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Acting Assistant Secretary for
Fossil Energy
U.S. Department of Energy

I am pleased to be a participant in this year's conference. Like my colleagues that follow, I want to compliment Dr. Brainard and the University of Pittsburgh's Chemical and Petroleum Engineering Department for their excellent job in organizing these sessions. The previous seven meetings have built a solid reputation as timely forums for exchanging ideas -- both on coal technology and on related public policy issues.

Much of this well-earned reputation has come from a consistently impressive list of attendees. And I'm pleased to see that this has not changed.

What is changing, however, is a fundamental perception about how best to produce and use energy resources wisely and efficiently. We are meeting at a time when the basic fabric of Federal energy policy is being restructured -- when budget balancing is the watchword, rather than budget growth. The Administration's package of tax and budgetary reforms -- presented five months ago and passed essentially intact last week by the individual houses in Congress -- was the first step. The President has made it clear that our first priority must be economic recovery -- because until we succeed in getting our economy back on track, we're not going to succeed in developing our energy resources, or in promoting new technologies, or in anything else.

The second step came last month when the President submitted the National Energy Policy Plan. Note the word "Policy." It's an important addition, because in a clean break with the past, this Administration has not presented a rigid plan mandating specific energy goals.

It has not attempted to predict or set arbitrary quotas on energy production or use. Quantitative levels for the production from a given fuel source are not objectives in themselves. Rather the national energy policy seeks an objective of energy sufficiency, as determined by market realities.

There are those, however, who would translate this departure from past policy into a slowdown or even abandonment of a national synthetic fuels program. To them I would argue that the Administration remains committed to building a solid foundation for an efficient, and most importantly, a durable synthetic fuels industry — one that can ultimately thrive without sustained Federal subsidies. To do any less today would be both shortsighted and dangerous for this country's future economic and national security.

The issue, therefore, is not so much the creation of a private synthetic fuels industry, but a more fundamental perception of the best way to accomplish it. The competitive position of synthetic fuels has improved in today's economic climate. The more than 60 responses now before the Synthetic Fuels Corporation reflect an impressive investment of corporate resources. Included in the commercial plans of many firms are technologies which have emerged from Government-sponsored research as well as those developed solely through private R&D.

In view of this, the focus of Government is now shifting. To stimulate a commercial industry, the role of Government is to streamline the investment climate, not to substitute for it.

Decontrol of conventional fuel prices, revisions of tax policies, the actions of the Synfuels Corporation, and perhaps as significant as any, the creation of a stable government regulatory environment -- these will provide the final push to get synfuels across the commercial threshold.

Those of you who have followed the restructuring of Federal energy policy are aware that the Department of Energy has, in turn, oriented its synfuels program toward "long-range, high-risk" technologies.

This presents a unique opportunity to re-examine where public spending is most appropriate. The terms "long-range, high-risk" are themselves rather vague descriptions. They do not draw a solid line dividing where our program should end and industry's should begin. This can only be done by active communication within the fossil energy community -- between us in Government and you in industry. I was interested to read of Congressional testimony given recently by a corporate R&D manager on how his company calculates the long-term worth of an R&D investment. With money borrowed at the prime rate of 20 percent, he said, at least $33 profit must be guaranteed by the year 2000 to motivate one dollar investment in energy R&D today. A 30 percent probability of success for the entire product cycle would reduce his company's allowable investment today to 30 cents.

This limits their R&D investment to relatively low-risk, short-term projects.

One way to increase corporate R&D spending is to ensure that future energy costs reflect true market values and that tax policies are conducive to private sector innovation. That is one part of the Administration's energy plan.

And in concert with that, the Federal R&D program must be structured to support those promising areas where the private sector is unlikely to invest even with these economic incentives. This means that we must not only define our respective R&D roles today, but recognize that these roles will be

continually changing. Economics will change, technologies will mature, and new avenues of innovation will open up. As this occurs, we need to understand your perceptions of future R&D needs, what you expect from government, and where you have private sector initiatives underway. And this communication must be active and on-going.

In setting the future course for our R&D program, we have recognized that by the year 2000, the world will still be drawing at least three-fourths of its energy from fossil fuels. We will continue to have a need for liquids and gases. More often than not, however, debate has centered on the magnitude of conventional supplies of these fuels. This tends to cloud the issue. The problem with natural gas and oil may not be so much availability in the foreseeable future, but price.

Regardless of what our graphs say about the actual quantity of the world's remaining hydrocarbons, there can be no uncertainty that they will become increasingly expensive and increasingly difficult to exploit.

