

SHALE OIL—WILL IT EVER BE A REALITY?

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Man's progress today is directly related to his ability to utilize energy. Because of our technological advance in harnessing various forms of energy, the United States has the distinction of being one of the most advanced societies in the world.

National productivity is directly related to our energy consumption. The economic security and social welfare of the United States demand that adequate low-cost energy resources be available at all times.

The most abundant energy resources in the United States are hydrocarbon fossil fuels, consisting of oil, gas, oil shale, and coal. Currently the most important of these energy sources are crude oil and natural gas. Although our supply of oil and gas is adequate today, we must recognize that they are depletable substances. Within the next few years, the increasing demand for liquid fuels will make it necessary to supplement supplies of domestic energy from crude oil and natural gas with synthetic fuels such as those from oil shale.

Before getting specifically into the role of oil shale, we might first take a look at the over-all energy picture, which is affected by two factors. The first factor is ever-increasing population; the second factor is the increase in per capita consumption of energy. From 1920 to the present, population in the United States has increased from 106 million to more than 200 million. Annual energy use during the same period has increased from 20 quadrillion Btu to more than 57 quadrillion Btu.

Because of our rapid growth in energy use, the United States is by far the most prosperous nation in the world, with the highest standard of living. With only 7 percent of the world's population and 6 percent of its land space, we currently produce about one-third of the world's total output of goods and services. On a per capita basis, we consume oil at a rate that would provide more than 900 gallons a year for every man, woman, and child in this country—about 8 times the per capita figure for the rest of the Free World.

Oil and gas began to account for one-third of the total energy consumed in this country by the late 1920's. By the mid-1940's, oil and gas began to

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provide one-half of our energy needs; they account for three-fourths of our energy needs today.

And still the demand goes up. While we consume petroleum products at a rate of almost 12 million barrels a day at present, it has been forecast that we shall consume 50 percent more petroleum by 1980. Eighteen million barrels a day is a lot of oil. This means that if we are to meet demand, the petroleum industry must come up with more than 75 billion barrels of products between now and 1980—and that is twice the present proved crude oil reserves in the United States. This explains why we have to keep on hunting so hard for new reserves. Even though our supplies are adequate now, there is not too far off a time when consumption will begin to outstrip additions to reserves.

What must we do if we are to keep pace with these mushrooming demands? It seems that three basic ways are open to us—and we may have to use all three. The most important way is to increase domestic exploration for oil and gas. The second is to increase imports. And the third is to develop production of synthetic fuels as a reserve force of energy fuel supply for the future—along with coal and nuclear energy.

We cannot rely on the first way *alone* to supply our increasing energy needs. It is already clear that future oil and gas discoveries are not going to keep up with future demand—unless an immediate expanded exploration program is begun and is successful in finding large reserves at an accelerated rate. And we cannot allow ourselves to become as dependent on foreign oil as increased imports would make us. If foreign supplies ever “got us over a barrel” in this respect, we will find ourselves paying a great deal more for foreign oil than we pay now—not only in money, but in national prestige and security. So by far the most attractive and feasible way of supplementing our energy needs would appear to be synthetic fuels such as could be derived from oil shale in addition to coal and nuclear energy.

Oil shale is abundant, and it certainly could become a major source of synthetic fuel. Important domestic deposits are in Colorado, Wyoming, and Utah where shale deposits are estimated to contain some 2 trillion barrels of oil in place. The most important of these areas is the Piceance Basin in northwestern Colorado which includes 1,380 square miles underlain with potentially commercial shale beds; that is, deposits 10 feet thick or greater that yield 25 gallons or more of oil per ton of shale.

Now I would like to emphasize some important figures. The oil shale in Colorado alone has been estimated as high as 1.5 trillion barrels. The minable portion which averages 25 gallons per ton or more is estimated to contain 480 billion barrels of oil of which 60 percent or 280 billion barrels might be re-

covered using present day technology. There is a growing public misconception that there are trillions of barrels to be recovered from oil shale. If we can recover 280 billion it would be phenomenal. Every effort should be made to dispel the trillions of barrels rumor that not only the public but unknowledgeable persons in important positions are assuming as a fact.

