity within the next ten years. She explained that, especially with the volatility of natural gas prices and the abundance of coal reserves in Indiana, Duke Energy Indiana believes that for the foreseeable planning horizon coal will continue to be an essential part of the future of base-load generation in the Midwest. Ms. Pashos also testified that Duke Energy Indiana believes that IGCC technology offers a number of potential benefits such as high efficiency, lower emissions, and the potential to capture Carbon Dioxide (CO[2]) emissions when and if those emissions are regulated. In her testimony, Ms Pashos compared the emissions from a possible IGCC project at Duke Energy [*8] Indiana's Edwardsport station with

the emissions from the existing 160 MW plant at that site. The possible IGCC plant would be significantly larger, would operate at a much higher capacity factor, and would produce significantly less sulfur dioxide (SO[2]), nitrogen oxide (NO[x]), and particulate emissions. Ms Pashos also described the strong local support for the project from Knox County and certain incentives, such as state, and possible Federal, tax credits for IGCC plants.

Ms. Diane L. Jenner is responsible for asset planning, including IRPs for Duke Energy Indiana. She testified that the company presented a number of IRPs to the Commission as a part of various proceedings over the past two years, and while the amount and exact timing of required resources has changed somewhat from plan to plan, all of these IRPs show that the company needs base-load capacity in the 2010-2014 timeframe. She also pointed out that the State Utility Forecasting Group's latest forecast shows that by 2010 Indiana will need an additional 3130 MW of generating capacity, half of which should be base-load. The Company's most recent IRP as presented to the Commission in Cause Nos. 42622/42718 (consolidated) [*9] (*Ind. Util. Reg. Comm'n*, May 24, 2006) reflected the installation of IGCC capacity in 2010. Ms. Jenner explained that the Company used EPRI data for that analysis and that while that data was accurate enough to serve as a "placeholder" it was not definitive enough to make a final decision. Ms. Jenner also testified that according to the preliminary or indicative cost information from GE/Bechtel an IGCC plant could still be a viable alternative however, more definitive cost and performance estimates are necessary to reach more certain conclusions.

Mr. Robert D. Moreland, General Manager, Analytical & Investment Engineering, for Duke Energy Indiana generally described IGCC technology and its history. Mr. Moreland explained that the gasification process converts a feedstock, in this case coal, at high pressure and temperatures in an oxygen controlled atmosphere, into a combustible gas called Synthesis Gas or "Syngas" which is then cleaned and used to fuel a combustion generating unit. Exhaust heat from the combustion turbine creates steam and, along with steam from the gasification process, is used to power a steam turbine. IGCC generation is expected to achieve lower emission rates [*10] as compared with traditional coal generation since elements such as sulfur, mercury and particulates are removed before the Syngas is burned, rather than being removed after combustion as in traditional pulverized coal plants.

Mr. Moreland also testified that a number of gasification technology owners have focused their attention on the benefits of IGCC and are developing commercial IGCC Reference Plants, a base design for the major components of a commercial IGCC generating station that will be adaptable to multiple sites so that each new IGCC plant will not have to be uniquely designed. Duke Energy Indiana has met with three of the IGCC technology vendors, and, the Joint Petitioners entered into a Technical Services Agreement with General Electric and Bechtel to prepare an indicative cost analysis for an IGCC project at Duke Energy Indiana's Edwardsport Generating Station based on the Reference Plant GE/Bechtel are developing. Joint Petitioners have also initiated the transmission interconnection process with the Midwest Independent Transmission System Operator, Inc. ("MISO"). Mr. Moreland testified that the results have indicated no "fatal flaws" to building and operating an IGCC [*11] plant at Edwardsport, but that it still appears that there is a small cost premium for IGCC over conventional coal fired generation, a gap that Joint Petitioner's hope to close with better cost estimates, more detailed engineering, and some of the incentives described by Ms. Pashos.

Since IGCC technology is still in the early stages of commercial development, Mr. Moreland explained that the technology needs more front end engineering than is required for a conventional coal plant, therefore the Joint Petitioners are pursuing a front end engineering and design ("FEED") study with GE/Bechtel to develop more detailed cost estimates, optimal plant configuration, and site specific and owner specific requirements such as coal type.

Mr. Ronald G. Jochum, Vice President-Power Supply for Vectren, described many of the reasons Vectren is interested in participating in a potential IGCC project. Mr. Jochum agreed that IGCC is a promising technology and discussed Vectren's current generating resources and the indicated need for additional capacity in the future. Mr. Jochum also explained that Vectren is a small electric system and that participating jointly in this potential project would allow [*12] Vectren to acquire needed base-load capacity in a manner that captures economies of scale and efficiencies through the construction of a larger unit.

