

OIL SHALE AND THE ENERGY SITUATION

Wayne E. Glenn

I am pleased to be with you to take part in this symposium. It was very thoughtful of you to invite me, and I want to emphasize how much I appreciate the opportunity to be here.

Recognizing the presence of so many knowledgeable people on oil shale and the thoroughness with which you will examine this subject today and tomorrow, my focus will be on the broader aspects of America's energy problems. In the process, I will offer some observations about the role shale oil can be expected to play in the total picture.

Learning from trying circumstances usually leaves a lasting impression. The American people just went through such a trying circumstance; it was called the Arab oil embargo. The embargo—and the energy shortages it caused—touched the lives of practically every American. For many people, particularly motorists on the east coast and thousands of workers around the country who lost their jobs due to economic slowdowns, the embargo caused real hardships. The cutoff of Mideast oil had a bundle of negatives, but it also had at least one plus: it showed us that as a nation we can break old habits and conserve substantial amounts of energy in the process.

In my opinion, the worst thing that could happen in the coming weeks and months is for the public to think that with oil beginning to flow into the United States from the Middle East again, all bets are off on energy conservation—that we can go back to the “burn it up, no holds barred” type of wasteful consumption that got us in a fix in the first place. If that happens, we could be in trouble again . . . and soon!

As the Arab embargo illustrated, dependence on imported oil is the real soft spot in America's energy supply situation. There is always the possibility that a flare-up or resumption in hostilities between the Arabs and Israel could set off another oil embargo against the United States.

Uncertainty about the continued availability of foreign oil—most of which is in the Middle East—makes it both reasonable and imperative that we look for answers to our energy problems right here in our own

President, Western Hemisphere Petroleum Division, Continental Oil Company.

country.

There are only three basic pieces to the energy problem—three things that must be done to improve the supply situation for the short term, the medium term and for the long haul as well:

- First, more domestic refinery capacity must be built;
- second, we must fully develop *all* of America's energy resources—not just one or two of them; and
- third, we must continue to conserve energy wherever possible and use it more efficiently.

Let's look at each of these pieces for a few minutes to get some feel for the magnitude of the task that lies ahead.

Refinery capacity is already short. At least 4 years is required to build a new grass roots plant. Based on projected increases in consumption, without taking into account the impact conservation may have, five new 150,000 barrel-a-day refineries will be needed *every* year to keep up with domestic demand.

A few new refineries have been constructed in the last few years and a number of expansions to existing facilities are underway. But even with this effort, the industry is well behind the timetable and forced to play catch-up.

Some people ask why the refining shortage wasn't anticipated and plans made to improve the situation before it became critical. The answer is that the industry *did* foresee the need for more refineries. But new refinery construction has been stalled for three primary reasons: environmental opposition, uncertainties about the availability of crude supplies, and the tremendous capital requirements.

Even in the face of actual shortages, we still lack a realistic attitude toward refinery construction. The east coast, the area most dependent on oil imports, is continuing to reject efforts to site refineries there. Mr. Onassis found this out recently in New Hampshire. Meanwhile, in Maryland, Governor Mandel has protested repeatedly that his state was not getting its share of gasoline while two Maryland counties were voting down attempts to build new refineries. These are not isolated cases.

According to the National Petroleum Refiners Association, applications to build new refineries by 15 companies have been rejected in recent years at a total of 18 locations along the eastern seaboard.

As a result, the lack of adequate refining capacity will continue to limit the amount of gasoline and other petroleum products that can be made available to the American consumer, regardless of how much foreign crude oil is brought into the country from the Middle East or anywhere else.

Even with an accelerated effort by the industry to expand its refinery capacity, the wide gap between domestic energy supply and demand will be with us for at least the next several years. And that's where the focus of our attention should be—on doing everything possible to close that gap or, at least, to keep it from widening any further.

President Nixon's "project independence" calls for an all-out national effort to achieve energy self-sufficiency by 1980. The kind of acceleration in domestic energy efforts being proposed will bring progress—and that's important—but I seriously doubt that 6 years can bring us to a position of energy self-sufficiency.

Let's put self-sufficiency in meaningful terms. As a nation we could become self-sufficient by 1980 if we increased domestic oil and gas production 37 percent as compared to 1970, and increased coal production 176 percent. That would mean 190,000 more oil and gas wells and 9,000 coal mines in just 6 years.

