HISTORIES of the anthracite industry are filled with much fact and fiction. In accepting the assignment of surveying the history of the industry from 1769 to 1976, I realize that I am challenging some of the old myths and may possibly be creating new ones. Hopefully students will question some of the statements contained in this paper, do original research, and enrich the scholarship in this area.¹

Economic historians have divided the time span covered by this paper into three periods which are useful in examining the history of the anthracite industry. The first period, called the agrarian-mercantile age, covers the years from the colonial days to the 1850s. During this period merchants took the lead in developing the economy by investing time, energy, and money into diverse projects such as extractive industries. Certainly this was true for the anthracite trade. The second period, called the age of industrialization, dates from the 1850s to World War I. During these years the use of corporate structures permitted the emergence of big business with

¹This paper was given at the sixth Rose Hill Seminar, 18 June 1977, and is one of a series of seminar papers which will appear periodically in Pennsylvania History to provide an overview of certain neglected fields of Pennsylvanian industry and technology.

railroads serving as the pacesetter for the industrializing economy. The anthracite industry exemplifies this trend. The last period since 1914 has been called the managerial economy with big business, big labor, and big government acting as countervailing powers to make the modern capitalistic system work. These forces have shaped the nature of the anthracite industry in the twentieth century.

To show the changing nature of the anthracite industry, Simon Kuznets's concepts of size and spread have been used. According to Kuznets, economic growth has taken place due to the spread of a large number of small firms as well as the emergence of gigantic economic units. His description is accurate in so far as the growth of the anthracite industry is concerned. With the completion of the anthracite canals both types of firms existed in the anthracite region.

The date 1769 serves as the starting point in the history of Pennsylvania anthracite since it is the earliest known date when Pennsylvania hard coal was actually used in the colony. This is the date when settlers of the Susquehannah Company moved into the Wyoming Valley, and Obadiah Gore started burning Pennsylvania anthracite at his blacksmith shop in Wilkes-Barre. The key fact to remember is that as soon as settlers moved into areas near the anthracite formation, they started burning this fuel. This is true for the Schuylkill Valley in 1784 and the upper Lehigh Valley the next year.

Early accounts tracing the origins of the Pennsylvania anthracite industry overlook the fact that hard coal had been burned in Great Britain for at least two centuries prior to the arrival of William Penn. Scotland, South Wales, and Ireland all had anthracite deposits which were providing fuel for the British Isles as well as being shipped overseas as ballast. The coal of Kilkenny, Ireland, closely resembled

2. These time periods have been illustrated nicely in Alfred D. Chandler, Jr., et al., The Changing Economic Order: Readings in American Business and Economic History (New York: Harcourt, Brace and World, Inc., 1968).
that of northeastern Pennsylvania, and according to the United States customs records, Kilkenny coal arrived regularly in the port of Philadelphia from 1790 to 1812. It may be assumed that this coal came into Philadelphia as ballast throughout the colonial period, and its value was known to a number of merchants and colonial craftsmen. A part of the colonial heritage was a knowledge of British anthracite and its value in making certain products.

While local residents in the anthracite region burned hard coal in homes and shops prior to 1812, Philadelphia looked to Great Britain and Virginia for its coal supply. However, the War of 1812 created Philadelphia's first fuel crisis and started the movement to inaugurate the Pennsylvania anthracite trade on an extensive scale. Rapid urbanization, the growth of a large class of craftsmen, and the British blockade of Delaware Bay forced the price of coal in March and April of 1813 to increase from $.30 a bushel to above $1.00 per bushel. Threatened by a severe shortage of coal, in April, 1813, the city's craftsmen created the Mutual Assistance Coal Company of Philadelphia to explore for coal near their city as well as look into the possibility of bringing anthracite more than 100 miles from northeastern Pennsylvania.

A number of merchants and other residents in northeastern Pennsylvania also responded to Philadelphia's first fuel crisis as they learned about the sharp increase in the price of coal. The extremely high price would more than pay them to take wagon loads of anthracite to Philadelphia as well as send ark loads of hard coal to the urban market on the spring and fall freshets. Their endeavors are recorded in the early folklore of the industry.

The most complete set of records involving these early anthracite pioneers concerns Jacob Cist. Born and raised in Philadelphia, his father had played a leading role in attempting to promote the Lehigh Coal Mine Company in the 1790s. Jacob Cist was aware of Philadelphia's dependence on coal in its craft shops and took advantage of that need. By the time he married the daughter of the richest merchant in northeastern Pennsylvania in 1807, he recognized the value of anthracite for developing the region's economy and its potential impact on the growth of the Atlantic seaboard


cities. The next year he moved to Wilkes-Barre to become the junior partner in Matthias Holleyback's mercantile firm as well as develop the Pennsylvania anthracite trade. Between the War of 1812 and Cist's death in 1825, his entrepreneurial endeavors established a market for Pennsylvania anthracite among Philadelphia's craftsmen. To achieve this goal, he convinced Philadelphia's coal merchants to handle his type of fuel, mapped the extent of the Pennsylvania anthracite formation in order to attract capital investment, and helped persuade capitalists and politicians to finance and construct the Lehigh Coal and Navigation Company and the North Branch Canal of the Pennsylvania public works. By the time of his death, Cist was recognized as one of the foremost experts in the nation on the subject of Pennsylvania anthracite. Yet he did not stand alone. Many others had also become involved in the movement to initiate the Pennsylvania anthracite trade.