Ms. Pashos and Ms. Stacie R. Gruca, Utility Analyst in the Electric Division for the OUCC testified in support of the Settlement Agreement. Ms. Pashos described the Settlement Agreement and testified that it was reasonable for a number of reasons. The Settlement Agreement provides a level of certainty for the Joint Petitioners to allow them to proceed with the necessary detailed up-front studies in order to gain enough definitive information to make an informed decision about the potential Edwardsport IGCC project. Under the terms of the Settlement Agreement this can be done while preserving the OUCC's ability to challenge higher costs than those contemplated at the time the settlement was reached. The Settlement Agreement also provides for a sharing of the cost of these studies among the Joint Petitioners and their customers if the studies indicate that other choices are preferable.

Ms. Gruca testified that providing some certainty of cost recovery to the utilities increases the likelihood of the pursuit of a new technology that may [*13] benefit the state of Indiana. She also testified that the Settlement Agreement incents the utilities to minimize their expenses while exploring the IGCC option since the utilities share in the costs if the project does not proceed.

7. Summary of CAC Testimony. Mr. Grant S. Smith, Executive Director of the CAC testified in opposition to the Joint Petitioners' proposal and the Settlement Agreement. Mr. Smith testified that he believes that the Joint Petitioners proposal and the Settlement Agreement are flawed for several reasons including: the overall proposal is grounded in a continued over-reliance on coal; the utilities' focus on coal and base-load generation in their IRPs result in missed opportunities for cleaner and more-cost-effective investments in renewables and efficiency; the specific IGCC engineering and preconstruction study being proposed is short-sighted and inadequate because it ignores carbon capture and sequestration; projections of future generation capacity needs, which focus on base-load generation, rely on flawed IRPs; and, the proposal and Settlement Agreement requires ratepayers to guarantee a certain level of cost recovery even if the plant is not built. [*14] Mr. Smith concluded that ratepayers should not be required to pay for any of the study if the IGCC plant is not built and recommended that the Settlement Agreement be rejected and that the Commission direct Joint Petitioners to file a new IRP.

Mr. Smith also testified that it is a misperception that coal power is cheap as the pervasive impact of emissions from coal fired power plants, on public health and the environment, is only partially reflected in the price of generating electricity. In addition, Mr. Smith indicated that reports have concluded that climate change will result due to anthropogenic emissions of greenhouse gases. Such global warming is also expected to cause a wide range of climate impacts including changes in precipitation patterns, increased climate variability, melting of glaciers, ice shelves and permafrost, and rising sea levels. All countries will experience social and economic consequences, with disproportionate negative impacts on those countries least able to adapt. However, Mr. Smith also recognized that there is no practical way to replace all or even the majority of Indiana's coal-fire generation with efficiency renewable generation in the near term. [*15] At the same time, the review and consideration of additional options can significantly contribute to reductions in carbon dioxide emissions. For example, Mr. Smith cited current interest in Benton County, Indiana where developers are interested in developing a facility that utilizes wind power to generate electricity.

With respect to the FEED study at issue in this proceeding, Mr. Smith, testified that it was inadequate and flawed in that it will do nothing to investigate the technical feasibility and economic costs of carbon capture and sequestration which is a primary advantage of IGCC over other coal-based technology. Mr. Smith testified that he does not believe that the Settlement Agreement is in the public interest because it will require ratepayers to pay for fifty-percent (50%) of the FEED study if the IGCC plant is not built. Mr. Smith urged the Commission to reject the Settlement Agreement, to direct the Joint Petitioners to prepare a revised IRP that includes: 1) planning for carbon regulations; 2) greater investment in energy efficiency; 3) diversification of energy mix to include renewable resources; 4) facilitating and investing in distributed power, and: 5) increased [*16] net metering and interconnection.

8. Joint Petitioners' Rebuttal. Ms. Pashos, Ms. Jenner, and Mr. Moreland testified in rebuttal to Mr. Smith. Ms. Pashos agreed that utilities should continue to explore energy efficiency and renewable resources. She disagreed that there is an over-reliance on coal in Indiana, and emphasized that Duke Energy Indiana continues to believe that, for the foreseeable planning horizon, coal, which is abundant and relatively low cost, is an essential part of the future of electric generation in the Midwest. According to Ms. Pashos, the challenge is to find efficient and environmentally-friendly ways to use this abundant resource.

