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Coal and Its Derivatives as an Energy Resource

W. G. Stockton

COAL AND ITS DERIVATIVES AS AN ENERGY RESOURCE

By: W. G Stockton
Vice President, Public Relations & Traffic
Peabody Coal Company

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Events of the last few months, it seems, have somewhat altered the public countenance of the coal industry. These events, I am sure, are the generating factors focusing interest on our industry currently, and I suspect they account for my invitation to address this distinguished group of engineering students today on the subject of coal in this nation's energy outlook.

Coal Mining is not a new industry - - it has been around a long, long time. A surprising number of people, though, have never seen any coal; they are not aware of the existence of the industry, or its relationship to the overall energy picture of the United States.

I have assumed that most of you are concerned about the energy crisis as it touches you, personally, but I hope your interest is broader than that. Many people have asked the question, "If the energy crisis is for real, why didn't someone warn us?" Well, if you are like most other people, you don't read everything in the newspapers or in the several weekly news magazines. All of us are inclined to pass over those items and articles that don't directly affect us in our daily lives. I can tell you that the warnings have been there, publicly stated, printed and reprinted. Let me show you what I mean:

1952

"In area after area we encounter soaring demands, shrinking resources, the constant pressure toward rising real costs, the strong possibility of an arrest or decline in the standard of living we cherish and hope to share. As a Nation, we are threatened, but not alert . . ."

PALEY COMMISSION REPORT
June, 1952

1954

"With demand increasing and the rate of discovery decreasing, after a time a definite shortage of gas occurs . . . the net result to the consumer is a shortage of supply and an increase in rates."

HINES H. BAKER
President, Humble Oil and Refining Company
December 1, 1954

1957

"Legislation freeing gas producers from public utility type regulation is essential if the incentives to find and develop new supplies of gas are to be preserved and sales of gas to interstate markets are not to be discouraged to the detriment of both consumers and producers, as well as the national interest."

President Eisenhower's
Budget Message to Congress
January 16, 1957

1960

"I can safely predict that between now and 1975 we will have an energy crisis in this country. Then the people will say 'The industry is to blame, why weren't we told?' Well, I'm telling them now."

MICHEL T. HALBOUTY
Houston Consulting Geologist
September 3, 1960

1963

"Today in the United States there is only a 20-year known reserve of crude oil and natural gas . . . if we stopped production for a period of just weeks there would be a shortage."

RAYMOND PLANK
President, Apache Corporation
January 11, 1963

1965

"The ratio of proved reserves to demand for both oil and gas continues to decline, in the face of steadily rising demands. Adequate prices are essential incentive to encourage greater search for new oil and gas reserves."

Phillips Petroleum Company
Annual Report, 1964
March 18, 1965

1966

"The days of world crude-oil surplus are coming to an end."

ROBERT O. ANDERSON
Chairman, Atlantic Richfield
August 1, 1966

1967

"As a consequence of insufficient incentive, domestic production adequate to meet consumption requirements in the years ahead is unlikely."

ROBERT G. DUNLOP
President, Sun Oil Co. and
Chairman, American Petroleum Institute
October 30, 1967

1968

"It's been a year now since the Arab and Israeli armies fought their brief war. This anniversary offers a good chance to point out the lesson these experiences taught. The troubles proved again that heavy reliance on foreign oil is a most insecure base for this nation's energy needs."

Oil and Gas Journal Editorial
June 10, 1968

1969

"Adverse tax changes would have or one result: aggravation and intens cation of the already critical supp situation as to U.S. supplies of na ral gas."

H. A. TRUI
Independent Producer
before the Senate Finance Comm
October 1

1970

"We are rapidly passing from a pha of energy abundance to one of e ergy scarcity. The gap between d mestic supply and demand is no widening so rapidly that not even t indicated production from the Nor Slope will be enough to restore o position of self-sufficiency in petr leum energy."

DR. WILSON M. LA
Director, Office of Oil and
Department of In
March, 1

1971

"Domestic oilmen have taken prom and effective action to prevent an im pending petroleum shortage duri the current winter, but there is re son for serious concern over th nation's long-term energy supp outlook."

FRANK N. IK
President, American Petroleum Inst
January 9, 1

1972

"Already there are many indications that the energy crisis is not simply impending—it is here now and it must be dealt with now."