Jacob Cist and other merchant politicians recognized that the most important bottleneck in getting anthracite to the rapidly expanding urban market involved transportation facilities. What means of transportation would be used, who would pay for the cost of construction, and what privileges each company would exercise became issues during the legislative debates to create the anthracite transporting companies. While Cist projected an anthracite-carrying railroad from Wilkes-Barre to New York in 1825, most merchants settled upon the anthracite tidewater canals. In England coal canals had proved highly profitable. Anticipating similar profits, most merchants willingly underwrote the major cost of constructing these canals with a limited amount of financial aid from the Commonwealth.

Of the six anthracite canals in Pennsylvania, only two were owned and operated by the state: The Delaware Division Canal and the North Branch Canal. Each cost the state just over $1.5 million to construct. During nearly thirty years of operation by the state, the amount of revenue they earned exceeded the amount spent to operate them. When the cost of construction is considered, the Delaware Division Canal more than paid for the original investment while the North Branch Canal just about broke even.


ANTHRACITE INDUSTRY

The four privately owned and operated anthracite canals in Pennsylvania were the Schuylkill Navigation Company, the Lehigh Coal and Navigation Company, the Delaware and Hudson Canal Company, and the Union Canal Company. Chester Lloyd Jones in *The Economic History of the Anthracite-Tidewater Canals* excludes the Union Canal Company, but there is substantial evidence that it belongs to this group. While its main line went from Middletown to Reading, the feeder tapped the western end of the southern field. Promotional literature in the 1820s gave as one of the most important reasons for its completion that it would open up mines in this region. Two years after its feeder reached Pine Grove in 1833, anthracite made up the largest amount of tonnage carried by the canal, producing one-third of the total tonnage carried in the 1840s. The other canals were designed primarily to carry hard coal.

The leadership for these canals consisted of merchants and capitalists in Philadelphia and New York. Their presidents ranked among the most wealthy and prominent merchants in these cities. Cadwalader Evans, Jr., headed the Schuylkill Navigation Company from 1815 until its completion in 1825. John Cox and then Jonathan Fell as presidents of the Lehigh Coal and Navigation Company made sure that their company received sufficient financial backing. Joseph Watson and Samuel Mifflin led the Union Canal Company in acquiring the necessary capital for its construction. Likewise, Philip Hone and John Bolton of New York City raised the money for constructing the Delaware and Hudson Canal Company. When these men tenured their resignations, other major merchants and financiers stepped into their shoes to assure strong leadership for these anthracite canals until the 1850s. The names of the men who served as presidents and managers of these companies read like a list of who's who among American men of finance during these decades.

Pennsylvania's anthracite canals ranked among the most heavily capitalized privately owned corporations in the nation prior to 1850. Their initial cost of construction exceeded the figure stated in their articles of incorporation, and during subsequent decades they all spent additional large amounts of money to expand facilities in order

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to accommodate the rapidly growing anthracite trade. For example, the Schuylkill Navigation Company initially spent over $2 million, and by 1855 its capitalization reached nearly $11 million. It had expanded facilities for handling boats of 25-ton capacity in 1830 to boats of 150-ton capacity by 1850. Starting in the 1830s, it also ran twenty-four-hour service.\textsuperscript{14} The investment paid off. Within four years of opening, it paid the first dividend of seven percent and in 1837 yielded the maximum amount allowed in its charter of twenty-five percent annually. Prior to the advent of the Reading Railroad in 1842, the Schuylkill Navigation Company averaged an annual dividend of thirteen percent.\textsuperscript{15} Even if the other anthracite canals did not earn as much profit as the Schuylkill Navigation Company, they showed a similar pattern of capital investment, expansion of physical facilities, and payment of dividends. Taking into consideration the North Branch Canal, these transportation facilities helped open up all four major anthracite formations. Their trade was augmented by the Reading Railroad after 1842 which showed a similar growth pattern.

Two of the six anthracite canals, the Delaware and Hudson Canal Company and the Lehigh Coal and Navigation Company, were from the very beginning vertically integrated corporations. Unlike the Schuylkill Navigation Company which could only provide transportation facilities, the D&H and the LC&NC had the corporate powers to own coal estates, rail facilities, and coal boats as well as mine, transport, and sell their own coal. They both owned extensive tracts of coal land, and initially both companies quarried coal from large outcrops at Summit Hill and Carbondale. By 1850 they had expanded their mining operations and produced in the neighborhood of 400,000 tons.\textsuperscript{16} They were the two largest mining companies in the anthracite region by the end of this period.

Auxiliary railways went from the mines to the heads of these canals, permitting coal merchants to ship a large amount of anthracite to market. By 1832 six railways fed the Schuylkill Navigation Company at the center of the southern anthracite field, and they were financed and managed by the same merchants who backed the canal company. Five of the six could only carry coal, but the Little Schuylkill Navigation, Railroad and Coal Company obtained the privileges for vertical integration. Running twenty-eight miles from Port Clinton to Tamaqua, this company acquired a sizeable coal estate, increased its capitalization from $250,000 to over $2 million, and by 1850 shipped over 200,000 tons of anthracite to market. It ranked as the third largest coal company in the region.

Between 1827 and 1841 canal companies and individual merchants constructed sixteen additional railways in the region to feed the waterways. Five belonged to the previously mentioned canal companies while the rest connected the four major anthracite formations with canals. The Beaver Meadows Railroad and the Hazleton Railroad, in addition to several small auxiliaries, opened the middle eastern field to the Lehigh coal trade. In 1840 the LC&NC completed the Lehigh and Susquehanna Railroad from its terminal point at White Haven into the Wyoming Valley, bringing that region's rich anthracite deposits within the orbit of the Lehigh trade. To the west the Lykens Valley Railroad tapped the western end of the southern field while the Danville and Pottsville Railroad opened the Shamokin district. The canals and railways permitted the spread of mining into every major district by 1850.