Ms. Jenner testified that while a very high percentage of both Joint Petitioners' energy is generated from coal, both companies have significant amounts of non-coal capacity. Both companies dispatch their generating resources economically, and since coal is currently more economical than gas or oil the coal generation is utilized more, to customers' benefit. Ms. Jenner disputed testimony by Mr. Smith that Indiana possesses 40,000 MW of wind capacity. Ms. Jenner explained that the study that Mr. Smith relied on was citing the [*17] maximum amount that could be installed without regard to the economics of such installation, and that, in a recent RFP for renewable energy resources, Duke Energy Indiana received only 300 MW of wind power bids from Indiana sites. In response to Mr. Smith's criticisms of Duke Energy Indiana's IRP process, Ms. Jenner testified that the methodology used gave the greatest possible advantage to DSM, efficiency, and renewables, and that in its IRP submitted this year Duke Energy Indiana planned to perform carbon scenario analyses and to include wind resources as alternatives for the model to choose. n2

n2 Duke Energy Indiana submitted its most recent IRP to the Commission on June 15, 2006, and the comment period on the IRP is currently open under the Commission's rules. Pursuant to 170 IAC 4-7-2, a customer or interested party may submit written comments on the IRP to the Commission within ninety (90) days from the date that the IRP was submitted to the Commission.

Mr. Moreland disputed Mr. Smith's assertions that the [*18] proposed FEED study is short-sighted and inadequate because it ignores carbon capture and sequestration. He explained that the technology for capturing and sequestering carbon is evolving, that Duke Energy Indiana is closely monitoring the progress of such technologies. Mr. Moreland testified further that a preliminary analysis, based on a study by the Indiana Geological Survey, indicates the Edwardsport site has suitable geology for the sequestration of removed CO2, and the Joint Petitioners are considering another analysis such as a test well at Edwardsport by the Midwest Regional Carbon Sequestration Partnership. Mr. Moreland also identified studies by EPRI and Jacobs Consultancy that indicate that the cost of carbon capture and sequestration will be significantly less than those suggested by Mr. Smith. Mr. Moreland also described the significant reductions in emissions that would occur if the IGCC plant is constructed at Edwardsport when compared with emissions from the current plant, even with vastly more electricity generated.

9. Discussion and Analysis of the Issues. Settlements presented to the Commission are not ordinary contracts between private parties. *United States Gypsum, Inc. v. Indiana Gas Co., 735 N.E.2d 790, 803 (Ind. 2000).* [*19] When the Commission approves a settlement, that settlement "loses its status as a strictly private contract and takes on a public interest gloss." *Id.* (quoting *Citizens Action Coalition v. PSI Energy, 664 N.E.2d 401, 406 (Ind. Ct. App. 1996)).* Thus, the Commission "may not accept a settlement merely because the private parties are satisfied; rather [the Commission] must consider whether the public interest will be served by accepting the settlement." *Citizens Action Coalition, 664 N.E.2d at 406.*

Furthermore, any commission decision, ruling, or order -- including the approval of a settlement - must be supported by specific findings of fact and sufficient evidence. *United States Gypsum, 735 N.E.2d at 795* (citing *Citizens Action Coalition v. Public Service Co., 582 N.E.2d 330, 331 (Ind. 1991)).* The Commission's own procedural rules require that settlements may be between some or all of the parties to a proceeding and must be supported by probative evidence. 170 IAC 1-1.1-17(d). Therefore, before the Commission can approve the Settlement Agreement we must determine [*20] whether the evidence in these causes sufficiently supports the conclusions that the Settlement Agreement serves the public interest.

It is clear from the evidence that there is significant potential for Indiana electric customers to benefit from IGCC technology. With the current state of development of the technology, as described by Mr. Moreland, additional study is clearly appropriate and could minimize future design changes. The Indiana Legislature has specifically found that the state should, ". . . encourage the use of advanced clean coal technology, such as coal gasification." I.C. 8-1-8.8-1(a)(5). The Settlement Agreement is consistent with this legislative framework; provides a reasonable assurance to the Joint Petitioners that the study costs, or a portion thereof, will be recovered; and, ensures that the potential benefits of IGCC, which were discussed by all parties, will continue to be explored within the State of Indiana.