Therefore, with the public believing such large figures, it is not surprising that a number of the critics of free enterprise would rally under the banner of public ownership and federal control and wave the red flags of “scandal” and “fear” before the people claiming that fabulous wealth which belongs to the people will be given away. For example, former Senator Paul Douglas of Illinois, an honorary chairman of the Public Resources Association headquartered in Denver, had this to say about the oil shale deposits on publicly owned lands:

“Every man, woman, and child of our country owns a share of the vast resources of recoverable oil, and the value to each in terms of total sales volume is at least \$25,000.”¹ Douglas warns of a possible “giveaway” of a great resource which he says is owned by all the people.

This sounds as if the shale oil had already been developed and sold and the money set aside in some communal warehouse or deposited in a bank. All each of us has to do, Douglas implies, is write a check or get a shovel and withdraw our personal share.

What nonsense! By similar reasoning, each of us could take an axe into our national forests, mark off our “personal” trees, chop down our share, and put the lumber to our own uses.

The Public Resources Association is staffed and led by men of much the same persuasion as ex-Senator Douglas. Its other honorary co-chairman is Dr. John Kenneth Galbraith of Harvard University, who has voiced the determination to see that shale oil is developed by the government to “protect the public interest as opposed to the selfish and speculative interest” of private business. Again what nonsense! Whatever private business does with oil shale accrues to the benefit of the public. It certainly is not selfish; however, I do agree that it is speculative. Private industry could lose its “shirt” and “pants” in this oil shale venture!

One of the more outspoken advocates of government control and development of shale oil is Professor Morris Garnsey of the University of Colorado. Dr. Garnsey has argued bitterly against what he calls “development of a vast resource by the monopolistic oil interest.” He says: “The oil industry in the United States is so highly monopolized that we can’t trust the development of

¹A “dear friend” broadside, undated letter on the stationery of the Public Resources Association and signed by Senator Paul Douglas.

this resource to that industry. We must avoid the greatest giveaway in the history of our nation."² In my opinion this is silly! Who else can develop this resource? In the first place, there is still a question if oil from shale will ever be developed by anybody! This I'll discuss later.

Critics favoring government development and control, as opposed to private development, know how to appeal to the public imagination and influence the public mind. They raise the specter of another "Teapot Dome Scandal"³ and speak of "stealing a public treasure"³ and of the "multi-trillion dollar value"³ of a shale oil industry. This doesn't hold up when even grammar school arithmetic is applied. The value of all the land in this country, plus all the surface improvements, is estimated to be no more than 1.5 trillion dollars!

If we could get out 2 trillion barrels of oil and sell them at \$3.00 a barrel, we might have a "multi-trillion dollar industry." But we are not going to get that much oil. As I said earlier, we will do well to expect a production of 280 billion barrels of recoverable oil from an estimated 480 billion barrels in commercial grade shale. This is still a large amount of oil but nothing to generate a "multi-trillion dollar" value.

Not all leaders in the academic world lack so much basic knowledge of shale oil or distort the facts in an appeal to naive minds. Dr. Orlo Childs, president of the Colorado School of Mines, speaks more knowledgeably and in sounder terms. To Dr. Childs, a view that a substantial shale oil production doesn't need to be developed in the United States is "not only shortsighted as to the oncoming energy requirements of our citizens but . . . is also dangerous to the military and economic security of our nation."⁴

"At this critical time of need for rational decision, it's inappropriate to fan the emotional fires of fear and endanger long-range values to our national economy," Dr. Childs declared. "Let's not be beguiled by those who believe that the government is all wise and all seeing and that total administrative regulation of our energy resources is the best answer. Let's not be charmed by those who not only say they can best determine what is in the public interest but also insist on the right to enforce their decisions by direct and indirect control over operations of the marketplace," Dr. Childs concludes.

Another authority speaking out for the free enterprise system in developing oil shale is Dr. Charles H. Prien, head of the chemical division, Denver Research Institute of the University of Denver. Dr. Prien is one of the fore-

²Denver Post, July 17, 1967; also in report of Senate Subcommittee on Interior and Insular Affairs hearing, April, 1967.

³Saturday Evening Post, December 30, 1967.