The same capitalists who financed the canals and railways also constructed mining towns to house workers for extracting coal as well as servicing the industry. Wilkes-Barre was the only village in the region prior to the advent of the trade, but by 1850 mining towns spread across all four anthracite districts. The most heavily populated field, the southern district, had Mauch Chunk, Summit Hill, Lansford, Nesquehoning, Tamaqua, New Philadelphia, Port Carbon, St. Clair, Pottsville, Minersville, Higgins, Donaldson, and Lykens. Beaver Meadows, Hazleton, and Shamokin dotted the two middle fields, and Carbondale, Scranton, Pittston, Wilkes-Barre, Plymouth, and Nanticoke became the major mining towns in the northern field.

Most of these towns resembled coal mining camps rather than urban centers with a diversity of economic activity servicing the industry. Only Pottsville, Mauch Chunk, Wilkes-Barre, and perhaps Carbondale can be classified as urban centers. Take Pottsville for example. Between 1825 and 1830 it became a prosperous boom town with a diversity of stores, shops, hotels, and newly erected houses. In addition, it contained boatbuilding facilities, coal wharves, and several mining sites. As production increased, a leading steam engine manufacturer located here. From its beginning in 1825, the Pottsville Miners Journal became the voice of the anthracite trade. Magazines across the country reprinted articles from this newspaper. In 1832 the leading anthracite producers of the area formed the Schuylkill County Board of Trade to promote their special interests and located its headquarters in Pottsville. By 1850 Pottsville, with a population of over 7,500, had become the largest mining town in the anthracite region and the leading urban center for promoting the Schuylkill coal trade.

Initially coal mining was extremely simple. Miners dug large chunks of anthracite from outcrops located near the transportation facilities. The greatest number of small mines were located in the Wyoming Valley and around Pottsville. Between 1825 and 1835 there were about 130 miners in the Pottsville area with 90 percent of them producing less than 5,000 tons a year. At the end of this decade ten firms exceeded the 10,000-ton mark, the largest producing just over 30,000 tons. During the next fifteen years the total number of firms increased to 190, and the annual output also showed significant growth. Twelve had achieved the contemporary criterion set by the Commonwealth of Pennsylvania for large scale production of 50,000 tons a year. Unfortunately, statistics do not exist for the Wyoming Valley, but evidence indicates a similar pattern.

An 1852 summary of Schuylkill County coal operators reported 111 collieries in production with 62 operating above water level and 49 below water level. They employed 122 miles of underground railways and 210 steam engines to get coal as well as water out of the mines. While most of the coal came out of slopes dug into the

20. Hazard's Register of Pennsylvania, 13 (1834): 260-272; Schuylkill County Board of Trade, Annual Reports, 1834-1850.
mountain side, one shaft went over 1,000 feet deep. The mines employed nearly 10,000 men, 500 horses, and over 500 mules. In addition to privately owned homes, the companies had constructed over 2,750 houses for their workers. The capital invested in one-third of each of these collieries ranged from $50,000 to $100,000, and the report estimated that the total amount of money involved in the Schuylkill County coal industry, excluding the cost of land, came to nearly $3.5 million. This report showed that by 1850 mining conditions in Schuylkill County were starting to resemble the dominant features of the anthracite industry for the rest of the century.

According to the commonly used statistical table, anthracite production increased annually every year from 1820 to 1850 except for 1834. Starting with 365 tons in 1820, by the end of the first decade production had passed 100,000 tons a year, within another twelve years had reached the one million-ton a year mark, and exceeded three million tons in 1850. It was one of the fastest growing industries in the country. The abundance of anthracite flooding the eastern urban markets had more than cut the price of Schuylkill coal by one-half in two decades, dropping from nearly $7.50 a ton in 1829 to just over $3.50 per ton by 1850.

During these decades the eastern urban market converted from using wood to burning Pennsylvania anthracite as its chief source of fuel. Two scholarly publications are worth reading regarding the consumption of Pennsylvania hard coal during these years: Frederick M. Binder's *Coal Age Empire* and Alfred D. Chandler's "Anthracite Coal and the Beginnings of the Industrial Revolution in the United States." Binder's book stresses the technological innovations which made possible the burning of hard coal in homes, iron production, steam engines, steam boats, and locomotives. Chandler's article places the use of Pennsylvania anthracite in the broader context of its impact on American economic growth. Neither assigns the percentage of hard coal used for each purpose, but the primary evidence indicates that more than fifty percent went for heating

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23. Ibid., 781.

The second period, dating from 1850 to World War I, has received the most attention, at least in terms of anthracite production. In addition to the two books mentioned in footnote one, Jules Bogen, *The Anthracite Railroads*, and Marvin Schlegal, *Ruler of the Reading: The Life of Franklin B. Gowen*, have stressed the dominant role of the railroads. Labor's side of the story has been told repeatedly in novels and scholarly monographs with a disproportionate amount of attention going to the Molly Maguires.

Eleven railroads entered the region to carry anthracite either east to Philadelphia, New York, and New England, or west to the Great Lakes. One-half of them had mining privileges as well as the right to take hard coal to market. The coal-producing railroads included the Central Railroad of New Jersey, the Delaware and Hudson, the Delaware, Lackawanna and Western, the Lehigh Valley, and the Reading. Not only did they mine the largest amount of coal, they also carried the greatest percentage to market. Those railroads restricted to carrying anthracite included the Delaware, Susquehanna and Schuylkill; the Erie; the Lehigh and New England; the New York, Ontario and Western; the New York, Susquehanna and Western; and the Pennsylvania. The latter railroads generally had special contracts with certain companies to ship their coal. The Pennsylvania Railroad, for example, leased at least two hard coal companies to get its anthracite from the Lykens Valley, Shamokin, and Nanticoke areas.