In reviewing the evidence and Settlement Agreement presented in this matter the Commission recognizes that either Petitioner could have pursued other generation options that afforded greater cost certainty but potentially less long term benefit for the [*21] State of Indiana. The Settlement Agreement serves to support and encourage the use of advanced clean coal technology in Indiana and balances and considers each of the issues that impact the specific relief requested in regarding the FEED Study. The Settlement Agreement also recognizes that the Commission, the OUCC, and other interested parties will have an opportunity to review and consider broader issues that may arise in the context of a subsequent CPCN proceeding. As the CAC's opposition to the Settlement Agreement is seemingly based primarily on a fundamental disagreement regarding the scope and direction reflected in the Joint Petitioners' IRPs, this issue may properly be reviewed by the Commission as part of any subsequent CPCN proceeding in the event that the Joint Petitioners elect to proceed with the project.

Based upon the evidence presented in these Cause and upon our review of the Settlement Agreement we are persuaded that the Settlement Agreement, which is attached hereto and incorporated by reference, is just, reasonable and in the public interest and should be approved. The parties agree that the Settlement Agreement should not be used as precedent in any other proceeding [*22] or for any other purpose, except to the extent necessary to implement or enforce its terms. Consequently, with regard to future citation of the Settlement Agreement, we find that our approval

herein should be construed in a manner consistent with our finding in *Richmond Power & Light*, Cause No. 40434, (*Ind. Util. Reg. Comm'n*, March 19, 1997).

IT IS THEREFORE ORDERED BY THE INDIANA UTILITY REGULATORY COMMISSION that:

1. The Settlement Agreement is hereby approved by the Commission.

2. The Joint Petitioners are hereby authorized to defer and recover its portion of the feasibility, engineering and preconstruction costs (including carrying costs) incurred in connection with the study and development of an IGCC plant for recovery either: (i) as a capitalized project cost if the Joint Petitioner receives a CPCN for and participates in the construction of an IGCC Project that is completed or; (ii) if the IGCC Project does not go forward, to defer, for recovery in their next base rate case, 50% of their allocated share of the actual study costs (including carrying costs).

3. This Order shall be effective on and after the date of its approval.

HARDY, HADLEY, LANDIS, SERVER, [*23] AND ZIEGNER CONCUR:

APPROVED: July 26, 2006

Submittal of Settlement Agreement

The Indiana Office of Utility Consumer Counselor (OUCC), by counsel, submits a Settlement Agreement between PSI Energy, Inc., Vectren Energy and OUCC in this cause.

Respectfully submitted,

Randall C. Helmen, Attorney No. 8275-49
Deputy Consumer Counselor for State Affairs

SETTLEMENT AGREEMENT

This Settlement Agreement, dated as of the 22nd day of March, 2006, is made and entered into by and between the duly authorized representatives of PSI Energy, Inc. ("PSI"), Southern Indiana Gas and Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc. ("Vectren") and the Office of the Utility Consumer Counselor ("OUCC"), (individually referred to as "Party" and collectively referred to as "Parties").

WITNESSETH:

WHEREAS PSI and Vectren are in the process of investigating Integrated Gasification Combined Cycle ("IGCC") technology for potential baseload generation addition to their electrical systems and believe that a study to determine the feasibility of building a standard IGCC plant in Indiana ("Study"), including but not limited to one or more front end engineering and [*24] design studies ("FEED"), is necessary prior to deciding whether proceeding with such a project ("IGCC Project") is reasonable and cost effective; and

WHEREAS on August 9, 2005, PSI and Vectren filed their joint petition with the Indiana Utility Regulatory Commission ("IURC" or "Commission"), initiating Cause No. 42894 requesting the Commission approve their continued consideration and exploration into the feasibility and cost-effectiveness of building an IGCC plant in Indiana as reasonable and prudent course of action by allowing for deferral and subsequent recovery of certain Study costs; and

WHEREAS the Parties have engaged in good faith negotiations in an effort to amicably resolve the issues presented in Cause No. 42894; and

WHEREAS subject in every particular to the conditions set forth in this Settlement Agreement, including the approval and acceptance by the Commission of this Settlement Agreement, in its entirety, without any change or condition that is unacceptable to any Party to this Settlement Agreement, and with the understanding that each and every term of this Settlement Agreement is in consideration and support of each and every other term, the Parties hereto [*25] have agreed as follows:

1. GENERAL CONDITIONS

This Settlement Agreement is expressly conditioned upon and subject to the following general conditions:

1.1 The communications and discussions had, and materials produced and exchanged, concerning this settlement all relate to offers of settlement, are privileged, without prejudice to any Party, and shall not be used for any purpose other than as part of the negotiations that led to this Settlement Agreement.

1.2 The making of this Settlement Agreement shall not constitute an admission by any Party to this Settlement Agreement.

1.3 It is understood that this Settlement Agreement is reflective of a negotiated settlement.

1.4 This Settlement Agreement shall not be used as precedent in any other proceeding or for any other purpose, except to the extent necessary to implement or enforce this Settlement Agreement.

