A ROLE FOR THE GOVERNMENT IN PETROLEUM FUEL R&D

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Deriving a national benefit from petroleum fuel involves many steps:

- Finding the resource - Exploration
- Getting it out of the ground - Production
- Bringing it to the refinery - Transportation
- Converting it to useful products - Refining
- Delivering it to the customer - Marketing
- Burning it in suitable equipment - Utilization

as well as the setting of standards that protect the national welfare. The overall role of petroleum fuel R&D is to provide better ways to carry out all these steps--where "better" means cheaper, safer, cleaner, more efficient, more convenient, more timely or any other positive comparative.

Who should control this R&D?

Obviously those who can do it in the best, that is in the cheapest, safest, cleanest, most efficient, most convenient, most timely manner.

In this country, we have basically four choices:

- The Government
- The Universities
- Non-profit Institutes
- Private Industry

and each of these four has its particular areas of expertise, activities in which it is "best." So we really need all four and our present goal must be to suggest a way in which to carve up the R&D function to assure that the overall result is optimal for the country.

Retrospectively, our private and highly competitive industry has funded, performed and controlled by far the greatest part of petroleum fuel R&D--with a very able assist from the Universities in the basic research area. Private industry has carried the ball and has carried it well. U.S. technology for all the steps involved--from exploration through refining to utilization--tends to be the model that other nations strive to emulate.

That has been the picture in the past.

What of the future?

A different factor is affecting the desire for new technology, a factor that does not necessarily make itself felt through the marketplace, a factor that does not elicit a prompt R&D response from private industry: the factor of national security.

To the extent that national security considerations override commercial driving forces, to that extent governmental intervention in petroleum fuel R&D is not only warranted but required. Thus if production of otherwise commercially unattractive resources such as shale oil or coal liquids is considered to be a national requirement, Government involvement in developing the requisite technology is called for. The ideal role here, as we see it, is a cooperative one where the Government and the private sector combine to fund and to control the R&D.

But what of the other steps--the steps beyond production? Transportation, refining, marketing and utilization of fuel products from synthetic feeds like shale oil and coal liquids will differ from these same operations using "normal" crude oils. Here we see no need for Government involvement in developing new technology. Private competitive industry has amply illustrated that it can well handle such a change in feedstocks. The driving forces to make, market and use the products will remain the same. We believe that it would be unwise to change a competitive innovation system that has worked well in the past if there is no change in the driving forces.

Similar reasoning applies wherever any societal factor overrides "normal" market forces: government intervention in R&D should parallel government intervention thru other mechanisms (penalties, grants, subsidies, tax-relief or whatever) to facilitate initiating the desired change. Once the new incentives and new criteria exist, the private sector is best able to uncover the technology needed to optimize meeting the perceived societal goals.

Of course, we also see other roles that the Government can and should play in indirect support of the development of new petroleum fuel technology.

First, is an obligation to help in the development of a pool of well-trained technical professional personnel. This is a national need. The best way to train good technical people is still to have them participate in good research and the Universities can hardly be expected to find adequate financing for meaningful research programs on their own.

The Government is also well placed to undertake large-scale basic research programs which the universities cannot affort and to build special facilities that can be shared by a number of organizations.

Basically, the role of all R&D is to find better ways of doing things and the Government's "things" have been well defined for us:

- To establish justice
- To ensure domestic tranquility
- To provide for the common defense
- To promote the general welfare
- To secure the blessings of liberty to ourselves and our posterity.

The appropriateness of any proposed Governmental R&D should be tested against those objectives.

Government Role in Fuels R&D -- DOE Perspective.

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The Federal government's perspective on the national energy problem and the role of the Department of Energy in dealing with the problem will be discussed. The basic problem is seen as the increasing U.S. dependence on foreign oil to meet its energy demands and the resultant need to reduce U.S. levels of energy imports.

The Federal government, through the Department of Energy, has three primary tools at its disposal to accomplish its energy policy objectives: tax incentives, regulatory actions, and support of R&D. The problem in any particular situation is to find the most suitable mix of these three tools. The mix will be different for each program, fuel, and technology area. The valid bases for government involvement in R&D in various situations will be discussed.