These railroads served as pacesetters for increasing production in the region from just over three million tons in 1850 to the high point of 100 million tons in 1917. They permitted the extensive spread of mining into all four districts as well as intensive output per colliery. To a major extent they influenced the anthracite region. But the stereotype that they dominated the industry needs qualification. They never had complete control which is the myth created by Bogen and others.

Much has been made about the amount of land the railroads owned. Fearing competition among each other, the five big land-owning railroads purchased large coal estates during the decade following the Civil War. Rounding off the figures given by Bogen,
the Reading owned 65,000 acres, the Lehigh Valley purchased 32,000 acres, the Delaware, Lackawanna and Western came in third with 25,000 acres, the Central Railroad of New Jersey took fourth place with 21,000 acres, and the Delaware and Hudson had 5,500 acres. The total of these figures comes to just over 150,000 acres or only about 50 percent of the total anthracite acreage.

The railroad to exert the greatest influence was the Reading which dominated the southern field west of Tamaqua because no other railroad competed with it in that region. In 1870 it leased the Schuylkill Navigation Company for a period of 999 years which ended any rivalry with waterways in this area. The Reading also picked up sizeable estates in the middle western field, giving it control of the Schuylkill coal trade. But the Lehigh Valley Railroad secured nearly 17,000 acres of coal land in the narrow valley which formed the middle western field, making it a formidable rival to the Reading. For example, the largest coal producer in Mahanoy City had the tracks of the Reading running along one side of his colliery while the tracks of the Lehigh Valley went along the other side. Like independent operators in other fields, he could play one railroad off against the other for the best price to transport his coal to market. One of the leading students of the Reading’s history states that this railroad was never the monolithic giant portrayed by scholarly literature.

The middle eastern and northern fields had the greatest amount of rail competition, and from 1870 to 1920 the northern field produced more than 50 percent of the anthracite mined each year. Every railroad except the Reading entered the Wyoming Valley where the best mining conditions existed. The broad relatively flat valley permitted mining on the level instead of at 45° or more as in the mountainous valleys to the south. Of course some collieries in the Wyoming Valley located along the mountain sides mined at similar pitches. The broad plateau in the Hazleton area also allowed for fairly easy mining.

29. Conversation with Hugh Gibb, archivist, at Eleutherian Mills Historical Library where the records of the Reading Railroad are now being acquisitioned for scholarly use.
In 1917 four railroads mined nearly 50 percent of the total output. The Reading accounted for fifteen million tons while the D&H, the DL&W, and the Lehigh Valley each mined about ten million tons. Eleven independent companies such as Coxe Brothers, the Kingston Coal Company, the Lehigh and Wilkes-Barre Coal Company, and G. B. Markle each exceeded one million tons. Thirty-five of 128 companies in existence produced more than 300,000 tons, making up ninety percent of the total output. Altogether there were over 700 mines with more than one-third of them being located in Luzerne County.  

If a company had prime coal land, it did not take a large amount of acreage to exceed 300,000 tons a year. For example, the Nottingham Colliery of the Lehigh and Wilkes-Barre Coal Company near Plymouth was cited as a model colliery by The Coal Trade. Its property covered nearly 1,000 acres of excellent coal land. In 1868 the company had sunk a shaft down 365 feet to a 21-foot thick red ash vein, which pitched at ten degrees. From the same shaft it worked a nearly level seven-foot-thick vein 250 feet below the surface. It also had driven a slope along the pitch of the red ash vein and a 600-foot tunnel into the mountain side. By 1888 twenty-one boilers of large capacity furnished the motive power, driving two 24-foot ventilating fans, pumping nearly 10,000 tons of water out of the mine daily, and hoisting over 1,000 mine cars of two-ton capacity out of the ground every ten hours to the top of the breaker. The company employed 740 men and 90 mules inside the mine and about one-half that number of men above ground.  

Nearly twenty different types of jobs required workers, employing males from age six until they were no longer able to work. Young boys of six could open doors to keep the air circulating properly within the mine or they could serve as messenger boys for the superintendent and foremen. Within another year or two they would be driving mules which next to mining occupied the greatest amount of underground labor; or they would be picking slate, the job which required the greatest amount of child labor above ground. It is interesting to note that the number of boys required to drive mules always exceeded the number of slate pickers. Just about every skilled worker such as a blacksmith, carpenter, electrician, machinist, pumpman, and trackman required young assistants as helpers who

most often served as apprentices to these trades. Pictures showing child labor as slate pickers in the breakers have created a stereotype which needs to be changed, considering the great variety of jobs for child labor around mines. Because of the diversity and complexity of jobs required to run a successful heavily capitalized mining company, it is little wonder that a few enlightened coal barons established such educational institutions as the Mining and Mechanical Institute at Freeland, Lafayette College, and Lehigh University or put pressure on the state legislature to aid Penn State.

As the annual output grew just about every year from 1850 to 1917, the cost of deep mining increased. One of the deepest shafts, located near Pottsville, went nearly 1,700 feet below the surface. Using the pillar and breast method, miners removed about 50 percent of the coal from a seam. To take out as much coal as possible, some of the better managed mines in the Wyoming Valley by 1900 were carting the culm back into the mines to prop up the roof so that nearly all the coal in a seam could be mined.