1.5 This Settlement Agreement is conditioned upon and subject to IURC acceptance and approval in its entirety, without any change or condition that is unacceptable to any Party to this Settlement Agreement.

2. SUBSTANTIVE PROVISIONS

2.1 If the IGCC Project goes forward after the Study, PSI and Vectren [*26] acknowledge and agree that the Project will need, and they will request, Certificates of Public Convenience and Necessity ("CPCNs") from the Commission under IC 8-1-8.5 and IC 8-1-8.7, as well as related relief pursuant to IC 8-1-8.8.

2.2 While the evidence presented suggests that at this time it is reasonable for each of the Joint Petitioners to anticipate that it may have a need for additional energy resources in Indiana and that the contemplated Study is in the public interest, the findings in this Proceeding as to either Petitioners' future need for additional energy resources will not be binding in the CPCN proceeding.

2.3 If the CPCNs are granted and construction of the Project begins, 100% of the Study costs will be capitalized as a part of the Project pursuant to the provisions outlined in section 2.4 below. If Vectren drops out of the Project but PSI proceeds with the Project, PSI will capitalize all of the costs related to the Study, so long as PSI refunds Vectren's contribution to the Study.

2.4 If the IGCC Project goes forward the OUCC reserves the right to challenge the reasonableness of Study costs above $ 15 million in the CPCN proceeding, but will not challenge [*27] any lesser amount; *provided, however*, if PSI and Vectren perform a second FEED study with an alternate IGCC vendor, the OUCC will not challenge the reasonableness of any Study costs less than $ 20 million.

2.5 If the CPCNs are granted and construction of the Project does not begin, the Joint Petitioners may seek to recover the Study costs and any other appropriate costs associated with the Project and the OUCC is not obligated to support or oppose the request.

2.6 If the IGCC Project does not go forward, Joint Petitioners will be permitted to defer, for recovery in their next base rate case over a period of not more than five years, 50% of their allocated share of actual Study costs (including carrying costs of the individual Joint Petitioners' based on the weighted cost of capital calculated and updated periodically as provided in 170 IAC 4-6-1 *et. seq.*)

2.7 If the IGCC Project does not go forward, and any other entity builds an IGCC plant using the results of the Study, no Study costs will be incurred by either of the Joint Petitioners' Indiana customers.

2.8 If Vectren determines not to participate in the Project and Vectren participates in an alternative IGCC project [*28] that uses similar technology and is located within the State of Indiana for which a CPCN request is filed within 3 years of the completion of the Study, Vectren will be entitled to capitalize its share of the Study costs not otherwise reimbursed by PSI so long as Vectren obtains a CPCN for the alternative project.

2.9 PSI and Vectren will periodically provide opportunities to meet and update the OUCC with respect to the Study.

3. CONFIDENTIAL TREATMENT

3.1 The Parties agree that all pricing information presented in this Cause shall be treated as confidential information, and not subject to public disclosure pursuant to Ind. Code § § 8-1-2-29 and 5-14-3 *et seq.*

4. PROCEDURAL TERMS

4.1 The Parties will request Commission acceptance and approval of this Settlement Agreement in its entirety, without any change or condition that is unacceptable to any Party to this Settlement Agreement.

4.2 PSI and Vectren will introduce into evidence in this Cause testimony and exhibits specifically addressing and supporting the terms of this Settlement Agreement.

4.3 OUCC agrees to waive cross-examination of all witnesses in these proceedings.

4.4 The Parties will work [*29] together to finalize and file an agreed upon proposed order with the IURC as soon as possible. The Parties will support the proposed order in the proceeding and will request that the IURC issue an order promptly accepting and approving the same in accordance with its terms.

4.5 The Parties will either support or not oppose on rehearing, reconsideration and/or appeal, an IURC Order accepting and approving this Settlement Agreement in accordance with its terms, including the submission of any applicable briefs and pleadings. The Parties will also either support or not oppose the relief outlined in this Settlement Agreement in any other forum.

Agreed To And Accepted this 22nd Day of March, 2006:

PSI Energy, Inc.

By:

Office of the Utility Consumer Counselor

By:

Southern Indiana Gas and Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc.