Likewise, there is little doubt that the pace of our eventual economic recovery can be significantly impacted by the price we pay for our energy. And future generations will have to live with many of the environmental impacts that result from the energy technologies we choose.

So our classic R&D targets still apply -- reducing costs, reducing environmental impacts or ensuring that the marketplace is not forced to trade one for the other.

In structuring our synthetic fuels program, we must also recognize that not all resources can meet our foreseeable need for gaseous and liquid fuels. Oil from shale, for example, must play a significant role in any future energy scenario. It's perhaps the cheapest of all synthetic products, and it most likely will be produced sooner than any other fossil-based synthetic fuel. Nonetheless, its geographic and environmental restrictions will limit the production of sufficient quantities to meet our total liquid needs. Therefore, for all practical purposes, if the industrialized world is to gain the particular advantage of a new source of liquids in substantial quantities, the fuels must be derived from coal. Only coal is sufficiently abundant and dispersed to offer this economic potential.

Let me describe briefly the content and direction of some of the coal-related efforts I see as particularly pertinent to this audience.

Our liquefaction program has focused historically on direct hydrogenation. Commercially, however, economic changes brought on by the escalation of world oil prices have revived activity in the nearer-term indirect technology -- particularly in the production of coal-based methanol.

I believe it was our colleague Eric Reichl who once said that methanol, in particular, could be our "first line of defense against imports." The fact that 14 out of the first 17 coal liquefaction proposals submitted to the U.S. Synthetic Fuels Corporation involve methanol synthesis -- either as an end product or as an intermediate step -- would tend to bear him out.

Even though indirect liquefaction is on the commercial horizon, it has yet to reach its technological limits. We see a legitimate Federal role -- consistent with the high-risk, long-range principle -- in developing substantially improved indirect methods. A broad-based catalyst program could lead to improved selectivity in the production of high quality gasoline and middle distillates. That's one direction our program will take.

Another will be in developing improved reactor designs. By the time this conference convenes again next year, we should have in operation the internationally-funded methanol-to-gasoline pilot plant in Germany. The fluid bed version of the Mobil M-Gasoline process to be tested at the pilot plant offers significant improvements over the fixed bed configuration now entering commercial use.

In the direct liquefaction area, the four processes that comprised the bulk of our past program -- the Exxon Donor Solvent, H-Coal, and SRC I and II processes -- have moved sufficiently beyond the development stage. In particular, the Exxon Donor Solvent pilot plant has completed nearly 4000 hours of operation on Illinois #6 coal, and this week we plan to begin processing Wyodak coal.

While testing will continue at both the EDS and H-Coal plants in 1982, we will begin turning our focus toward more advanced concepts -- particularly methods to improve the efficiency and economics of catalytic reactions.

In developing new catalysts for both direct and indirect liquefaction, we in the government R&D program need to be especially sensitive to commercial activities. Our interest is to work at the leading edge of the technology -- where industry is not substantially involved. Here particularly, it is not easy to draw the line. We will be looking for your input as we develop the proper positioning for our catalyst program in the future.

Another technique that could help result in lower costs is staged liquefaction. Recent bench-scale tests of integrated two-stage liquefaction produced 20 percent more liquid product with substantially lower hydrogen consumption than technologies such as EDS, H-Coal and SRC. We plan to continue this effort, looking at variations in the preheater, solvent extraction and hydrocracking steps. In future years, we would link the optimum combination of these steps at the process development unit scale.

The restructuring of our Fossil Energy program, along with recent industry activity, have also established new directions for our gasification program.

In putting this activity together, we recognize that the importance of coal gasification extends considerably beyond just the production of a substitute for pipeline gas. The growing demand for coal gas in the next several years will more likely come from firms planning indirect liquefaction plants or combined cycle generating facilities or from the chemical industry. Consequently, our activities will emphasize the production of medium-Btu gas. And with a large slate of commercial gasification technologies now available to industry -- for both western and eastern coals -- we believe it more appropriate to move away from developing distinct processes and toward a more fundamental base program.

There is still much we can learn about the basic principles of gasification, particularly the behavior of various coals in fluid and entrained bed systems. Gaps still remain in the data base which, if filled, could lead to a gasifier which operates more reliably and with significant operational advantages. For example, we are looking to a new test unit being built at Salt Lake City to provide significant advances in the capability to feed dry coal into an entrained bed system and to recover the gasifier's heat energy more efficiently.

A new element of our R&D program will be in materials, components and control systems. In the past, our efforts were aimed at meeting specific requirements, usually originating in our pilot and demonstration plants. Now, we plan to move into a more fundamental technology base effort -- heeding the advice from several outside groups including many of you that this has been a shortcoming in our past R&D program.