The danger facing miners was constant. Gas and water in the mines created many problems. The type of gas in a mine directly affected production. Fire-damp caused explosions, and black-damp suffocation. A well ventilated mine with ample oxygen reaching the miners could increase output by as much as 100 percent. Mine foremen as well as state inspectors went through the tunnels and chambers using safety equipment to measure the amount of oxygen and other gases in the air. Expensive fans and other equipment kept air circulating in the mines, bringing fresh air in from above ground and pushing gases out of the chambers.

The cost of pumping water increased as the mines went deeper. In 1910 the editor of The Coal Trade reported that many mines removed twenty-eight times as much water as coal from a shaft. One Scranton colliery pumped three million gallons of water a day from its mine, and John Markle drove a three-mile tunnel down through solid rock in the Hazleton area in order to drain his mines naturally into Nescopeck Creek. As mines continued to extend both laterally and vertically, the cost of pumping water to keep them operating increased.

32. Pennsylvania, Department of Mines, Annual Reports, 1903–1920, Table A.
34. Pennsylvania, Department of Mines, Annual Report 1871, 1747.
ANTHRACITE INDUSTRY

While anthracite mines needed expensive machinery to pump water and circulate air, the actual job of mining depended upon a large body of man power with very crude tools. The contour of the hard coal seams with steep pitches and numerous faults prevented using sophisticated equipment to mine coal. In their back-breaking work, miners used crude hand-powered drills, blasting powder or quick lime, sledges, picks, and shovels. Of more than 110,000 men working underground in 1917, two-thirds of them were miners and their helpers. They accounted for the 100 million tons produced that year. They each produced about ten tons of coal a day.

According to *The Coal Trade*, the job of preparing anthracite for market in the breakers was a separate operation from mining coal. This journal called the breakers anthracite factories. They removed slate, "bone", rock, and dirt from the coal. In addition, starting in the 1860s they began breaking down coal into various sizes for the market until by 1910 eight distinct sizes existed: grate, egg, stove, nut, pea, buckwheat, rice, and barley. In 1915 *The Coal Trade* reported 300 breakers in the anthracite region. While their average cost came to $200,000, some of the more elaborate ones constructed of steel and concrete ranged from $300,000 to $500,000. To operate them, electricity had started to replace steam power as was also the case in running mining equipment.

Starting in 1889 anthracite breakers began reclaiming useable coal from culm banks. More sophisticated machinery in the breakers permitted saving valuable fuel which once went to the dump heap. By 1920 over twenty percent of the hard coal shipped to market came from culm banks.

While several support industries were established in the region to aid coal production, the anthracite industry employed the greatest number of men. The Pennsylvania department of mines reported an increase of from 35,000 men and boys in 1870 to a high point of just over 180,000 employees in 1914. Unlike England, no women worked in the mines or breakers. Producing iron equipment such as pumps and fans for the mines, machinery for the breakers, and railroad equipment for the coal companies sustained a number of iron

companies such as the Vulcan Iron Works and the Hazard Manufacturing Company in Wilkes-Barre as well as the Lackawanna Coal and Iron Company in Scranton. These three ranked among the largest producers of mining equipment during this period. There were several large breweries furnishing the miners' favorite beverage as well as textile mills where women and girls worked to supplement the family income. The larger anthracite towns and cities sustained a multitude of occupations.

Next to Philadelphia and Pittsburgh, the anthracite region had the third greatest density of population in Pennsylvania. From 1870 to 1920 Luzerne County contained the third largest population in the state while Lackawanna and Schuylkill counties ranked among the top six. By 1920 there were twelve mining towns with a population between 5,000 and 10,000, and sixteen exceeded a population of 10,000 with Wilkes-Barre and Scranton having a population of 73,000 and 137,000 respectively. During the decades after the Civil War every one of these towns and cities grew rapidly as anthracite production became the dominant industry in the area.  

In addition to mining their own coal in these towns and cities, the anthracite railroads cooperated with independent producers who formed a strong trade association in order to maximize distribution. From its establishment in 1869 through the 1930s The Coal Trade gave a rough statistical estimate of where anthracite was consumed. About ten percent of the total output was used at the mines to keep steam engines running day and night. The anthracite railroads consumed an additional ten percent of the annual production in their locomotives to get the coal to market. The railroads distributed better than fifty percent of the total production to the areas they served in eastern Pennsylvania, New York, and New Jersey. They constructed large port facilities opposite New York City and along the Delaware River in Philadelphia so that the New England states could receive fifteen percent of the output. From these ports the railroads also sent about three percent annually to the southern states. The port of Philadelphia even sent anthracite as ballast to Latin American ports and San Francisco. Buffalo became the great anthracite port on the Great Lakes so that better than ten percent could be sent west to the rapidly industrializing Great Lake cities as well as the western states. The anthracite railroads used several Great Lake ports to ship about three percent of the total output

More than forty cities in twenty-five states consumed Pennsylvania anthracite. They ranked among the largest cities in the country as the United States turned from an agrarian to an urban industrial nation.

To market anthracite, the railroads owned and operated a large number of coastal vessels and Great Lake freighters. The most coastal vessels belonged to the Reading Railroad. In 1910 the Reading reported owning 108 sea barges with a capacity for carrying over 75,000 tons of coal. Interestingly, the Reading handled a greater volume of bituminous coal than anthracite after that year. Most of the Reading’s hard coal went to the Great Lakes via the Lehigh Valley Railroad which owned and operated the greatest number of Great Lake freighters.

Both the railroads and the big independent mining companies established coal yards in major cities such as Boston, New York, Philadelphia, Buffalo, and Chicago to sell anthracite to consumers. Of the twelve anthracite dealers in Chicago in 1889, for example, five numbered among the major hard coal mining companies in Pennsylvania. In order of importance as far as volume was concerned, they included the Lehigh Valley Coal Company, the Delaware and Hudson Canal Company, the Pennsylvania Coal Company, Coxe Brothers and Company, and the Lehigh and Franklin Coal Company.