By:

HARVARD UNIVERSITY
JOHN F. KENNEDY SCHOOL OF GOVERNMENT

Deploying IGCC in This Decade With 3Party Covenant Financing

Volume I

William G. Rosenberg, Dwight C. Alpern,
Michael R. Walker

Energy Technology Innovation Project
a joint project of the
Science, Technology and Public Policy Program
and the
Environment and Natural Resources Program
Belfer Center for Science and International Affairs

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JULY 2004

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Harvard University

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will actually be built, the data indicate a strong interest in coal power plants and suggest that if the economics and risks of IGCC are viewed as acceptable, and attractive financing is available, there will be commercial interest in IGCC deployment.

This conclusion is supported by the fact that several companies have announced plans to develop IGCC projects (although it is unlikely any of the projects will actually be built without 3Party Covenant or other government financial assistance). Excelsior Energy is working to develop a 450 MW IGCC plant in Minnesota (Mesaba Energy Project), Global Energy is working to develop a 540 MW IGCC plant in Kentucky (Kentucky Pioneer), and Clean Coal Power Resources has announced its intention to build a 2,400 MW facility in Illinois.

3.4. NGCC Re-Fueling Opportunity

A major opportunity for IGCC deployment has arisen from the impact of high natural gas prices on existing natural gas combined cycle facilities. The high prices, combined with soft electricity markets, have made many natural gas combined cycle generating plants uneconomic. Many of these facilities are now being sold, written-off, mothballed, or repossessed by banks.

For example, in May, 2004 Duke Energy announced the sale of 5,325 MW of merchant natural gas generating capacity for $475 million, or $89 per kilowatt, which is less than one-fifth of original cost. In a related matter, Duke Energy announced in January, 2004 that it was taking a $3 billion write off from 2003 earnings, in large part because of the decline in value of its natural gas generation fleet in the Southeast U.S.[121] Furthermore, a study by SAIC for DOE/NETL indicates that as of April 2004 as much as 33,000 MW of distressed merchant gas capacity was for sale.[122] The study also indicates that a number of natural gas plants have been mothballed (including a 1,100 MW NGCC plant in Hays County, Texas) and that as many as 50 GE7FA natural gas turbines are currently sitting in warehouses because the projects for which they were purchased have not gone forward.[123] Many natural gas-fired power plants are also being repossessed by lending institutions, including Citibank (4,150 MW), Societe Generale (5,550 MW) and BnP Paribas (3,400 MW).[124]

The devaluation and market availability of underutilized natural gas generation assets presents an important opportunity for early and cost-effective coal gasification refueling. The combined cycle power block associated with a NGCC power plant is essentially the same as the combined cycle power block needed for an IGCC facility. To convert an existing natural gas turbine to use synthesis gas from a coal gasifier is estimated to cost

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[121] See http://www.dukeenergy.com/news/releases/2004/jan/2004010701.asp
[122] NETL, "Potential for NGCC Plant Conversion to a Coal-Based IGCC Plant - - A Preliminary Study," May 2004.
[123] Id.
[124] Id.

only $5 million for a typical 350 MW plant, or roughly $15/kW.[125] This cost could be more than made up for by large savings associated with using a distressed NGCC facility to provide the combined cycle power block for the IGCC plant. For example, if a distressed NGCC facility is used for an IGCC refueling at 75% of its original cost ($375/kW, assuming $500/kW as the original cost) then even with the retrofit cost there is a savings of over $100/kW versus building a new power block.

Furthermore, refueling to IGCC means taking a depressed asset facing large-scale write-offs that is operating at only a fraction of its capacity and repositioning it to operate as an economical base load coal facility that operates at a high (80-90%) capacity factor. If this type of refueling were done under the 3Party Covenant, the owner also receives a regulated 11.5 percent after-tax return for the new value of the repositioned asset. The refueling potential is creating a new category of enthusiastic, potential IGCC developers. With 3Party Covenant financing, the cost of energy from the resulting plant is well below the cost of energy from a new PC plant (see Section 5.6 below).

Not all NGCC power plants are suited for IGCC refueling. SAIC's preliminary analysis for DOE estimates that as much as 12,000 MW (enough for about 20 550 MW IGCC facilities) of existing NGCC facilities may be suitable for IGCC conversion. This estimate is based on plants larger than 250 MW that appear to have coal available by railroad.[126]

3.5. IGCC Deployment Hurdles

Despite the potential benefits and commercial interest in IGCC, investments to design and build commercial IGCC power plants in the U.S. have not materialized due to financing, cost, and risk concerns. A 2004 survey by DOE indicates that the three leading risk factors perceived by industry to be associated with IGCC investments are high capital costs, excessive down time, and difficulty with financing.[127]