Specific examples from current DOE fuels programs will be cited to show how the various mixes of these tools are being applied and what the appropriate role is for Federal support of R&D in each case.

FEDERAL FUELS R&D AS AN ARM OF ENERGY POLICY

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It would be a truism to state that Federal support or lack thereof of energy research, development and demonstration (RD&D) has become one of the key elements in the implementation of energy policy. Examples abound. They range from the cutback and restructuring of nuclear breeder R&D in line with the Administration's non-proliferation policy, to growing support for unconventional natural gas R&D in line with the Administration's recognition that increased domestic pipeline quality gas supply and use is one of the most effective means to constrain oil imports.

In the fossil fuel or, more generally, the non-nuclear area, the role of Federal energy R&D as an energy policy tool is of relatively recent vintage. The step-up in the scope and magnitude, and the shift to relatively near-term commercialization goals, dates roughly from the consolidation of all energy-related RD&D programs under the Energy Research and Development Administration (ERDA) in January 1975. Prior to that time the technical data base for fossil energy policy came largely from private R&D sources. In contrast with nuclear energy policy and RD&D, which was under Federal control from its inception, most early attempts of major Federal intervention in fossil fuel RD&D failed. The fossil energy industry with its large and effective in-house R&D programs successfully bypassed such Federal initiatives as the abortive post-World War II synthetic fuels effort. Prior to the official recognition of an "energy crisis" in 1971 in the form of the first pronouncement of a comprehensive energy policy by a U.S. president, only the coal industry actively sought Federal support for relatively short-term commercial applications-oriented fossil fuel R&D. Some minor exceptions were co-operative programs with the gas industry in such areas as nuclear stimulation of tight gas formations and the production of pipeline quality gas from coal.

The coal industry initiative led to the establishment in 1963 of the relatively small program of the Office of Coal Research in the Department of the Interior which became the nucleus of the vastly expanded ERDA and Department of Energy (DOE) fossil energy RD&D programs developed with the urging of Congress. The blueprint for integrating nuclear and fossil fuel R&D, and developing a better balance between the two, was prepared in 1973 under the direction of Dixy Lee Ray, the last Chairman of the Atomic Energy Commission (AEC). In this blueprint, the AEC RD&D model was followed closely because of its success in moving government-developed technology into the private sector

following World War II. Although defense-related and nuclear material supply activities continued to be a major share of the Federal nuclear program, civilian RD&D by the National Laboratories and industry grew rapidly and formed the foundation for the development of commercial nuclear power.

The expansion of the Federal role in energy RD&D was, of course, greatly accelerated by the 1973/74 oil embargo and led to the increase of Federal energy RD&D budgets from less than $1 billion to more than $3 billion today. However, even during the short ERDA days, it became apparent that the AEC model could not be successfully applied to fossil fuel RD&D and to non-nuclear R&D in general. Nuclear RD&D, nuclear energy policy, and nuclear power commercialization were always fully integrated under Federal control. This is not true in any sense in the fossil fuel area. In fact, with some notable exceptions, relationships between the Administration, Congress and industry in this area could be better characterized as adversary rather than as cooperative.

Thus, the basic objective of Federal fossil fuel RD&D — commercialization of new technologies leading to increased use of domestic resources and a reduction of oil imports — has become increasingly elusive. The difficulty extends far beyond the government/industry interface. Whereas, until the relatively recent doubts concerning safety, the goal of nuclear programs was to reduce electric power cost and environmental impact while simultaneously relying on abundant domestic resources, the goal in much of fossil fuel RD&D has been to substitute more costly, environmentally more difficult energy sources for conventional oil and natural gas. The direct benefits often defy conventional economic or social justifications. Rather they are of broad national scope — improved military security and monetary stability, greater freedom to implement foreign policy and trade objectives, etc., not cheaper energy.