THORNTON F. BRADSHAW
President Atlantic Refining Company
testifying before the Senate Committee
on Interior and Insular Affairs
April 11, 1972

1973

"Importing relatively cheap and abundant foreign crude might have delayed this situation, and traditionally certain politicians for years have enunciated this as a anacea to the energy situation. I suppose politically this made sense ... realistically, it was sheer nonsense."

KENNETH G. REED
President, Apexco Inc.
March 24, 1973

So you see the warnings have been coming for 20 years.

If you are concerned about the supply of gasoline for your car, or the supply of fuel oil to heat your home, or the increasing prices of both, I cannot give you all the answers. I can tell you, however, that you probably don't realize how lucky you are to live in the Missouri area. We haven't really felt the shortage of gasoline or heating oil; neither have we had excessive price increases of these products yet. We probably have more to come. But I have been in New York three times in the month of February and March and I have seen the eleven block long lines, three lanes deep, all pointed toward the same filling station. I have seen the "car sitters" in action.....I hope we do not get into that position here.

While I am not an expert in the oil business, I believe the industry is facing a severe logistics problem. The crude is not always where immediate refining capacity is - the market is not always where the refined products are. So it then becomes a problem of transportation and distribution. This is the reason energy czar Simon has been saying his office would probably have to re-allocate supplies of gasoline and oil from certain proints to places other than normal market areas.

Those of us in the fuels industries have recognized for twenty years or more that an energy crisis was developing, and we have made it our business to keep aware of the progressively declining reserves of petroleum and natural gas, the delays in the development of nuclear energy systems, and the general deterioration of the conventional energy sources except coal. It came as no surprise to us in the coal industry, and neither was it surprising to those in the oil and gas business, who I am sure know as much about coal reserves as we know about their situation. The Arab oil embargo simply accentuated the situation a little earlier than was anticipated.

Now, what about coal in this nation's present energy dilemma and in the longer term outlook? Of the total domestic coal reserves of 3.2 trillion tons, about 400 billion tons are commercially mineable under today's technology. These reserves are widely distributed throughout the United States and Alaska. The higher quality coals, those with a BTU content of 12,000 to 14,500 are found in the Appalachia Region in the Eastern part of the country. Those with 11,000 to 12,000 BTU are generally found in the Midwestern Region. The Western states of the Rocky Mountain Region, however, have vast quantities of low sulfur sub-bituminous coals ranging from 8,000 to 8,500 BTU, much of which occurs in seams up to 100 feet thick, and within 100 feet of the surface. Based on coal consumption in 1973, the total of these mineable reserves would last about 800 years!

To put it another way, our total domestic energy reserves, of all forms, conservatively estimated and measured in terms of BTU's, are approximately as follows:

Coal	80%
Shale	8%
Natural Gas	6%
Oil	3%
Uranium	3%

On the same conservative basis, our domestic consumption is:

Oil	46%
Natural Gas	32%
Coal	17%
Hydroelectric	4%
Uranium	1%

Nearly 80% of our consumption of energy must be in a liquid or gaseous form but less than 10% of our indigenous reserves occur in that form. It is only logical to conclude, then, that we must either change our consumption, mix or convert the only remaining fossil fuel - - coal - - to liquid and gaseous forms. The only alternative is to import petroleum and liquid natural gas. This would result in the disastrous negative balance of payments approaching 100 billion dollars a year, based on today's oil import prices, not to mention the tremendous loss of jobs in this country. Furthermore, this nation cannot afford to continue in this dependent position if we are to remain the world's number one independent industrial power.

As many of you may know, the basic scientific processes to convert coal to synthetic substitutes for oil and natural gas have been around for many years. The Germans ran their war machine in World War II on synthetics from their own coal. Some further refinements are needed to make the substitutes compatible with our own fuels, to be sure, but the research to solve these problems is nearing completion right now. Today it is entirely feasible to anticipate synthetic gas within the next five years, and synthetic crude very shortly thereafter.

The future looks good for these coal conversion uses, and they could well account for 750 million tons of coal production themselves by 1985. Continuation in the projected growth of the electric energy industry alone will probably result in requirements of 650 million tons of coal by 1985, so that with the combined requirements of the electrical industry, the synthetic fuels industry, and the other conventional coal uses, the total coal demand could reach 1.5 billion tons per year by that date, or about three times the output of last year.