Most estimates suggest that the capital costs associated with a new IGCC power plant are about 20 percent higher than the cost of a new PC plant, and IGCC costs are less certain. Furthermore, unlike pulverized coal boilers, IGCC technology is not perceived to have sufficient experience and to have operating risks that are not clearly understood. The operating performance of IGCC has only been demonstrated at a handful of facilities, which have reached 80 percent availabilities, but not the 90 percent and higher availability preferred for modern commercial base load coal generation.[128]

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[125] Id.
[126] Id.
[127] See David Berg & Andrew Patterson, "IGCC Risk Framework Study," DOE Policy Office, Presentation to Gasification Technology Council, May 20, 2004.
[128] As discussed in Section 2.4 below, the incorporation of redundant gasification capacity should enable IGCC facilities to readily achieve this level of availability.

ORC Ann. § 1551.31 (2006)

§ 1551.31. Public policy of state to increase Ohio coal use

The general assembly hereby finds and declares that:

(A) Coal is one of the state's best, most abundant energy resources.

(B) In recent years the coal industry in this state has experienced economic difficulties that have resulted in a loss of jobs in that industry.

(C) Some coal users are reluctant to use coal from this state because of its high sulfur content.

(D) The increased use of Ohio coal in this state could enable the state to be more energy self-sufficient.

(E) It is therefore imperative for this state to have a strong, viable coal industry in order to create and preserve jobs and improve the economy of this state and that, in order to strengthen that industry, methods must be found to use Ohio coal in an environmentally acceptable, cost effective manner.

Accordingly, it is declared to be the public policy of the state, through operation of sections 1551.30 to 1551.35 of the Revised Code and other applicable laws and authority vested in the general asembly, to assist in the development of facilities and technologies that will lead to increased, environmentally sound use of Ohio coal.

HISTORY:

140 v H 655 (Eff 6-8-84); ◆ 148 v H 640. Eff 9-14-2000.

ORC Ann. § 1551.311 (2006)

§ 1551.311. Necessity of federal assistance to develop clean coal technology

The general assembly hereby finds and declares that the future of the Ohio coal industry lies in the development of clean coal technology and that the disproportionate economic impact on the state under Title IV of the "Clean Air Act Amendments of 1990," 104 Stat. 2584, 42 U.S.C.A. 7651, warrants maximum federal assistance to this state for such development. It is therefore imperative that the Ohio air quality development authority created under Chapter 3706. of the Revised Code, its Ohio coal development office, the Ohio coal industry, the Ohio Washington office in the office of the governor, and the state's congressional delegation make every effort to acquire any federal assistance available for the development of clean coal technology, including assisting entities eligible for grants in their acquisition. The Ohio coal development agenda required by section 1551.34 of the Revised Code shall include, in addition to the other information required by that section, a description of such efforts and a description of the current status of the development of clean coal technology in this state and elsewhere.

HISTORY:

◆ 144 v S 143. Eff 7-10-91; ◆ 150 v H 95, § 1, eff. 6-26-03.

ORC Ann. 4928.02 (2006)

§ 4928.02. State policy commencing with start of competitive retail electric service

It is the policy of this state to do the following throughout this state beginning on the starting date of competitive retail electric service:

(A) Ensure the availability to consumers of adequate, reliable, safe, efficient, nondiscriminatory, and reasonably priced retail electric service;

(B) Ensure the availability of unbundled and comparable retail electric service that provides consumers with the supplier, price, terms, conditions, and quality options they elect to meet their respective needs;

(C) Ensure diversity of electricity supplies and suppliers, by giving consumers effective choices over the selection of those supplies and suppliers and by encouraging the development of distributed and small generation facilities;

(D) Encourage innovation and market access for cost-effective supply- and demand-side retail electric service;

(E) Encourage cost-effective and efficient access to information regarding the operation of the transmission and distribution systems of electric utilities in order to promote effective customer choice of retail electric service;

(F) Recognize the continuing emergence of competitive electricity markets through the development and implementation of flexible regulatory treatment;

(G) Ensure effective competition in the provision of retail electric service by avoiding anticompetitive subsidies flowing from a noncompetitive retail electric service to a competitive retail electric service or to a product or service other than retail electric service, and vice versa;

(H) Ensure retail electric service consumers protection against unreasonable sales practices, market deficiencies, and market power;

(I) Facilitate the state's effectiveness in the global economy.

HISTORY:

♦ 148 v S 3. Eff 10-5-99.