But that's not all. Self-sufficiency by 1980 also means building 435 nuclear plants, 8 shale oil plants, 13 oil-from-coal plants, 30 gas-from-coal plants and 19 geothermal plants. This undertaking would bring thousands of people into action and billions of dollars of hardware in operation.

Even if all this is orchestrated somehow, there's a sour note. If all conditions were perfect from this moment on—if we irresponsibly threw environmental constraint to the winds and assumed that the necessary hundreds of billion of dollars were forthcoming from oil company profits—the basic lead times on most of these projects still would push completion outside the 1980 time frame. It takes 3 to 10 years to bring on a new oil field. Current lead time for coal mines is 2 to 5 years. The new nuclear plants will require about 7 years.

In reality, conditions are not perfect. And that's a considerable understatement. National energy policy is still not clear. Necessary legislation is lagging. Many environmental questions remain unresolved, and, understandably, the public is becoming increasingly confused and angry about energy issues.

So, what can we expect by 1980? First, let's look at the demand side of the energy equation. There are several estimates of how much domestic energy demand is expected to grow during the next 6 years. These estimates range from a high of 4.2 percent per year by the National Petroleum Council to a low of 1.7 percent suggested by the Ford Foundation, if industrial growth was cut to the bare minimum.

The Federal Energy Office's estimate falls in the middle—at 3 percent a year. Using the FEO figure as an average, total domestic energy demand is expected to reach the equivalent of 92.9 quadrillion Btu by

1980. Current demand is running at about 75.5 quadrillion Btu annually.

Contrast this projection with what domestic energy supplies are expected to be in 1980. The most realistic, though not the most optimistic estimate of energy available from domestic sources 6 years from now, is 81.3 quadrillion Btu. That means there will still be a gap between supply and demand of 11.5 quadrillion Btu (or, if you prefer, about five-and-one-half million barrels of oil per day).

Of the total domestic energy expected to be available in 1980, here's the part each source is expected to play: conventional oil and gas, 61.3 percent; coal, 25 percent; nuclear power, 8.2 percent; hydroelectric, 4 percent; gas from coal or nuclear stimulation, 0.7 percent; geothermal, 0.5 percent; and shale oil, 0.3 percent.

This projection takes into account that oil and gas production will increase from present levels, although the percentage of total energy supplied by these two fuels will decline. Greater contributions by the other energy sources will make up the difference.

But there still will be an 11.5 quadrillion Btu energy shortfall in 1985 that must be met by imported oil. If our goal is energy self-sufficiency by that time, let's see what we can do to fill the gap with one of our domestic energy resources. One of these is the focal point of this meeting: shale oil.

Assuming that production of conventional energy sources remains at about present levels, the contribution necessary by shale oil requires a jump from absolutely nothing in 1974 to an output in excess of 12 million barrels of oil per day in 1980. Contrast that, if you will, with the more realistic estimate of shale oil's contribution in 1980: 197 trillion Btu, or 100,000 barrels per day. This gives you some idea of the difficulty the nation faces in achieving energy self-sufficiency so quickly.

Of course it is not logical or practical to expect shale oil to carry so much of the load in the early 1980s. Certainly the potential is there. It has been estimated that shale deposits in Colorado alone are equal to, or exceed, all the crude oil in Saudi Arabia. But the contribution of shale oil won't be felt until late into the 1980s, at the earliest.

Coal is only one part of the solution. A number of other domestic energy sources also can be tapped to help bridge the gap between supply and demand. Here are some examples.

The present rate of recovery for oil in known reservoirs is 31 percent. We believe it is realistic to shoot for a 50 percent recovery rate within 15 years—but only if free market prices can be the carrot that encourages the development of better recovery techniques. If recovery can be increased to a 50-percent average, this would mean the addition of more

than 80 billion barrels of crude oil to domestic proved reserves. That is almost as much oil as was produced in the United States in the 100 years following the first oil well drilled in this country in 1859.

When the trans-Alaska pipeline finally is built, about two-and-a-half million barrels of oil a day will begin flowing from Alaska's north slope to the lower 48 states. This also will spur substantial exploration activity to confirm whether the Prudhoe Bay find is a "unique giant" in an area of smaller fields or only one of several large deposits.