Before all these things can come about, however, certain things must be done to preserve--or indeed to improve the viability of the coal industry.

First of all, we must be permitted to mine the coal, and this includes surface mining as well as underground mining. Surface mining now accounts for more than 50% of the total United States production. This matter rests today largely in the hands of the Federal Congress, which is currently considering legislation to curb or restrict surface mining, or quite possibly prohibit it entirely.

Secondly, the coal users must be allowed to burn the coal as coal, without the threat of punitive penalties, or shutdown for want of a pollution-free substitute. There are no more substitutes!

The industries that consume coal should be allowed to continue the practice until technology is developed for the removal of sulfur from stack gases, or from the fuel itself, and not be required to make overwhelming investments in processes and equipment that are neither proved nor practical in application. These techniques will come, of course, but there is no possibility of their development by July 1, 1975, barely a year away, when the E. P. A. emission standards are scheduled to become effective. These standards, by the way, are such that coal would have to contain less than 1% sulfur to meet them, and this low sulfur coal simply is not available.

Thirdly, let's look at the business aspects of this problem. The coal industry today, with its high level of mechanization is extremely capital intensive. It costs from $10 to $15 per annual ton to build a mine today, so for a five million ton mine we are looking at a 50 to 75 million dollar investment.

No coal company will build, and no financial institution will underwrite a coal mine to produce millions of tons per year of high sulfur or low sulfur coal unless the company has a guaranteed market, or at least a guarantee of market availability, for the life of the coal mine. To do otherwise would be financial suicide.

Now, transportation. There are several problems in transporting coal and they are real, at the present time; for the longer term, they are not insolvable. Today, there is a shortage of railroad cars, as much as 40% at some mines and on some railroads, while at other mines, on other railroads, there has been a shortage of both cars and the locomotives to pull them. I am sure the railroads will make a valiant effort to improve their car and locomotive supplies through more timely maintenance, more complete reconditioning, and new acquisitions to meet the challenge of growing coal movements from greater production, if they can be assured of the continuance of the service sufficient to amortize these investments. Some railroad officials have stated publicly, however, they will not make such investments on a short term basis. You can see, therefore, that the railroads' interests run parallel to those of the mining industry, and for the same reasons.

I might add that the circumstances in the barge transport industry are almost identical.

I know from experience in our own company, that currently the lead time from placing an order to time of delivery of either railroad cars or barges is at least two years. For the long term, I think the problems of transport can be overcome. Mine mouth consumption will obviate some transport requirements. Increased use of coal slurry pipelines can alleviate the problem in other areas. But if the coal industry expands as President Nixon has indicated, I am sure all transportation capabilities will be taxed to the utmost.

My remarks to you would not be complete without some brief comment on "Coal versus Nuclear." It is difficult to predict if one has a more optimistic future than the other. For the near-term, and the mid-term, through the end of this century, I think even the Government's atomic energy experts hold the opinion that the nation will have to rely heavily on coal to meet its energy requirements. Let's face it! Nuclear fission, which is atomic power as we know it today, would consume all the known uranium reserves in about 10 to 15 years, and the breeder reactor still is not a reality.

But the coal is here, available, and mineable, now, and for a great deal longer period than 30 years, more like 300 years if we produce 1.5 billion tons, annually. I think also that coal has an extremely optimistic outlook in the synthetic fuels industry as far ahead in the future as we are permitted to see, even with a more rapid advent of nuclear power.

Now, let's look at the time-table for coal development - - Has the energy crisis changed it?

I don't think the energy crisis in the context of the Arab embargo has changed the time-table in the last five months. Peabody has been involved in gasification research, commitment and planning for at least five years, and the present energy shortage has not changed that program.

Speeding up the time-table still rests largely in the Federal and State governments. If restrictions can be eased in coal usage pending technological developments, if requirements in mine planning and in reclamation planning can be streamlined to eliminate needless delays, if the government wants to encourage rather than to deter coal mining, then I think the time-table might be substantially shortened.

Energy independence for the United States can be accomplished - - not by 1980 in my opinion, as President Nixon has predicted - - but perhaps by 1985, if we start now with a well-defined national policy.

Gentlemen, I have already told you, "We have run out of substitutes"---COAL is the answer, and half of the world's supply lies right here in these United States. Coal can, and it appears now that it will, pull this nation's energy chestnuts out of the fire.