Initially we will concentrate on sensor research, environmental monitoring and multi-phase flow measurement. We expect to call upon the expertise of universities and industry, as well as our national laboratories, to aid in this new effort.

Without a large-scale DOE demonstration program, one may ask what potential is there for technologies emerging today to cross the commercial threshold? A main argument for an aggressive Government demonstration program has been that the private sector alone will move into large-scale development too slowly to serve the national interest. Another has been that the gap from a process development unit to a commercial plant would be insurmountable without some intermediate step. I am not convinced that either argument is still valid. One need only look at the activity in today's industry.

Westinghouse is an example. Once its second-generation gasifier was developed at a 15-ton per day DOE-funded process development unit, the company restructured its corporate organization to market the technology commercially. The gasifier is now part of three proposals to the Synfuels Corporation. Likewise, the British Gas/Lurgi slagging gasifier, originally in our demonstration program, is also part of a commercial proposal before the Corporation. Exxon is planning to scale-up its catalytic gasification process to a 100-ton per day pilot plant entirely with private funds -- this after the technology was verified at a process development unit run jointly with the Government.

And new generations of technologies developed outside the Government's program are likewise moving closer to commercial reality -- such as the Texaco and Shell-Koppers gasifiers. This tell me that the synfuels era is arriving. Most importantly, it is happening in the U.S. by the actions of private firms -- each reading the signals of the marketplace -- and not by the Federal government attempting to force it before the economic climate is ready.

This is the liquids and gases portion of our coal program. The other part, of course, is direct combustion.

Even with synfuels entering the marketplace, 90 percent of the coal we use at the end of this century will still be burned directly, and this fact has played a key role in shaping our Fossil R&D program. New combustion and clean-up technologies can be equally important in plotting a future energy path. These new technologies have not attracted the same public attention as their synthetic fuel counterparts, but I believe emerging from this program are some truly innovative concepts that have the potential for substantial payback.

New coal-based fuel mixtures could be one. We can point to coal-oil mixtures as one example of a new fuel that has emerged from a government R&D program and is now beginning to take its place in the commercial sector. Therefore we are now beginning to look at a variety of newer concepts. In particular, coal-water mixtures might be the "sleeper" in our R&D program -- where relatively modest R&D funding today might return substantial dividends in the future.

Laboratory tests have shown that stable mixes of up to 70 percent coal and 30 percent water can be prepared and stable combustion can be achieved. Coupled with pre-combustion coal cleaning, this fuel could become a leading candidate for replacing 100 percent of the oil burned in many existing utility and industrial boilers.

The bulk of our combustion program will concentrate on the pressurized fluidized bed system as a future option for utility power plants. One part of our core effort will be the 13-megawatt test unit now being built in New Jersey. Another will be the continued operation of the international test unit at Grimethorpe, England -- this following Secretary Edward's endorsement of the project at the meeting of the International Energy Agency earlier this summer.

Our flue gas clean-up program has shown the commercial potential for concepts such as the spray dryer and industry is responding by taking over development. So we see the proper Federal role in environmental control systems as concentrating on more advanced approaches. Specifically we will focus most of our flue gas clean-up efforts on simultaneous NO_x/SO_x particulate removal. Here, as in our combustion program, innovations such as electron beam irradiation may open new doors leading to much improved control with the potential for producing marketable byproducts.

Organizationally, we will be integrating our coal preparation activities into the environmental control technology program to provide a better coordinated, systems approach to coal cleaning. And we will be continuing our efforts in gas stream clean-up for pressurized fluidized bed and gasification combined cycle power generation.

These, then, are some of the new directions for our synfuels and combustion programs. Each of us here today, of course, recognizes the potential benefits of an aggressive R&D program in these areas. But we must also recognize that it, like all government activities, will be strongly influenced by the stringencies of today's economic conditions. There will be limits and priorities to contend with. And R&D, for all its recognized worth, will have to compete.

As Dr. George Keyworth, the President's choice as science and technology advisor, recently told the American Association for the Advancement of Science, "These considerations imply value judgements. Value judgements are difficult and fallible. However, if one concentrates upon the extremes, emphasizing what appears to be clearly the most promising avenues, and deemphasizing those that have been least productive in recent years, the probability of a large error in judgement is diminished."

This is the course we have adopted for our fossil energy technology program. We will concentrate on those advanced concepts offering the most in terms of efficiency, cost-savings, or environmental performance. But not every good idea can be pursued. We will have to apply more stringent and fundamental criteria to those efforts that qualify for government assistance. Yet the nation would be remiss if it did not aggressively press the search for those new alternatives which could result in significantly cheaper and cleaner domestic energy.

Thank you.