ORC Ann. 4928.06 (2006)

§ 4928.06. Commission to ensure effectuation of state policy; rules; abuses of market power

(A) Beginning on the starting date of competitive retail electric service, the public utilities commission shall ensure that the policy specified in section 4928.02 of the Revised Code is effectuated. To the extent necessary, the commission shall adopt rules to carry out this chapter. Initial rules necessary for the commencement of the competitive retail electric service under this chapter shall be adopted within one hundred eighty days after the effective date of this section. Except as otherwise provided in this chapter, the proceedings and orders of the commission under the chapter shall be subject to and governed by Chapter 4903. of the Revised Code.

(B) If the commission determines, on or after the starting date of competitive retail electric service, that there is a decline or loss of effective competition with respect to a competitive retail electric service of an electric utility, which service was declared competitive by commission order issued pursuant to division (A) of section 4928.04 of the Revised Code, the commission shall ensure that that service is provided at compensatory, fair, and nondiscriminatory prices and terms and conditions.

(C) In addition to its authority under section 4928.04 of the Revised Code and divisions (A) and (B) of this section, the commission, on an ongoing basis, shall monitor and evaluate the provision of retail electric service in this state for the purpose of discerning any noncompetitive retail electric service that should be available on a competitive basis on or after the starting date of competitive retail electric service pursuant to a declaration in the Revised Code, and for the purpose of discerning any competitive retail electric service that is no longer subject to effective competition on or after that date. Upon such evaluation, the commission periodically shall report its findings and any recommendations for legislation to the standing committees of both houses of the general assembly that have primary jurisdiction regarding public utility legislation. Until 2008, the commission and the consumer's counsel also shall provide biennial reports to those standing committees, regarding the effectiveness of competition in the supply of competitive retail electric services in this state. In addition, until the end of all market development periods as determined by the commission under section 4928.40 of the Revised Code, those standing committees shall meet at least biennially to consider the effect on this state of electric service restructuring and to receive reports from the commission, consumers' counsel, and director of development.

(D) In determining, for purposes of division (B) or (C) of this section, whether there is effective competition in the provision of a retail electric service or reasonably available alternatives for that service, the commission shall consider factors including, but not limited to, all of the following:

(1) The number and size of alternative providers of that service;

(2) The extent to which the service is available from alternative suppliers in the relevant market;

(3) The ability of alternative suppliers to make functionally equivalent or substitute services readily available at competitive prices, terms, and conditions;

(4) Other indicators of market power, which may include market share, growth in market share, ease of entry, and the affiliation of suppliers of services.

The burden of proof shall be on any entity requesting, under division (B) or (C) of this section, a determination by the commission of the existence of or a lack of effective competition or reasonably available alternatives.

(E) (1) Beginning on the starting date of competitive retail electric service, the commission has authority under Chapters 4901. to 4909. of the Revised Code, and shall exercise that authority, to resolve abuses of market power by any electric utility that interfere with effective competition in the provision of retail electric service.

(2) In addition to the commission's authority under division (E)(1) of this section, the commission, beginning the first year after the market development period of a particular electric utility and after reasonable notice and opportunity for hearing, may take such measures within a transmission constrained area in the utility's certified territory as are necessary to ensure that retail electric generation service is provided at reasonable rates within that area. The commission may exercise this authority only upon findings that an electric utility is or has engaged in the abuse of market power and that that abuse is not adequately mitigated by rules and practices of any independent transmission entity controlling the transmission facilities. Any such measure shall be taken only to the extent necessary to protect customers in the area from the particular abuse of market power and to the extent the commission's authority is not preempted by federal law. The measure shall remain in effect until the commission, after reasonable notice and opportunity for hearing, determines that the particular abuse of market power has been mitigated.

(F) An electric utility, electric services company, electric cooperative, or governmental aggregator subject to certification under section 4928.08 of the Revised Code shall provide the commission with such information, regarding a competitive retail electric service for which it is subject to certification, as the commission considers necessary to carry out this chapter. An electric utility shall provide the commission with such information as the commission considers necessary to carry out divisions (B) to (E) of this section. The commission shall take such measures as it considers necessary to protect the confidentiality of any such information.

The commission shall require each electric utility to file with the commission on and after the starting date of competitive retail electric service an annual report of its intrastate gross receipts and sales of kilowatt hours of electricity, and shall require each electric services company, electric cooperative, and governmental aggregator subject to certification to file an annual report on and after that starting date of such receipts and sales from the provision of those retail electric services for which it is subject to certification. For the purpose of the reports, sales of kilowatt hours of electricity are deemed to occur at the meter of the retail customer.

HISTORY:

- 148 v S 3. Eff 10-5-99.