⁴Denver Post, July 18, 1967; also testimony before the Senate Subcommittee on Interior and Insular Affairs, February 1967 and September 1967.

most authorities on the advancing technology and economics of the emerging shale oil industry. He lines up squarely against those who shout about “give-aways,” who say that reserves on public lands aren’t needed now for a viable shale oil industry, and who contend that private industry can’t be trusted with a resource owned by all the people.

Dr. Prien has been personally active in oil shale research for a quarter of a century. He has written some 35 technical papers and portions of books on oil shale technology, and he has been the advisor on oil shale to the President’s Office of Science and Technology. Dr. Prien thus speaks with the weight of authority when he says: “The era for development of our oil shale resource is now, to supplement our natural resources in meeting our burgeoning energy needs. Shale oil will never dominate the energy market or displace conventional petroleum, but will simply take its proper position in the highly competitive total energy mix.”

Dr. Prien goes on to say: “The potential contribution of an oil shale industry to our national economy is enormous—in creating new jobs, new tax sources, new byproduct industries, new national wealth. None of these benefits can be realized while the shale deposits remain undeveloped in the ground.”⁵

Production of oil from shale will be costly. The per barrel investment in a commercial mining and retorting operation may be lower than for liquid petroleum, but unit operating costs will be considerably higher. One reason for this is that shale oil cannot be refined by conventional means. Oil from shale is deficient in hydrogen, and hydrogen will have to be manufactured and added during the refining process. Shale oil also contains relatively large amounts of such elements as sulfur and nitrogen, and these will have to be removed during the upgrading process, which is going to be especially expensive. Shale oil produced in commercial operations involving mining, crushing, retorting, and processing and under reasonable royalty and tax provisions would have about the same book rate of return as the national average for mining and manufacturing generally. The proposed Department of the Interior regulations, however, set forth terms under which these returns would be substantially lower. Nothing in the studies of shale oil operations suggests windfall profits, and shale oil operations are not going to offer any get-rich-quick opportunities. It is most peculiar that the critics of the free enterprise system don’t know this fact. Frankly, I think they believe the oil from shale will gush forth like the old oil gushers at Spindletop, Signal Hill, and El Dorado at 100,000 barrels per day without any expense.

⁵Denver Post Interview, July 27, 1967.

Let's review another problem. The ownership and leasing situation with regard to oil shale lands is unusual. These lands are from 80 to 90 percent owned by the Federal Government, and it is obvious that a satisfactory basis for leasing the federal lands must be devised soon.

Oil shale lands should be leased on a competitive bid basis, preferably by public auction, using a bonus system with a moderate, fixed royalty. The bonus system will result in the maximum leasing income to the federal treasury, will preclude political or other forms of favoritism, and will avoid speculation in leasing. Competitive pressures will insure that the lease bonuses reflect the profitability of shale oil operations; therefore, the royalty should be held to a relatively low, fixed amount so that shale oil will not be at a cost disadvantage compared with competing energy sources.

Bidding for leases should be open to all potential participants on a competitive basis with no discrimination in respect to firms in any particular industry, size category, or other classification. Unitization of lands into efficient conservation or production units should be permitted. It is not necessary that an extensive amount of acreage be leased currently. Oil shale lands should be researched and developed at once—therefore, leasing procedures should be adopted and the lands leased out for development. Now—what entity will do this—the government or private industry?

Frankly and unequivocally, this is a job for private industry. Private enterprise has repeatedly demonstrated that under a minimum of federal controls, it can beat the Federal Government by providing better operations, better research, and at the same time provide a source of taxation. The offshore oil and gas operations in federal waters is an excellent example. This is a republic. Federal operations of such enterprises impede individual efforts and are inconsistent with our way of life and our form of government.

So that there is absolutely no misunderstanding by the critics of free enterprise of what I have just said, I will bluntly state it another way:

The research and development of shale oil should be the responsibility of private industry. It has repeatedly been proven in this country that private-capital investments based on the free enterprise system is most efficient and productive. Our whole nation has prospered under this concept and anything contrary to it borders on socialism and other "isms" which I know our people do not desire. It has also been proven that the greater the federal control on operations of this kind, the less the efficiency, the less the productive capacity, and the greater the cost to the taxpayer.