From mining anthracite to selling coal in cities across the United States, Pennsylvania’s hard coal companies had become vertically integrated corporations. Even though the anthracite railroads owned less miles of track than the major trunk lines and the transcontinental railroads, they ranked among the most heavily capitalized railroads in the country due to their policy of vertical integration. In 1907 just about every one of the anthracite railroads was capitalized above $50 million with the Reading being the sixth most heavily capitalized railroad in the country.

44. Seward, The Coal Trade 1889, 51.
Consumption of anthracite in the period from 1850 to World War I changed significantly. At the beginning of the period hard coal consumption was diversified. While urban homes along the Atlantic seacoast burned the greatest amount, it was also used extensively for smelting pig iron. Between 1855 and 1870 anthracite smelted more than fifty percent of the iron produced in the United States. As coke became a more efficient fuel for smelting pig iron, the percentage produced by anthracite dropped off until by 1910 only two percent was made by hard coal.\(^4\) Even in the decades from 1850 to 1880 smelting iron ore with anthracite never consumed more than ten percent of the total hard coal output.

In 1889 *The Coal Trade* reported that Pennsylvania hard coal was used almost entirely as a domestic fuel. While anthracite production had exceeded soft coal production until after the Civil War, by 1889 twice as much bituminous coal was mined as anthracite.\(^47\) The high cost of mining and transporting anthracite long distances made it a much more expensive fuel than bituminous coal except in Buffalo, New York City, Philadelphia, and the hard coal region. Because of the cost factor industrialists bought soft coal to operate their factories. However, sulphur in soft coal made it repugnant to home owners who preferred to pay four or five dollars more per ton for the luxury of anthracite.\(^48\)

It is difficult to determine just how much anthracite an urban household consumed. Climatic conditions cut down on consumption in the South while the long cold winters in the Northeast and Great Lakes regions raised the demand. Chambers of Commerce reported the amount of anthracite and bituminous coal received in their cities each year. The heavy concentration of population in New York, New Jersey, and eastern Pennsylvania account for these states receiving about fifty percent of the total production. The statistics show that in the major northern cities households burned about one ton per person annually during the period from 1850 to 1910. Anthracite became the major household fuel for urbanizing America during these decades.

The managerial period from World War I to the present has seen the decline of anthracite output from the high point of 100 million

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tons in 1917 to just over six million tons in 1976. During this period significant structural changes have taken place in the industry with the emergence of big government, big labor, and the continuation of a handful of big anthracite mining corporations. The criterion for a large-scale hard coal producer in 1970 had dropped to 50,000 tons a year. Thirty-one of a total of 338 companies met that criterion, producing nearly eighty percent of that year's output. The Reading Anthracite Company still led production with just over one million tons, followed by Lehigh Valley Anthracite, Inc., and Blue Coal Corporation, successor to the DL&W. 49

The first significant structural change in the hard coal industry came with the anthracite strike of 1902. Granted that the Commonwealth of Pennsylvania had passed legislation for inspectors as early as 1869 to improve mine safety and the federal government had investigated labor conditions in the region several times during the last decades of the nineteenth century, it was the anthracite strike of 1902 which for the first time created conditions whereby the federal government backed the emergence of a strong labor union in the anthracite industry. 50 The United Mine Workers had organized in 1897. When Mark Hanna intervened three years later to settle a strike so that it would not become a political issue, the labor leaders mistook his action as a cue to push unionization. After another strike had lasted for nearly two months in 1902, Father John Curran persuaded President Theodore Roosevelt to visit Wilkes-Barre and look over the situation. Roosevelt talked with the labor leaders and coal barons and helped settle the strike by setting up the Anthracite Board of Conciliation. By appointing Father Curran to the board, Roosevelt swung the balance of power in favor of the mine workers and union. Even though the coal companies refused to officially recognize the United Mine Workers until 1920, they negotiated 3-year contracts with the union officials in the years after 1902.

Meanwhile the Anthracite Board of Conciliation continued to exist, settling labor industrial disputes and even putting an end to the abortive attempt of the United Anthracite Miners of Pennsylvania to form a separate union in the region in the 1930s when the UMW proved under the leadership of John L. Lewis to favor

bituminous coal miners over anthracite miners. In the anthracite region this resentment against the UMW lasts until today since soft coal miners receive over three times the amount of pension funds from the union as do hard coal miners. Still the UMW remains unchallenged as the representative of anthracite miners in negotiating contracts with the coal companies to the present day.\textsuperscript{51}

The second significant structural change came in 1906 when the federal government enacted the Hepburn Act. One provision of this act forbade railroads from owning and operating mining companies. The Interstate Commerce Commission received the responsibility of making sure that the anthracite railroads obeyed this law. Since the Lehigh Valley and the Reading companies were already holding companies, they were not affected. After much litigation the Supreme Court upheld the law as constitutional, forcing the other anthracite railroads to establish separate coal mining companies. In 1917 the Delaware and Hudson Company set up the Hudson Coal Company, and three years later the DL&W turned over its coal operation to the Glen Alden Coal Company.

The changing nature of the economy and society in the twentieth century has called for enlarging the role of state and federal agencies in the region. In 1903 the Pennsylvania legislature created the department of mines as a separate entity. Formerly the department had been a part of the department of internal affairs. The new department assumed greater responsibility for mine safety in the region, established offices in Pottsville and Wilkes-Barre, and enlarged its staff. With the decline of anthracite production after World War II and the demand for greater protection of the environment in the 1960s the old department of mines was made a part of the newly created department of environmental resources. In addition to maintaining high safety standards in the deep mines, the new department assumed responsibility for stream pollution, air pollution, fires in culm banks, and mine subsidence. In 1973, for example, Pennsylvania paid out over $2.5 million to protect the environment in the anthracite region.\textsuperscript{52} These projects resulted from previous devastation left from mining hard coal.