The synthetic fuels program is, of course, the best example of the difficulty of applying the lessons of the civilian nuclear reactor program, the wartime synthetic rubber program, the civilian air transport program, etc., to commercialization of Federally developed fossil fuel technology. Various administrative, legislative and regulatory approaches so far have either failed or have poor prospects. This includes loan guarantees, cost sharing, construction grants, tax credits, favorable regulatory treatment in case of synthetic pipeline gas, and several combinations and permutations of these means to compensate the producer, user and investor for higher costs and risks. It has been next to impossible to have the stockholder, tax payer and consumer or rate payer assume costs or risks on behalf of the national interest which they perceive to be inequitable. Thus, in spite of a lot of good R&D and widespread acceptance of the overall goal of increased energy self-sufficiency, little progress has been made. Apparently, the model, the logic and the entire approach have been faulty. The biggest problem is, of course, that synthetic fuels continue to cost about twice as much as their fossil fuel counterparts as has been the case since World War II.

As an alternative, I would like to propose a plan for new fossil fuel technology development and commercialization modeled after the legislatively

mandated automotive fuel efficiency standards. Evidence abounds that they have indeed been successful. Without National Laboratories, any major Federal RD&D programs, loan guarantees, special tax treatment or other forms of Federal intervention, the automotive industry has risen to the challenge and is indeed far along the road to meeting the efficiency standards. In the process, they are probably now building domestic automobiles which will again be competitive in the world market.

This is not an original idea, of course, but why not legislate that by 1990, say, 5 percent of total pipeline gas and total liquid fuels marketed must consist of the domestic supplemental source of the wholesaler's choice, i.e., it can be derived from coal, oil shale, unconventional natural sources, or biomass, by whatever process that gives the desired results. Purchase of entitlements should be encouraged to ensure optimum economy of scale, etc. This would drive the system to the quickest and lowest cost solutions. It would take government largely out of the process of developing and commercializing synthetics and biomass fuels, a task at which government so far has an unbroken record of failure. It would mandate industry, including its regulated utility component, to do the job instead, under conditions which distribute the financial burdens and risks equitably, thereby eliminating the need for complex systems of selective subsidies. If, through some miracle, further expansion of synthetics and other supplementals after 1990 is not needed, the consumer impact of 5 percent of supply at, say, double conventional fuel price, would have been marginal. If, as many believe, supplementals will be essential to the survival of the United States, then this investment would have untold benefits at relatively little cost.

GENERAL MOTORS' VIEW ON ALTERNATE FUELS. Alex C. Mair, GM Research Laboratory, Warren. Michigan 48090

General Motors' outlook regarding utilization of domestic energy resources to provide alternative fuels for transportation will be discussed. Alternative fuels production is needed to complement energy conservation programs now in effect. The Government's role in spurring production of alternative fuels will be addressed.

DEFENSE MOBILITY FUELS AND GOVERNMENT R&D. Dr. R. M. Davis, Deputy Under Secretary of Defense for Research and Advanced Technology, Room 3E114, Pentagon, Washington, D.C. 20301

Our national security objectives can be achieved only if we are thoroughly prepared to meet essential military energy requirements. The continuation of our ability to deter armed conflict, to produce modern weapon systems, to maintain the readiness of our military forces, and to support worldwide commitments on the seas, in the air, and on the ground depends on energy, particularly liquid hydrocarbon fuels. As evidenced by the fact that crude oil imports now comprise nearly 50 percent of the U.S. petroleum demand, our most serious near term energy problem is our growing reliance upon foreign oil to compensate for the inability of domestic energy production to keep pace with domestic energy demand. Considering the practical reality of DOD's continued dependence upon liquid hydrocarbon fuels, this pattern of ever increasing dependence upon foreign oil poses a most serious threat to our ability to guarantee adequate energy supplies to meet essential military requirements, particularly for mobility fuels. In response to this current and most critical energy issue, the Department of Defense has undertaken a series of actions which are intended to provide the basic framework upon which it can formulate a comprehensive, fully coordinated defense mobility fuels strategy. These actions will be discussed with particular emphasis on DOD's efforts to develop the capability to transition to synthetic mobility fuels.