The outer continental shelf of the United States holds the greatest potential as a source of substantial new domestic oil and gas supplies. Recently, the President's Council on Environmental Quality reported that offshore petroleum development along the eastern seaboard is—as they put it—"an acceptable risk." This recommendation came after a year-long study by the council on the environmental impact of oil and gas production in the coastal waters from Maine to Florida. During 1973 and thus far in 1974, the Department of Interior has accelerated offshore lease sales in the Gulf of Mexico. But no sale has yet been held on acreage off the Atlantic coast, even though the U.S. Geological Survey estimates there may be up to 58 billion barrels of crude oil and 222 trillion cubic feet of natural gas out there. And that's more than the proved domestic reserves of oil and close to the total for natural gas. Hopefully, this report by the council will be a step in the direction of east coast offshore development.

These are ways to add to the nation's petroleum supply. The key to ending energy shortages in this country once and for all lies in developing America's full energy potential—in reducing our dependence on petroleum. This can be achieved only through greater contributions by every energy resource at our disposal—shale oil, coal, nuclear power and synthetic fuels, among others.

But to do this, the nation can no longer afford the provincial attitude that has delayed domestic energy development on so many fronts. You know what I'm referring to: the mistaken belief that certain parts of the country can block the development of energy supplies in their own areas and still expect to have ample supplies provided by other parts of the nation.

There was a time when the rest of the nation could run their automobiles and heat their homes with oil and gas produced by a handful of states and the coal mined in another handful of states. That era has ended. I submit that if all Americans want to continue to have energy available at their fingertips, then all Americans must not obstruct the search for energy and the location of processing plants and terminals—even if it leads to their own doorstep.

We also must have confidence in the marketplace and give it a chance to work. Prices will then determine the kind of energy we will use, and, in the process, more domestic energy will be available.

There's no panacea to America's energy problems, but no need to panic either. The key is not to put all our eggs in one basket. It's not an either/or situation. The answer lies in a number of eggs—oil, gas, coal, shale oil, nuclear, synthetics and so forth. *We need them all*—and the sooner the better.

Whether it's bringing synthetic fuels on stream, making greater use of coal, building more nuclear plants, or finding and producing more domestic oil and gas, one thing is certain: it's going to take time before any of these things can add new energy supplies. In the meantime, we really have only one choice: to continue to follow strict conservation policies and to make the most efficient use of available fuels.

Conserving sizable amounts of energy is the best possible equivalent to developing new oil fields, building coal mines and siting nuclear plants. And that is what we'll have to do while these longer-term developments are in progress. If we underrated conservation earlier, we must not do it now.

For example, if we save 10 percent on our total energy consumption, that is the same as developing 200,000 new oil wells at present low U.S. production levels. It is the same as developing 2,930 new coal mines. It is the same as developing 211 additional nuclear plants.

A study published by the Ford Foundation says that by the year 2000, the United States could save almost as much energy each year as it now uses annually. This could be achieved without reducing the growth in our standard of living or significantly changing life styles, the Foundation report adds. That's a rather optimistic prediction and naturally depends on the cooperation of the American public in continuing to drive slower, in eliminating unnecessary travel, in carpooling where possible, and in taking other energy-saving steps.

Conservation is essential in the current energy situation. Equally important is an all-out effort by the petroleum industry to find and develop the energy America needs now and in the future. That effort will take a staggering amount of money. Chase Manhattan Bank of New York estimates that the industry must spend \$1.3 trillion between 1970 and 1985 to meet the free world's energy requirements. That effort will be one of the most expensive privately financed projects in the history of man.

To get the job done will take a lot more than money, however. A

national commitment also is needed to get started *right now* on all fronts toward permanent solutions to our energy problems.

Some skeptics say that the present situation shows once and for all that private petroleum companies are not capable of responding to the public's requirements in the complex world of the 1970s. I view it another way. The ultimate criterion of any industry's success is its record of service to the public. By this standard, the oil industry has been very successful: the American consumer and American industry traditionally have been provided with ample supplies of energy at reasonable prices. It has been this low-cost energy that has helped propel the United States to a standard of living unprecedented in the history of the world.

Great challenges face the nation's energy industries in the years ahead. But as I travel around the country, meeting and talking with the men and women who comprise the membership of A.I.M.E.—and I see the wealth of knowledge, experience and dedication you bring to the task—I'm confident that the challenges of the future will be met successfully.