\textsuperscript{51} For this information I would like to thank J. R. Sperry of Bloomsburg State College who has done extensive research in this area.

\textsuperscript{52} Franklin Cooper, \textit{Mineral Industry of Pennsylvania in 1973} (Harrisburg: state printer, 1976), 7.
Likewise, the federal government has expanded its activity in the region. In 1910 the federal government established the United States Bureau of Mines. During World War I this bureau published a series of pamphlets on all phases of mining conditions. In addition to the U.S. Bureau of Mines, by the 1970s at least five more federal agencies had been created, all affecting some phase of coal production in the region. They include the Federal Coal Mine Safety Review Board, the Federal Environmental Protection Agency, the Federal Power Commission, the Manpower Development and Training Program, and the Office of Coal Research. Needless to say, a discussion of each of these agencies and their powers would be too long for the purposes of this paper, but someone needs to do research and write at least a scholarly article showing their effect on the anthracite industry.

Finally the production of anthracite has changed significantly since World War I. From 1910 to the end of World War I the greatest amount of hard coal was deep mined. In 1959 the Knox Mine disaster near Pittston signaled the end of deep mining in the northern field as tons of water from the Susquehanna River rushed through a hole in the river bottom which could not be plugged. By 1974 there were only 80 deep mines still operating, but they produced ten percent of the total output. And these mines still used the old nineteenth-century methods of pick and shovel to take out anthracite instead of the modern equipment adopted in the bituminous coal industry.

Strip mining in the anthracite region became practical with the advent of motorized vehicles. While strip mining goes back to the turn of the twentieth century, it was not done extensively until the 1920s. The early steam shovels went along the top of the mountain side where the anthracite outcropped. As deep mining became more expensive and steam shovels more powerful, strip mining changed. In areas where the seams came fairly close to the surface, drag lines could remove the overburden, and then steam shovels could load coal into trucks or railroad cars to be hauled to breakers for processing. By 1968 gigantic diesel-powered shovels removed from 50 to 100 feet of top surface to get down to the coal seams. In 1974

53. I would like to thank John N. Hoffman of the Smithsonian Institution for discussing the role of each of these agencies with me.
ninety percent of the total output of over six million tons came from eighty-four strip mining firms.\(^5\)

Anthracite production remained fairly high above fifty million tons annually until the 1950s, giving employment to more than eighty thousand men a year. The prosperous years after World War II made many Americans desire a cleaner type of fuel to heat homes and cook food. During the years after 1945 Americans started buying oil burners and gas furnaces in mass quantity, and in the 1960s electric heat became popular. Consequently, anthracite lost ground rapidly as the major source of fuel for heating homes. The advent of diesel engines to pull trains after World War II also robbed anthracite producers of one of their traditional markets in the region, and the collieries burned very little hard coal.

In the 1970s hard coal production hit the bottom even though over fifty percent of the total output still went for residential and commercial heating. One report in 1973 noted fifty percent was used for space heating, twenty-five percent went to public utilities, thirteen percent for steel production when mixed with metallurgical bituminous coke, and the remainder for other industrial customers. The Sunbury plant of Pennsylvania Power and Light was the largest public utility to burn anthracite.\(^5\)

United Gas Improvement Company owned its own mine from which it furnished fuel to its Hunlock Creek plant, and in 1973 this company ranked tenth among the largest hard coal mining companies, producing just under 250,000 tons.\(^5\) Electric utilities had taken up some of the slack in the market lost to the home owners.

The fuel crisis of 1973 raised many questions about the future of the anthracite industry, and to date three conferences have been held to discuss the major problems confronting the industry. Governor Shapp called the first conference to meet in Pottsville in 1973. The second conference, held at the University of Scranton in January, 1975, proved more fruitful. As reported in Coal Age, coal producers as well as state and federal officials generally agreed that seven major problems restricted the expansion of hard coal production.\(^5\)

\(^{56}\) Pennsylvania, Department of Environmental Resources, Annual Report 1974, 78.

\(^{57}\) "Many Problems Hobble Appalachia's Anthracite Producers," Coal Age, 80 (Mid-May 1975): 300-302.


\(^{59}\) "Many Problems Hobble Appalachia's Anthracite Producers," Coal Age, 80 (Mid-May 1975): 300-301.
The first problem concerned the lack of significant research into the development of new markets. Many observers felt that the potential rested strictly in the area of gasification, but to date scientists at such institutions as Penn State have failed to come up with an efficient process of turning a large amount of anthracite into gas for America's energy needs. The large BTU market in the northeastern section of the country should be an adequate incentive to invest time and money to perfect this technology.

In response to this problem the third conference on 6–8 April 1976 had an official of Pennsylvania Power and Light Company give the keynote address. He said that PP&L supplied twenty-nine counties and 2.4 million people in Pennsylvania with electric service. In 1975 ninety-two percent of the company's energy came from coal-fired power stations. They burned eleven million tons of coal, and only ten percent was anthracite. To him the major problem dealt with increasing anthracite output.