The availability of dependable, low-cost energy is basic to national security and welfare. The petroleum industry has established a remarkable record for providing the energy needed at quite reasonable prices. Gasoline is an ex-

cellent case to support this point. It is a remarkable revelation to know that the gasoline sold today is not only a higher quality product than gasoline sold in the 1920's, but it is also cheaper, excluding taxes.

Energy needs are growing so fast that, within the next 8 to 10 years, energy from conventional hydrocarbons will need to be supplemented with synthetic fuels from shale oil, coal, and/or nuclear means. Gasoline from shale oil will require large commitments of technical talent, significant capital expenditures for research and development, and a substantial period of time.

Timely action by government in establishing a framework within which a shale oil industry can function is essential, and given the proper incentives, private industry *may* be able to make commercial production during the next decade a reality. And I want you to know I stress the "may."

I would like to summarize my remarks on shale by emphasizing the following points and comments:

Synthetic liquid fuels could be needed in the next 10 years or so, and oil shale could become an important source of those fuels—provided large scale operations to recover this oil are begun immediately.

Because of the lead time requirements, steps should be taken now to encourage the necessary research and development of oil shale, or it will be too late for this source to be of any assistance to us in an emergency or when the demand for more oil grows so great that we would have an immediate need for a supplement.

Oil shale can best be developed by private enterprise, wherever it is located, whether on public or private lands.

Clear title to the public domain oil shale lands is essential to such development.

Regulations proposed by the Department of the Interior do not provide the necessary encouragement and incentives for private enterprise to commit its technical and capital resources to the important task of developing this industry on the public domain.

Revised regulations should be issued by the Department of the Interior without delay. These regulations should encourage the advancement of research and development by private enterprise so that shale oil can make its proper contribution as a supplemental energy source when the need arises.

And last, but most important, is that the *technology for commercial operation of oil from shale is still uncertain and unproven*—and we cannot sit around for another decade or more waiting for a definite answer to this question.

Those who oppose private industry's role in the *attempt* to develop oil from shale speak as if the end product is already a commercial reality. There is

absolutely no proof that oil from shale can be extracted economically. Experiments and tests which may work in the laboratory, or in a small pilot plant, may be most difficult to put in actual, large-scale, field, commercial operation.

Furthermore, I am disgusted with picking up some newspaper or magazine and reading where one or more of these self-appointed oil shale experts declare "it should be a comfort to us that domestic oil reserves in shale can supply the deficit of our future needs."

What future? How many years from now? Ten—20—30—40—or 50? How much longer do we have to wait?

I haven't heard anyone yet give an exact date for the economic manufacturing of such reserves!!

Twenty-five years ago, we were told that oil from shale would be a reality in 5 years. Twenty years ago, we were told it would be in 5 years. And for each successive 5-year period, it was still 5 years away. And today, we hear oil from shale will be a reality in the next 5 years. I am beginning to doubt that it will ever be a reality. In fact, if private industry is not given the immediate opportunity to determine whether or not oil from shale on a large scale operation is economically feasible, it will turn its efforts to other sources of supply, and the reality of large oil reserves from shale may never occur. And what a great loss this would be to the people of the oil shale states and our nation!

Let us not be lulled into a sense of apathy by the hopes that these shale oil reserves will be readily available to us when we need them—especially in times of an emergency. This is wishful thinking on still *unproved* economics and unproved profitable foundations. Billions of barrels of oil are worthless if it costs one penny per barrel more than its returned sale value.

Until costs of such manufactured oil reserves are reasonably profitable, we should orient *our* thinking to find the natural petroleum reserves we know still exist and can be found in this vast country of ours. There is no doubt that there is several times as much oil and gas that remains to be found in this country as we have found and produced since 1859. Our task is simply to find and produce it.

Therefore, our current responsibilities are two-fold: first, to accelerate in every possible manner and by every possible method a daring, imaginative, and greatly expanded program of exploration for natural (conventional) petroleum reserves; and second, it is exceedingly important that shale oil lands be immediately leased to private industry for research and development to determine once and for all whether or not such shale oil can be economically produced and whether or not shale oil reserves can be included in estimates for our future energy requirements.