In 1974 Pennsylvania still had an abundant reserve of anthracite. One professor at Penn State estimated that sixteen billion tons remained underground and that some of the older culm banks contained as much as fifteen to twenty percent of recoverable coal. At the Scranton conference experts separated the underground reserves into three categories. They said that twenty-five percent of the reserves could be taken by present-day methods of strip mining. This coal would be the easiest to acquire. Of the remaining reserves ten percent remained above the water table and sixty-five percent below the water table. To take out most of the reserves would require deep mining. The southern field had the greatest tonnage of coal to be mined in the future.

Most of the attention at the Scranton conference focused on increasing production. For both the strip mining operator and the deep mining firm the added costs required by federal and state legislation caused major problems. In this area the greatest expense for strip miners involved land reclamation. Deep mining companies faced new health and safety regulations. All these regulations would substantially increase the expense of mining anthracite.

60. Ibid.
While increasing labor costs bothered both the strip mining and deep mining operators, the most critical shortage for the deep mining firms was the small labor force. Young men in the region in ever increasing numbers refused to spend their lives in the deep mines. Efforts to bring in deep miners from Nova Scotia several years ago had failed dismally, and many of the young people moved from the region as soon as they left high school. The population of a majority of the hard coal towns had dropped by more than fifty percent since 1920 with the remaining population being made up of many retired miners who did not care to leave the region. Great inducements needed to be offered to young men in their twenties to return to deep mining.

Another major problem facing the producers concerned the chronic lack of hopper cars to take anthracite to market via railroads. In 1974 just over two million of the six million tons produced had gone to market by railroad while the operators had to depend on trucks to market nearly three million tons. Nevertheless, railroads remained the most efficient method of sending anthracite to market. The creation of Conrail last year has further complicated this problem.

Complicating these problems even more was the difficulty of attracting investment capital into new mining projects and into the research and development of new mining equipment and techniques. According to one Penn State expert, it takes one to two years of planning for a strip mining operation and from three to four years for a deep mine. Investors want to be assured of sufficient returns before putting their capital into such projects. The strip miners noted the increasing urban sprawl in the region restricting the surface area they can mine. The capacity of their drag lines had just about reached their limits since most the reserves are several hundred feet below the surface. The major headaches of the deep miners concern the geological folds of the anthracite seams, making it impossible to adopt the long wall method used in the bituminous coal region. In the southern field, where most of the reserves exist, the pitch of the seams is the sharpest and faults in the seams are more numerous. To develop equipment to take coal out of the deep mines in this region will indeed be difficult.

64. Ibid.
Coal operators considered the last problem the most important. It concerned the uncertainty within the industry and among coal investors for long term financing at reasonable rates. The president of the Reading Company suggested taking the federal government in as a partner in order to acquire the much needed funds. An official of the Blue Coal Corporation agreed, advocating some type of government guaranteed loans and price supports for at least a ten-year period. Other producers agreed. They felt that the federal government could purchase anthracite at set prices and stockpile any amount not consumed for future purposes. Federal financial assistance would help assure raising the large sum of money necessary to undertake projects producing the great amount of coal needed to operate the type of energy park called for by Governor Shapp. Such a park similar to the Conemaugh Power Plant in western Pennsylvania would consume at least four million tons of anthracite annually. To be worthwhile, enough hard coal would have to be mined to operate the plant at least thirty years.67

In light of the fact that six of the leading producers of anthracite on 19 November 1976 were charged by a federal grand jury for price fixing, the question remains whether the federal government will be willing to help provide the money to revitalize the anthracite industry. But there have always been anthracite operators who willfully cut as many corners as possible to make high profits. Fortunately this does not include all the coal companies during the last two centuries. It is my feeling that the state and federal government will come to the assistance of anthracite operators to solve the nation’s energy crisis in this age of the managerial economy.

67. Ibid., 300-302.

"WAR IS HELL!"

Philadelphia, Nov. 1776

I refer you to the Newspapers for Genl. Washingtons and Howes movements, the people here have been horridly frightened. The Council of Safety a set of water Gruel Sons of B—s told the people a damned Lie “that they had certain information that 100 Ships had left Sandyhook for this City”—the people at first believed and trembled, the tories grinned.
Rumour trumpeted it for a day. Searle from Shrewsbury from whom the report originated was mistaken, the transports seen were empty bound for England. I can with pleasure however assure you that upon this alarm all ranks of people Quakers and Tories excepted declared their readiness to turn out as soon as matters were ascertained. . . . Your friends the portugueses have interdicted us from any Commerce with them and stiled us Rebels—for which they are a set of fools—What fine pickings amongst their Southern Cargoes as soon as we can justify a declaration of war against them that I hope and believe will be soon.

—William Hooper to Joseph Hewes, both delegates to Continental Congress from North Carolina


Philadelphia, 10 Jan. 1777

We mentioned some time ago the waste and destruction that was going forward in the Continental Stables here. The more we enquire into that Matter the more ruinous we find it, and the business is now in such a state of Confusion that we hardly know how to remedy it. Our Opinion is that no such thing as a Continental Stable should ever have existed. Generall Mifflin when he proposed it and established it we well know mean’t to save mony, but the experiment will prove destructive to the last degree. The Horses after being worked to the Bone, become neglected because it is nobodys business to take care of them. the Feed is stolen wasted and destroyed, because nobody can tell who is intitled to it, and who is not. every Officer in the service crams his Horses into the Public Stables and calls him Continental. every Team that is hired and ought to find their own feed, say they are Continental and demand it as a right from the Public. Mr Hiltzheimer does all he can to prevent waste imposition and abuses, but they threaten his life and to burn his stables.

We sent him a Gaurd and they were as bad as the waggoners.

—Committee (Robert Morris, George Clymer, and George Walton), appointed to represent Congress in Philadelphia, to the Continental Congress, then in Baltimore.


**Contributed By Ernest H. Schell, Temple University.**